Pimpri Chinchwad Education Trust's

PIMPRI CHINCHWAD COLLEGE OF ENGINEERING

SECTOR NO. 26, PRADHIKARAN, NIGDI, PUNE 411044

An Autonomous Institute Approved by AICTE and Affiliated to SPPU, Pune

DEPARTMENT OF MECHANICAL ENGINEERING



Curriculum Structure and Syllabus

of

SY B Tech Mechanical Engineering (Course 2020)



Effective from Academic Year 2023-24

(Updated with minor changes)

Institute Vision

To be one of the top 100 Engineering Institutes of India in coming five years by offering exemplarily Ethical, Sustainable and Value Added Quality Education through a matching ecosystem for building successful careers.

Institute Mission

- 1. Serving the needs of the society at large through establishment of a state-of-art Engineering Institue.
- 2. Imparting right Attitude, Skills, Knowledge for self-sustenance through Quality Education.
- 3. Creating globally Competent and Sensible Engineers, Researchers and Entrepreneurs with an ability to think and act independently in demanding situations.

Quality Policy

We at PCCOE are committed to impart Value Added Quality Education to satisfy the applicable requirements, needs and expectations of the Students and Stakeholders. We shall strive for academic excellence, professional competence and social commitment in fine blend with innovation and research. We shall achieve this by establishing and strengthening state-of- the-art Engineering and Management Institute through continual improvement in effective implementation of Quality Management System.



INDEX

Sr. No.	Content	Page No.
1.	List of Abbreviations in Curriculum Structure	1
2.	Curriculum Framework	2
3.	Curriculum Structure – S.Y. B.Tech. Semester III	5
4.	List of Courses – Life Skill Course - III	5
5.	Curriculum Structure – S.Y. B.Tech. Semester - IV	6
6.	List of Courses – Open Elective Course – I	7
7.	List of Courses – Life Skill Course - IV	7
8.	List of Courses – Audit Courses	7
9.	Course Syllabus S.Y. B.Tech. Semester –III	8
10.	Course Syllabus S.Y. B.Tech. Semester – IV	25

"Knowledge tickings Freedom"

LIST OF ABBREVIATIONS IN CURRICULUM STRUCTURE

Sr. No.	Abbreviation	Type of Course
1.	BSC	Basic Science Course
2.	ECC	Engineering Core/ Science Course
3.	HSMC	Humanities, Social Sciences and Management Course
4.	PCC	Programme / Professional Core Course
5.	PEC	Programme / Professional Elective Course
6.	OEC	Open Elective Course
7.	PROJ	Project
8.	INTR	Internship
9.	AC	Audit Course
10.	MC	Mandatory Course
11.	LS	Life Skill
12.	PFC	Proficiency Course
13.	МО	MOOC Course
14.	L	Lecture
15.	Р	Practical
16.	Т	Tutorial
17.	Н	Hours
18.	CR	Credits
19.	IE	Internal Evaluation
20.	MTE	Mid Term Evaluation
21.	ETE	End Term Evaluation
22.	TW	Term Work
23.	OR	Oral
24.	PR	Practical

CURRICULUM FRAMEWORK

(2020-2021; 2021-2022; 2022-2023; 2023-2024)

The Course and Credit Distribution

Sr. No.	Type of Courses	No of Courses	Total Credits No		
1.	Basic Science Course (BSC)	8	23		
2.	Engineering Core/ Science Course (ECC)	13	22		
3.	Humanities, Social Sciences And Management Course (HSMC)	6	13		
4.	Professional Core Course (PCC)	17	48		
5.	Professional Elective Course (PEC)	6	18		
6.	Open Elective Course (OEC)	-6	18		
7.	Project (PROJ)	2	16		
8.	Internship (INTR)	12	3		
9.	Audit Course (Audit)	3	-		
10.	Mandatory Course (MC)	2	-		
11.	Life Skill (LS) "Knowledge Brings Freed	om" 4			
12.	Proficiency Course (PFC)	4	-		
	Total	72	161		

SY B Tech (Mechanical Engineering), PCCoE Pune

	COURSE DISTRIE	BUTIC	DN : S	EME	STER	WISE	E			
Sr.	Trans of Correspondence			Tatal						
No.	Type of Course	1	2	3	4	5	6	7	8	lotal
1.	Basic Science Course (BSC)	3	3	2	I	-	-	-	-	8
2.	Engineering Core Course (ECC)	6	5	1	1	-	-	-	I	13
3.	Humanities, Social Sciences And Management Course (HSMC)	1	1	1	1	1	1	-	-	6
4.	Professional Core Course (PCC)	-	-	5	4	3	3	2	-	17
5.	Professional Elective Course (PEC)	-	-	-		2	2	2	-	6
6.	Open Elective Course (OEC)	-	-	-	1	1	2	2	-	6
7.	Project (PROJ)	- 1	1	-	-		-	-	1	2
8.	Internship (INTR)	-	-	-	-		-	1	1	1
9.	Audit Course (Audit)	-	-	-	1	1	1	-	-	3
10.	Mandatory Course (MC)	-	-	_	-	1	1	-	1.1	2
11.	Life Skill (LS)	1	1	1	1	-	-	-	-	4
12.	Proficiency Course (PFC)	-	-	1	1	1	1	-	-	4
	Total	11	11	11	10	10	11	6	2	72

	CREDIT DISTRIBUTION : SEMESTER WISE											
	1 Lecture hour = 1 Credit 2 Lab	Hours	s = 1 C	Credit	1 Tut	orial	Hour	= 1 Cı	redit			
Sr.	T. CO											
No.	Type of Courses	1	2	3	4	5	6	7	8	Total		
1.	Basic Science Course (BSC)	9	9	5		ion	100	-	-	23		
2.	Engineering Core Course (ECC)	9	7	3	3	-	-	-	-	22		
3.	Humanities, Social Sciences And Management Course (HSMC)	2	2	3	2	2	2	-	-	13		
4.	Professional Core Course (PCC)	-	-	11	12	9	8	8	-	48		
5.	Professional Elective Course (PEC)	-	-	-	-	6	6	6	-	18		
6.	Open Elective Course (OEC)	-	-	-	3	3	6	6	-	18		
7.	Project (PROJ)	_	2	-	-	-	-	-	14	16		
8.	Internship (INTR)	-	-	-	-	-	-	-	3	3		
9.	Audit Course (Audit)	-	-	-	-	-	-	-	-	-		
10.	Mandatory Course (MC)	-	-	-	-	-	-	-	-	-		
11.	Life Skill (LS)	-	-	-	-	-	-	-	-	-		
12.	Proficiency Course (PFC)	-	-	-	-	-	-	-	-	-		
	Total	20	20	22	20	20	22	20	17	161		

Curriculum structure SY B Tech Mechanical Engineering

"Knowledge tickings Freedom"

CURRICULUM STRUCTURE FOR 2nd YEAR B. TECH. MECHANICAL ENGINEERING

Course	Course	Course Nome	Teaching Scheme							Evaluation Scheme						
Code	Туре	Course Name						CR			MTE					
			L	, P	Т	Н	тн	PR	Tota l	IE		ETE	TW	PR	OR	Total
BAS3201	BSC	Applied Mathematics	3		1	3	3	1	3	20	30	50	-	-	-	100
BAS3202	BSC	Statistics and Probability	2	-	-	2	2	-	2	2 20 30		-	50			
BME3301	ECC	Manufacturing Science	3	-	1	3	3	1	3	20	30	50		-	-	100
BME3401	PCC	Engineering Thermodynamics	3	-		3	3	-	3	20	30	50	5	-	-	100
BME3402	PCC	Strength of Materials	3	-	-	3	3	-	3	20	30	50	1	-	-	100
BME3403	PCC	Materials Engineering	3	-	-	3	3	-	3	20	30	50	-	-	-	100
BME3404	PCC	Material Testing Lab	-	2	1	2	-	1	1	1	-	-	50	-	50	100
BME3405	PCC	Manufacturing Practices		2	1	2	-	1	1	1	-	-	50	-		50
BHM3101	HSMC	Universal Human Values	3	-	-	3	3	-	3	30	-	20	-	-	-	50
BME3911	PFC	Computer Aided Machine Drawing-I	ie.	2	a	2	in	15	Fri	GRADE						
BHM3939	LS	Life Skill-III	-	2	-	2	-	-	-							
Total				8	-	28	20	2	22	130	170	300	100	-	50	750

SEMESTER – III

Abbreviations are: L-Lecture, P-Practical, T-Tutorial, H- Hours, IE- Internal Evaluation, MTE- Mid Term Evaluation, ETE- End Term Evaluation, TW – Termwork, PR-Practical, OR - Oral

List of Life Skill Courses

Course Code	Course Name: Life Skills-III	
	 Practicing Meditation Sports 	Choose any one
BHM3939	Performing Arts: Music, Singing, Poetry, Indian Conventional Dancing, Photography, Short Movie Making, Painting/ Sketching/ Drawing, Theatre Arts, Anchoring, Calligraphy etc.	Choose any one

CURRICULUM STRUCTURE FOR 2nd YEAR B. TECH. MECHANICAL ENGINEERING

Course	Course			T	each	ing S	cher	ne		Evaluation Scheme						
Code	Туре	Course Name	т	Р	т	н		CR		IF	MTF	FTF	тw	PR	OR	Total
			L	1	1	11	тн	PR	Total	112	WIIE	EIE	1 **	IN	OK	Total
BME4302	ECC	Metrology and Mechanical Measurement	3		-	3	3	-	3	20	30	50	-	-	-	100
BME4406	PCC	Applied Thermodynamics	3	-	-	3	3	-	3	20	20 30 50 -		-	-	-	100
BME4407	PCC	Fluid Mechanics	3	-	-	3	3	-	3	20	30	50	-	-	-	100
BME4408	PCC	Kinematics and Theory of Machines	3	-	-	3	3	-	3	20	30	50	-	-	-	100
BME4409	PCC	Metrology and Mechanical Measurement Lab	-	2	-	2	-	1	1	-	-	-	25	-	25	50
BME4410	PCC	Applied Thermodynamics Lab	1	2		2		1	1	-	-	-	25	50		75
BME4411	PCC	Kinematics and Theory of Machines Lab		2		2		1	1	-	-	-	25	-	50	75
BAS4601 to BAS4606	OEC	Open Elective –I	3	-	-	3	3		3	20	30	50	-	0.1	-	100
BHM4101	HSMC	Professional Skills for Engineers	1	2	-	3	1	1	2	30	-	20	-	-	-	50
BME4912	PFC	Computer Aided Machine Drawing-II	-	2	_	2	-	-	-							
BHM <mark>4940</mark>	LS	Life Skill –IV	12	2	1	2	1	Fich	5	GRADE						
BHM9961 to BHM9965	AC	Audit Course-I	1	-	-	1	-	-	-							
	Total			12	-	29	16	4	20	130	150	270	75	50	75	750

SEMESTER – IV

Abbreviations are: L-Lecture, P-Practical, T-Tutorial, H- Hours, IE- Internal Evaluation, MTE- Mid Term Evaluation, ETE- End Term Evaluation, TW – Term-work, PR-Practical, OR - Oral

Semester- IV

List of Open Electives

Course Code	Course Name: Open Electives-I	
BAS4601	Numerical Methods	
BAS4602	Mathematical Optimization	
BAS4603	Choose enviore	
BAS4604	Mathematical Modelling and Simulation	Choose any one
BAS4605	Financial Mathematics	
BAS4606	Neural Network and fuzzy logic Control	

List of Life Skill Courses

Course Code	Course Name: Life Skills-IV	
10 m	 Social welfare and Cultural Awareness Transactional Analysis 	Choose any one
BHM4940	Caring and service Hospital Caring, Personal Safety, First Aid, Disaster Management Gardening, Organic farming, Cooking etc.	Choose any one

List of Audit Courses

Course Code	Name of Course: Audit Courses-I	
BHM9961	Environmental Science	
BHM9962	Constitution of India	
BHM9963	Emotional Intelligence	Choose any one
BHM9964	Entrepreneurship Development	
BHM9965	Research Article Writing	



Progra	am:	B. Tech. (Me	chanical Engi	neering)		Semester : III						
Cours	e :	Applied Math	nematics			Code : BAS32	01					
		Teaching	Scheme			Evaluation S	Scheme					
Lec	ture	Practical	Tutorial	Credit	IE	MTE	ETE	Total				
	3	-	-	3	20	30	50	100				
Prior	knowled	ge of:	•									
a.	a. Univariate Calculus											
b.	Multiv	ariate Calculus.	are essentia	al								
Cours	e Objec	tives:				1 . 1		1 1 6				
After completion of the course, students will have adequate background, conceptual clarify and knowledge mathematical principles related to:												
mathematical principles related to:												
1.	1. Ordinary and Partial differential equations applied to mechanical engineering problems such as mechanical vibrations and heat transfer											
2.	Vector	differentiation a	and integration	applied to prob	ems in fluid mec	hanics.						
3.	Laplac	e Transform and	d Inverse Lapla	ce Transform ap	plied to solve lin	ear differential ea	quations.					
Cour	se Outc	omes:				111.						
After	learning	the course, the	students will b	e able to:								
1.	Calcul	ate natural frequ	uencies of mass	s spring systems	using the conce	ots of higher orde	er linear differen	tial				
2	equation Solvo i	ns.	dary value prob	lome for Partial	differential equat	ions of first and	second order					
2.	Annly	variable separat	tion method to	solve wave tran	sport one and tw	o-dimensional he	ecolid order.	ne				
4.	Analyz	the vector fie	ld using Vector	r differentiation	and integration.	o unnensionar n	cut now equation	10.				
5.	Find L	aplace transform	n of functions	using theorems a	and properties.							
6.	Solve t	he mass spring	system using L	aplace Transfor	m							
		-		Detailed	Syllabus:							
Unit				Descrip	otion			Duration				
	Lincor	Differential E	Formational Inte	aduction of Li	and Nonling	on differential a	austions linear	(H)				
	differen	tial equation	of nth order v	with constant co	pefficients Gene	ral method Sho	rtcut methods					
1.	Metho	l of Variation	of Parameters	Application of	of Linear differe	ntial equations i	n mass spring	7				
	system		01 1 41 41 10 10 10	, inprivation of		initial organizations of	in muss spring					
	Partia	Differential E	quations: Intro	oduction, Types,	Initial and Boun	dary value proble	ems, First order					
2.	Partial	differential equ	ations, Homog	eneous and non	homogeneous line	ear Partial differe	ential equations	8				
2	of seco	nd order. ations of Partis	al Differential	Fauations: Sol	ution to One dim	ensional Wave		ρ				
3.	Heat a	nd Transport e	quation Two-	timensional her	t flow equation	using Method o	f separation of	0				
4.	variabl	es.	quation, 1 wo-c	unitensional nee	a now equation	using method o	r separation of	7				
	Vector	Calculus:	UDW/84	Street Mar.	trans Fr	e doni						
	Vector	Differentiation	n: Vector Diff	erentiation Calc	ulus: Introduction	n, Vector differe	ntial operators,					
5.	Gradie	nt, Divergent, C	Curl, Physical 1	Interpretation of	Vector Differen	tiation, Direction	al Derivatives,	7				
	Soleno	idal, Irrotational	l and conservat	ive fields, Scala	r Potential.	. Statement - 6.6						
	vector Stoke	theorem Gaus	Line, Surface, a	nd volume inte	tion to problems	e, Statement of C	reen's lemma,					
	Laplac	e Transform:	Introduction, L	aplace Transfor	n of some standa	rd and special fu	actions. Region					
6.	of conv	vergence and Pro	operties, proper	rties and theorem	ns of Laplace		,8	8				
	Transfe	ormation.	1 1 1									
							Total	45				
Text E	Books:											
1.	B.V. Ra	mana, "Higher	Engineering M	lathematics", Ta	ta McGraw-Hill,	34 edition, ISBN	13:978007063	4190.				
Z.	Erwin K	reyszig, "Advai	nced Engineeri	ng Mathematics	Wiley Eastern I	Ltd., 10 Edition, 1	SBN 13: 97804	/0458365				
	Peter V	Meil "Advance	ed Engineering	Mathematics"	Thomson Learnin	a 7 Edition ISB	N 13.07813372	74524				
2.	 I CHER V. IVER, AUVALUCU Englicening Mathematics, Thomson Learning, / Edition, ISBN 15.9780486402707 M.D. Greenberg, "Advanced Engineering Mathematics" Pearson Education, 2 Edition, ISBN 13-0780486402707 											
3. B. S. Grewal, "Higher Engineering Mathematics". Khanna Publication 42 Edition ISBN 13:9780480												
4.	<u>N.</u> P. Ba	li, Manish Goya	al, " A textbool	<u>k of E</u> ngineering	<u>g Math</u> ematics", 9	th Edition, ISBN	16:978-813180	08320				
e-sour	ces:											
1.	1. NPTEL Course lectures links:											
	https://n	ptel.ac.in/course	es/111/105/111	<u>105038/</u> (P.D.E		Andrew C. N						
	nttps://o	ninecourses.npt	te1.ac.1n/noc20_	<u>ma13/</u> (Advanc	ed Engineering N	/lathematics)						

Progra	am:	B. Tech. (M	echanical Eng	gineering)		Semester : III		
Course	e :	Statistics and	d Probability		_	Code : BAS320	2	
		Teachin	g Scheme			Evaluation Sector	cheme	
Lect	ure	Practical	Tutorial	Credit	IE	MTE	ETE	Total
2		-	-	2	20	30	50	100
Prior l	knowledg	ge of: NIL			·			
Course	e Objecti	ives:						
This	course ai	ms at enablin	g the students	to				
1.	Present, a	analyze and ir	nterpret data.	o 1				
2.	Develop	a statistical m	nodel and apply	for the specific	perspective data in	n an appropriate m	anner.	
<u> </u>	Understa	nd uncertain	occurrences in	data through log	ical manner.			
After 1	e Outcon	he course the	students will	be able to:				
	Underst:	and the vario	us methods of	collecting data :	and get familiar w	vith some element	arv method of	data viz
	Measures	s of central te	ndency. Disper	sion. Skewness	and Get failing w	nterpret them.	ary method of	dutu VIZ.
2.	Analyze	the statistical	data using the	concepts of corr	elation and regress	sion.		
3.	Apply th	e theoretical	discrete and co	ntinuous probabi	lity distributions i	n the relevant appl	lication areas.	
4.	Examine	data using d	lifferent hypot	hesis tests and n	nake conclusions a	about acceptance a	and rejections	of sample
	data.	11.4						
		100		Detailed	l Syllabus:			
Unit				Descr	iption			Duration
		·			1			(H)
	Descri	ptive Statisti	C l tondonovu l	Maan Mada N	Adian and Mag	ourse of Variahi	litzy Stop dond	
1.	Deviat	ion Variance	a Quartiles a	nd Interquartile	Range Coefficier	nt of variation C	harts for data	7
	distrib	ution Mome	nts Skewness	and Kurtosis	Range, Coefficien	in or variation, C	marts for data	
	Regree	sion Analysi	s					
2.	Coeffic	cient of corr	elation, rank	correlation, Star	ndard error of es	stimation, Regress	sion Analysis.	8
	applica	tion of regres	ssion analysis f	or demand forec	asting and cost and	alysis.	, , , , , , , , , ,	
	Proba	bility distribution	ution					
3.	Probab	ility, Discret	e & Continuo	us random varia	able, Theorems o	<mark>on Prob</mark> ability: Ba	yes Theorem,	7
	Rando	m variables, l	Mathematical I	Expectation, Prol	pability density fu	nction, Probability	v distributions:	· · ·
	Binom	ial, Poisson a	nd Normal dist	ributions.	_			_
4.	Hypot	hesis testing	on How oth said	testine Tenes	of owners lovel of		tion land a	0
	Sampli tost)	ing Distributi	on, Hypothesis	ANOVA Appli	of errors, level of	is testing to produ	ction control	ð
	test), C	III-Square les	z z z z z z z z z z	ANOVA, Applic	cation of hypothes	is testing to produ	Total	30
Text B	looks		the searchest	where the	dentries, Fri	in the set	1014	30
1.	Montgo	omery and Ru	inger, "Applied	l Statistics and P	robability for Eng	ineers". Wiley. Ind	lia, 6 Edition.	ISBN:
	978812	26562947	0 / 11		, ,	, ,,	, ,	
2.	R. Johr	ison, "Probab	ility and Statis	tics for Engineer	s", Prentice India	Ltd, 8 Edition, ISE	3N 13:978-812	20342132
Refere	ence Bool	ks						
1.	P. New	/bold, W. Car	lson, B. Thorn	e, "Statistics for	Business and Ecor	nomics", Pearson	India, 6 Editio	n, ISBN
2	978813	31719275				10 5 10	DN 12 070 0	51 (10100
2.	S. P. G	upta and M.	P. Gupta, "Bus	iness Statistics",	Sultan Chand & s	ons, 19 Edition, 18	SBN 13:978-9.	351610120.
3.	waipo India	le, K. Myers a	and S. Myers 12.0780221	620111	statistics for Engin	ieers and Scientist	s, Pearson Ed	ucation
4	S P Gu	9 Euliioli, ISE inta "Statisti	cal Methods"	029111 Papperbook publ	ication 43 edition	ISBN: 97881804	49892 81805	49895
+. e-sour	0.1.00	ipia, Statisti	car wieurous ,			I, ISDIN. 9788180.	49892, 81803	47075
1.	NPTE	L Course lec	tures links:					
	https://	nptel.ac.in/co	ourses/111/105/	/ <u>1111050</u> 90/ (Pro	obability)			
	https://	nptel.ac.in/co	ourses/111/105/	/111105077/ (Sta	tistics)			
2.	Cours	era Corse						
	https:/	/www.course	era.org/learn/j	orobability-stati	stics (Statistics &	z Probability)		
3.	V-lab	(IIT-Bombay	y) link: http://v	labs.iitb.ac.in/vla	abs-dev/labs/nume	erical lab/labs/exp	list.php	

Progra	am:	B.Tech. (Med	chanical)				Semester : III					
Cours	e:	Manufacturi	ng Science				Code : BME33	301				
		Teaching	g Scheme			Evalu	ation Scheme					
Lect	ure	Tutorial	Hours	Credit	IE	MTE	ЕТЕ		Total			
3			3	3	20	30	50		100			
Prior	knowl	edge of										
a. b	Trig Han	onometry	essories									
c.	Basi	c manufacturin	ig processes									
d.	Basi	c mechanical c	omponents	are essential								
Objec	tives:		1									
Studen	its are Λ	expected to stud	dy, of various man	ufacturing proc	asses and their	relevance in c	urrent manufact	urina ir	dustry			
1.	The	fundamental sc	cience behind t	he various man	ufacturing tech	niques.	unent manufact	uning n	idusu y.			
3.	The	insights of mar	nufacturing equ	upment, tools,	operations, the	ir capabilities a	and limitations.					
4.	The	knowledge of a	different proce	ss parameters in	n manufacturin	g and their eff	ect on final prod	uct.				
5.	Und	erstanding of a	dvanced manu	facturing proce	sses.			-				
The St	udents	ents will be able to, Evaluate casting process parameters, identify defects and propose remedies. Understand various metal forming processes and evaluate necessary forming parameter										
1.	Eva	luate casting p	, rocess paramet	ters, identify de	efects and prop	ose remedies.						
2.	Un	derstand vario	us metal formi	ng processes an	nd evaluate neo	cessary formin	g parameter					
3.	Und	lerstand funda	mentals of me	tal cutting and	calculate cutti	ng forces, tool	l life, machining	; time a	nd material			
4	Sele	oval rate.	the appropriat	e joining proces	s for different	applications						
5.	Sele	ct and explain	the appropriat	e non-conventio	onal machining	g process for pa	art under conside	eration	1.1			
6.	Wri	te CNC part pr	ogram for give	en compon <mark>ent a</mark>	nd select eleme	ents required to	o design jig and	fixture.				
				Detail	ed Syllabus:	100			_			
Unit				Desci	ription				Duration (H)			
1.	Casti Introc system aspira	ang Processes: duction, Pattern m and its desi ation, friction a	n and Mold, gn, Melting, and velocity d	Pattern allowar Furnaces, Pour istribution, Coo	nces, Types of ing (Top & E oling and Mec	f pattern, Typ Bottom Gating hanism of So	es of molds, G Design), Effec lidification, Clea	ating ets of aning	8			
	and F Proce	esses: Shell mol	ting, Inspectio lding, Investme	n of casting, De ent casting, Die	casting, Centr	ig, Fundamenta	als of Special Ca Continuous cast	isting ing.				
2.	Form Func Relat rollin formi	ang Processes: lamentals of bu ion between ten g processes, A ing, Sheet meta	alk and sheet nsile and sheat analysis of op l forming anal	metal forming r yield stresses, en die forging ysis, Die design	processes, Pla Types of meta a flat strip a n for sheet met	stic deformation al forming pro- nd circular dials shearing and d forming a	on and yield cri cesses, Mechani sc, Defects in a nd forming opera	teria, ics of metal ation,	8			
	strip	layout, center o	of pressure, for	ces in sheet met	tal shearing and	d forming.						
3.	Conc cuttin forma	ept of Generat ag, Mechanics ation, Tool geo ag fluids, Mach	es: rix and Direct of basic maching protection of basic maching protection of the basic protection of the basic of the basic protection of the basic of the basic of the basic protection of the basic of the basic of the basic of the basic protection of the basic of	trix with respect ning operation, materials, Failu l material remov	ct to surface g Mechanism of ure of cutting val rate for var	eneration, Ort f chip formatic tool, Tool lif	hogonal and ob on, Mechanics of e and machinal g processes.	lique chip pility,	7			
4.	Joini Introd fusion	ng Processes: duction and cla n welding and t	ssification of j heir types, Prin	oining processe nciples of solid/	es, Principles o liquid state joi	f solid phase v ning and their	velding, Principl types, Weld defe	les of ects.	7			
5.	Unco Introd Mach Elect	Inventional Ma duction, Mecha nining, Ultrason ron Beam Mach	achining Proc anics, process nic Machining hining, Laser F	esses: parameters, eff g, Electrochem Beam Machinin	fects on mater ical Machinin g and Plasma A	ial, characteris g, Electric D Arc Machining	stics of: Abrasiv vischarge Machi	ve Jet ning,	7			
6.	Jigs a Introd Mani	and Fixtures, (duction to Jigs al Part Program	Computerized and Fixtures, 1 nming.	Numerical Controduction to 1	ontrol System: NC & CNC sy	stem, Machini	ng Centers, Basi	ics of	8			
		- 6 -	0				r	Total	45			

Text Books:

- 1. P. C. Sharma, A Textbook of Manufacturing Technology I and II, S. Chand Publication, 2011.
- 2. Serope Kalpak Jian, Steven Schmid, Manufacturing Engineering & Technology, 7th Edition, Pearson erence books:

Reference books:

- 1. P. N. Rao, Manufacturing Technology, Volume I & II, McGraw Hill Education (India) Private Limited. 4th Edition (2018)
- 2. D. K. Singh, Fundamentals of Manufacturing Engineering, Ane's Books. Pvt. Ltd. 1st Edition, 2008.
- 3. Amitabha Ghosh, Ashok Kumar Mallik, Manufacturing Science, East-West Press Pvt. Ltd. 2nd Edition, 2010.
- 4. Richard W. Heine, Principles of Metal Casting, Tata McGraw-Hill Education, 2nd Edition, 1976.
- 5. Avitzur B, Metals Forming: Processes and Analysis, McGraw Hill, New York. 1st Edition, 1968.
- 6. Boothroyd G., Fundamentals of Metal Machining and Machine Tools, Scripta Book Company, Washington. 3 rd Edition, 2005.
- 7. P H Joshi, Jigs and Fixtures, Tata McGraw-Hill Education, 3rd Edition, 2017
- 8. P N Rao, CAD/CAM: Principles and Applications, Tata McGraw-Hill Education, 2017
- 9. Production Technology HMT handbook, McGraw-Hill Education, 2017.

Miniature commitment or Assignments:

- 1. Sand casting: Design of product, Pattern making, Sand preparation, Mold and core making, Melting and Pouring, Cooling, Fettling, Cleaning and inspection, Report writing.
- 2. Effect of process parameters on chip formation during machining of ductile and brittle materials
- 3. Implementation of CNC part programming and Jig/Fixture Design for customized products.

Industrial Visit:

To provide awareness and understanding of the course, Industrial Visit must be arranged for the students. The Industrial Visit must be preferably to one of the following industries.

- 1. Casting
- 2. Forming
- 3. Sheet Metal

"Knowledge tickings Freedom"

Program	m: B. Tech.	(Mechanical)			Semester : III		
Course	: Engineer	ing Thermodyr	namics	1	Code: BME3401	l	
	Teac	hing Scheme	I		Evaluation So	cheme	
Lectu	ire Tutor	al Hours	Credit	IE	MTE	ETE	Total
3	-	3	3	20	30	50	100
Prior K	nowledge of:	on contra of physic	aa lilea Voluma	Duaganna Valaaity	Work Energy		
a. b	Concepts of m	officepts of physical sthematics like of the state of the	derivative integr	ation nature of cu	, work ,Ellergy	e	
с.	Construction a	nd working of c	ommon mechani	cal devices / machi	inesare essen	tial	
Course	Objectives:	0					
1.	To understand	of the fundame	ntal concepts and	l Laws of thermod	ynamics		
2.	To differentiat	e between energ	y and energy tran	nsfer, heat and wor	rk transfer		
3.	To be able to	apply of the law	s of thermodyna	mics	a haharian		
4.	To understand To be able to r	se of seam table	nd processes gov	for reading propert	ies of steam		
5. 6.	To apprehend	the concept of F	Exergy and its ap	plication to open a	nd closed systems		
Course	Outcomes:		intergy and its up				
The Lea	arners will be ab	le					
1.	Identify work	transfer by usin	g the operation d	lefinition			
2.	Apply the first	law of Thermoo	dynamics to vario	ous processes and s	systems and draw in	nferences.	
3.	Identify the Po	ossibility /type o	f processes and	cycles		4	1
4.	Evaluate neat	transfer, work t	ransier & other i	mportant thermody	ynamic entities for	the processes un	dergone by
5	Use steam tabl	es and Mollier (hart for solving	problems related to	o steam processes		
6.	Estimate the e	xergy of simple	thermodynamic	systems	s steam processes		
			Deta	iled Syllabus:			
Unit			De	escription			Duration
Om			De	scription			(H)
	Basic Ideas a	nd definitions:	Role of thermody	ynamics in mechan	ical Engineering, T	Thermodynamic	
1	System, Bou	ndary, Types of	of system, Stat	e of system, Pro	operties of system	n, Viewpoints,	-
1.	Process Qua	si-static Proces	Thermodynamic	mic cycle The	operational defini	ition of work	/
	Interaction, ty	pes of work tran	sfer. Complexity	of system. State P	ostulate-2	ITION OF WOLK	
-	The first La	w of thermody	namics: Analysi	s of Joule's Expe	riment for obtainin	g definition of	
	Change of en	ergy and Heat th	ransfer, Closed s	ystem formulation	of First law, Spec	ial case: closed	
2.	system under	going cycle, Ope	en system formu	lation of First law	of thermodynamic	s, Special case:	8
	Steady Flow	Energy equatio	n (SFEE), Appl	ication of SFEE	to typical Enginee	ering Devices,	Ŭ
	Application of	f first law to o	day-to -day life	examples, concep	pt of PMM-I, Ze	cro'th Law of	
	The second I	aw and Entro	w. Limitations of	of First Law Conc	ent of HF HP ar	d Refrigerator	
	Kelvin-Plank	and Clausius S	tatements and the	neir equivalence.	Reversible process	cvcle. Carnot	
	Theorem and	its corollaries, H	Efficiency of Rev	versible cycle, PM	M-II, Criteria to ch	neck Possibility	
3	of a cycle, E	ntropy as proper	rty of system, Ci	riteria to check Po	ossibility of a proce	ess, Concept of	8
5.	Entropy Gene	ration and its sig	gnificance, Entro	py change calculat	ion : General case,	Incompressible	0
	systems, T.E.	R.s. Simple com	pressible system	(Tds equations), F	low the second law	overcomes the	
	for open syste	first law, Carno	t cycle for Heat	Engine. (1-v and	1-s diagram), secol	nd law analysis	
	Ideal Cas P	operties and P	Processes · Defin	ition Laws pertai	ning to Ideal Gas	Specific Heat	
	Joules Experi	nent on Ideal G	ases. Various pro	ocess (Constant P/	$\Gamma/V/H$ and Polytror	bic. p-v and T-s	_
4.	diagrams): Ev	aluation of Wor	k transfer, Heat	transfer and Entro	py change. P-v dia	gram of Carnot	7
	Cycle with Ide	eal Gas.					
	Properties of	Pure Substance	e: Definition, F	ormation of steam	at constant pressur	re (T-v and T-s	
	diagram), For	mation of stean	n at constant ter	nperature (p-v dia	gram), generation	of h-s diagram	
5.	from 1-ds ed	team from Idea	(Chart), Criteria	a for identificatio	n of phases of w	ater substance,	8
	Wet steam.	drvness fracti	on Separating	Throttling and	Combined Separ	ating-throttling	
	Calorimeter, v	arious processes	s with steam as a	working substance	e.	an otting	
<u> </u>	Availability:	Concept of De	ad state, Definit	ion of Availability	//Exergy, Exergy a	s a property of	
6.	system, Exerg	y associated wit	h K.E. and P.E.,	Exergy by Heat an	nd work transfer, Ex	kergy of Closed	7
	system and op	en system, Princ	ciple of Exergy D	Destruction, Irrever	sibility and second	law efficiency.	
						Total	45

Text Books:

- 1. Y. Cengel & Boles: Thermodynamics An Engineering Approach, Tata McGraw-Hill
- 2. P. K. Nag, Engineering Thermodynamics, Tata McGraw Hill Publications
- Mahesh M. Rathore, Thermal Engineering, Tata McGraw-Hill 3.

Reference Books:

- 1. Michael Moran, Howard Shapiro, Fundamentals of Engineering Thermodynamics, John Wiley
- Claus Borgnakke, Richard E. Sonntag, Fundamentals of Engineering Thermodynamics, John Wiley 2.
- 3. M. Achuthan, Engineering Thermodynamics, PHI Learning Pvt. Ltd.
- Rayner Joel, "Basic Engineering Thermodynamics", AWL-Addison Wesley Holman J.P, "Thermodynamics", McGraw Hill 4.
- 5.
- 6. Robert T. Balmer, Modern Engineering Thermodynamics, Elsevier Inc.
- 7. Steam Tables and Mollier Chart



Knowledge tichnes Freedom

Prog	ram:	B. Tech. (Mech	anical)			Semester : I	II	
Cour	se :	Strength of Ma	terials			Code : BME	23402	
		Teachin	g Scheme	-		Evaluatio	n Scheme	
Le	cture	Tutorial	Hours	Credit	IE	MTE	ETE	Total
D •	<u>3</u>		3	3	20	30	50	100
Prior	Knowl	edge of:	neering mechan	ice				
h	. Ana	lysis of forces and	d moments	105				
c	. Law	s of motion, kinet	tics, kinematics					
d	l. Cen	tre of gravity and	Moment of iner	tiaare essen	tial			
Cour	se Obje	ectives:						
1	. Toe	stablish an under	standing of the	fundamental conc	epts of mechar	nics of deformal	ble solids, mat	erial behavior
	and subi	ected to axial load	torsion and be	riying modern app	proaches for de	sign of various	types of struct	Jrai members
2	l. Tou	tilize the concept	s of Strength of	material for solvin	ng engineering	problems.		
Cour	se Outo	comes:			<u> </u>			
After	learnin	g the course, the s	tudents should l	be able to:				
1	. Und	erstand and distin	nguish the Mee	chanical behavior	of ferrous and	d nonferrous m	aterials by det	ermining the
-	stres	sses, strains, defle	ctions produced	by the loads.	the been een	as the longth Er	valuata atraccas	in beens for
2	. Con vari	ous end condition	s load condition	and materials	the beam acro	ss the lengul.Ev	aluate stresses	III Deallis Ioi
3	6. Calc	culate stresses in l	beams for vario	us end conditions	, load conditio	ns, and materia	ls.Design shaf	t subjected to
	torq	ue and column sul	bjected to axial	loading.			U	5
4	. Dete	ermine the slope &	k deflection of t	he beam for vario	us loading conc	litions.		
5	6. Con	pute the torsion f	or the circular s	haft and find the c	rippling load a	nd equivalent le	ength of the col	umn.
6	o. Und	erstand principal	stresses and abl	e to apply the theo	ries of failure.		_	_
				Detailed Syl	liabus:			Duration
Unit				Descriptio	n			(H)
	Stress	and Deformation	n of Solids:					
	Stress,	strain, Hooke's la	aw, Poisson's r	atio, Modulus of I	Elasticity, Mod	ulus of Rigidity	, Bulk Modul	15.
1.	Interre	lation between	elastic constan	its, Stresses and	strains in c	leterminate and	1 indetermina	te, 9
	Temp	erature stresses i	n simple memb	ers.	is and sen-weig	sint.		
	Shear	Force and Bendi	ing Moment Di	agrams :				
2	Shear	force and bendin	g moment diag	rams for statically	y determinate	beam due to co	oncentrated loa	id, 6
2.	unifor	nly distributed lo	ad, uniformly	varying load and	couple, Relation	onship between	rate of loadin	ı <mark>g,</mark>
	shear f	orce and bending	moment. Maxii	num bending mon	nent and position	on of points of c	ontra flexure.	
	Bendir	es in beams:	y of simple ber	ding: Flexural for	rmula bending	stress distribut	ion diagrams f	or
3.	commo	on cross sections (rectangular, I,T	,C), moment of re	sistance and se	ction modulus.		8
	Shear	stresses: Shear s	stress distributi	on in beams, she	ear stress dist	ribution diagram	ms for comm	on
	symme	etrical sections, ma	aximum and ave	erage shears stress	ses.			
	Slope	and deflection of	beams:					
4.	Relatio	on between bendi	ng moment and	l slope, slope and Macaulay's mathe	deflection of	determinate bea	ams for standa	rd 7
	Strain	energy due to axia	al load (gradual	sudden and impa	ct) Strain ene	igy (meorencai	ueaunent om	<i>4</i>).
	Torsio	n:	(Bruuuli					
	Stresse	es, strain and defor	rmations in dete	erminate shafts of	solid and hollo	w subjected to t	wisting mome	nt,
	torsion	equation.						
5.	Buckli	ng of columns:	1	с				7
	Conce	on cent of equival	columns, deriva	tion of Euler's for	ions limitation	ing load for col	umn with hing	
	formul	a(only theoretical	treatment).		aono, mintatioi		iniuia, ivalikille	
	Princi	pal planes and st	resses:					
	Princip	al planes and str	resses on obliq	ue planes, expres	sion for princi	pal stresses &	maximum she	ar
	stress,	orientation of pri	incipal planes a	nd planes of max	timum shear. C	Braphical soluti	on using Moh	.''S
6.	circle.	log of alastic fail-						8
	1 neor	um principal stra	ire: ss theory mavin	mum shear stress t	heory maxim	um distortion on	erov theory th	əir
	applics	ations and limitation	ons		полу, шалиш		engy moory m	211
							To	tal 45

Text Books:

- 1. R. K. Bansal, "Strength of Materials", Laxmi Publication
- 2. G. H. Ryder- Strength of Materials- 3rd Edition, Macmillan Pub, India
- 3. S.S. Rattan Strength of Material Tata McGraw Hill Publication Co. Ltd. S.
- 4. Ramamurtham Strength of material Dhanpat Rai Publication.
- 5. Timoshenko and Young Strength of Materials CBS Publication

Reference Books:

- 1. Beer and Johnston Strength of materials CBS Publication.
- 2. E.P. Popov Introduction to Mechanics of Solids Prentice Hall Publication.
- 3. Singer and Pytel Strength of materials Harper and row Publication.
- 4. B.K. Sarkar Strength of Material Tata McGraw Hill New Delhi
- 5. R. C. Hibbeler, "Mechanics of Materials", Prentice Hall Publication
- 6. Prof. S.K. Bhattacharyya, IIT Kharagpur , "NPTEL Web course material" https://drive.google.com/file/d/1N2Eyv9ofPimIT2OSMZeMrSxe68Ulclei/view?usp=sharing



Progr	am:	B.Tech. (Mech	hanical)			Semester : III	[
Cours	se :	Materials Engi	ineering			Code: BME34	403	
		Teaching	g Scheme			Evaluation	Scheme	
Lec	ture	Practical	Hours	Credit	IE	MTE	ETE	Total
	3		3	3	20	30	50	100
Prior	knowle	dge of						
a. A	Atomic :	arrangement						
	Crystal s Classific	ation of material	le					
d. 7	Thermal	electrical and o	ntical properties	of materials	are essential			
Cours	e Obie	tives:	pileur properties	of materials				
Studer	nts are e	xpected to study.	,					
1. 5	Structur	e of materials and	d their property 1	elationship				
2. I	Fundam	entals of alloying	g.					
3. I	Mechani	ical behavior of r	naterials.					
4. I	Ferrous	metals and alloys	S.					
5. I 6 I	Nonierro	ous metals and al	and allows					
	Material	standards and m	and anoys.	process				
Cours	e Outco	mes:	laterial selection				1	
The St	tudents	will be able to,						
1. C	Correlat	e crystal structur	es and imperfect	tions in crystals	with mechanical	l behavior of ma	terials.	
2. A	pply fu	ndamentals of al	loying and equil	ibrium di <mark>agram</mark>	to predict phase	s and their amou	ints.	
3. C	Correlat	e microstructure	and properties o	f various ferrous	s alloys.			
4. C	Correlat	e microstructure	and properties o	f various nonfer	rous alloys.			
5. S	elect ap	propriate heat tre	eatment based or	desired applica	tions.	mulication		
0. (Jse vari	ous material stan	dards and Select	Detailed Sx	dental for given a	application.		
				Detailed Sy	mabus:			Duration
Unit				Descript	ion			(H)
	Struc	ture of Materia	ls and their pro	perty relations	hip			
	Cryst	alline structure in	n metals. Cerami	cs and molecula	r arrangement o	f polymers.		
	Mech	anical behavior	of materials					
1.	Intro	duction to cryst	tal imperfection	s, classification	n and its effec	t on properties	s of materials	, 8
	Mech	anism of elastic	& plastic deform	mation (slip and	twinning), The	ory of dislocation	on, deformation	1
	Of SII	igle crystal by s	slip, plastic defe	king & hot work	ycrystalline mai	terials, work ha	rdening theory	,
	Fund	amentals of allo	ving	king & not work	ling.	nobus	12	
	Relat	ed terms and t	their definitions	Hume Rothe	erv's rule of so	olid solubility	Allotropy an	d
2.	polyr	norphism, Conce	ept of solidificat	ion of pure me	tals and alloys,	Nucleation: ho	mogeneous an	d 7
	heter	ogeneous, Grain	growth. Cooling	g curves, Plottin	g of equilibriun	n diagrams, Lev	er rule, Coring	
	Туре	s of equilibrium	diagrams.					
	Ferre	ous metals and a	alloys			- C	· · · · ·	
	Iron-	iron carbide equ	ulibrium diagra	m, critical temp	peratures, solidi	fication and mi	icrostructure o	f
3.	slowl	y cooled steels, s	structure & prop	erty relationship	, classification a	nd application o	of steels.	7
	Cast	Irons: Classifica	ation, Manufacti	uring, Composit	tion, Properties	and application	is of cast from	,
	Forre	of various paral	neters on structu	re and propertie	s of cast frons.			
	Class	ification of allow	steels and effect	s t of alloving ele	ments examples	s of alloy steels	stainless steels	
	tool	steels and specia	al purpose steels	s with application	ons, super alloy	s. Classification	n of nonferrou	s
4.	metal	s. Importance of	of nonferrous m	netals in engine	ering application	ons & composi	tions, study o	f 7
	differ	ent mechanical	properties: Cu &	& Cu based allo	bys, Al and Al	based alloys, N	i and Ni base	t
	alloy	s, Co and Co ba	sed alloys, Titar	nium & its alloy	ys, Tin & Lead	base alloys, Be	aring materials	:
	impo	rtant properties &	& applications.					
	Heat	treatment of ma						
1	- rans	formation 1	etals and alloys	4. Time T.				-
	cooli	sformation produ	etals and alloys ucts of Austeni	te, Time Temp	erature Transfo	ormation diagra	ms, continuou	s
5	coolin	sformation produces of the state of the stat	etals and alloys ucts of Austeni on diagrams. He or media Retent	te, Time Temp at treatment of	perature Transfo steels: Annealing e effects of ret	ormation diagra ng, Normalizing ained austenite	ms, continuou g, Hardening & Elimination o	s 'z f 10
5.	coolin Temp retain	sformation produces ng transformation pering, quenchin ned austenite (Su	etals and alloys ucts of Austeni on diagrams. He g media. Retent ubzero treatment	te, Time Temp at treatment of ion of austenite). Secondary ha	perature Transfo steels: Annealin e, effects of retained	ormation diagra ng, Normalizing ained austenite.	ms, continuou g, Hardening & Elimination o quench cracks	s 2 f 10
5.	coolin Temp retain Hard	sformation produ- ng transformatio pering, quenchin and austenite (Su enability & hard	etals and alloys ucts of Austeni on diagrams. He g media. Retent ubzero treatment enability testing.	te, Time Temp at treatment of ion of austenite). Secondary ha Defects due to	perature Transfor steels: Annealin e, effects of reta rdening, temper heat treatment a	ormation diagraming, Normalizing ained austenite. embrittlement, and remedial me	ms, continuou g, Hardening & Elimination o quench cracks easures. Surfac	s z f 10
5.	coolin Temp retain Harde	sformation produ- ng transformatio pering, quenchin ned austenite (Su enability & hard ning heat treatm	etals and alloys ucts of Austeni on diagrams. He g media. Retent ubzero treatment enability testing, ents.	te, Time Temp at treatment of ion of austenite). Secondary ha Defects due to	perature Transfo steels: Annealin e, effects of reta rdening, temper heat treatment a	ormation diagraming, Normalizing ained austenite. embrittlement, and remedial me	ms, continuou g, Hardening & Elimination o quench cracks easures. Surfac	s 2 f 10 ., 2

	Ceramics, Polymers and Composites	
6.	Designation of ferrous and nonferrous alloys: IS, AISI, SAE, DIN etc.	6
	Process of material selection.	
	Total	45
Text I	Books:	
1.	Dr. V. D. Kodgire, Material Science and Engineering, Everest publishing house, 42 nd Edition, 2017	
2.	W. D. Callister, Introduction to Material Science and Engineering, John Wiley, 10 th Edition, 2018	
3.	V. Raghavan, Materials Science and Engineering: A First Course, Prentice Hall India, 2015	
Refer	ence Books:	
1.	George E. Dieter, Mechanical Metallurgy, McGraw-Hill, 3 rd Edition, 2017.	
2.	Charles O. Smith, The Science of Engineering Material, Prentice Hall, 1977.	
3.	Higgins R.A., Engineering Metallurgy, Viva Books Pvt. Ltd., 2004.	
4		

- 4.
- Avener S.H., Introduction to Physical Metallurgy, Tata McGraw-Hill, 1997. William Hosford, Mechanical Behavior of Materials, Cambridge University Press, 2005 5.



"Knowledge tickings Freedom"

Program:	B.Tech. (Mecha	nical)			Semester : III		
Course :	Material Testing	g Lab			Code: BME340)4	
	Teaching	Scheme			Evaluation Sc	cheme	
Practical	Tutorial	Hours	Credit	TW	OR	PR	Total
2		2	1	50	50		100
Prior knowled	ge of						
a. Type o	of materials						
b. Mecha	nical behavior of n	naterialsare	e essential				
Course Object	ives:						
Students are exp	pected to study,						
1. Signifi	cance of various m	aterial testing me	ethods.				
2. The us	e of various materi	al testing method	ls.				
Course Outcor	nes:						
The Students w	ill be able to,						
1. Perfor	m mechanical test	ing referring app	ropriate material t	esting standar	ds and analyze th	e data.	
2. Prepa	re, observe and an	alyze microstruc	ture.				
3. Measu	ire and analyze eff	ect of heat treatm	nent <mark>on propert</mark> ies	of materials.	- CO CO		
			Det <mark>ailed Sylla</mark> bu	s:			
Practical 1,7,8,	9 and 12 are com	pulsory.		-	-	-	
Any 4 out of re	emaining.						
List of Practica	al						
1. Tensic	n test on mild steel	l, aluminum and s	stainless steel (AS	STM E8/ ISO	6892-1).		
2. Shear	test of ductile mate	rial on UTM.					
Experi	mental verification	of flexural form	ula in bending of	cantilever/sim	ply supported bea	ım.	
4. Compi	ression test on bras	s and cast iron (A	ASTM <mark>E9/ IS</mark> O 60	4).			
5. Impact	t testing of materia	ls (ASTM D256	or ASTM E23).				
6. Non-de	estructive testing o	f materials: Dye j	penetrant (ASTM	E165), Magn	aflux (ASTM E70	19).	
7. Heat tr	eatment: Annealin	g, Normalizing, H	Hardening and Te	mpering.			
8. Specin	nen preparation for	microscopic stud	ły.				
9. Micros	structure observation	on and analysis of	f ferrous and non-	ferrous mater	ials.		
10. Flow l	ines observation.						
11. Hardn	ess test: Brinell (A	STM E10), Vicke	ers (ASTM E384)	, Rockwell (A	STM E18), etc.		
12. Torsio	n Test.						
13. Jomin	y End Quench test	(ASTM A255-20	Ja).				
Reference bool	K:						
ASM Han	dbook: Mechanica	I Testing and Eva	luation.				

Progra	am:	B.Tech. (Mech	anical)				Semester : II	I
Course	e :	Manufacturing	g Practices				Code : BME.	3405
		Teachin	g Scheme	1		Evaluation	on Scheme	
Practi	ical	Tutorial	Hours	Credit	TW	OR	PR	Total
2			2	1	50			50
Prior k a b c d	know . H . B . M . M l. Sa	ledge of and tools and acc asic measuremen lachine tools afety practices or	cessories t instruments (c 1 shop floor	aliper, micromet . are essential	er, dial gauge	e, etc.)		
Course	e Obi	ectives:						
Stu	dents	are expected to,						
1 2 3	. G 2. Se 3. E	et hand on exper elect appropriate xperience dimense et acquainted wit	ience of workin machining para sional and geom	g on various mac meters. hetrical tolerances machining proc	chine tools an	d welding machir	ne.	
Course	$\frac{1}{0}$			i machining proc	C35C5.			
The stu	idents	should be able t	0					
1110 300	S	elect appropriate	machining para	meters and hand	le machines			
2		nalvze product a	nd select approx	priate method ty	pe of joint an	d joining paramet	ers	
3	B. A	nalyze product a	nd select approp	priate machining	process, tool	ing and process p	arameters.	
4	. D	esign jigs and fix	tures.	8	r,			
5	5. E	xecute NC part p	orogram.					
				Detailed :	Syllabus:			-
Unit		(A. A. J.		Descripti	on			Duration (H)
1.	Eac on 1	h student shall m athe machine.	anufacture one	useful componen	t/part using	various machining	g operations	8
2.	Eac	h student shall m	anufacture one	component on m	illing machir	e using indexing	mechanism.	9
3.	Wel	ding operations	and testing.		_			5
4.	Gro com VM	up of 3 to 4 stude ponents using va C.	ents shall design arious machine	n manufacture on tools, including (e marketable CNC simulate	assembly of 3 or or, CNC Turning of	more center and	8
5.	Ass	ignment on desig	n of jig and fix	ture.	Income of			-
		-	100 Wiles	inder m	milla	(Transition	Total	30
Refere 1.	ence b Haj 201	ooks: ra Chaudhary, E	lements of Wor	kshop Technolo	gy, Vol. I an	d II, Media prom	oters and publis	shers Pvt. Ltd.,

Heinrich Grelling, All about machine tools, New Age publication, 2nd Edition, 2006
 J. T. Black, Degormos Materials and process in manufacturing, John Willey and sons

4. M. P. Grover, Fundamentals of modern manufacturing: Materials and systems

5. Cryil Donaldson and George H LeCain, Tool Design, Tata McGraw Hill Education Pvt. Ltd.

6. Little, Richard L, Welding and welding technology, McGraw Hill Education Pvt. Ltd.

P N Rao, CAD/CAM: Principles and Applications, Tata McGraw-Hill Education. 7.

Progra	m:	B. Tech. (All	branches)				Semeste	er :III		
Course	:	Universal Hu	man Values				Code: B	3HM3101		
		Teaching Scl	heme			Ev	valuation S	cheme		
Lect	ure	Practical	Hours	Credit	IE	MTE	ЕТЕ	TW	PR	Total
3		-	3	3	30	-	20	-	-	50
Course 1. 7 s 2. 7 tu S 1i 3. 7 a	• Objecti To help th ustained To facilita owards he Such a ho iving in a To highlig nd mutua	ves: the students apprect happiness and pro- te the developme appiness and pro- listic perspective natural way. ght plausible impl ally fulfilling hum	tiate the essentia osperity which a ont of a Holistic sperity based on forms the basis ications of such han behavior and	al compleme are the core a perspective a correct un of Universa a Holistic u d mutually e	ntarity betwee spirations of among studer derstanding o Human Valu nderstanding priching inter	en 'VALU all human its towarc of the Hur ies and m in terms action wi	JES' and 'S n beings. ls life and p nan reality ovement to of ethical h th Nature.	KILLS' to profession a and the reso wards valu uman con-	ensure as well st of exi ue-based duct, tru	as stence. d ıstful
Course (After le 1. 2. 3. 4. 5. 6.	 Course Outcomes: After learning the course, the students will be able to: Understand the relevance of Universal Human Values. Interpret the concept of 'Self' & 'Body'. Develop harmony in the family based on nine Universal Human Values. Apply the sense of Harmony in society. Take part in maintaining coexistence with Nature. Integrate Universal Human Values in personal and professional life. 									
			-	Detailed S	anabus.					
Unit	1			Descrip	tion				D	uration (H)
1	Introd Proces Aspira – Curr	luction to Value s for Value Ed ations, Right Und rent Scenario, Me	e Education: Uncation, Continent erstanding, Relation the fulfill the fulfil	Jnderstandin nuous Happ ationship and e Basic Hun	g Value Edu iness and Pr 1 Physical Fa 1 an Aspiration	cation, S cosperity cility, Ha ns	Self-explora – the Ba ppiness ar	ation as t sic Hum ad Prosperi	he an ty	6
	Practic Natura	ce Session: Sha al Acceptance	ring about On	eself, Expl	oring Humar	1 Consci	ousness, H	Exploring		3
2	Harm and th Instrui Progra	ony in the Hum the Body, Disting ment of the Self, the to ensure se	an Being: Und uishing betweer Understanding 1 elf-regulation ar	lerstanding I n the Needs Harmony in nd Health	Human being of the Self a the Self, Harr	as the C and the H mony of t	o-existence Body, The the Self wi	of the So Body as th the Bod	elf an ly,	6
	Practio Imagii	ce Session: Exploration in the Self,	oring the differ Exploring Hari	ence of Nee mony of Self	ds of Self ar with the Boo	nd Body, ly	Exploring	Sources	of	3
3	 Harmony in the Family: Harmony in the Family – the Basic Unit of Human Interaction, Values in Human-to-Human Relationship, Nine universal values in relationships viz. Trust, Respect, Affection, Care, Guidance, Reverence, Glory, Gratitude, Love 									
	Practic	ce Session: Explo	ring the Feeling	g of Trust, Ex	ploring the F	eeling of	Respect			3
4	Harm Order,	ony in Society: Human Order Fi	Understanding l ve Dimensions	Harmony in	the Society,	Vision fo	r the Unive	ersal Hum	an	3
	Practic	ce Session: Explo	ring Systems to	fulfill Hum	an Goal					2

5	Harmony in the Nature/Existence: Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual Fulfillment among the Four Orders of Nature, Realizing Existence as Coexistence at All Levels, The Holistic Perception of Harmony in Existence	3
	Practice Session: Exploring the Four Orders of Nature, Exploring Co-existence in Existence	2
6	Implications of the Holistic Understanding – a Look at Professional Ethics: Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics, Holistic Technologies, Production Systems and Management Models-Typical Case Studies, Strategies for Transition towards Value-based Life and Profession	4
	Practice Session: Exploring Ethical Human Conduct, Exploring Humanistic Models in Education, Exploring Steps of Transition towards Universal Human Order	6
	Total	45
Text Boo 1. A l Ed 2. Tea Ba	oks Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2 ition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1 achers'' Manual for A Foundation Course in Human Values and Professional Ethics, R R Gaur, R A garia, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2	nd Revised sthana, G P
Reference 1. Jee 2. Hu 3. Th 4. On 5. Re 6. Hin Links for	Be Books evanVidya: EkParichaya, A Nagaraj, JeevanVidyaPrakashan, Amarkantak, 1999. man Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004. e Story of My Experiments with Truth - by Mohandas Karamchand Gandhi a Education - J Krishnamurthy discovering India - by Dharampal and Swaraj or Indian Home Rule - by Mohandas K. Gandhi	00
Links for <u>h</u>	r additional learning ttp://madhyasth-darshan.info/postulations/knowledge/knowledge-of-humane-conduct/	

Knowledge tickings Freedom"

https://youtu.be/OgdNx0X923I

Conserver Aided Machine Drawing-1 Code: BME301 Teaching Scheme Code: BME301 Teaching Scheme Credit IE Total Prior Knowledge of: a - <	Progr	am:	B. Tech. (M	echanical)				Semester : III		
Teaching Scheme Evaluation Scheme Practical Tatorial Hours Credit E MTE ETE Total 2 2	Cours	se :	Computer A	Aided Machine	Drawing-I			Code: BME391	1	
ProtectedTationalHoursCreditIEMTEETETotal22			Teachir	ng Scheme			Evaluati	on Scheme		
2 Prior Knowledge of: a. Engineering 2D drawings, b. Machine elements used in Mechanical Engineering,are essential Course Objectives: 1. To understand convention of standard machine components 2. To understand Convention ing & Tolerancing, 3. To understand Parametric Mechanical Engineering,are essential Course Outcounce: Are to shibit ability to develop Parametric 2: D Stetches, and Edit Parametric Dimensions. 5. To build Solid Models of machine components. Course Outcounce: Apply the parametric feature-based moteling 2D Sketching and 3D machine components modeling. Outs and the projection of standard conventions (SP-46) for. Introduction to Graphical User Interface (GUI) of any commercially used CAD software. Understand and draw the projection of standard conventions (SP-46) for. 1 2. Conventional Representation using CAD Software 10 1 2. Conventional Representation of common features shafts, Bearings, Joints, Valves, Gears assemblies, Threads, Springs, holes etc. 3 Convent	Pract	tical	Tutorial	Hours	Credit	IE	MTE	ETE	Total	
Prior Knowledge of: Engineering 2D drawings, Machine elements used in Mechanical Engineering,are essential Course Objectives: To understand Geometric Dimensioning & Tolerancing, To understand Geometric Dimensioning & Tolerancing, To understand Parametric Modeling and "Shape before Size" Approach. To exhibit ability to develop Parametric 2-D Sketches, and Edit Parametric Dimensions. To exhibit ability to develop Parametric 2-D Sketches, and Edit Parametric Dimensions. To exhibit ability to develop Parametric 2-D Sketches, and Edit Parametric Dimensions. Understand the importance of CAD software and interpret various sign conventions, limit fits and tolerances. Interpret dimensioning toferance, and surface Enrich symbols from production drawing Apply the parametric Fautre-based modeling 2D Sketching and 3D machine components modeling. Description Duration (IJ) Conventional Representation using CAD software Introduction to Graphical User Interface (GUI) of any commercially used CAD software. Understand and draw the projection of standard conventions (SP-46) for. Variaos materials. Conventional Representation using CAD software Surface Roughness Conventional Representation using Contences. Position, Runout, Profile, Concentric Dimessioning & Tolerance (GD&T) Introduction to GD&T, ASME Y14.5-2018, Dimensioning System, GD&T Symbols, Form Introduction to GD&T, ASME Y14.5-2018, Material condition(LMC)/ Parametric Solid Model	2			2	-					
Tegineering 2D drawings. Machine elements used in Mechanical Engineeringare essential Course Objectives: To understand conventions of standard machine components To understand Commit Dimensioning & Tolerancing. To understand Parametric Modeling and "Shape before Size" Approach. To exhibit ability to develop Parametric 2-D Steches, and Edit Parametric Dimensions. To build Solid Models of machine components. Course Outcomes: After learning the course, the students should be able to: Understand the importance of CAD Software To 2D Steches, and Edit Parametric Dimensions. Therpret dimensioning, tolerance, and surface finish symbols from production drawing Apply the parametric feature-based modeling 2D Steching and 3D machine components modeling. Duration Understand the importance of CAD software and interpret various sign conventions, limit fits and tolerances. Interpret dimensioning, tolerance, and surface finish symbols from production drawing Apply the parametric feature-based modeling 2D Steching and 3D machine components modeling. Duration Understand and the projection of standard conventions (SP-46) for. Understand and draw the projection of standard conventions (SP-46) for. Understand and draw the projection of standard conventions (SP-46) for. Understand contention of CBAT of Symbols, Form Tolerances, Datum, Orientation Tolerances, Joatum, Auxilary datum, Unilateral tolerances, Joatum, Orientation Tolerances, Joatum, Auxilary datum, Unilateral tolerances, Maximum Material condition(MMC) / Least Material condition(LMC) Parametric Solid Modeling Acconcept of modeling approach. Active sequence and starting of D model, Steches into 3D model of simple mechanical elements by feature based modeling approach. Active sequence based indeding approach. Active sequence and the Drawing ", Charotar Publishing House Pvt. Ltd, Anand, India, Active Stangh, "Machine Drawing ", Charotar Publishing House Pvt. Ltd, Anand,	Prior	Know	edge of:	_						
b. Machine elements used in Mechanical Engineering,are essential Course Objectives:	211101	a. En	gineering 2D d	trawings.						
Course Objectives: 1 To understand conventions of standard machine components 2. To understand Conventions of standard machine components 2. To understand Parametric Modeling and "Shape before Size" Approach. 4. To exhibit a bility to develop Parametric 2-D Stetches, and Edit Parametric Dimensions. 5. To build Solid Models of machine components. Course Outcomes: After learning the course, the students should be able to: Interpret dimensioning, tolerance, and surface finish symbols from production drawing Apply the parametric feature-based modeling 2D Sketching and 3D machine components modeling. Detailed Syllabus: Unit Outcomes: Apply the parametric feature-based modeling 2D Sketching and 3D machine components modeling. Outcomes: Unit Detailed Syllabus: Unit interpret dimensioning ICD Doftware Introduction to Graphical User Interface (GUI) of any commercially used CAD software. Unit interpret dimensioning & Tolerances. Action of standard conventions (SP-40 for. 1. Various materials.	ł	b. Ma	chine element	s used in Mech	anical Engineeri	ngare ess	ential			
1. To understand acoventions of standard machine components 2. To understand Parametric Modeling ad "Shape before Size" Approach. 4. To exhibit ability to develop Parametric 2-D Sketches, and Edit Parametric Dimensions. 5. To build Solid Models of machine components. Course Outcomes: After learning the course, the students should be able to: 1. Understand the importance of CAD software and interpret various sign conventions, limit fits and tolerances. 2. Interpret dimensioning, Iolerance, and surface finish symbols from production drawing 3. Apply the parametric feature-based modeling 2D Sketching and 3D machine components modeling. Detailed Syllabus: Unit Conventional Representation using CAD software Understand and draw the projection of standard conventions (SP-46) for. 1. 1. Variae Roughness 10 association and parametric BCD&T) Introduction to Graphical User Interface (GDP) of any commercially used CAD software. 10 association of common features- shafts, Bearings, Joints, Valves, Gears association of Standard conventions (SP-46) for. 1. Watare Roughnes 10	Cours	se Obie	ectives:							
2. To understand Geometric Dimensioning & Tolcrancing. 3. To understand Parametric Modeling and "Shape before Size" Approach. 4. To exhibit ability to develop Parametric 2-D Sketches, and Edit Parametric Dimensions. 5. To build Solid Models of machine components. Consection of the students should be able to: 1. Understand the importance of CAD software and interpret various sign conventions, limit fits and tolerances. 2. Interpret dimensioning, tolerance, and surface finish symbols from production drawing. 3. Apply the parametric feature-based modeling 2D Sketching and 3D machine components modeling. Detailed Syllabus: Unit Conventional Representation using CAD software Introduction to Graphical User Interface (GUI) of any commercially used CAD software. Understand me draw the projection of standard conventions (SP-46) for. 1 1. Various materials. 10 2. Ocoventional representation of common features- shafts, Bearings, Joints, Valves, Gears assemblies, Threads, Springs, holes etc. 10 3. Surface Roughness 10 2. Toolerances, Datum, Orientation Tolerances, Location Tolerances: Position, Rumout, Profile, Concentrict Dimensioning & Tolerances, Location Tolerances: Position, Rumout, Profile, Concentrictly & Symmetry Tolerances, Jactime Tolerance, Maximum Material condition(MCC) Least Material condition(LMC) Paramet	1	со л 1. То	understand co	nventions of sta	andard machine	components				
3. To understand Parametric Modeling and "Shape before Size" Approach. 4. To exhibit ability to develop Parametric 2-D Sketches, and Edit Parametric Dimensions. 5. To build Solid Models of machine components. Concest Outcomes: After learning the course, the students should be able to: 1. Understand the importance of CAD software and interpret various sign conventions, limit fits and tolerances. 2. Interpret dimensioning, tolerance, and surface finish symbols from production drawing 3. Apply the parametric feature-based modeling 2D Sketching and 3D machine components modeling. Detailed Syllabus: Unit Outcomestimation of common features-shafts, Bearings, Joints, Valves, Gears assembles, Threads, Springs, holes etc. 3. Conventional representation of common features-shafts, Bearings, Joints, Valves, Gears assembles, Threads, Springs, holes etc. 10 Surface Roughness Conventional representation of common features-shafts, Bearings, Joints, Valves, Gears assembles, Threads, Springs, Holes etc. Surface Roughness Geometric Dimensioning & Tolerances, Location Tolerances: Position, Runout, Profile, Concentricity & Symmetry Tolerances, Jozeth Diriciple, Primary datum, Auxiliany datum, Junilateral tolerance, Maximum Material condition(MMC) / Least Material condition(LMC) Parametric sketching - draw and modify 2D entities, apply/modify const	2	2. To	understand Ge	eometric Dimen	sioning & Tole	ancing.				
 To exhibit ability to develop Parametric 2-D Sketches, and Edit Parametric Dimensions. To build Solid Models of machine components. Course Outcomes: After learning the course, the students should be able to: Interpret dimensioning, tolerance, and surface finish symbols from production drawing Apply the parametric feature-based modeling 2D Sketching and 3D machine components modeling. Unit Description Description Description (H) Conventional Representation using CAD software on machine components modeling. Unit Description Description (H) Conventional Representation of standard conventions (SP-46) for. Various materials. Conventional Representation of common features- shafts, Bearings, Joints, Valves, Gears assemblies, Threads, Springs, holes etc. Conventional representation of common features- shafts, Bearings, Joints, Valves, Gears assemblies, Threads, Springs, holes etc. Surface Roughness Conventicol Imensioning & Tolerances, Jocation Tolerances: Position, Runout, Profile, Concentric Dimensioning & Yl45-2018, Dimensioning System, GD&T Symbols, Form Tolerances, Jocation Colerances: Position, Runout, Profile, Concentricity & Symmetry Tolerances, Jocation Tolerances: Position, Runout, Profile, Concentricity & Symmetry Tolerances, Jocation Tolerances: Position (L) Instard and Minensions. Parametric Solid Modeling Para		3. To	understand Pa	rametric Model	ing and "Shape	before Size" Apr	oroach.			
 5. To build Solid Models of machine components. Course Outcomes: Apply the parametric of CAD software and interpret various sign conventions, limit fits and tolerances. Interpret dimensioning, tolerance, and surface finish symbols from production drawing Apply the parametric feature-based modeling 2D Sketching and 3D machine components modeling. Detailed Syllabus: Duration Ouroentional Representation using CAD software. Interpret dimension, block and the projection of standard conventions (SP-46) for.	4	4. To	exhibit ability	to develop Par	ametric 2-D Ske	etches, and Edit P	Parametric Dim	ensions.		
Course Outcomes: After learning the course, the students should be able to: 1 Understand the importance of CAD software and interpret various sign conventions, limit fits and tolerances. 2. Interpret dimensioning, tolerance, and surface finish symbols from production drawing 3. Apply the parametric feature-based modeling 2D Sketching and 3D machine components modeling. Detailed Syllabus: Duration Outailed Syllabus: Duration Introduction to Graphical User Interface (GUI) of any commercially used CAD software. Understand and draw the projection of standard conventions (SP-46) for. 1. Various materials. 10 2. Conventional Representation of common features-shafts, Bearings, Joints, Valves, Gears assemblies, Threads, Springs, holes etc. 10 3. Convention of Section 10 4. Limits, Fits, Tolerances 2. 5. Surface Roughness Surface Roughness 10 2 Concentricity & Symmetry Tolerances. Jocation Tolerances: Position, Runout, Profile, Concentricity & Symmetry Tolerances. Jocation Tolerances. 10 1. Parametric Solid Modeling 10 3.	4	5. To	build Solid M	odels of machir	e components.	Conces, and Barr I		•••••••		
After learning the course, the students should be able to: 1. Understand the importance of CAD software and interpret various sign conventions, limit fits and tolerances. 2. Interpret dimensioning, tolerance, and surface finish symbols from production drawing 3. Apply the parametric feature-based modeling 2D Sketching and 3D machine components modeling. Duration (II) Unit Description Duration (II) 1 Conventional Representation using CAD software Introduction to Graphical User Interface (GUI) of any commercially used CAD software. Understand and draw the projection of standard conventions (SP-46) for. 1. 1. Various materials. 10 3. 2. 2. Conventional representation of common features- shafts, Bearings, Joints, Valves, Gears assemblies, Threads, Springs, holes etc. 3. 10 3. Conventico IDMET, ASME Y14.5-2018, Dimensioning System, GD&T Symbols, Form Tolerances, Datum, Orientation Tolerances, Location Tolerances: Position, Rumout, Profile, Concentricity & Symmetry Tolerances, 3-2-1 Principle, Primary datum, Auxiliary datum, Unilateral tolerance, Maximum Material condition(MMC) / Least Material condition(LMC) 10 3. 2. Parametric Solid modeling - Transforming 2D sketches into 3D model of simple mechanical elements by feature based modeling approach. 10 3. 2. Parametric Solid modeling - Transforming 2D sketches into 3D model of sim	Cours	se Outo	omes:							
1. Understand the importance of CAD software and interpret various sign conventions, limit fits and tolerances. 2. Interpret dimensioning, tolerance, and surface finish symbols from production drawing 3. Apply the parametric feature-based modeling 2D Stetching and 3D machine components modeling. Detailed Syllabus: Unit Operation of the projection of standard conventions (SP-46) for. 1. Various materials. 10 Conventional representation of common features-shafts, Bearings, Joints, Valves, Gears assemblies, Threads, Springs, holes etc. 2. Conventional representation of Common features-shafts, Bearings, Joints, Valves, Gears assemblies, Threads, Springs, holes etc. 10 3. Conventions of Section 11 Introduction to GD&T, ASME Y14.5-2018, Dimensioning System, GD&T Symbols, Form Tolerances, Daximum, Orientation Tolerances, Location Tolerances: Position, Runout, Profile, Concentricity & Symmetry Tolerances. 10 Tolerances, Jatum Material condition(MMC) / Least Material condition(LMC) 10 Total dimensioning 2D sketches into 3D model of simple mechanical elements by feature based modeling approach. 10 Total dimensioning on doll working and Tolerancing for Mechanical Design", 3rd edition, McGraw-Hill Education Total	After	r learni	ng the course	the students sho	ould be able to					
2. Interpret dimensioning, tolerance, and surface finish symbols from production drawing 3. Apply the parametric feature-based modeling 2D Sketching and 3D machine components modeling. Detailed Syllabus: Detailed Syllabus: Unit Detailed Syllabus: Unit 0 Conventional Representation using CAD software Introduction to Graphical User Interface (GUI) of any commercially used CAD software. [Interpret dimensioning stratements] 1 Various materials. 10 2. Conventional representation of common features- shafts, Bearings, Joints, Valves, Gears assemblies, Threads, Springs, holes etc. 10 3. Conventions of Section 10 4. Limits, Fits, Tolerances 10 5. Surface Roughness 10 6 Concentricity & Symmetry Tolerances, Jocation Tolerances: Position, Runout, Profile, Concentricity & Symmetry Tolerances, Jocation Tolerances: Position, Runout, Profile, Concentricity & Symmetry Tolerances, Jocation Tolerances: Position, Runout, Profile, Concentricity & Symmetry Tolerances, Jourgan,	1 1100	1 Un	derstand the i	mportance of C.	AD software an	d interpret variou	s sign convent	ions limit fits and	tolerances	
3. Apply the parametric feature-based modeling 2D Sketching and 3D machine components modeling. Detailed Syllabus: Detailed Syllabus: Unit Duration Conventional Representation using CAD software Introduction to Graphical User Interface (GUU) of any commercially used CAD software. Understand and draw the projection of standard conventions (SP-46) for. 10 1. Various materials. 10 2. Conventional representation of common features- shafts, Bearings, Joints, Valves, Gears assemblies, Threads, Springs, holes etc. 10 3. Conventional Representation Tolerances 10 4. Limits, Fits, Tolerances 10 5. Surface Roughness 10 Conventicity & Symmetry Tolerances, Jocation Tolerances: Position, Runout, Profile, Tolerances, Datum, Orientation Tolerances, Location Tolerances: Position, Runout, Profile, Tolerances, Maximum Material condition(MMC)/ Least Material condition(LMC) 10 Parametric Solid Modeling 1. Parametric Solid Modeling - Transforming 2D sketches into 3D model of simple mechanical elements by feature based modeling approach. 10 2. Parametric Books: 10 30 1. Bhatt, N. D. and Panchal, V. M., "Machine Drawing", Ch		2 Int	erpret dimensi	ioning tolerance	e and surface fi	nish symbols from	m production (trawing	torer unces.	
Description Duration Unit Description Duration (H) Conventional Representation using CAD software Introduction to Graphical User Interface (GUI) of any commercially used CAD software. Understand and draw the projection of standard conventions (SP-46) for. 1 1 2. Conventional representation of common features- shafts, Bearings, Joints, Valves, Gears assemblies, Threads, Springs, holes etc. 3. 10 3 Conventions of Section 4. Limits, Fits, Tolerances 5. Surface Roughness 10 10 2 Convention to GD&T, ASME Y14.5-2018, Dimensioning System, GD&T Symbols, Form Introduction to GD&T, ASME Y14.5-2018, Dimensioning System, GD&T Symbols, Form Tolerances, Datum, Orientation Tolerances, Location Tolerances: Position, Runout, Profile, Concentricity & Symmetry Tolerances, 3-2-1 Principle, Primary datum, Auxiliary datum, Unilateral tolerance, Maximum Material condition(MMC) / Least Material condition(LMC) 10 3 Parametric Solid Modeling 1. Parametric Solid modeling - Transforming 2D sketches into 3D model of simple mechanical elements by feature based modeling approach. 3. Reverse engineering of 3D model. 4. Concept of model-based definition Total 30 Test Books: 1. Bhatt, N. D. and Panchal, V. M., "Machine Drawing", Charotar Publishing House Pvt. Ltd, Anand, India, 2. Actes They Status 30 Text Books: 1. Cogrom, G. R., (2020), "Geometric Dimensioning and Tolerancing: A Complete Guide - 2020 Edi		2. m 3. Ar	only the param	etric feature-ha	sed modeling 2	Sketching and 3	3D machine co	mponents modeli	ισ	
Unit Description Duration (H) Unit Conventional Representation using CAD software Introduction to Graphical User Interface (GUI) of any commercially used CAD software. Understand and draw the projection of standard conventions (SP-46) for. 1 1 1 1 1 1 1 1 1 2 Conventions of Section 1 <td></td> <td><i>J. m</i></td> <td>pry the param</td> <th>ente feature da</th> <td>Dotoilo</td> <td>d Syllobus:</td> <td>JD maenine ee</td> <td>inponents modern</td> <td>15.</td>		<i>J. m</i>	pry the param	ente feature da	Dotoilo	d Syllobus:	JD maenine ee	inponents modern	15.	
Unit Description Dirtrition (H) Conventional Representation using CAD software Introduction to Graphical User Interface (GUI) of any commercially used CAD software. Understand and draw the projection of standard conventions (SP-46) for. Improve the text of the text of the text of				_	Detaile	a Synabus:			Duration	
Conventional Representation using CAD software (III) Introduction to Graphical User Interface (GUI) of any commercially used CAD software. (III) Understand and draw the projection of standard conventions (SP-46) for. 1. Various materials. 1 2. Conventional representation of common features- shafts, Bearings, Joints, Valves, Gears assemblies, Threads, Springs, holes etc. 10 3. Conventions of Section 1. Limits, Fits, Tolerances 10 5. Surface Roughness 10 Concentricity & Symmetry Tolerances, Location Tolerances: Position, Rumout, Profile, Concentricity & Symmetry Tolerances, Location Tolerances: Position, Rumout, Profile, Concentricity & Symmetry Tolerances, Location Tolerances: Position, Rumout, Profile, Concentricity & Symmetry Tolerances, 2-1 Principle, Primary datum, Auxiliary datum, Unilateral tolerance, Maximum Material condition(MMC) / Least Material condition(LMC) Parametric Solid Modeling - Transforming 2D sketches into 3D model of simple mechanical elements by feature based modeling approach. 10 3. Reverse engineering of 3D model. 4. Concept of model-based definition 30 Text Books: 1. Bhatt, N. D. and Panchal, V. M., "Machine Drawing", Charotar Publishing House Pvt. Ltd, Anand, India, 2. Ajeet Singh, "Machine Drawing", McGraw Hill Publications, New Delhi 2012 30 3. Aster Singher Standards: ISO/TR 23605:2018, ISO 1101:2017, SP 46, IS 15054(2001) 4. Coraple Guide - 2020 Edition", STARCooks	Unit				Descr	iption				
Conventional Representation User Interface (GUU) of any commercially used CAD software. Introduction to Graphical User Interface (GUU) of any commercially used CAD software. 1 Linderstand and draw the projection of standard conventions (SP-46) for. I. Various materials. 1 Conventional representation of common features- shafts, Bearings, Joints, Valves, Gears assemblies, Threads, Springs, holes etc. 10 3 Conventional representation of common features- shafts, Bearings, Joints, Valves, Gears assemblies, Threads, Springs, holes etc. 10 3 Conventional & Threads, Springs, holes etc. 10 4 Limits, Fits, Tolerances 10 5 Surface Roughness 10 Concentricity & Symmetry Tolerances, Location Tolerances: Position, Runout, Profile, Concentricity & Symmetry Tolerances, 2-1 Principle, Primary datum, Auxiliary datum, Unilateral tolerance, Maximum Material condition(MMC) / Least Material condition(LMC) 10 7 Parametric Solid Modeling 10 10 8 Parametric solid modeling approach. 10 10 9 Parametric solid modeling approach. 10 10 9 Reference Books: 10 10 1 Bhatt, N. D. and Panchal, V. M., "Machine Drawing", Charotar Publishing House Pvt. Ltd, Anand, India, Ajeet Singh, " Machine Drawing", McGraw Hill Publica		Com	antianal Dan						(П)	
Introduction to Graphical User Interace (GDI) of any commercianty used CAD Software. Understand and draw the projection of standard conventions (SP-46) for. 1. Various materials. 2. Conventional representation of common features- shafts, Bearings, Joints, Valves, Gears assemblies, Threads, Springs, holes etc. 3. Conventions of Section 4. Limits, Fits, Tolerances 5. Surface Rougheness 6eometric Dimensioning & Tolerances, Location Tolerances: Position, Runout, Profile, Concentricity & Symmetry Tolerances, Jocation Tolerances: Position Runout, Profile, Concentricity & Symmetry Tolerances, Jocation Tolerances: Position Runout, Profile, Concentricity & Symmetry Tolerances, Jocation Tolerances, Incuting Value, Auxiliary datum, Unilateral tolerance, Maximum Material condition(MMC) / Least Material condition(LMC) Parametric solid Modeling 1. Parametric solid Modeling 1. Reverse engineering of 3D model. 4. Concept of model-based definition Total 30 Total Standards: Roy (Gourden Drawing", Charotar Publishing House Pvt. Ltd, Anand, India, Ajeet Singh, "Machine Drawing", Charotar Publishing House Pvt. Ltd, Anand, India, Ajeet Singh, "Machine Drawing", Charotar Publishing House Pvt. Ltd, Anand, India, Ajeet Singh, "Machine Drawing", Charotar Publishing House Pvt. Ltd, Anand, India, Ajeet Singh, "Machine Drawing", Charotar Publishing House Pvt. Ltd, Anand, India, Standards: ISO/TR 23605:2018, ISO 1101:2017, SP 46, IS 15054(2001) Corcept		Conv	entional Repl	resentation usi	ng CAD softwa	ire		- Channel and		
1 Understand and draw the projection or standard conventions (SP-40) for. 1 1 2. Conventional representation of common features- shafts, Bearings, Joints, Valves, Gears assemblies, Threads, Springs, holes etc. 10 3 Conventions of Section 1 4 Limits, Fits, Tolerances 5 5 Surface Roughness 6 6 Geometric Dimensioning & Tolerances, Location Tolerances: Position, Runout, Profile, Concentricity & Symmetry Tolerances, Joetanno, Orientation Tolerances, Location Tolerances: Position, Runout, Profile, Concentricity & Symmetry Tolerances, 3-2-1 Principle, Primary datum, Auxiliary datum, Unilateral tolerance, Maximum Material condition(MMC) / Least Material condition(LMC) 9 Parametric Solid Modeling 10 10 Reverse engineering of 3D model. 10 11 Parametric sketching – transforming 2D sketches into 3D model of simple mechanical elements by feature based modeling approach. 10 1 Reverse engineering of 3D model. 10 2 Concept of model-based definition 10 3 Total 30 7 Text Books: 1 10 1 Bhatt, N. D. and Panchal, V. M., "Machine Drawing", Charotar Publishing House Pvt. Ltd, Anand, India, 2. Ajeet Singh, "Machine Drawing", McGraw Hill Publications, New Delhi 2012		Intro	duction to Gra	aphical User Int	erface (GUI) of	any commercial	y used CAD so	onware.	5	
1 Various materials. 10 2 Conventional representation of common features- shafts, Bearings, Joints, Valves, Gears assemblies, Threads, Springs, holes etc. 3. 3. Conventions of Section 10 4. Limits, Fits, Tolerances 10 5. Surface Roughness 10 6 Geometric Dimensioning & Tolerancing (GD&T) 11 Introduction to GD&T, ASME Y14.5-2018, Dimensioning System, GD&T Symbols, Form 10 7 Tolerances, Datum, Orientation Tolerances, Location Tolerances: Position, Runout, Profile, Concentricity & Symmetry Tolerances, 3-2-1 Principle, Primary datum, Auxiliary datum, Unilateral tolerance, Maximum Material condition(MMC) / Least Material condition(LMC) 8 Parametric Solid Modeling 1 1. Parametric Solid Modeling - Transforming 2D sketches into 3D model of simple mechanical elements by feature based modeling approach. 10 3. Reverse engineering of 3D model. 10 4. Concept of model-based definition 10 7 Total 30 7 Total 30 7 Reference Books: 1 Cogorno, G. R., (2020), "Geometric Dimensioning and Tolerancing: A Complete Guide - 2020 Edition, McGraw-Hill Education 1. Blo		Unde	rstand and dra	w the projection	n of standard co	nventions (SP-46	o) Ior.			
1 2. Conventional representation of common features- snatts, Bearings, Joints, Valves, Gears 10 2 Conventions of Section 3. Conventions of Section 4. Limits, Fits, Tolerances 5. Surface Roughness 10 Convention of GD&T, ASME Y14.5-2018, Dimensioning System, GD&T Symbols, Form 10 Tolerances, Datum, Orientation Tolerances, Location Tolerances: Position, Runout, Profile, Concentricity & Symmetry Tolerances, 3-2-1 Principle, Primary datum, Auxillary datum, Unilateral tolerance, Maximum Material condition(MMC) / Least Material condition(LMC) 10 Parametric Solid Modeling 1. Parametric solid modeling approach. 10 3. Reverse engineering of 3D model. 10 10 4. Concept of model-based definition 10 Total 30 Text Books: 1. Bhatt, N. D. and Panchal, V. M., "Machine Drawing", Charotar Publishing House Pvt. Ltd, Anand, India, 2. Ajeet Singh, " Machine Drawing", McGraw Hill Publications, New Delhi 2012 3. ASME Y14.5 -2018, Reference Books: 1. Cogorno, G. R., (2020), "Geometric Dimensioning and Tolerancing for Mechanical Design", 3rd edition, McGraw-Hill Education 2. Conventional representations (using CAD Software) 3. Standards: ISO/TR 23605:2018, ISO 1101:2017, SP 46, IS 15054(2001) 4. CATIA For Engineers & Designers VSR16, Sham Tickoo		1. V	arious material	IS.	6	10 0 1	T ' / T7 1	C	10	
 assembles, Ihreads, Springs, holes etc. Conventions of Section Limits, Fits, Tolerances Surface Roughness Geometric Dimensioning & Tolerancing (GD&T) Introduction to GD&T, ASME Y14.5-2018, Dimensioning System, GD&T Symbols, Form Tolerances, Datum, Orientation Tolerances, Location Tolerances: Position, Runout, Profile, Concentricity & Symmetry Tolerances, 3-2-1 Principle, Primary datum, Auxiliary datum, Unilateral tolerance, Maximum Material condition(MMC) / Least Material condition(LMC) Parametric Solid Modeling Parametric sketching - draw and modify 2D entities, apply/modify constraints and dimensions. Parametric sketching - draw and modify 2D sketches into 3D model of simple mechanical elements by feature based modeling approach. Reverse engineering of 3D model. Concept of model-based definition Total 30 Text Books: Bhatt, N. D. and Panchal, V. M., "Machine Drawing", Charotar Publishing House Pvt. Ltd, Anand, India, Ajeet Singh, "Machine Drawing", McGraw Hill Publications, New Delhi 2012 ASME Y14.5 - 2018, Reference Books: Cogorno, G. R., (2020), "Geometric Dimensioning and Tolerancing for Mechanical Design", 3rd edition, McGraw-Hill Education Bloddyk, Gerardus, (2019), "Geometric Dimensioning and Tolerancing: A Complete Guide - 2020 Edition", SSTARCooks Standards: ISO/TR 23605:2018, ISO 1101:2017, SP 46, IS 15054(2001) CATIA For Engineers & Designers VSR16, Sham Tickoo Drawing various conventional representations (using CAD Software) Assignment on reading of Industrial drawings. Assignment on reading of Industrial drawings. Assignment on read	1	2. Co	onventional rej	presentation of	common feature	es- shafts, Bearing	gs, Joints, Valv	ves, Gears	10	
 3. Conventions of Section 4. Limits, Fits, Tolerances 5. Surface Roughness Geometric Dimensioning & Tolerancing (GD&T) Introduction to GD&T, ASME Y14.5-2018, Dimensioning System, GD&T Symbols, Form Tolerances, Datum, Orientation Tolerances, Location Tolerances: Position, Runout, Profile, Concentricity & Symmetry Tolerances, J-2-1 Principle, Primary datum, Auxiliary datum, Unilateral tolerance, Maximum Material condition(MMC) / Least Material condition(LMC) Parametric Solid Modeling Parametric solid modeling – Transforming 2D sketches into 3D model of simple mechanical elements by feature based modeling approach. Reverse engineering of 3D model. Concept of model-based definition Total 30 Text Books: Cogrono, G. R., (2020), "Geometric Dimensioning and Tolerancing: A Complete Guide - 2020 Edition, McGraw-Hill Education Standards: ISO/TR 23605:2018, ISO 1101:2017, SP 46, IS 15054(2001) CATIA For Engineers & Designers VSR16, Sham Tickoo List of Experiments: Drawing various conventional representations (using CAD Software) Assignment on parametric solid modeling of a machine component Understand Model based definition for 3D model. 		as	semblies, Three	eads, Springs, h	oles etc.					
4. Limits, Fits, Tolerances 5. Surface Roughness 5. Surface Roughness 6 6. Geometric Dimensioning & Tolerancing (GD&T) Introduction to GD&T, ASME Y14.5-2018, Dimensioning System, GD&T Symbols, Form 7. Tolerances, Datum, Orientation Tolerances, Location Tolerances: Position, Runout, Profile, Concentricity & Symmetry Tolerances, 3.2-1 Principle, Primary datum, Auxiliary datum, Unilateral tolerance, Maximum Material condition(MMC) / Least Material condition(LMC) 10 8. Parametric Solid Modeling 1. Parametric setetching - draw and modify 2D entities, apply/modify constraints and dimensions. 10 2. Parametric solid modeling - Transforming 2D sketches into 3D model of simple mechanical elements by feature based modeling approach. 10 3. Reverse engineering of 3D model. 4. Concept of model-based definition 10 Total 30 Total 30 Total 30 Reference Books: 1. Cogorno, G. R., (2020), "Geometric Dimensioning and Tolerancing: A Complete Guide - 2020 Edition", SSTARCooks 3. Standards: ISO/TR 23605:2018, ISO 1101:2017, SP 46, IS 15054(2001) 4. CATIA For Engineers & Designers VSR16, Sham Tickoo List of Experiments: 1. Drawing various conventional representations (using CAD Software) 2. Assignment on parametric solid modeling of a machine component 3. Understand Model		3. Co	onventions of S	Section						
5. Surface Roughness Geometric Dimensioning & Tolerancing (GD&T) Introduction to GD&T, ASME Y14.5-2018, Dimensioning System, GD&T Symbols, Form Tolerances, Datum, Orientation Tolerances, Location Tolerances: Position, Runout, Profile, Concentricity & Symmetry Tolerances, 3-2-1 Principle, Primary datum, Auxiliary datum, Unilateral tolerance, Maximum Material condition(MMC) / Least Material condition(LMC) Parametric Solid Modeling 1. Parametric sketching - draw and modify 2D entities, apply/modify constraints and dimensions. 2. Parametric solid modeling - Transforming 2D sketches into 3D model of simple mechanical elements by feature based modeling approach. 3. Reverse engineering of 3D model. 4. Concept of model-based definition Text Books: 1. Bhatt, N. D. and Panchal, V. M., "Machine Drawing", Charotar Publishing House Pvt. Ltd, Anand, India, 2. Ajeet Singh, " Machine Drawing", McGraw Hill Publications, New Delhi 2012 3. ASME Y14.5 -2018, Reference Books: 1. Cogorno, G. R., (2020), "Geometric Dimensioning and Tolerancing for Mechanical Design", 3rd edition, McGraw-Hill Education 2. Blokdyk, Gerardus, (2019), "Geometric Dimensioning and Tolerancing: A Complete Guide - 2020 Edition", SSTARCooks 3. Standards: ISO/TR 23605:2018, ISO 1101:2017, SP 46, IS 15054(2001) 4. CATIA For Engineers & Designers V5R16, Sham Tickoo List of Experiments: 1. Drawing v		4. Li	mits, Fits, Tol	erances					100	
Geometric Dimensioning & Tolerancing (GD&T) Introduction to GD&T, ASME Y14.5-2018, Dimensioning System, GD&T Symbols, Form Tolerances, Datum, Orientation Tolerances, Location Tolerances: Position, Runout, Profile, Concentricity & Symmetry Tolerances, 3-2-1 Principle, Primary datum, Auxiliary datum, Unilateral tolerance, Maximum Material condition(MMC) / Least Material condition(LMC) 10 Parametric Solid Modeling 1. Parametric sketching - draw and modify 2D entities, apply/modify constraints and dimensions. 1. Parametric sketching - draw and modify 2D entities, apply/modify constraints and dimensions. 3. Parametric solid modeling - Transforming 2D sketches into 3D model of simple mechanical elements by feature based modeling approach. 10 3. Reverse engineering of 3D model. 10 4. Concept of model-based definition Total 30 Text Books: 1. Bhatt, N. D. and Panchal, V. M., "Machine Drawing", Charotar Publishing House Pvt. Ltd, Anand, India, 2. Ajeet Singh, " Machine Drawing", McGraw Hill Publications, New Delhi 2012 30 3. ASME Y14.5 - 2018, Reference Books: 1. Cogorno, G. R., (2020), "Geometric Dimensioning and Tolerancing for Mechanical Design", 3rd edition, McGraw-Hill Education 2. Blokdyk, Gerardus, (2019), "Geometric Dimensioning and Tolerancing: A Complete Guide - 2020 Edition", 5STARCooks 3. Standards: ISO/TR 23605:2018, ISO 1101:2017, SP 46, IS 15054(2001) 4. CATIA For Engineers & Designers V5R16, Sham Tickoo List of Experiments: 1. Drawing various conventional representations (using CAD Software) 2. Assignment		5. Si	irface Roughn	ess	-					
Introduction to GD&T, ASME Y14.5-2018, Dimensioning System, GD&T Symbols, Form 10 Tolerances, Datum, Orientation Tolerances, Location Tolerances: Position, Runout, Profile, Concentricity & Symmetry Tolerances, 3-2-1 Principle, Primary datum, Auxiliary datum, Unilateral tolerance, Maximum Material condition(MMC) / Least Material condition(LMC) 10 Parametric Solid Modeling 1. Parametric sketching - draw and modify 2D entities, apply/modify constraints and dimensions. 10 2. Parametric solid modeling - Transforming 2D sketches into 3D model of simple mechanical elements by feature based modeling approach. 10 3. Reverse engineering of 3D model. 4. Concept of model-based definition 10 Text Books: 1 10 1. Bhatt, N. D. and Panchal, V. M., "Machine Drawing", Charotar Publishing House Pvt. Ltd, Anand, India, 30 Text Books: 1 1 30 Reference Books: 1 1 30 Reference Books: 1 1 2020 Edition, 1. Cogorno, G. R., (2020), "Geometric Dimensioning and Tolerancing for Mechanical Design", 3rd edition, McGraw-Hill Education 3 2. Blokdyk, Gerardus, (2019), "Geometric Dimensioning and Tolerancing: A Complete Guide - 2020 Edition", SSTARCooks 3 3. Standards: ISO/TR 23605:2018, ISO 1101:2017, SP 46, IS 15054(2001) 4 4 4. CATLA For Engi		Geor	netric Dimens	sioning & Tole	rancing (GD&'	Г)				
2 Tolerances, Datum, Orientation Tolerances, Location Tolerances: Position, Runout, Profile, Concentricity & Symmetry Tolerances. 3-2-1 Principle, Primary datum, Auxiliary datum, Unilateral tolerance, Maximum Material condition(MMC) / Least Material condition(LMC) 10 3 Parametric Solid Modeling 1. Parametric solid modeling – Transforming 2D sketches into 3D model of simple mechanical elements by feature based modeling approach. 3. Reverse engineering of 3D model. 4. Concept of model-based definition 10 7 Total 30 7 Total		Intro	duction to G	D&T, ASME	Y14.5-2018, I	Dimensioning Sy	ystem, GD&T	Symbols, Form	1	
Concentricity & Symmetry Tolerances. 3-2-1 Principle, Primary datum, Auxiliary datum, Unilateral tolerance, Maximum Material condition(MMC) / Least Material condition(LMC) Parametric Solid Modeling Parametric sketching - draw and modify 2D entities, apply/modify constraints and dimensions. 2. Parametric solid modeling - Transforming 2D sketches into 3D model of simple mechanical elements by feature based modeling approach. 3. Reverse engineering of 3D model. 4. Concept of model-based definition Total 30 Text Books: 1. Bhatt, N. D. and Panchal, V. M., "Machine Drawing", Charotar Publishing House Pvt. Ltd, Anand, India, 2. Ajeet Singh, " Machine Drawing", McGraw Hill Publications, New Delhi 2012 3. ASME Y14.5 - 2018, Reference Books: 1. Cogorno, G. R., (2020), "Geometric Dimensioning and Tolerancing for Mechanical Design", 3rd edition, McGraw-Hill Education 2. Blokdyk, Gerardus, (2019), "Geometric Dimensioning and Tolerancing: A Complete Guide - 2020 Edition", STARCooks 3. Standards: ISO/TR 23605:2018, ISO 1101:2017, SP 46, IS 15054(2001) 4. CATIA For Engineers & Designers V5R16, Sham Tickoo List of Experiments: 1. Drawing various conventional representations (using CAD Software) 2. Assignment on parametric solid modeling of a machine component 4. Understand Model based definition for 3D model.	2	Toler	ances, Datum	n, Orientation	Tolerances, L	ocation Tolerand	ces: Position,	Runout, Profile	10	
Interface, Maximum Material condition(MMC) / Least Material condition(LMC) Parametric Solid Modeling 1. Parametric Solid Modeling – transforming 2D sketches into 3D model of simple mechanical elements by feature based modeling approach. 3. Reverse engineering of 3D model. 4. Concept of model-based definition Total 30 Text Books: 1. Bhatt, N. D. and Panchal, V. M., "Machine Drawing", Charotar Publishing House Pvt. Ltd, Anand, India, 2. Aject Singh, " Machine Drawing", McGraw Hill Publications, New Delhi 2012 3. ASME Y14.5 -2018, Reference Books: 1. Cogorno, G. R., (2020), "Geometric Dimensioning and Tolerancing for Mechanical Design", 3rd edition, McGraw-Hill Education 2. Blokdyk, Gerardus, (2019), "Geometric Dimensioning and Tolerancing: A Complete Guide - 2020 Edition", 5STARCooks 3. Standards: ISO/TR 23605:2018, ISO 1101:2017, SP 46, IS 15054(2001) 4. CATIA For Engineers & Designers V5R16, Sham Tickoo List of Experiments: 1. Drawing various conventional representations (using CAD Software) 2. Assignment on reading of Industrial drawings. 3. Assignment on reading of Industrial drawings. 3. Assignment on reading of Industrial drawings. 3. Assignment on parametric solid modeling of a machine component 4. Understand Model based definition for 3D mo		Conc	entricity & Sy	mmetry Tolera	nces. 3-2-1 Prin	ciple, Primary da	tum, Auxiliary	datum, Unilatera		
Parametric Solid Modeling 1. Parametric Solid Modeling 1. Parametric sketching - draw and modify 2D entities, apply/modify constraints and dimensions. 10 3 2. Parametric sketching - draw and modify 2D entities, apply/modify constraints and dimensions. 10 3 2. Parametric sketching - draw and modify 2D entities, apply/modify constraints and dimensions. 10 3 2. Parametric sketching - draw and modeling approach. 3. Reverse engineering of 3D model. 10 4. Concept of model-based definition Total 30 Total 30 Total 30 Text Books: 1. Bhatt, N. D. and Panchal, V. M., "Machine Drawing", Charotar Publishing House Pvt. Ltd, Anand, India, Ajeet Singh, " Machine Drawing", McGraw Hill Publications, New Delhi 2012 3 3. ASME Y14.5 - 2018, Reference Books: 1 Cogorno, G. R., (2020), "Geometric Dimensioning and Tolerancing for Mechanical Design", 3rd edition, McGraw-Hill Education 1 Blokdyk, Gerardus, (2019), "Geometric Dimensioning and Tolerancing: A Complete Guide - 2020 Edition", 5STARCooks 3 Standards: ISO/TR 23605:2018, ISO 1101:2017, SP 46, IS 15054(2001) 4 CATIA For Engineers & Designers V5R16, Sham Tickoo List of Experiments: 1. Drawing various conventional representations (using CAD Software) 2 </td <td></td> <td>tolera</td> <td>ince, Maximur</td> <th>n Material conc</th> <td>lition(MMC) / L</td> <td>east Material con</td> <td>ndition(LMC)</td> <td></td> <td></td>		tolera	ince, Maximur	n Material conc	lition(MMC) / L	east Material con	ndition(LMC)			
1. Parametric sketching - draw and modify 2D entities, apply/modify constraints and dimensions. 10 3 2. Parametric solid modeling - Transforming 2D sketches into 3D model of simple mechanical elements by feature based modeling approach. 10 3. Reverse engineering of 3D model. 4. Concept of model-based definition 10 Total 30 Total 10 Total 10 Total 20 Agence Sooks: 1. Bhatt, N. D. and Panchal, V. M., "Machine Drawing", Charotar Publishing House Pvt. Ltd, Anand, India, Ageet Singh, " Machine Drawing", McGraw Hill Publications, New Delhi 2012 ASME Y14.5 -2018, Reference Books: 1. Cogorno, G. R., (2020), "Geometric Dimensioning and Tolerancing for Mechanical Design", 3rd edition, McGraw-Hill Education 2. Blokdyk, Gerardus, (2019), "Geometric Dimensioning and Tolerancing: A Complete Guide - 2020 Edition", SSTARCooks 3. Standards: ISO/TR 23605:2018, ISO 1101:2017, SP 46, IS 15054(2001) 4. CATLA For Engineers & Designers V5R16, Sham Tickoo List of Experiments: 1. Drawing various conventional representations (using CAD Software) 2. Assignment on reading of Industrial drawings. 3. Assignment on parametric solid modeling of a machine component 4. Understand Model based		Para	metric Solid N	Modeling			2010/01/201			
3 2. Parametric solid modeling – Transforming 2D sketches into 3D model of simple mechanical elements by feature based modeling approach. 10 3. Reverse engineering of 3D model. 4. Concept of model-based definition 10 Total 30 Total 10 Total 30 Total 30 Total 30 Total 30 Total 10 Concept of model-based definition Total 20 Total 20 Total 20 Asymptotic provement, "Machine Drawing", Charotar Publishing House Pvt. Ltd, Anand, India, 2. Aject Singh, "Machine Drawing", McGraw Hill Publications, New Delhi 2012 Total 20 Total 20 <td co<="" td=""><td></td><td>1. Pa</td><td>rametric sketcl</td><th>hing - draw and</th><td>modify 2D enti</td><td>ties, apply/modif</td><td>y constraints a</td><td>nd dimensions.</td><td></td></td>	<td></td> <td>1. Pa</td> <td>rametric sketcl</td> <th>hing - draw and</th> <td>modify 2D enti</td> <td>ties, apply/modif</td> <td>y constraints a</td> <td>nd dimensions.</td> <td></td>		1. Pa	rametric sketcl	hing - draw and	modify 2D enti	ties, apply/modif	y constraints a	nd dimensions.	
 elements by feature based modeling approach. 3. Reverse engineering of 3D model. 4. Concept of model-based definition Total 30 Text Books: Bhatt, N. D. and Panchal, V. M., "Machine Drawing", Charotar Publishing House Pvt. Ltd, Anand, India, Ajeet Singh, " Machine Drawing", McGraw Hill Publications, New Delhi 2012 ASME Y14.5 - 2018, Reference Books: Cogorno, G. R., (2020), "Geometric Dimensioning and Tolerancing for Mechanical Design", 3rd edition, McGraw-Hill Education Blokdyk, Gerardus, (2019), "Geometric Dimensioning and Tolerancing: A Complete Guide - 2020 Edition", SSTARCooks Standards: ISO/TR 23605:2018, ISO 1101:2017, SP 46, IS 15054(2001) CATIA For Engineers & Designers V5R16, Sham Tickoo List of Experiments: Drawing various conventional representations (using CAD Software) Assignment on parametric solid modeling of a machine component Understand Model based definition for 3D model. 	3	2. Pa	rametric solid	l modeling – T	ransforming 2I) sketches into 3	3D model of s	simple mechanica	10	
3. Reverse engineering of 3D model. 4. Concept of model-based definition Total 30 Total 100 Total 200 Reference Books: 1. Cogorno, G. R., (2020), "Geometric Dimensioning and Tolerancing: A Complete Guide - 2020 Edition", 5STARCooks Standards: ISO/TR 23605:2018, ISO 1101:2017, SP 46, IS 15054(2001) 4. CATIA For Engineers & Designers V5R16, Sham Tickoo	5	eleme	ents by feature	based modeling	g approach.				10	
 4. Concept of model-based definition Total 30 Text Books: Bhatt, N. D. and Panchal, V. M., "Machine Drawing", Charotar Publishing House Pvt. Ltd, Anand, India, Ajeet Singh, "Machine Drawing", McGraw Hill Publications, New Delhi 2012 ASME Y14.5 -2018, Reference Books: Cogorno, G. R., (2020), "Geometric Dimensioning and Tolerancing for Mechanical Design", 3rd edition, McGraw-Hill Education Blokdyk, Gerardus, (2019), "Geometric Dimensioning and Tolerancing: A Complete Guide - 2020 Edition", 5STARCooks Standards: ISO/TR 23605:2018, ISO 1101:2017, SP 46, IS 15054(2001) CATIA For Engineers & Designers V5R16, Sham Tickoo List of Experiments: Drawing various conventional representations (using CAD Software) Assignment on parametric solid modeling of a machine component Understand Model based definition for 3D model. 		3. Re	verse engineer	ring of 3D mode	el.					
Total 30 Text Books: 1. Bhatt, N. D. and Panchal, V. M., "Machine Drawing", Charotar Publishing House Pvt. Ltd, Anand, India, 2. Ajeet Singh, " Machine Drawing", McGraw Hill Publications, New Delhi 2012 3. ASME Y14.5 -2018, Reference Books: 1. Cogorno, G. R., (2020), "Geometric Dimensioning and Tolerancing for Mechanical Design", 3rd edition, McGraw-Hill Education 2. Blokdyk, Gerardus, (2019), "Geometric Dimensioning and Tolerancing: A Complete Guide - 2020 Edition", 5STARCooks 3. Standards: ISO/TR 23605:2018, ISO 1101:2017, SP 46, IS 15054(2001) 4. CATIA For Engineers & Designers V5R16, Sham Tickoo List of Experiments: 1. 1. Drawing various conventional representations (using CAD Software) 2. Assignment on reading of Industrial drawings. 3. Assignment on parametric solid modeling of a machine component 4. Understand Model based definition for 3D model.		4. Co	ncept of mode	el-based definiti	on					
 Text Books: Bhatt, N. D. and Panchal, V. M., "Machine Drawing", Charotar Publishing House Pvt. Ltd, Anand, India, Ajeet Singh, " Machine Drawing", McGraw Hill Publications, New Delhi 2012 ASME Y14.5 -2018, Reference Books: Cogorno, G. R., (2020), "Geometric Dimensioning and Tolerancing for Mechanical Design", 3rd edition, McGraw-Hill Education Blokdyk, Gerardus, (2019), "Geometric Dimensioning and Tolerancing: A Complete Guide - 2020 Edition", 5STARCooks Standards: ISO/TR 23605:2018, ISO 1101:2017, SP 46, IS 15054(2001) CATIA For Engineers & Designers V5R16, Sham Tickoo List of Experiments: Drawing various conventional representations (using CAD Software) Assignment on reading of Industrial drawings. Assignment on parametric solid modeling of a machine component Understand Model based definition for 3D model. 								Tota	l 30	
 Bhatt, N. D. and Panchal, V. M., "Machine Drawing", Charotar Publishing House Pvt. Ltd, Anand, India, Ajeet Singh, "Machine Drawing", McGraw Hill Publications, New Delhi 2012 ASME Y14.5 -2018, Reference Books: Cogorno, G. R., (2020), "Geometric Dimensioning and Tolerancing for Mechanical Design", 3rd edition, McGraw-Hill Education Blokdyk, Gerardus, (2019), "Geometric Dimensioning and Tolerancing: A Complete Guide - 2020 Edition", 5STARCooks Standards: ISO/TR 23605:2018, ISO 1101:2017, SP 46, IS 15054(2001) CATIA For Engineers & Designers V5R16, Sham Tickoo List of Experiments: Drawing various conventional representations (using CAD Software) Assignment on reading of Industrial drawings. Assignment on parametric solid modeling of a machine component Understand Model based definition for 3D model. 	Text I	Books:								
 Ajeet Singh, "Machine Drawing", McGraw Hill Publications, New Delhi 2012 ASME Y14.5 -2018, Reference Books: Cogorno, G. R., (2020), "Geometric Dimensioning and Tolerancing for Mechanical Design", 3rd edition, McGraw-Hill Education Blokdyk, Gerardus, (2019), "Geometric Dimensioning and Tolerancing: A Complete Guide - 2020 Edition", 5STARCooks Standards: ISO/TR 23605:2018, ISO 1101:2017, SP 46, IS 15054(2001) CATIA For Engineers & Designers V5R16, Sham Tickoo List of Experiments: Drawing various conventional representations (using CAD Software) Assignment on reading of Industrial drawings. Assignment on parametric solid modeling of a machine component Understand Model based definition for 3D model. 	1.	Bhatt	, N. D. and Pa	nchal, V. M., "	Machine Drawi	ng", Charotar Pu	ublishing Hous	e Pvt. Ltd, Anand	, India,	
 ASME Y14.5 -2018, Reference Books: Cogorno, G. R., (2020), "Geometric Dimensioning and Tolerancing for Mechanical Design", 3rd edition, McGraw-Hill Education Blokdyk, Gerardus, (2019), "Geometric Dimensioning and Tolerancing: A Complete Guide - 2020 Edition", 5STARCooks Standards: ISO/TR 23605:2018, ISO 1101:2017, SP 46, IS 15054(2001) CATIA For Engineers & Designers V5R16, Sham Tickoo List of Experiments: Drawing various conventional representations (using CAD Software) Assignment on reading of Industrial drawings. Assignment on parametric solid modeling of a machine component Understand Model based definition for 3D model. 	2.	Ajeet	Singh, "Mac	hine Drawing",	McGraw Hill P	ublications, New	Delhi 2012			
 Reference Books: Cogorno, G. R., (2020), "Geometric Dimensioning and Tolerancing for Mechanical Design", 3rd edition, McGraw-Hill Education Blokdyk, Gerardus, (2019), "Geometric Dimensioning and Tolerancing: A Complete Guide - 2020 Edition", 5STARCooks Standards: ISO/TR 23605:2018, ISO 1101:2017, SP 46, IS 15054(2001) CATIA For Engineers & Designers V5R16, Sham Tickoo List of Experiments: Drawing various conventional representations (using CAD Software) Assignment on reading of Industrial drawings. Assignment on parametric solid modeling of a machine component Understand Model based definition for 3D model. 	3.	ASM	E Y14.5 -2018	8,						
 Cogorno, G. R., (2020), "Geometric Dimensioning and Tolerancing for Mechanical Design", 3rd edition, McGraw-Hill Education Blokdyk, Gerardus, (2019), "Geometric Dimensioning and Tolerancing: A Complete Guide - 2020 Edition", 5STARCooks Standards: ISO/TR 23605:2018, ISO 1101:2017, SP 46, IS 15054(2001) CATIA For Engineers & Designers V5R16, Sham Tickoo List of Experiments: Drawing various conventional representations (using CAD Software) Assignment on reading of Industrial drawings. Assignment on parametric solid modeling of a machine component Understand Model based definition for 3D model. 	Refer	ence B	ooks:							
 McGraw-Hill Education Blokdyk, Gerardus, (2019), "Geometric Dimensioning and Tolerancing: A Complete Guide - 2020 Edition", 5STARCooks Standards: ISO/TR 23605:2018, ISO 1101:2017, SP 46, IS 15054(2001) CATIA For Engineers & Designers V5R16, Sham Tickoo List of Experiments: Drawing various conventional representations (using CAD Software) Assignment on reading of Industrial drawings. Assignment on parametric solid modeling of a machine component Understand Model based definition for 3D model. 	1.	Cogo	rno, G. R., (20)20), "Geometri	c Dimensioning	and Tolerancing	for Mechanic	al Design", 3rd ed	ition,	
 Blokdyk, Gerardus, (2019), "Geometric Dimensioning and Tolerancing: A Complete Guide - 2020 Edition", 5STARCooks Standards: ISO/TR 23605:2018, ISO 1101:2017, SP 46, IS 15054(2001) CATIA For Engineers & Designers V5R16, Sham Tickoo List of Experiments: Drawing various conventional representations (using CAD Software) Assignment on reading of Industrial drawings. Assignment on parametric solid modeling of a machine component Understand Model based definition for 3D model. 		McG	raw-Hill Educ	ation						
5STARCooks 3. Standards: ISO/TR 23605:2018, ISO 1101:2017, SP 46, IS 15054(2001) 4. CATIA For Engineers & Designers V5R16, Sham Tickoo List of Experiments: 1. Drawing various conventional representations (using CAD Software) 2. Assignment on reading of Industrial drawings. 3. Assignment on parametric solid modeling of a machine component 4. Understand Model based definition for 3D model.	2.	Bloke	lyk, Gerardus,	, (2019), "Geom	etric Dimension	ning and Tolerand	cing: A Compl	ete Guide - 2020 I	Edition",	
 Standards: ISO/TR 23605:2018, ISO 1101:2017, SP 46, IS 15054(2001) CATIA For Engineers & Designers V5R16, Sham Tickoo List of Experiments: Drawing various conventional representations (using CAD Software) Assignment on reading of Industrial drawings. Assignment on parametric solid modeling of a machine component Understand Model based definition for 3D model. 		5STA	ARCooks							
 CATIA For Engineers & Designers V5R16, Sham Tickoo List of Experiments: Drawing various conventional representations (using CAD Software) Assignment on reading of Industrial drawings. Assignment on parametric solid modeling of a machine component Understand Model based definition for 3D model. 	3.	Stand	lards: ISO/TR	23605:2018, IS	O 1101:2017, S	P 46, IS 15054(2	2001)			
 List of Experiments: Drawing various conventional representations (using CAD Software) Assignment on reading of Industrial drawings. Assignment on parametric solid modeling of a machine component Understand Model based definition for 3D model. 	4.	CAT	IA For Engine	ers & Designers	s V5R16, Sham	Tickoo				
 Drawing various conventional representations (using CAD Software) Assignment on reading of Industrial drawings. Assignment on parametric solid modeling of a machine component Understand Model based definition for 3D model. 	List of	f Expe	riments:							
 Assignment on reading of Industrial drawings. Assignment on parametric solid modeling of a machine component Understand Model based definition for 3D model. 	1.	. Dra	wing various c	conventional rep	resentations (us	ing CAD Softwa	re)			
 Assignment on parametric solid modeling of a machine component Understand Model based definition for 3D model. 	2.	. Assi	gnment on rea	ding of Industr	ial drawings.					
4. Understand Model based definition for 3D model.	3.	. Assi	gnment on par	rametric solid n	nodeling of a ma	chine componen	t			
	4.	. Und	erstand Model	l based definition	on for 3D model					

Program:	B. Tech.	(All branche	es)				Semester:	: III 1M2020	
course.	Teaching	Scheme				Fyaluati	on Scheme		
	Teaching	Scheme				Evaluati			
Lecture	Practical	Tutorial	Credit	IE	MTE	ЕТЕ	TW	OR	Total
	2				-	-	-		-
Prior know	vledge: Nil								
1. To un 2. To <u>3. To</u> Course Ou After comp 1. 2.	attain mental, derstanding of b learn to build provide a platt detomes: leting the cours Achieve a balan	emotional ba the inner pers team spirit and form to expres se, the student aced state of m	alance and sp conality & its d adapt to the ss their mind, ss should be a hind and enjo	biritually to establishing various s body, and ble to: y improve	o achieve se nent of harm kills required l emotions th d mental, ph	lf-realization ony with the d in various arough perfor ysical, emot	n and enligh e external de sports activior orming arts.	htenment f emands. ities. piritual we	to help bette
2. 4 3. 1	Apply sportsma Demonstrate the	nship skills in e ability to thi	the context on the critically a	of leadersh about a var	nip, sports marine the sports marine the sports and	anagement e	etc. ming arts.	•	C
			D	etailed Sy	yllabus:	1	U		
Unit	18	1		Descriptio	on	100	~~~	5	Duration (H)
1. P P S 2. M	ranayama and atanjali /Sahaja ports: Indoor C erforming arts Iusic, Singing,	Breathing exe ayoga/Vipassa Games / Outdo Poetry, Indian	ercises, Medi na /Madhyas por Games n Convention	itation Teo tha Darsha or al Dancin	chnique, Tho an/ Art of Liv	bughtless Aving etc.,	wareness : Aovie Makin	Through	12
P	ainting/ Sketch	ing/ Drawing,	, Theatre Arts	s, Anchori	ng, Calligrap	ony etc.	_	Total	24
Doforance	Dooka		-					Total	24
 Vishn Swarr Shri M Shri M Willia Denni Boria publis T. Milkh Sfurti Dina Ronoj Andre Dr. M Kisho Veeja publia 	u Devananda, " ii Vivekananda, Mataji Nirmala J um Hart, S. N. G is Hill, "Medita Majumdar, Sac shing, 6 Novem la Singh, "The I Sahare, "Think Serto and Mary oy Sen, "Nation e Agassi, "Open Ionica Hiten Sha ri Amonkar, "I y Sai & forewa	Meditation ar , "Patanjali"s Devi, "Sahaja Goenka, "The tion Deep Pea chin Tendulak ber 2014. Race of My Li c and Win like Kom, "Unbre n at Play: A H ", 2009. ah, "Sangeet A Recreating A J rd by Girish K	nd Mantras", Yoga Sutras" yoga an Intro Art of Livin, ace", Trafford ar, "Sachin T ife", 2013. Dhoni", 3 Ju eakable", 19 J listory of Spo Aradhana", A Dream", Star Karnad, "Dra	1978. , 1 Jan 20 duction" g", 4 Augg l Publishir rendulkar ly 2016. November ort in India aradhana S idard Editi ma Queens	12. ust 2009. ng, 7 August – Playing It I 2 2013. ", 2015. Gangeet Acad ion . s – Women v	2014. My Way", H emy Ahmeo who created	lodder & Sto labad, Editio history on S	oughton, F on 2018. Stage", Rol	IachetteLivre i Books
public	cation.								

Course Syllabus SY B Tech Semester-IV

PERCENTRAL PROPERTY AND A DESCRIPTION OF A DESCRIPTION OF

10 CIONI

Progr	am:	B. Tech. (Mee	chanical)		Semester : IV								
Cours	e :	Metrology an	d Mechanical	Measurement		Code:	BME4302						
		Teachin	ig Scheme			Evaluat	ion Scheme						
Lect	ure	Tutorial	Hours	Credit	IE	MTE	ETE	Total					
3	5		3	3	20	30	50	100					
Prior	knowl	edge of											
a.	Basi	c mechanical co	omponents										
D.	Opti	lCS											
d	Stat	istics are e	essential										
Cours	e Ohie	etives.	osentiai										
Studer	ts are	expected to.											
1.	Use	and apply vario	us measuremen	t methods, instru	ments, calibra	ation and advance	ced measurement	systems.					
2.	2. Understand and use of sensors and transducers for various measurements.												
Cours	Course Outcomes:												
The st	udents	will be able to,				111 C							
1.	Desi	ign limit gauges	to meet desire	d needs within re	alistic constra	ints.							
2.	2. Use appropriate method of measurement/instruments/tools/techniques and experimental data to determine geometry and dimensions of parts in engineering applications												
3	geometry and dimensions of parts in engineering applications. 3. Select appropriate advanced measurement/inspection techniques for different applications.												
3. 4	 Select appropriate advanced measurement/inspection techniques for different applications. Discuss fundamentals of instrumentation for measurement applications and interpret static and dynamic. 												
	4. Discuss fundamentals of instrumentation for measurement applications and interpret static and dynamic characteristics of instruments.												
5.	 5. Identify different sensors for position and temperature measurement. 												
6.	 Select different sensors for force, flow and speed measurement. 												
	1			Detailed	Syllabus:			· · · · · ·					
Unit	1.1			Descript	tion			Duration					
Cimt				Descript				(H)					
	Fund	amentals of Di	mensional Me	trology			1. 1.11.	E.1					
1.	•	Engineering Me	etrology, Measu	rement Standard	, Abbe's prine	ciple, Calibratio	n and traceability	7					
		Design of limit											
	Com	parators. Three	ad and Gear N	fetrology	_								
	•	Comparators: N	Aechanical, Pne	umatic, Optical,	Electrical.			1.1					
	•	Measurement o	f Thread form:	Thread form erro	ors, Measuren	nent of Minor, N	ajor and Effectiv	e					
2.		diameter (Thre	e Wire Metho	d), Best Wire S	ize, Flank ar	gle and Pitch,	Floating Carriag	e 7					
		Micrometer	and the second	ALC: NAME	Income of	and the second second							
	•	Gear Metrology	y: Introduction,	Gear tooth Vern	ier, Constant	chord, Base tan	gent, Gear Rollin	g					
	Confe	Tester, Profile I	Projector	and Advances in									
	Suria	Surface Rough	ness Measurem	and Advances in pent: Introduction	to Surface t	texture Parame	ters for measurin	7					
	•	surface roughne	ess. Surface rou	ghness measuring	g instrument:	TalvSurf.	ters for measurm	5					
3.	•	Coordinate Mea	asuring Machin	e (CMM)	6	1 01 / 2 01 11		8					
	•	Interferometry:	Principle, O	ptical Flat, NP	L Interferon	neter, Laser I	nterferometry an	b					
		Applications											
	•	Machine Visior	n Systems										
	Fund	lamentals of in	strumentation				C .						
	•	Basic functiona	l elements of m	leasurement syste	em and instruction	nentation, need	of measurement						
4.	•	From the measurement, standards											
	•	Significance of	IS standards of	instruments									
	•	Storage and dis	play devices, di	igital voltmeter a	nd ammeter.								
	Posit	ion and Tempe	rature Measu	rement									
	•	Classification o	f sensor/transd	ucers									
5	•	Position sensor	s: Potentiomete	er, LVDT, RVD	T, digital enc	oder, LIDAR (ight detection an	d 7					
5.		ranging), Linea	r scale					,					
	•	Proximity sense	ors: Optical, Inc	luctive, Capacitiv	ve								
	•	Temperature sensor: RTD, Thermocouples, pyrometer, Infrared thermometer											

6.	 Miscellaneous Measurement Force/Pressure Sensors: Piezoelectric, strain gauges Flow sensors: Electromagnetic, Ultrasonic, hot-wire anemometer Level Sensors: Capacitive, Optical, Conductive Measurement of speed/velocity: Stroboscope, Noncontact type of tachometers Vibration sensor: Accelerometer Color sensor and its applications Selection of sensor/transducers 	8
	Total	45
Text B	Books:	
1.	Jain R.K., Engineering Metrology, Khanna Publication.	
2.	Alan Morris, Reza Langari, Measurement and Instrumentation Theory and Application, Elsevier.	
3.	Bewoor A. K. and Kulkarni V. A., Metrology and Measurements, Tata McGraw hill Publication.	
Refere	ence Books:	
1.	K. J. Hume, Engineering metrology, TBS.	
2.	S. P. Venkateshan, Mechanical Measurements, Ane Books Pvt. Ltd	
3.	Doebelin E. O, Measurement Systems-Application and Design, McGraw Hill Publication	X 1 · 1
4.	J. P. Holman, Experimental Methods for Engineers, McGraw Hill International Edition	is, Mechanical
5.	Alciatore & Histand, Introduction to Mechatronics and Measurement system, 4th Edition, publication, 2011	McGraw Hill
6.	I. C. Gupta, Engineering Metrology, Dhanpath Rai	
7.	Narayana K.L., Engineering Metrology.	· · · ·
8.	Galyer J.F & Shotbolt C.R., Metrology for engineers	
9.	Judge A.W., Engineering Precision Measurements, Chapman and Hall	0.1
10	. Francis T. Farago, Mark A. Curtis, Handbook of dimensional measurement.	
11	ASTME, Handbook of Industrial Metrology, Prentice Hall of India Ltd.	
12	. Connie Dotson, Fundamentals of Dimensional Metrology, Thomson, 4th Edition.	

"Knowledge tickings Freedom"

Progr	Program: B. Tech. (Mechanical) Semester : IV										
Cours	e :	Applied The	ermodynam	ics				Code: I	BME4406		
		Teaching Sch	neme			•	Evaluat	ion Schen	ne		
L	ecture	Practical	Hours	Credit	IE	MTE	ETE	TW	PR	Total	
	3		3	3	20	30	50			100	
Prior	Knowledge	e of :			•		•	•			
a.	Fundame	ental concepts	of thermody	namics							
b.	Laws of	thermodynami	cs								
C.	Use of st	eam tables and	l Mollier cha	irt							
Course	Ideal Gas	s Equations and	a processes.	are ess	sential						
	1. To understand the theory and performance calculations of reciprocating air compressors										
2	 To understand the theory and performance calculations of reciprocating air compressors To understand the performance evaluation of boilers 										
3.	3. To study various thermodynamic cycles with gas and steam as working medium										
4.	To get fa	miliar with the	e characterist	tics of comp	r <mark>essi</mark> ble flu	uid flow					
5.	To under	stand the analy	ysis of flue g	ases and cal	culation of	f Air fuel ra	tio.				
Cours	e Outcome	s:									
The le	arners will	be able to	(D)		a						
1.	Analyze	the performan	ce of Recipr	ocating Air (Compresso	or.					
2.		the performan	ce of Vapor	nower cycle	c						
3. 4	Analyze	the performan	ce of Gas po	wer cycles	5.						
5.	Analyze	steady one din	nensional ise	entropic com	pressible f	fluid flow.					
6.	Estimate	e the Actual an	d Stoichiom	etric air fuel	ratio of va	arious fuels.					
				Deta	il <mark>ed Sy</mark> lla	bus:					
Unit				De	escription					Duration	
	D 141 3		G				<i>a</i> : 1			(H)	
	Positive Displacement Compressors: Reciprocating Compressor - Single stage compressor -										
1	afficiency Free air delivery Theoretical and actual indicator diagram Multistage compressor										
1.	Computati	on of work of	compression	n Volumetri	ic efficien	cy Ideal In	ermediate	nressure	Inter-cooli	η, σ	
	and after c	ooling. Rotary	Compresso	r – Introduct	ion. vane	compressors	, roots blo	wer	inter coom	15	
	Steam Ge	neration: Boi	lers, Classif	ication, Mou	unting, Ac	cessories, A	pplication	s, Introdu	ction to IB	R,	
2.	Boiler per	rformance cal	culations-Eq	uivalent eva	aporation,	Boiler eff	iciency(di	rect & in	direct), He	at 8	
	balance, B	oiler draught (natural and a	artificial drau	ught)						
•	Vapour P	ower Cycle: (Carnot cycle,	Rankine cy	cle, Comp	parison, Effi	ciency of l	Rankine c	ycle, Relati	ve	
3.	efficiency,	Effect of su	iperheat, bo	iller and col	ndenser p	ressure on	performat	nce of Ra	ankine cycl	e, 7	
	Gas Powe	r Cycles: Air	Standard a	sumptions	Otto Cvc	le Diesel c	vele Dua	l cycle C	omparison	of	
4.	cycles. Br	avton cycle. F	Efficiency. W	Vork output.	Effect of	pressure ra	tio. Rehea	it and reg	eneration at	nd 7	
	intercoolin	ig.	, , , , , , , , , , , , , , , , , , ,	, orn output,	211000 01	prossure ru	,				
	Compress	ible Fluid Flo	w: Definitio	on, Speed of	sound and	1 Mach No.	, Sonic, S	ubsonic ar	nd Superson	ic	
5	flow, Effe	ct of Area var	riation on or	ne dimensior	nal Steady	isentropic	compressi	ble flow,	Convergent	;- e	
5.	Divergent	Nozzle, Effec	et of friction	and heat the	ransfer on	steady one	dimensio	onal comp	ressible flu	id o	
	flow, Fann	o Lines, Reyle	eigh lines.								
(Fuels & C	Combustion:	Fuel propert	ies, Higher	and Lowe	r Calorific	value, Det	ermination	n of Air Fu	el	
6.	Ratio (Act	ual and Stoich	110metric), A	analysis of e	xhaust gas	ses, Adiabat	ic Flame	emperatu	re, Dew poi	nt 7	
	temperatur	le of products (лп .					Tot	al 45	
Text I	Books:								100	ai 45	
1.	Y. Cenge	el & Boles: Th	ermodynami	cs – An Eng	ineering A	Approach, Ta	ata McGra	w-Hill			
2.	P. K. Na	g, Engineering	Thermodyn	amics, Tata	McGraw I	Hill Publicat	ions				
3.	Mahesh 1	M. Rathore, Th	nermal Engir	neering, Tata	McGraw	-Hill					
Refer	ence Books	:	1 G1 · -		6 .			••			
	Michael	Moran, Howar	a Shapiro, F	undamentals	s of Engin	eering Theri	nodynami Thorra 1	cs, John V	Viley		
2.	M Ash	rgnakke, Kich	aru E. Sonnt	ag, rundame	HI Loornir	ngmeering	inermody	namics, Jo	min wiley		
3. 4	V Ganes	an "Internal (Combustion	Engines" Ta	ata McGra	w-Hill					
5.	M. L. Ma	athur and R.P.	Sharma. "A	course in Inf	ternal com	bustion eng	ines". Dha	npat Rai d	& Co.		
6.	Introduct	ion to Fluid M	lechanics, Ro	obert W. Fox	k, Alan T.	McDonald,	John W. N	Aitchell, J	ohn Wiley		

Prog	B. Tech. (Mechanical) Semester : IV									
Cour	se :	Fluid Mecha	nics			Code : BM	E4407			
		Teachi	ng Scheme			Evaluation	Scheme			
Lec	ture	Tutorial	Hours	Credit	IE	MTE	ETE	Total		
3	3	-	3	3	20	30	50	100		
Prior	· Know	vledge of :	ate of physics l	ika foraa prassur	a valocity area y	olumo oto				
a. b.	Math	ematical conce	pts of physics f	differential equation	tionare esse	ntial				
Cour	se Obj	ectives:	F	,						
1.	Unde	erstand & analy	ze various pro	perties of fluid &	fluid conditions su	ich as static and	dynamic.			
2.	Unde	erstand the imp	ortance of flow	v measurement de	vices and its indus	trial application	S.			
5. 4.	Unde	rstand losses o	and s theorem and a pi	be when there is a	flow between two	places.				
5.	Unde	erstand bounda	ary layer pheno	menon, drag and	lift	Francis				
Cour	se Out	comes:		100						
The s	tudent	should be able	to:	tation to determine						
1.	2. Analyze fluid flow behavior in different systems.									
3.	Deterr	nine fluid para	meters pressure	e, velocities, etc u	sing Bernoulli's eq	uation.				
4.	. Determine flow rates, pressure changes, minor and major head losses for internal flows like pipes and simple									
~	networ	ks.		1 1	1.0			a : 1 a		
5.	Under	stand the cond	cept of bound	ary layer theory	and flow separat	ion and detern	une the external	fluid flow		
6.	Apply	principles of d	limensional ana	alysis and use dim	ensionless parame	ters to simple a	pplications.			
				Detaile	d Syllabus:	-				
Unit		1. 1. 1.		Descr	iption			Duration		
	Fluid	Duanantias an	d II. duostotic					(H)		
	Defin	ition of fluid.	Concept of c	ontinuum, Prope	rties of fluid (De	nsity. Specific	Weight, Specific			
1	Gravi	ty, Viscosity,	Newton's law	of viscosity, Sur	face Tension, Cap	illarity, Compr	essibility, Vapour	_		
1.	pressure, Cavitation.)									
	Types	of fluid & R	heological dia	gram. Hydrostatio	c forces on vertica	al & horizontal	plate, Buoyancy,			
	Fluid	Kinematics	ation.	_	_			-		
	Conti	nuity equation	, types of flo	ws (One, two, th	ree dimensional,	steady, unstead	ly, uniform, non-			
	unifor	m, laminar,	turbulent, con	mpressible, inco	mpressible, rotati	onal, Irrotatio	nal flow), Mass			
2.	conse	rvation equation	on (Continuity	equation) $-1D$, 2	D & 3D equation,	Visualization of	of flow field (Path	8		
	line,	Streamlines an	d streak lines), Introduction to	flow visualizatio	n devices:- Pl	(Particle image	•		
	net V	elocity of fluid	particle, local	& convective acc	eleration.	velocity poten	tial function, now			
	Fluid	Kinetics	1							
	Euler	equation of r	notion, Berno	oulli's equation of	of motion along st	tream line Mo	dified Bernoulli's			
3.	equat	ion.						8		
	Appli Appli	cation of Ber	amics	ple:-Medical field	Engineering field	d Hydraulic co	efficient Ventur			
	meter	, Orifice and C	Drifice meter, N	lotch, Pitot tube.	, Engineering new	a, myaraane ee	ernerent, ventur			
	Inter	nal Flows	,	,						
	Veloc	ity and shear	Stress distribut	tion for laminar f	low in a pipe & fi	xed parallel pla	ates, Velocity and			
4.	shear	Stress distribu	ition for Coue	tte flow, Introduc	tion to velocity pr	ofile for turbu	lent flow, Energy	8		
	nines	in parallel and	-Major and Mi	inor losses (no dei uvalent nine Mo	ody's diagram Sir	hons Transmis	s), Pipes in series			
	Exter	nal Flows	concept of eqt	arranent pipe, 100	ouy 5 ungrann, 51	,10115, 11 anoilli	sion of power.			
=	Boun	dary layer form	nation for flow	over flat plate, B	oundary layer thicl	kness - displace	ement, momentum	7		
5.	and en	nergy, Separat	tion of boundar	y layer and metho	ods of controlling,	Introduction to	drag and lift & its	/		
	applic	cations, Drag or	n a flat plate:-I	Bluff body & Stre	am line body.					
	Dime	ficance of di	/SIS imensional an	alveis Dimonsi	onal homogeneity	& methods	- Raleigh and			
6.	Buck	ingham π the	orems. Similit	ude (Types of s	imilarities). Dime	nsionless num	bers – Revnolds	7		
	Frou	le, Euler, Wel	ber, Mach, Ur	nit quantities-Spe	cific quantities, M	Iodel laws - F	Reynolds, Froude			
	Euler	, Mach		_ 1						
							Total	45		

Text Books:

- 1. Fluid Mechanics, Dr. R.K. Bansal Laxmi Publication (P) Ltd. New Delhi
- 2. Hydraulics and Fluid Mechanics Modi P. N. and Seth S. M Standard Book House.
- 3. Introduction to Fluid Mechanics and Fluid Machines S K Som and G Biswas TATA McGraw –Hill

Reference Books:

- 1. Mechanics of Fluids Merle C. Potter, David C. Wiggert and Bassem Ramadan-Cengage Learning
- 2. Fluid Mechanics Kundu, Cohen, Dowling Elsevier India
- 3. Fundamentals of Fluid Mechanics Munson, Young and Okiishi Wiley India
- 4. Fluid Mechanics, Cengel & Cimbla TATA McGraw -Hill
- 5. Fluid Mechanics F.M. White TATA McGraw-Hill
- 6. Introduction to Fluid Mechanics, Robert W. Fox, Alan T. McDonald, John W. Mitchell, John Wiley



"Knowledge tickings Freedom"

Program	m: B. Tech. (M	(echanical)			Semester: IV					
Course	: Kinematics	and Theory of	Machines				Code: BN	Code: BME4408		
		Teaching Sche	eme				Evalu	ation Sch	eme	
Lectu	re Practical	Hours	Credit	IE	MTE	ЕТЕ	TW	OR	Total	
3		3	3	20	30	50			100	
Prior K	Cnowledge of: Fundamentals of me	chanics								
b. P	Power transmission	elements used in	mechanical e	ngineeri	ng					
Course	Objectives:									
1. T	To make the student	s conversant wit	h kinematic an	alysis of	f mechani	sms appli	ied to real li	ife and indu	ıstrial	
a	pplications.									
2. T	To develop the comp	petency to analyz	ze the velocity	and acc	eleration	in mecha	nisms using	analytical	and graphical	
зт	pproacn To develop the skill	to propose and s	withesize the	linkages	and came					
4. T	To develop the com	petency to under	stand & apply	the prin	ciples of g	gear theor	y to design	various ap	plications.	
5. Т	5. To develop the competency to predict friction in clutches and brakes									
Course	Course Outcomes: After learning the course, the students should be able to:									
 Identify mechanisms in real life applications. Analyze velocity & acceleration of mechanism by analytical method and graphical method 										
 Analyze velocity & acceleration of mechanism by analytical method and graphical method Compute Frictional torque and Power in Clutch and Brake for given application and gyroscopic couple for an 										
3. C	application.									
4. S	4. Synthesize the Cam for given application									
5. A	5. Apply Fundamentals of Gear Theory and									
6. A	6. Analyze Epicyclic Gear Train for speed and Torques									
Detailed Syllabus:										
Unit	Introduction to	Description (H)								
1.	Kinematic link,	Kinematic Pai	r, Kinematic	Chain,	Mechanis	sms, Gra	shof [*] s law	, Degree	of 8	
	chain, slider and	double slider cra	ink chain, Intro	oduction	to spatial	mechani	sms	s of four b	u	
	Kinematic analy	ysis			-					
2	Kinematic analys	sis of simple pla	nar mechanisr	ns using	relative v	velocity a	and accelera	ation metho	d 8	
2.	(limitations to 6	links), Coriolis	component of	accelera	tion. (lim	it to 4 lin	iks). Kinem	atic analys	IS	
	Using complex a	lgebra method.	0		_			_		
	Uniform pressure	e and uniform w	ear theory. Frid	ction clu	tches: sin	gle plate	and multi n	late: frictic	m	
3.	torque transmiss	sion capacity. B	rakes Internal	expand	ling shoe	(drum)	brake and	disc brak	e: 8	
	braking torque an	nalysis.		-						
	Gyroscope: Gyr	oscopic Principle	e, Application	to Four	wheeler, S	Ships				
	Cam and Follow	vers			and defin	itiana Di	anla com ont			
4.	Uniform velocit	v parabolic si	nple harmoni	c and c	vcloidal	motions	cam profi	le for give	- 8	
	follower motion,	3-4-5 Polynomi	al Cams, Cam	jump ph	enomeno	n	cum prom	ie ioi give		
	Gears									
5	Gear tooth termi	nology, fundame	ental law of ge	earing ar	nd conjug	ate actior	n Involute a	nd cycloid	al 8	
	gear profiles, Spi	ur gear contact ra	atio and interfe	erence/u	ndercuttin	g, metho	ds to avoid	interferenc	e, 0	
	ritcuon in gears.									
6.	Gear Trains	nnla Compound	and Enjoyalia	agor tre	in (limita	d to sour	gaar trains	only)	5	
	Kinematics of SII	mpre, Compound	and Epicychic	gear tr	un (minte	u to spur	gear trains	onry) To	tol 45	
Tort D	-l							10	tal 45	
1 ext Boo	DKS:		m1 · 1 m 1·/·	MC	TT-11 TP 1				. 11 .	

 S. S. Rattan, "Theory of Machines", Third Edition, McGraw Hill Education (India) Pvt. Ltd., New Delhi.
 J. J. Uicker, G. R. Pennock, J. E. Shigley, "Theory of Machines and Mechanisms", Fifth Edition, International Student Edition, OxfordBevan T, "Theory of Machines", Third Edition, Longman Publication

4. G. Ambekar, "Mechanism and Machine Theory", PHI

Reference Books:

- 1. Neil Sclater, "Mechanisms and Mechanical Devices Sourcebook", Fifth Edition, Tata McGraw Hill Publication
- 2. Ghosh Malik, "Theory of Mechanism and Machines", East-West Pvt. Ltd.
- 3. Hannah and Stephans, "Mechanics of Machines", Edward Arnolde Publication
- 4. R. L. Norton, "Kinematics and Dynamics of Machinery", First Edition, McGraw Hill Education (India) P Ltd. New Delhi
- 5. Sadhu Singh, "Theory of Machines", Pearson
- 6. Dr. V. P. Singh, "Theory of Machines", Dhanpatrai and Sons
- 7. C. S. Sharma & Kamlesh Purohit, "Theory of Machine and Mechanism", PHI



Progress Credibility Coujidence Optimism Excellence

Knowledge tickings Freedom"

Course : Metrology and Mechanical Measurement Lab Code: BME4409 Teaching Scheme Evaluation Scheme Lecture Practical Hours Credit TW OR PR Total 2 2 1 25 25 50 Prior knowledge of: a. Basic mechanical components b. Optics - 50 Curse Objectives: Statistics	Program:	m: B.Tech. (Mechanical) Semester : IV										
Teaching Scheme Evaluation Scheme Lecture Practical Hours Credit TW OR PR Total 2 2 1 25 25 50 Prior knowledge of: a. Basic mechanical components b. Optics 50 a. Basic mechanical components b. Optics 50 Course Objectives: Statistics are essential Course Objectives: Statistics are essential Course Objectives: Students are expected to, 1. Select and use of suitable measuring and inspection instruments for different geometrical and dimensional measurements. Course Outcomes: 1. Use appropriate method of measurement/instruments/tools/techniques and experimental data to determine geometry & dimensions of parts in engineering applications. 3. Use modern tools for measurement, gauging and analysis. 1. Use modern tools for measurement. Detailed Syllabus:	Course :	Metrology and	d Mechanical M	leasurement La	ab	Code: BME4	409					
Lecture Practical Hours Credit TW OR PR Total - 2 2 1 25 25 50 Prior knowledge of: a. Basic mechanical components b. Optics 50 a. Basic mechanical components b. Optics 50 50 Course Objectives: Students view essential 50 Course Objectives: Students are expected to, 50 Course Objectives: Students and use of sensors and transducers for various measurements. 2. Understand and use of sensors and transducers for various measurements. 50 Detrostrate calibration process for various measurements.		Teaching	g Scheme			Evaluation S	Scheme					
- 2 2 1 25 25 50 Prior knowledge of: a. Basic mechanical components b. Optics c. Trigonometry d. Statistics 50 Course Objectives: Students are essential 50 50 Course Objectives: Students are essential 50 50 Course Outcomes: The Students will be able to, 50 The Students will be able to, 2. Understand and use of sensors and transducers for various measurements. 50 Course Objectives: Students will be able to,	Lecture	Practical	Hours	Credit	TW	OR	PR	Total				
 Prior knowledge of: a. Basic mechanical components b. Optics c. Trigonometry d. Statisticsare essential Course Objectives: Students are expected to, 1. Select and use of suitable measuring and inspection instruments for different geometrical and dimensional measurements. 2. Understand and use of sensors and transducers for various measurements. Course Outcomes: The Students will be able to, 1. Use appropriate method of measurement/instruments/tools/techniques and experimental data to determine geometry & dimensions of parts in engineering applications. 2. Demonstrate calibration process for various measuring instruments. 3. Use modern tools for measurement, gauging and analysis. 4. Apply fundamentals of instrumentation for measurement of flow/temperature/level/ proximity/speed. Detailed Syllabus: Industrial Visit is compulsory, any 8 from remaining List of Practical 1. Demonstration of linear and angular measuring instruments, slip gauges and their applications. 2. Calibration of measuring instrument, like Pressure gauge, Dial gauge, Micrometer, Vernier (any one) (Refer ISO 17025). 3. Verification of dimensions and geometry of given components using Mechanical /Pneumatic/Electrical comparator. 4. Measurement of complex components such as thread, gear, etc. 5. Demonstration of surface inspection using optical flat and surface roughness measurement using surface roughness tester. 6. To measure temperature using any temperature sensor/transducer. 7. To measure temperature using any temperature sensor/transducer. 7. To measure the load by using a load cell and its comparison with mechanical load. 8. Case study on sensor/transducer selection for any one real life application and prepare detailed report for the same. <l< th=""><th></th><th>2</th><th>2</th><th>1</th><th>25</th><th>25</th><th></th><th>50</th></l<>		2	2	1	25	25		50				
 a. Basic mechanical components b. Optics c. Trigonometry d. Statisticsare essential Course Objectives: Students are expected to, Select and use of suitable measuring and inspection instruments for different geometrical and dimensional measurements. Understand and use of sensors and transducers for various measurements. Course Outcomes: The Students will be able to, Use oppropriate method of measurement/instruments/tools/techniques and experimental data to determine geometry & dimensions of parts in engineering applications. Demonstrate calibration process for various measuring instruments. Use modern tools for measurement, gauging and analysis. Apply fundamentals of instrumentation for measurement of flow/temperature/level/ proximity/speed. Detailed Syllabus: Industrial Visit is compulsory, any 8 from remaining List of Practical Demonstration of linear and angular measuring instruments, slip gauges and their applications. Calibration of measuring instrument, like Pressure gauge, Dial gauge, Micrometer, Vernier (any one) (Refer ISO 17025). Verification of dimensions and geometry of given components using Mechanical /Pneumatic/Electrical comparator. Measurement of complex components such as thread, gear, etc. Demonstration of surface inspection using optical flat and surface roughness measurement using surface roughness tester. To measure temperature using any temperature sensor/transducer. To measure temperature using any temperature sensor/transducer. Demonstration and use of various proximity sensors in mechanical industry. Speed measurement using suitable sensor/transducer. Demonstration and use of various proximity sensors in mechanical industry. Speed measurement using suitable sensor/transducer. Industrial Visit. 	Prior know	vledge of:				•	•					
 b. Optics c. Trigonometry d. Statisticsare essential Course Objectives: Students are expected to, select and use of suitable measuring and inspection instruments for different geometrical and dimensional measurements. Understand and use of sensors and transducers for various measurements. Course Outcomes: The Students will be able to, Use appropriate method of measurement/instruments/tools/techniques and experimental data to determine geometry & dimensions of parts in engineering applications. Demonstrate calibration process for various measuring instruments. Use modern tools for measurement, gauging and analysis. A: Apply fundamentals of instrumentation for measurement of flow/temperature/level/ proximity/speed. Detailed Syllabus: Industrial Visit is compulsory, any 8 from remaining List of Practical List of Practical Demostrate on of linear and angular measuring instruments, slip gauges and their applications. Calibration of measuring instrument, like Pressure gauge, Dial gauge, Micrometer, Vernier (any one) (Refer ISO 17025). Verification of dimensions and geometry of given components using Mechanical /Pneumatic/Electrical comparator. Measurement of complex components such as thread, gear, etc. Demostrate temperature using any temperature sensor/transducer. To measure therporture using any temperature sensor/transducer. To measure temperature using any temperature sensor/transducer. To measure temperature using any temperature sensor/transducer. To measure the load by using a load cell and its comparison with mechanical load. Case study on sensor/transducer selection for any one real life application and prepare detailed report for the same. Show/Level measurement using suitable sensor/transducer. Demonstration and use of various proximity sensors in mechanic	a. Ba	sic mechanical com	ponents									
 c. Trigonometry d. Statisticsare essential Course Objectives: Students are expected to, Select and use of suitable measuring and inspection instruments for different geometrical and dimensional measurements. Understand and use of sensors and transducers for various measurements. Course Outcomes: The Students will be able to, Use appropriate method of measurement/instruments/tools/techniques and experimental data to determine geometry & dimensions of parts in engineering applications. Demonstrate calibration process for various measuring instruments. Use modern tools for measurement, gauging and analysis. Apply fundamentals of instrumentation for measurement of flow/temperature/level/ proximity/speed. Detailed Syllabus: Industrial Visit is compulsory, any 8 from remaining List of Practical Demonstration of linear and angular measuring instruments, slip gauges and their applications. Calibration of dimensions and geometry of given components using Mechanical /Pneumatic/Electrical comparator. Measurement of complex components such as thread, gear, etc. Demonstration of surface inspection using optical flat and surface roughness measurement using surface roughness tester. To measure temperature using any temperature sensor/transducer. Flow/Level measurement using suitable sensor/transducer. Flow/Level measurement using suitable sensor/transducer. Flow/Level measurement using suitable sensor/transducer. Benonstration and use of various proximity sensors in mechanical industry. Seed measurement of mechanical system/application using instruments based on non-contact and contact t	b. Op	otics										
 d. Statisticsare essential Course Objectives: Students are expected to, 1. Select and use of suitable measuring and inspection instruments for different geometrical and dimensional measurements. 2. Understand and use of sensors and transducers for various measurements. Course Outcomes: The Students will be able to, 1. Use appropriate method of measurement/instruments/tools/techniques and experimental data to determine geometry & dimensions of parts in engineering applications. 2. Demonstrate calibration process for various measuring instruments. 3. Use modern tools for measurement, gauging and analysis. 4. Apply fundamentals of instrumentation for measurement of flow/temperature/level/ proximity/speed. Detailed Syllabus: Industrial Visit is compulsory, any 8 from remaining List of Practical 1. Demonstration of linear and angular measuring instruments, slip gauges and their applications. 2. Calibration of dimensions and geometry of given components using Mechanical /Pneumatic/Electrical comparator. 4. Measurement of complex components such as thread, gear, etc. 5. Demonstration of surface inspection using optical flat and surface roughness measurement using surface roughness tester. 6. To measure temperature using any temperature sensor/transducer. 7. To measure the load by using a load cell and its comparison with mechanical load. 8. Case study on sensor/transducer selection for any one real life application and prepare detailed report for the same. 9. Flow/Level measurement using suitable sensor/transducer. 10. Demonstration and use of various proximity sensors in mechanical industry. 11. Speed measurement of mechanical system/application using instruments based on non-contact and contact type principles and its comparison. 12. Industrial Visit. 	c. Tr	igonometry										
 Course Objectives: Students are expected to, Select and use of suitable measuring and inspection instruments for different geometrical and dimensional measurements. Understand and use of sensors and transducers for various measurements. Course Outcomes: The Students will be able to, Use appropriate method of measurement/instruments/tools/techniques and experimental data to determine geometry & dimensions of parts in engineering applications. Demonstrate calibration process for various measuring instruments. Use modern tools for measurement, gauging and analysis. Apply fundamentals of instrumentation for measurement of flow/temperature/level/ proximity/speed. Detailed Syllabus: Industrial Visit is compulsory, any 8 from remaining List of Practical Demonstration of linear and angular measuring instruments, slip gauges and their applications. Calibration of measuring instrument, like Pressure gauge, Dial gauge, Micrometer, Vernier (any one) (Refer ISO 17025). Verification of dimensions and geometry of given components using Mechanical /Pneumatic/Electrical comparator. Measurement of complex components such as thread, gear, etc. Demonstration of surface inspection using optical flat and surface roughness measurement using surface roughness tester. To measure temperature using any temperature sensor/transducer. To measure temperature using any temperature sensor/transducer. Plow/Level measurement using suitable sensor/transducer. Plow/Level measurement using suitable sensor/transducer. Demonstration and use of various proximity sensors in mechanical industry. Speed measurement using suitable sensor/transducer. Demonstration and use of various proximity sensors in mechanical industry. Speed measurement of mechanical system/application using instruments based on non-contact and contact ty	d. Sta	atisticsare ess	sential									
 Students are expected to, Select and use of suitable measuring and inspection instruments for different geometrical and dimensional measurements. Understand and use of sensors and transducers for various measurements. Understand and use of sensors and transducers for various measurements. Course Outcomes: Use appropriate method of measurement/instruments/tools/techniques and experimental data to determine geometry & dimensions of parts in engineering applications. Demonstrate calibration process for various measuring instruments. Use modern tools for measurement gauging and analysis. Apply fundamentals of instrumentation for measurement of flow/temperature/level/ proximity/speed. Detailed Syllabus: Demonstration of linear and angular measuring instruments, slip gauges and their applications. Calibration of measuring instrument, like Pressure gauge, Dial gauge, Micrometer, Vernier (any one) (Refer ISO 17025). Verification of dimensions and geometry of given components using Mechanical /Pneumatic/Electrical comparator. Measurement of complex components such as thread, gear, etc. Demonstration of surface inspection using optical flat and surface roughness measurement using surface roughness tester. To measure the load by using a load cell and its comparison with mechanical load. Case study on sensor/transducer selection for any one real life application and prepare detailed report for the same. Flow/Level measurement using suitable sensor/transducer. Demonstration and use of various proximity sensors in mechanical industry. Speed measurement using suitable sensor	Course Ob	jectives:										
 Select and use of suitable measuring and inspection instruments for different geometrical and dimensional measurements. Understand and use of sensors and transducers for various measurements. Course Outcomes: Use appropriate method of measurement/instruments/tools/techniques and experimental data to determine geometry & dimensions of parts in engineering applications. Demonstrate calibration process for various measuring instruments. Use modern tools for measurement, gauging and analysis. Apply fundamentals of instrumentation for measurement of flow/temperature/level/ proximity/speed. Detailed Syllabus: Industrial Visit is compulsory, any 8 from remaining Demonstration of linear and angular measuring instruments, slip gauges and their applications. Calibration of measuring instrument, like Pressure gauge, Dial gauge, Micrometer, Vernier (any one) (Refer ISO 17025). Verification of dimensions and geometry of given components using Mechanical /Pneumatic/Electrical comparator. Measurement of complex components such as thread, gear, etc. Demonstration of surface inspection using optical flat and surface roughness measurement using surface roughness tester. To measure the load by using a load cell and its comparison with mechanical load. Case study on sensor/transducer selection for any one real life application and prepare detailed report for the same. Flow/Level measurement using suitable sensor/transducer. Demonstration and use of various proximity sensors in mechanical industry. Speed measurement of mechanical system/application using instruments based on non-contact and contact type principles and its comparison	Students are expected to,											
 Inderstand and use of sensors and transducers for various measurements. Understand and use of sensors and transducers for various measurements. Inderstand and use of sensors and transducers for various measurements. Use appropriate method of measurement/instruments/tools/techniques and experimental data to determine geometry & dimensions of parts in engineering applications. Demonstrate calibration process for various measuring instruments. Use modern tools for measurement, gauging and analysis. Apply fundamentals of instrumentation for measurement of flow/temperature/level/ proximity/speed. Detailed Syllabus: Industrial Visit is compulsory, any 8 from remaining List of Practical Demonstration of linear and angular measuring instruments, slip gauges and their applications. Calibration of measuring instrument, like Pressure gauge, Dial gauge, Micrometer, Vernier (any one) (Refer ISO 17025). Verification of dimensions and geometry of given components using Mechanical /Pneumatic/Electrical comparator. Measurement of complex components such as thread, gear, etc. Demonstration of surface inspection using optical flat and surface roughness measurement using surface roughness tester. To measure the load by using a load cell and its comparison with mechanical load. Case study on sensor/transducer selection for any one real life application and prepare detailed report for the same. Flow/Level measurement using suitable sensor/transducer. Demonstration and use of various proximity sensors in mechanical industry. Speed measurement of mechanical system/application using instruments based on non-contact and contact type principles and its comparison. Industrial Visit. 	I. Se	1. Select and use of suitable measuring and inspection instruments for different geometrical and dimensional										
 Understand and use of sensors and transducers for various measurements. Course Outcomes: The Students will be able to, Use appropriate method of measurement/instruments/tools/techniques and experimental data to determine geometry & dimensions of parts in engineering applications. Demonstrate calibration process for various measuring instruments. Use modern tools for measurement, gauging and analysis. Apply fundamentals of instrumentation for measurement of flow/temperature/level/ proximity/speed. Detailed Syllabus: Industrial Visit is compulsory, any 8 from remaining List of Practical Demonstration of linear and angular measuring instruments, slip gauges and their applications. Calibration of measuring instrument, like Pressure gauge, Dial gauge, Micrometer, Vernier (any one) (Refer ISO 17025). Verification of dimensions and geometry of given components using Mechanical /Pneumatic/Electrical comparator. Measurement of complex components such as thread, gear, etc. Demonstration of surface inspection using optical flat and surface roughness measurement using surface roughness tester. To measure temperature using any temperature sensor/transducer. To measure temperature using automprise sensor/transducer. Flow/Level measurement using suitable sensor/transducer. Demonstration and use of various proximity sensors in mechanical industry. Speed measurement of mechanical system/application using instruments based on non-contact and contact type principles and its comparison. Industrial Visit. 	me	measurements.										
 Course Outcomes: The Students will be able to, Use appropriate method of measurement/instruments/tools/techniques and experimental data to determine geometry & dimensions of parts in engineering applications. Demonstrate calibration process for various measuring instruments. Use modern tools for measurement, gauging and analysis. Apply fundamentals of instrumentation for measurement of flow/temperature/level/ proximity/speed. Detailed Syllabus: Industrial Visit is compulsory, any 8 from remaining List of Practical Demonstration of linear and angular measuring instruments, slip gauges and their applications. Calibration of measuring instrument, like Pressure gauge, Dial gauge, Micrometer, Vernier (any one) (Refer ISO 17025). Verification of dimensions and geometry of given components using Mechanical /Pneumatic/Electrical comparator. Measurement of complex components such as thread, gear, etc. Demonstration of surface inspection using optical flat and surface roughness measurement using surface roughness tester. To measure temperature using any temperature sensor/transducer. To measure the load by using a load cell and its comparison with mechanical load. Case study on sensor/transducer selection for any one real life application and prepare detailed report for the same. Flow/Level measurement using suitable sensor/transducer. Beromstration and use of various proximity sensors in mechanical industry. Seed measurement of mechanical system/application using instruments based on non-contact and contact type principles and its comparison. Industrial visit.	2. Ur	2. Understand and use of sensors and transducers for various measurements.										
 Use appropriate method of measurement/instruments/tools/techniques and experimental data to determine geometry & dimensions of parts in engineering applications. Demonstrate calibration process for various measuring instruments. Use modern tools for measurement, gauging and analysis. Apply fundamentals of instrumentation for measurement of flow/temperature/level/ proximity/speed. Detailed Syllabus: Industrial Visit is compulsory, any 8 from remaining List of Practical Demonstration of linear and angular measuring instruments, slip gauges and their applications. Calibration of measuring instrument, like Pressure gauge, Dial gauge, Micrometer, Vernier (any one) (Refer ISO 17025). Verification of dimensions and geometry of given components using Mechanical /Pneumatic/Electrical comparator. Measurement of complex components such as thread, gear, etc. Demonstration of surface inspection using optical flat and surface roughness measurement using surface roughness tester. To measure temperature using any temperature sensor/transducer. To measure temperature using any temperature sensor/transducer. Demonstration and use of various proximity sensors in mechanical industry. See study on sensor/transducer selection for any one real life application and prepare detailed report for the same. Flow/Level measurement using suitable sensor/transducer. Demonstration and use of various proximity sensors in mechanical industry. Speed measurement of mechanical system/application using instruments based on non-contact and contact type principles and its comparison. Industrial Visit. 	Course Ou	tcomes:										
 Ose appropriate method of measurement/instruments/ostreminques and experimental data to determine geometry & dimensions of parts in engineering applications. Demonstrate calibration process for various measuring instruments. Use modern tools for measurement, gauging and analysis. Apply fundamentals of instrumentation for measurement of flow/temperature/level/ proximity/speed. Detailed Syllabus: Industrial Visit is compulsory, any 8 from remaining List of Practical Demonstration of linear and angular measuring instruments, slip gauges and their applications. Calibration of measuring instrument, like Pressure gauge, Dial gauge, Micrometer, Vernier (any one) (Refer ISO 17025). Verification of dimensions and geometry of given components using Mechanical /Pneumatic/Electrical comparator. Measurement of complex components such as thread, gear, etc. Demonstration of surface inspection using optical flat and surface roughness measurement using surface roughness tester. To measure temperature using any temperature sensor/transducer. To measure temperature using any temperature sensor/transducer. Demonstration and use of various proximity sensors in mechanical industry. Speed measurement using suitable sensor/transducer. Demonstration and use of various proximity sensors in mechanical industry. Speed measurement of mechanical system/application using instruments based on non-contact and contact type principles and its comparison. 		is will be able to,	had of massure	mont/instrumon	te/tools/toohnigu	as and avnorin	aantal data to	datarmina				
 Demonstrate calibration process for various measuring instruments. Use modern tools for measurement, gauging and analysis. Apply fundamentals of instrumentation for measurement of flow/temperature/level/ proximity/speed. Detailed Syllabus: Industrial Visit is compulsory, any 8 from remaining List of Practical Demonstration of linear and angular measuring instruments, slip gauges and their applications. Calibration of measuring instrument, like Pressure gauge, Dial gauge, Micrometer, Vernier (any one) (Refer ISO 17025). Verification of dimensions and geometry of given components using Mechanical /Pneumatic/Electrical comparator. Measurement of complex components such as thread, gear, etc. Demonstration of surface inspection using optical flat and surface roughness measurement using surface roughness tester. To measure the load by using a load cell and its comparison with mechanical load. Case study on sensor/transducer selection for any one real life application and prepare detailed report for the same. Flow/Level measurement using suitable sensor/transducer. Demonstration and use of various proximity sensors in mechanical industry. Speed measurement of mechanical system/application using instruments based on non-contact and contact type principles and its comparison. Industrial Visit. 	1. US	ometry & dimension	nod of measure	rineering applica	tions	es and experin	iental data to	determine				
 Definition are canotation process for various necksing instantials. Use modern tools for measurement, gauging and analysis. Apply fundamentals of instrumentation for measurement of flow/temperature/level/ proximity/speed. Detailed Syllabus: Industrial Visit is compulsory, any 8 from remaining List of Practical Demonstration of linear and angular measuring instruments, slip gauges and their applications. Calibration of measuring instrument, like Pressure gauge, Dial gauge, Micrometer, Vernier (any one) (Refer ISO 17025). Verification of dimensions and geometry of given components using Mechanical /Pneumatic/Electrical comparator. Measurement of complex components such as thread, gear, etc. Demonstration of surface inspection using optical flat and surface roughness measurement using surface roughness tester. To measure the load by using a load cell and its comparison with mechanical load. Case study on sensor/transducer selection for any one real life application and prepare detailed report for the same. Flow/Level measurement using suitable sensor/transducer. Demonstration and use of various proximity sensors in mechanical industry. Speed measurement of mechanical system/application using instruments based on non-contact and contact type principles and its comparison. Industrial Visit. 	$2 \mathbf{D}_{e}$	monstrate calibrat	ion process for y	arious measurin	instruments							
 Oscination of instrumentation for measurement of flow/temperature/level/ proximity/speed. Apply fundamentals of instrumentation for measurement of flow/temperature/level/ proximity/speed. Detailed Syllabus: Industrial Visit is compulsory, any 8 from remaining List of Practical Demonstration of linear and angular measuring instruments, slip gauges and their applications. Calibration of measuring instrument, like Pressure gauge, Dial gauge, Micrometer, Vernier (any one) (Refer ISO 17025). Verification of dimensions and geometry of given components using Mechanical /Pneumatic/Electrical comparator. Measurement of complex components such as thread, gear, etc. Demonstration of surface inspection using optical flat and surface roughness measurement using surface roughness tester. To measure temperature using any temperature sensor/transducer. To measure the load by using a load cell and its comparison with mechanical load. Case study on sensor/transducer selection for any one real life application and prepare detailed report for the same. Flow/Level measurement using suitable sensor/transducer. Demonstration and use of various proximity sensors in mechanical industry. Speed measurement of mechanical system/application using instruments based on non-contact and contact type principles and its comparison. Industrial Visit. 	2. De 3. Us	e modern tools for	measurement ga	uging and analy	sis							
 Detailed Syllabus: Industrial Visit is compulsory, any 8 from remaining List of Practical Demonstration of linear and angular measuring instruments, slip gauges and their applications. Calibration of measuring instrument, like Pressure gauge, Dial gauge, Micrometer, Vernier (any one) (Refer ISO 17025). Verification of dimensions and geometry of given components using Mechanical /Pneumatic/Electrical comparator. Measurement of complex components such as thread, gear, etc. Demonstration of surface inspection using optical flat and surface roughness measurement using surface roughness tester. To measure temperature using any temperature sensor/transducer. To measure the load by using a load cell and its comparison with mechanical load. Case study on sensor/transducer selection for any one real life application and prepare detailed report for the same. Flow/Level measurement using suitable sensor/transducer. Demonstration and use of various proximity sensors in mechanical industry. Speed measurement of mechanical system/application using instruments based on non-contact and contact type principles and its comparison. 	3. US	ply fundamentals c	of instrumentatio	n for measureme	ent of flow/temp	erature/level/ pro	oximity/speed					
 Industrial Visit is compulsory, any 8 from remaining List of Practical Demonstration of linear and angular measuring instruments, slip gauges and their applications. Calibration of measuring instrument, like Pressure gauge, Dial gauge, Micrometer, Vernier (any one) (Refer ISO 17025). Verification of dimensions and geometry of given components using Mechanical /Pneumatic/Electrical comparator. Measurement of complex components such as thread, gear, etc. Demonstration of surface inspection using optical flat and surface roughness measurement using surface roughness tester. To measure temperature using any temperature sensor/transducer. To measure the load by using a load cell and its comparison with mechanical load. Case study on sensor/transducer selection for any one real life application and prepare detailed report for the same. Flow/Level measurement using suitable sensor/transducer. Demonstration and use of various proximity sensors in mechanical industry. Speed measurement of mechanical system/application using instruments based on non-contact and contact type principles and its comparison. Industrial Visit. 	Detailed S	vllabus:				interest of the test of pro-	, speca.					
 List of Practical Demonstration of linear and angular measuring instruments, slip gauges and their applications. Calibration of measuring instrument, like Pressure gauge, Dial gauge, Micrometer, Vernier (any one) (Refer ISO 17025). Verification of dimensions and geometry of given components using Mechanical /Pneumatic/Electrical comparator. Measurement of complex components such as thread, gear, etc. Demonstration of surface inspection using optical flat and surface roughness measurement using surface roughness tester. To measure temperature using any temperature sensor/transducer. To measure the load by using a load cell and its comparison with mechanical load. Case study on sensor/transducer selection for any one real life application and prepare detailed report for the same. Flow/Level measurement using suitable sensor/transducer. Demonstration and use of various proximity sensors in mechanical industry. Speed measurement of mechanical system/application using instruments based on non-contact and contact type principles and its comparison. Industrial Visit. 	Industrial	Visit is compulsory	, any 8 from re	maining								
 Demonstration of linear and angular measuring instruments, slip gauges and their applications. Calibration of measuring instrument, like Pressure gauge, Dial gauge, Micrometer, Vernier (any one) (Refer ISO 17025). Verification of dimensions and geometry of given components using Mechanical /Pneumatic/Electrical comparator. Measurement of complex components such as thread, gear, etc. Demonstration of surface inspection using optical flat and surface roughness measurement using surface roughness tester. To measure temperature using any temperature sensor/transducer. To measure the load by using a load cell and its comparison with mechanical load. Case study on sensor/transducer selection for any one real life application and prepare detailed report for the same. Flow/Level measurement using suitable sensor/transducer. Demonstration and use of various proximity sensors in mechanical industry. Speed measurement of mechanical system/application using instruments based on non-contact and contact type principles and its comparison. Industrial Visit. 	List of Pra	ctical	•	U								
 Calibration of measuring instrument, like Pressure gauge, Dial gauge, Micrometer, Vernier (any one) (Refer ISO 17025). Verification of dimensions and geometry of given components using Mechanical /Pneumatic/Electrical comparator. Measurement of complex components such as thread, gear, etc. Demonstration of surface inspection using optical flat and surface roughness measurement using surface roughness tester. To measure temperature using any temperature sensor/transducer. To measure the load by using a load cell and its comparison with mechanical load. Case study on sensor/transducer selection for any one real life application and prepare detailed report for the same. Flow/Level measurement using suitable sensor/transducer. Demonstration and use of various proximity sensors in mechanical industry. Speed measurement of mechanical system/application using instruments based on non-contact and contact type principles and its comparison. Industrial Visit. 	1. Der	nonstration of linear	r and angular me	asuring instrum	ents, slip gauges	and their applica	ations.					
 Verification of dimensions and geometry of given components using Mechanical /Pneumatic/Electrical comparator. Measurement of complex components such as thread, gear, etc. Demonstration of surface inspection using optical flat and surface roughness measurement using surface roughness tester. To measure temperature using any temperature sensor/transducer. To measure the load by using a load cell and its comparison with mechanical load. Case study on sensor/transducer selection for any one real life application and prepare detailed report for the same. Flow/Level measurement using suitable sensor/transducer. Demonstration and use of various proximity sensors in mechanical industry. Speed measurement of mechanical system/application using instruments based on non-contact and contact type principles and its comparison. Industrial Visit. 	2. Cal	ibration of measurin	ng instrument, li	ke Pressure gaug	<mark>ge, Dial</mark> gauge, M	Aicrometer, Ver	nier (any one) (Refer ISO				
 Verification of dimensions and geometry of given components using Mechanical /Pneumatic/Electrical comparator. Measurement of complex components such as thread, gear, etc. Demonstration of surface inspection using optical flat and surface roughness measurement using surface roughness tester. To measure temperature using any temperature sensor/transducer. To measure the load by using a load cell and its comparison with mechanical load. Case study on sensor/transducer selection for any one real life application and prepare detailed report for the same. Flow/Level measurement using suitable sensor/transducer. Demonstration and use of various proximity sensors in mechanical industry. Speed measurement of mechanical system/application using instruments based on non-contact and contact type principles and its comparison. Industrial Visit. 	170	25).										
 Measurement of complex components such as thread, gear, etc. Demonstration of surface inspection using optical flat and surface roughness measurement using surface roughness tester. To measure temperature using any temperature sensor/transducer. To measure the load by using a load cell and its comparison with mechanical load. Case study on sensor/transducer selection for any one real life application and prepare detailed report for the same. Flow/Level measurement using suitable sensor/transducer. Demonstration and use of various proximity sensors in mechanical industry. Speed measurement of mechanical system/application using instruments based on non-contact and contact type principles and its comparison. Industrial Visit. 	3. Ver	ification of dimer	nsions and geo	metry of given	n components	using Mechani	cal /Pneumatic	/Electrical				
 Industrient of complex components such as mead, gear, etc. Demonstration of surface inspection using optical flat and surface roughness measurement using surface roughness tester. To measure temperature using any temperature sensor/transducer. To measure the load by using a load cell and its comparison with mechanical load. Case study on sensor/transducer selection for any one real life application and prepare detailed report for the same. Flow/Level measurement using suitable sensor/transducer. Demonstration and use of various proximity sensors in mechanical industry. Speed measurement of mechanical system/application using instruments based on non-contact and contact type principles and its comparison. Industrial Visit. 	4 Me	asurement of compl	ex components s	such as thread o	ear etc							
 Beinfordutation of sufface inspection along optical that and sufface roughness include online along sufface roughness tester. To measure temperature using any temperature sensor/transducer. To measure the load by using a load cell and its comparison with mechanical load. Case study on sensor/transducer selection for any one real life application and prepare detailed report for the same. Flow/Level measurement using suitable sensor/transducer. Demonstration and use of various proximity sensors in mechanical industry. Speed measurement of mechanical system/application using instruments based on non-contact and contact type principles and its comparison. Industrial Visit. 	5 Der	nonstration of sur	face inspection	using optical t	flat and surface	roughness me	asurement usir	og surface				
 6. To measure temperature using any temperature sensor/transducer. 7. To measure the load by using a load cell and its comparison with mechanical load. 8. Case study on sensor/transducer selection for any one real life application and prepare detailed report for the same. 9. Flow/Level measurement using suitable sensor/transducer. 10. Demonstration and use of various proximity sensors in mechanical industry. 11. Speed measurement of mechanical system/application using instruments based on non-contact and contact type principles and its comparison. 12. Industrial Visit. 	rou	ghness tester.	nuce mopeetion	using optical	that and surface	10uginiess me	usu ement usu	ig surface				
 To measure the load by using a load cell and its comparison with mechanical load. Case study on sensor/transducer selection for any one real life application and prepare detailed report for the same. Flow/Level measurement using suitable sensor/transducer. Demonstration and use of various proximity sensors in mechanical industry. Speed measurement of mechanical system/application using instruments based on non-contact and contact type principles and its comparison. Industrial Visit. 	6. To	measure temperatur	e using any tem	oerature sensor/t	ansducer.							
 Case study on sensor/transducer selection for any one real life application and prepare detailed report for the same. Flow/Level measurement using suitable sensor/transducer. Demonstration and use of various proximity sensors in mechanical industry. Speed measurement of mechanical system/application using instruments based on non-contact and contact type principles and its comparison. Industrial Visit. 	7. To	measure the load by	using a load cel	l and its compar	ison with mecha	nical load.						
 same. 9. Flow/Level measurement using suitable sensor/transducer. 10. Demonstration and use of various proximity sensors in mechanical industry. 11. Speed measurement of mechanical system/application using instruments based on non-contact and contact type principles and its comparison. 12. Industrial Visit. 	8. Cas	e study on sensor/1	transducer select	tion for any one	e real life applic	ation and prepa	re detailed rep	ort for the				
 Flow/Level measurement using suitable sensor/transducer. Demonstration and use of various proximity sensors in mechanical industry. Speed measurement of mechanical system/application using instruments based on non-contact and contact type principles and its comparison. Industrial Visit. 	sam	ne.	traduct	cost the h	and Fra	ndonr						
 Demonstration and use of various proximity sensors in mechanical industry. Speed measurement of mechanical system/application using instruments based on non-contact and contact type principles and its comparison. Industrial Visit. 	9. Flo	w/Level measureme	ent using suitable	e sensor/transduc	er.	a same						
 Speed measurement of mechanical system/application using instruments based on non-contact and contact type principles and its comparison. Industrial Visit. 	10. Der	nonstration and use	of various proxi	mity sensors in 1	nechanical indus	stry.						
principles and its comparison. 12. Industrial Visit.	11. Spe	ed measurement of	mechanical sys	tem/application	using instrumen	ts based on non	-contact and co	ontact type				
12. Industrial Visit.	prin	ciples and its comp	arison.									
	12. Ind	ustrial Visit.										

Program:	B. Tech. (I	Mechanical)				Semester : IV							
Course :	Applied T	hermodynan	nics Lab			Code: BM	ode: BME4410						
	Teac	ching Scheme	е			Evaluat	V E4410 ion Scheme TW PR Tota 25 50 75 Sssors Sssors Sssors compulsory, any one of Exp Esheet etc tling Calorimeter Tmal Efficiency, Heat rejected oftware. Y, BSFC, Torque, Volumetria y parameters Image: Structure of the structure						
Lecture	Practical	Hours	Credit	IE	MTE	ЕТЕ	TW	PR	Total				
	2	2	1				25	50	75				
Prior Know	ledge of :					1							
a. Fun	damental cond	cepts of thern	nodynamics										
b. Law	s of thermody	ynamics	_										
c. Use	of steam table	es and Mollie	r chart										
d. Idea	I Gas Equatio	ons and proces	sses 1s es	ssential									
	understand the	theory and r	orformance c	algulation	of reciprocat	ting air compre	accore						
1. 10t	 To understand the performance evaluation of boilers 												
3. To study various thermodynamic cycles with gas and steam as working medium													
4. To s	4. To get familiar with the characteristics of compressible fluid flow												
5. To i	understand the	analysis of f	lue gases and	calculatio	n of Air fuel 1	ratio.							
Course Outo	comes:		U			1111							
The learners	will be able to	C											
1. Ana	lyze the perfo	ormance of Re	eciprocating A	Air Compr	essor.								
2. Ana	lyze the perfo	ormance of bo	oiler.										
3. Ana	lyze the perfo	ormance of S.	I. and C. I. En	igine.									
4. Ana	lyze steady or	ne-dimension	al isentropic o	compressi	ble fluid flow.								
5. Use	software tool	s to do param	etric analysis	of therma	al systems and	l cycles							
				etailed Sy	Ilabus:								
		6.1 6.11	List of L	aborator	y Experiment	ts		-	6 F				
Total Eight	experiments	of the follow	ing are to be	performe	d (Expt. 3, 4,	5 and 13 are	compulsor	y, any one	of Expt				
1 and 2 , and 1 Det	y one of Exp	colorific Vol	iy three of Ex	xpt. 8 to 1	2)								
1. Dete	ermination of	Chand Cy of	ile of Solid/ G	raseous ru	lei								
3 Trai	l on Boiler to	determine Ef	ficiency Fau	ivalent Ev	aporation Rat	e Heat Balanc	e Sheet etc						
4 Dete	ermination of	Dryness fract	tion of steam l	hy using (Combined sen	arating & Thro	ttling Calor	imeter					
5. Trai	1 on reciproca	ating Air con	pressor to de	termine v	olumetric effi	ciency. Isothe	rmal Efficie	ency. Heat	rejected				
in ir	itercooler.		iprossor to de					, 110 J, 110 at	rejected				
6. Ana	lysis of comp	ressible fluid	flow by using	g Engineer	ing Equation	Solver (EES) s	software.						
7. Den	nonstration of	Compressibl	e fluid flow th	rough con	vergent- Dive	ergent Nozzle							
8. Var	iable load tes	t on Single of	cylinder CI er	ngine to c	letermine the	rmal efficiency	y, BSFC, 7	Forque, Vol	lumetric				
effic	ciency												
9. Tria	l on single cy	linder CI eng	ine to calculat	e heat bal	ance sheet								
10. Var	iable speed ter	st on Multi cy	linder S.I. eng	gine to de	termine variou	is performance	e parameter	s					
11. Mor	se test on Mu	lti cylinder S	I. engine										
12. Gen	eration of P-tl	heta diagram	of C.I. / S. I. I	Engine									
13. Ana	lysis of exhau	ist gases of S.	I. and C.I. En	gines.									
Tort Boolist		unizing bone											
1 V	Concel & Bole	s. Thermody	namice - An I	Engineerin	a Approach	Tata McGraw	H(11						
1. 1.C	 Y. Cengel & Boles: Inermodynamics – An Engineering Approach, Tata McGraw-Hill P. K. Nag, Engineering Thermodynamics, Tata McGraw Hill Publications 												
3. Mahesh M. Rathore. Thermal Engineering. Tata McGraw-Hill													
Reference B	Reference Books:												
1. Mic	hael Moran, H	Howard Shapi	ro, Fundamen	tals of En	gineering The	ermodynamics,	John Wile	V					
2. Clau	us Borgnakke.	, Richard E. S	Sonntag, Fund	amentals of	of Engineering	g Thermodyna	mics, John	Wiley					
3. M. A	Achuthan, Eng	gineering The	rmodynamics	, PHI Lea	rning Pvt. Ltd	i.		-					
4. V. C	Ganesan, "Inte	ernal Combus	tion Engines"	, Tata Mc	Graw-Hill								
1. M. I	L. Mathur and	R.P. Sharma	, "A course in	Internal of	combustion er	ngines", Dhanp	oat Rai & C	0.					
2. Intro	oduction to Fl	uid Mechanic	es, Robert W.	Fox, Alan	T. McDonald	l, John W. Mit	chell, John	Wiley					

Program:	B. Tech. (Med	hanical)					Semester	: IV			
Course:	Kinematics a	nd Theory of I	Machines Lab	<u> </u>			Code: BN	/E4411			
course.	Trinematics a	Feaching Sche	me	, 			Evalua	ation Sche	me		
							Livalua				
Lecture	Practical	Hours	Credit	IE	MTE	ETE	TW	OR	Total		
	2	2	1				25	50	75		
Prior Knowl	ledge of										
a. Funda	amentals of mec	hanics	1 . 1								
b. Powe	r transmission e	lements used in	n mechanical e	engineeri	ng						
c. Types	s of Motion	are essential									
Course Obje	ectives:	conversant wi	h trinomotio o		fmaahani	ama annli	ind to maple 1	fo and ind	notrio 1		
	ake the students	conversant wi	in kinematic a	liarysis 0.	i mechani	sins appi	led to real li	le and mo	usulai		
applic 2 To da	cations.	atonay to analy	za tha valoait	, and aco	aloration	in maahar	niama naina	apolytical	and graphical		
2. 10 de	ach	etency to analy	ze the velocity			in meena	lisilis usilig	anaryucar	and graphical		
3. To develop the skill to propose and synthesize the linkages and cams											
 To develop the competency to understand & apply the principles of gear theory to design various applications. 											
 To develop the competency to understand & appry the principles of gear theory to design various appreations. To develop the competency to predict friction in clutches and brakes 											
Course Outcomes:											
After learning the course, the students should be able to:											
1. Identify mechanisms in real life applications and perform kinematics analysis for mechanisms.											
 Analyze velocity & acceleration of mechanism by analytical method and graphical method 											
3. Compute Frictional torque and Power in Clutch and Brake for given application and gyroscopic couple for an											
appl	ication				Ũ			•			
4. Synt	thesize Cam for	given applicati	on.								
5. App	ly Fundamental	s of Gear Theo	ry								
6. Ana	lyze Epicyclic C	Gear Train for s	peed and Torc	que					-		
			Detail	ed Syllal	ous:				100 C		
A. Laborato	ry Experiments	s (Any 4):									
1. Iden	tify real life me	chanism for typ	oes of links, jo	int and n	nobility (F	Presentation	on)				
2. To s	tudy manufactu	ring of gear us	ing gear generation	ation wit	h rack as	a cutter ai	nd to genera	ate an invo	lute profile.		
3. Spee	ed and torque an	alysis of Epicy	clic gear train	to deterr	nine hold	ing torque	e.				
4. Kine	ematic analysis of	of Constant me	sh, Sliding me	esh and S	ynchrome	esh Gearb	OX				
5. To c	letermine frictio	n torque capac	ity of a clutch.								
6. To v	verify the gyrosc	copic principle.									
D D	A · · - · · · · · · · · · · · ·	2	A 2) -								
B. Drawing	Assignments (A	() () () () () () () () () () () () () (Any 3):	iam (limi	itad to 6 li	intra) main	a malativa v	alaaitu ana	l malativa		
	y and acceleration	on analysis of j	fianar mechan			inks) usin	g relative v	elocity and	I relative		
2 Valocit	wand accoloration	on analysis of	lanor machan	iem invo	lying coir	acidant no	into with ro	lativa mot	ion (limited to		
2. Velocit		on analysis of j	Jana meenan		iving con	icident po	mits with re		ion (minied to		
4 IIIKS) 3. To generate a conjugate profile for a given tooth profile											
4. To draw Cam profiles for given follower motions											
4. To draw Cam promes for given follower motions											
C. Computer Aided Assignments (Any 2):											
1. Velocity and acceleration analysis of planar mechanism using any simulation software											
2. Analysi	is of slider crank	mechanism a	nd validating t	he same	with any i	programm	ning softwar	re			
3. Analvti	cal synthesis of	four bar mecha	anism and vali	dating th	e same w	ith any pr	ogramming	software			
4. To sim	ulate Cam profil	es for various	follower motio	on and co	mparison	for differ	ent perform	nance para	meters		

Progra	Program: B. Tech. Semester : IV								
Cours	e :	Numerical	Methods (O)	pen Elective-	I)		Code: BAS460	1	
		Teaching Scl	heme			Evaluati	on Scheme		
L	ecture	Practical	Hours	Credit	IE	MTE	ETE	Total	
	3	-	3	3	20	30	50	100	
Prior	Knowledge of	f:				•			
a.	Univariate Ca	alculus							
b.	Multivariate	Calculusa	re essential						
Cours	e Objectives:			• . • • •					
This co	ourse aims at	enabling stude	nts to get acq	uainted with,					
1.	Numerical to	christian to se	Numerical N	intion integr	ve systems of fine	ear equations.	fforantial aquation	s and thair	
2.	applications	chiliques to s	orve unterent	lation, integr	ation, orunnary a	nu partiai ui	ilerentiai equation	s, and then	
3.	3. Open-source software to perform numerical techniques.								
Cours	Course Outcomes:								
After 1	earning the co	ourse, the stude	ents will be al	ole to:					
1.	Understand a	and perform th	e numerical n	nethods to sol	ve the systems of	linear equati	ons		
2.	Evaluate diffe	erentiation and	l integration u	using different	Numerical meth	ods.			
3.	Understand	basic operator	s, packages,	syntax of ope	<mark>en-sou</mark> rce softwa	e and develo	op a program for	systems of	
]	linear equation	ns, differentiat	ion and Integ	ration using.			· · · · · · · · · · · · · · · · · · ·		
4.	Solve ordinar	y differential e	quations of fi	rst order using	g single & multis	tep numerical	methods.	, , .	
5.	Apply explicit	t and implicit	methods to s	olve the partia	al differential equ	lations viz Oi	ne-dimensional He	at equation,	
6	Analyze the s	olution of OD	Equations. E & PDE using the second	ng open sourc	e software				
0	Analyze the s	orution of OD.	E & FDE usi	Detailed	Svllabus.			_	
		_		Detailed	Synabus.		100	Duration	
Unit	1.00			Descrip	otion			(H)	
1.	System of	linear equat	ions: Gauss	elimination n	nethod by pivoti d: Jacobi and Ga	ng, Gauss-Jo uss-Seidel ite	rdan method, LU	7	
	Numerical	Integration:	Difference fo	ormulae for n	umerical differen	tiation. Bool	e's rule. Romberg		
2.	integration	and Gauss qua	adrature for d	ouble & triple	integration.		• • • • • • • • • • • • • • •	8	
2	Problem S	olving-I: Solu	itions of syste	ems of linear	equations, Differ	entiation and	Integration using	0	
3.	open source	e software.		1				8	
4	Ordinary	differential eq	quations: Eul	er's method,]	Modified Euler's	method, Run	ge-Kutta 4 th order	7	
	methods, p	redictor correc	ctor method.	1000				,	
	Partial Dif	ferential Equ	ations: Expli	cit and Implie	cit method, Stabil	ity of finite d	lifference method,		
5.	Application	ns of finite di	fference analy	ysis in bound	ary value proble	ms: one dim	ensional diffusion	7	
	equation, V	vave equation,	Laplace equa	ation.					
6.	Problem S	olving-II: So	olutions of or	dinary and p	artial differential	equations u	sing open source	8	
	software.			-			Total	45	
Text F	Books:						1000	-10	
1.	S.S. Sastry,	"Introductory	Methods of N	umerical Ana	lysis", PHI learn	ing Pvt Ltd, 5	th Edition, ISBN 1	0:	
	9788120345	928							
2.	B. S. Grewa	l, "Numerical	Methods in E	ngineering &	Science", Khann	a Publishers,	43 rd Edition, ISBN	I	
	13: 9788174	092489							
Refere	ence Books:			15		N 411 G		T t t th	
1.	S.R.K. Iyen	gar, Rajendra	K. Jain, "Adv 2659469	anced Engine	ering Mathematic	cs", Alpha Sc	ience International	, Ltd,4"	
2	Edition, ISBN 15. 9701042030400 2 B.V. Ramana, "Higher Engineering Mathematics" Tata McGraw Hill, 34 edition, ISBN 13:0780070634100								
3	Abhishek K	Gunta " Num	erical Method	ls using MAT	LAB" Springer	First Edition	ISBN 13 [.] 978148	4201541	
4.	Victor A. B	loomfield. "Us	sing R for Nu	merical Analy	sis in Science and	d Engineering	2". CRC Press. Firs	st Edition.	
	ISBN: 9781	315360492	0			0 2	,	,	
e-sour	ces:								
1.	NPTEL C	ourse lectures	links:						
	https://npte	l.ac.in/courses	/127/106/127	<u>106019/</u> (Met	hods of root find	ing)			
	https://npte	Lac.in/courses	/115/103/115	<u>103114/</u> (NM	& Simulation)	• 、			
2	https://npte	Bombard Provident	/122/106/122	<u>106033/</u> (N.M	1. with programm	nng)	ounlist star		
Ζ.	v-IaD (111	-dombay) im	к: <u>nup://viabs</u>	.ntd.ac.in/vla	us-dev/labs/nume	ancal_lab/labs	s/explisi.php		

Progr	Program: B.Tech.(All branches) Semester: IV								
Cou	rse:	Mathematic	al Optimizatio	on (Open Elec	tive-I)	Code:BAS4	602		
		Teaching	Scheme			Evaluation Scl	neme		
Lec	ture	Practical	Hours	Credit	IE	MTE	ETE	Total	
3	3	-	3	3	20	30	50	100	
Prior a. b. c.	Knowle Linear Multiv Applie	edge: Algebra & Uni ariate Calculus, d Mathematics.	variate Calculu	is,	10				
1. 2. 3.	Develo Get far Unders	p a practical ap niliar with man stand the differe	proach to math y commonly u nt mathematic	abiling students nematical probl sed tools and to al approaches	e to em solving. echniques in numeric for optimization.	al work.			
Cours	e Outc	omes:		1					
 Course Outcomes: After learning the course, the students will be able to: Formulate and solve linear programming models using basic theoretical principles. Apply variants of Simplex methods and duality to find optimal solutions for constrained and unconstrained problems. Understand basic operators, packages, syntax of software to develop programs to optimize Linear Programming Problems. Solve transportation and assignment problems using optimization techniques. 									
6.	Develo	p programs for	transportation	and assignmen	nt problems and Non	linear Programmi	ng problems		
Unit	Ľ.		/	Detail Desc	ed Syllabus: ription			Duration (H)	
1.	LinearProgramming(LP)-I:Introduction,formulationofLinearProgramming problems, Graphical solution method, alternative or multiple optimal solutions, Unbounded solutions, In feasible solutions, Maximization–Simplex Method.								
2.	Linea metho solutio	r Programmin d, Two phase ons.	ng (LP)-II: M method, Un	inimization – restricted varia	Simplex method, Si ables, Degeneracy,	mplex Algorithm Types of linear	n using Big-M programming	8	
3.	Duali Probl	ty: Duality in li em Solving-I: S	near programn Solutions of Ll	ning, Formulat Pusing softwar	ion of Dual Linear pr re	cogramming prob	lems.	8	
4.	Trans transp metho Assign Assign	sportation Pr ortation algorit d, VOGEL''s ap nment Problem nment problems	oblems: Introduction hm, Methods pproximation r ms: Introduction using Hungar	oduction, Ma of finding in nethod, Optima ion, Mathemat ian method, va	athematical model itial solutions: North ality of initial solution itical model of Assi riations in Assignment	of transportat n-west Corner ru n using MODI M gnment problems	ion problem, ile, Least cost lethod. , solutions to	7	
5.	Netwo Projec	ork Analysis: 1 et scheduling wi	Network diagr th uncertain ac	am, Project ma ctivity time, Pro	anagement: PERT an oject time-cost, trade	nd CPM, Critical - off.	path analysis,	8	
6.	Nonli metho Probl optim	near program d, Quadratic pr em Solving-II ization problem	ming: Introduc ogramming: K Solutions s using softwa	ction, General uhn-Tucker co of Assignmen re.	nonlinear programm nditions. nts and Transporta	ing problem, Gra	phical solution and nonlinear	7	
Text 1. 2.	Books Rao S Taha	: . S, Engineerin Hamdy, Operat	g Optimization	theory and Pr An Introductio	actice, Willy, Easter n, Pearson Education	Ltd.4 th Edition, IS	10tal SBN: 978-0-470 N:0134444019	45)- 18352-6	
Refe 1. 2. 3. 4. 5. 6.	 Sharma S.D. Operation Research, Kadar Nath Ram Nath & Co. Edition, ISBN: 9380803389 Matteo Fischetti, "Introduction to mathematical optimization", 1st Edition, ISBN:9781692792022 Judith L.Gersting, "Mathematical Structures for Computer Science", Freeman Co,4th Edition, ISBN: 9780716783060 Peter V. O'Neil, "Advanced Engineering Mathematics", Thomson Learning,7th Edition, ISBN13: 9781337274524 Hira and Gupta, "Operation research", S. Chand publication, ISBN (13): 9788121909686. Sharma J.K. "Operations Research-Theory and Applications", Trinity Press, 6th Edition, ISBN:9789385935145 								
e-sou	irces: 1.NPTH <u>http</u>	ELCourselectur os://nptel.ac.in/c	reslinks: 2000/2007/2007/2007/2007/2007/2007/2007	<u>2/111102012/(</u> 6/110106059/(LPP) Transportation&Ass	ignmentsProblem	8)		

Prog	ram:	B. Tech. (Mechanical) Semester : IV								
Cou	rse :	Calculus of Va	ariation (Open H	Elective-I)		Code : BA	Code : BAS4603			
		Teaching S	cheme			Evaluation	Scheme			
Le	cture	Practical	Hours	Credit	IE	MTE	ЕТЕ	Total		
	3	-	3	3	20	30	50	100		
Prio	r knowled	ge of:	, v	, C		00		200		
a. b.	Linear A Multiva	Algebra & Univar riate Calculus	iate Calculus are essential.							
	Course Objectives: After completion of the course, students will have adequate background, conceptual clarity and knowledge of									
math	After completion of the course, students will have adequate background, conceptual clarity and knowledge of mathematical principles related to:									
1.	1. Formulation of variational problems and analysis of key properties of system behavior.									
2	. Constru	uction of variation	al problem for m	ultivariate fur	ctional and it's s	olution				
3.	3. Application of mathematical methods of calculus of variation to construct finite element structure for several									
Cou	rse Outco	mes:	- LON 1 1		1.11					
After	learning t	he course, the stu	dents should be a	ble to:		1.				
1	. Solve v	rariational problem	ns to optimize co	nstrained and	unconstrained fu	nctional.	ational			
2.	. Appiy Unders	stand basic operat	equation to deter	mine stationa	ry pains of a mul	ograms to opt	imize functio	nal		
4	Apply	theory & techniqu	es of calculus of	variation for	boundary value p	roblems.	ninze runeuo.	itur.		
5	. Discuss	s finite element m	odels for ordinar	y differential of	equations.					
6.	. Analyz	e the solution and	FEM models of	ordinary diffe	rential equations	using open-se	ource softwar	e.		
	Detailed Syllabus:									
Unit	1.00			Description				(H)		
	The foundations of calculus of variations									
	Introduct	tion, The Euler-L	agrange differen	tial equation,	Minimal path 1	problems, ope	ens boundary	-		
1	Constrai	al problems.	nrohlems					- 1		
1.	Algebrai	c boundary condit	ions, Lagrange's	solution, Isop	erimetric problem	ms, Closed-lo	op integrals,			
	Multiva	riate functional						-		
	Variation	al problems in j	parametric form,	Functional variables (on	with two indepe	endent variab	les, Minimal			
2	Higher of	order derivatives	lifee independent		ry conversion).			8		
2.	The Eule	er-Poisson equation	on, The Euler-Po	isson system	of equations, Al	lgebraic const	raints on the			
	derivativ	e. Solving L								
3.	Solutions	s of constrained ar	nd unconstrained	variational pr	oblems using ope	en source soft	ware.	8		
4.	Approxi	mate methods		1 1	1			7		
	Euler's 1	method, Rayleigh-	-Ritz method, Ga	lerkin's meth	od					
5.	Boundar	y integral method,	Finite element n	nethod, Case S	Studies.			8		
6.	Problem	Solving-II: Solu	tions of Approxin	nate and FEM	I models using of	pen source sof	tware.	7		
							Total	45		
1 ext	Mark Ko	ot. "A First Course	e in the Calculus	of Variations'	AMS_ISBN: 9	78-1-4704-14	95-5			
 A.S. Gupta , "Calculus of Variation with applications", PHI Learning PVT LTD, ISBN: 978-8120311206 										
1. 2.	 L.Eisgons, Differential equations and calculus of variations, MIR Publications, ISBN 13: 978-1410210678 B. S. Grewal, "Higher Engineering Mathematics". Khanna Publication. 42 Edition. ISBN 13: .9788174091955 									
3.	Krishnar	no orthy C. S., "F	inite element ana	lysis: theory a	nd programming	, Mcgraw hi	Il education (J	ndia) pvt.		
	Ltd., 2 E	dition, ISBN 13:	9780074622100		_ _	-	Ì.	-		
4.	Moaveni	, Saeed, "Finite el	lement analysis: t	heory and app	plication with ans	sys" Pearson e	ducation pvt	ltd, 2		
6-501	Eultion,	190028/013/1020								
1.	1. NPTEL Course lectures links:									
	https://n	ptel.ac.in/course	s/111/104/11110	4025/(Function	onal)					
1	https://n	ptel.ac.in/course	<u>s/112/104/11210</u>	<u>4193/</u> (FEM)						

Prog	Program: B. Tech. Semester : IV								
Cour	se :	Mathematic	cal Modeling	and Simulati	on (Open Elective-I)	English the	Code : BAS	4604	
т		Teaching	Scheme		ш	Evaluation	Scheme		
Leo	eture	Practical	Hours	Credit				1	
Drio	5 hknowl	- adga af:	3	3	20	30	50		100
a.	Linea	r Algebra & Ur	nivariate Calc	ulus					
b.	Multi	variate Calculu	S						
с.	Highe	r order of diffe	rential equation	ons	are essential.				
Cour	se Obj	ectives:					1 1		1.1
math	ematical	etion of the	course, stude	ents will hav	e adequate backgro	und, concepti	ial clarity a	na kno	wiedge of
1.	Mathe	ematical Model	ing and its us	es in different	engineering disciplin	es.			
2.	Mathe	ematical technic	ques that can	be used to buil	ld a proper mathemati	cal model for a	a given engin	eering p	roblem.
3.	3. Simulation of mathematical models using open source software.								
Cour	se Outo	comes:	a studente wi	ll be able to:					
Alter	Identi	g the course, the fypes of	mathematica	l modeling acc	cording to the real life	problem.			
2.	Build	a simple math	ematical mode	el.	for any to the real fire	problem			
3.	Unde	rstand basic of	perators, pack	ages, syntax o	o <mark>f software</mark> to develop	programs for	analytical so	lutions of	of ordinary
4	and pa	artial differentia	al equations.	1 1 1					
4.	Apply Prodi	Explicit and I	mplicit metho	ds to partial d	ifferential equations f	or analyzing h	eat, wave &	Laplace	equations.
5. 6.	Devel	op programs	for Numerica	al Solutions	of ordinary and part	ial differentia	equations	using o	pen-source
	softwa	are.					- 1		r
				De	tail <mark>ed Sy</mark> llabus:			1.1	_
Unit	1.1			D	escription			1	Duration (H)
	Basics	s of Mathem	natical Mode	eling: Introd	uction, open and c	losed systems	s, advantage	s and	()
1	limita	tions, propertie	es, needs and t	echniques use	d, discussion on non-	uniqueness of 1	nodels.		7
	Classi	fication of ma	thematical mo	odels: Classica	al and Continuous mo	odels, Determi	nistic, Probab	oilistic	
	and St Proce	dure and Tec	is, Areas of a	Asthematical	Modeling: Procedu	re: Introductio	n Identificat	ion of	
2.	param	eters, significa	ant parameter	s, reduction	of an open problem	to a closed	form, Techn	iques:	8
	Analy	tical Methods,	Numerical M	ethods, Comp	uter simulation, physi	cal interpretation	on, case studi	les.	
3.	Probl	em Solving-I:	Analytical S	Solutions of c	ordinary and partial of	lifferential equ	uations using	g open	8
	Nume	rical Method	s: Explicit a	and Implicit f	inite difference sche	me Stability	of finite diff	erence	
4.	metho	d, Application	is of finite of	lifference ana	lysis in boundary v	alue problems	: one dimen	sional	7
	diffusi	ion equation, V	Vave equation	, Laplace equa	ation.	- PECID	111		
_	Predi	ction of Perf	ormance: St	eps involved	in a computer mo	del, predict p	performance	of an	_
5.	experi	mental system	n, Numerical	Simulation	and its Validation,	Multiscale mo	deling, Sens	sitivity	7
	Probl	em Solving-II	: Numerical	Solutions of	ordinary and partial	differential eq	uations using	open	
6.	source	e software.			oronnaly and partia	annoronnan og		, open	8
								Total	45
Text	Books:	Parramaa Swat	om Modeling	and Simulati	on: An Introduction"	John Wilow &	Song limita	1 2001	ICDN:079
1.	R12651	9606	em Modeling	and Simulatio	on. An introduction,	John whey &	sons minted	1,2001,	ISDIN.9/0-
2.	S.S. S	astry, "Introdu	actory Metho	ds of Nume	rical Analysis", PHI	learning Pvt	Ltd, 5th E	dition,	ISBN 10:
	978812	0345928							
3.	Erwin l	Kreyszig, "Ad	vanced Engin	eering Mather	natics" Wiley Eastern	n Ltd.,10 Editio	on, ISBN 13:	978047	0458365
Refe	A verill	OOKS: Law "Simulat	tion modeling	and analysis"	Mc_oraw Hill Publ	ication 5 Editi	on ISBN: 97	800732	9//1/
2.	Abhish	ek K "Gupta, I	Numerical Me	thods using M	IATLAB", Springer, I	First Edition, IS	SBN 13: 9781	484201	541
3.	John A	Sokolowski a	and Catherine	M Banks , "P	rinciples of Modeling	g and Simulati	on", John W	iley, Fir	st Edition,
	ISBN:9	780470289433	3						
e-sou	irces:	FFL Course b	etures links.						
	httr	s://nptel.ac.in	courses/111	/107/1111071	13/ (Mathematical Mo	delling)			
	http	s://nptel.ac.in/o	courses/115/1	03/115103114	/ (NM & Simulation)	6/			
	http	s://nptel.ac.in/d	courses/122/1	06/122106033	$\frac{3}{2}$ (N.M. with program	ming)	, <u>.</u> -		
2	2. V-la	ab (IIT-Bomba	ay) link : <u>http:</u>	//vlabs.iitb.ac.	in/vlabs-dev/labs/nun	nerical_lab/lab	s/explist.php		

Prog	ram:	B. Tech.				Semester: IV	V	
Cour	se:	Financia	Mathematics	(Open Elective-I)		Code: BAS4	505	
		Teaching	Scheme			Evaluation	on Scheme	
Lect	ure	Practical	Hours	Credit	IE	MTE	ЕТЕ	Total
3		-	3	3	20	30	50	100
Prior l	knowledg	ge of:						
a. B	Basic Mat	hematics						
b. P	robability	are esse	ential.					
Course	e Objecti	ves:						
The	e course a	aims at:						
1. A	Address is	sues related t	o globalization	of financial marke	ets,			
2. D	vevelopm	ent and Feasi	bility of finance	tial transactions,	motion land sources	stational tasks	man that are	aquinal for
3. P	rovide in	e students wi	in knowledge (of a range of maine		utational technic	ques that are r	equired for a
_/ F	orecastin	g market dev	elopments	i ule illianciai secu	01			
			ciopinents.					
After 1	learning f	he course, the	e students will	be able to:				
1. D)emonstr	ate knowleds	ge of the funda	mental concepts of	financial mathem	atics		
2. Ie	dentify v	arious types of	of cash flow pa	tterns; Compute th	e future value and	the present valu	e of different	cash flow
st	treams.							
3. U	Indersta	nd types of O	ptions and ap	oly it to <mark>hedge again</mark>	<mark>nst ris</mark> ks in existing	g investments.		
4. U	Inderstan	d the characte	eristics of diffe	rent finan <mark>cial asset</mark>	<mark>s suc</mark> h as money n	narket instrumer	nts, bonds, and	d stocks, and
h	ow to buy	y and sell the	se assets in fin	ancial markets.				
5. D	Describe a	and to analyz	e the investment	nt environment, dif	ferent types of inv	estment vehicle	s;	
6. A	nalyze th	ne degree of 1	risk for its effe	ctive management				
	(Detailed S	yllabus:			1.00
Unit	-	n-17		Descriptio	n			Duration (H)
	Funda	mentals of	Financial Ma	thematics I: Intro	oduction of Finar	ncial Mathemat	ics and its	
1.	applica	tion in real	life, Sources o	of Finance; Short t	erm finance and l	Long term Fund	ds (basics),	7
	Rate of	f interest, sim	ple interest, co	mpound interest.				
2.	Funda flows,	mentals of loans, genera	Financial Ma l cash flows ar	thematics II: The ad portfolios, derive	e time value of n atives, swaps, and	noney, annuitie hedging.	s and cash	8
3.	Basics specula	of Options ation (call or	• Options; (c put) and its ap	all option and pupication (option).	it options), payo	ffs call and p	ut options,	8
4.	Stocks capital	and bonds and ratio and	: Stocks and b llysis.	oonds, Valuation o	f stocks and bone	ds, Mutual fund	ds, Cost of	7
5.	Basics Econor	of Investme nic equivaler	nt: Investment nce. Portfolio d	return. Uneven cas liversification	sh flows Compour	ding frequency	of interest,	7
(Risk &	k uncertaint	y: Decision un	der risk & uncertai	nty, Risk premiun	n, Portfolio dive	ersification,	C

Text Books:

6.

- 1. Marek Capinski and Tomasz Zastawniak, "Mathematics for Finance", Springer 2nd Edition, ISBN 13:978-0857290816.
- Ambad Nazri Wahidudin, "Financial Mathematics and its Applications", Ventus Publishing ApS, ISBN 978-8776819286

Reference Book:

1. Giuseppe Campolieti Roma M. Makarov "Financial mathematics a Comprehensive treatment", CRC Press Taylor and francis Group, 1st Edition, ISBN 978-1439892428

e-sources:

1. NPTEL Course lectures links:

Life Insurance, Endowment

https://nptel.ac.in/courses/112/107/112107260/

8

45

Total

Course : Code : BAS4606 Teaching Scheme Evaluation Scheme Lecture Practical Hours Credit IE MTE ETE Total 3 - 3 20 30 50 100 Prior Knowledge of: Nill Course Objectives: . <th>Prog</th> <th>ram:</th> <th>B. Tech. (N</th> <th>fechanical)</th> <th></th> <th></th> <th colspan="5">Semester : IV</th>	Prog	ram:	B. Tech. (N	fechanical)			Semester : IV				
Teaching Scheme Evaluation Scheme 1 Practical Hours Credit IE MTE ETE Total 3 - 3 3 20 30 50 100 Prior Knowledge of: Nit Course Objectives: This course aims at enabling students to get acquainted with, 1. Knowledge about fuzzy set theory to solve various engineering problems. 3. 3. 20 30 50 100 Course Objectives: This course aims at enabling students will be able to: 1. Understand the architecture of Neural Networks and types of Neural Networks. 2. Apply backpropagation and optimizers algorithms to update weights of Neural Network 3. 1. Understand the various fuzzy control system. 0. Understand the various fuzzy control system. Detailed Syllabus: Duration (1) 1 Marchitecture of Neural Network: Introduction, Biological neuron, Artificial neuron, Neuron (1) 1. Indefinity Activation, Back propagation Neuron	Cour	se :	Neural Net	work and Fuz	zy Logic Contro	ol (Open Electi	ve-I)	Code : BAS4606			
Lecture Practical Hours Credit IE MTE ETE Total 3 - 3 3 20 30 50 100 Prior Knowledge of: Nil Course Objectives: This course aims at enabling students to get acquainted with. 1. Knowledge of Neural Networks and its use for controlling real time systems. 2. Knowledge about fuzzy set theory to solve various engineering problems. 3. Open-source software to perform NN toolbox and Fuzzy Logic Course Outcomes: 4. Understand the architecture of Neural networks and types of Neural Networks. 2. Apply backpropagation and optimizers algorithms to update weights of Neural Network at Understand the various fuzzification and defuzzification methods. 3. Apply fairzy logic courol system to handle uncertainty and solve engineering problems. 6. 1. Inderstand the various fuzzification and defuzzification, Biological neuron, Artificial neuron. Neuron (H) 10.			Teaching	g Scheme			Eval	uation Scheme			
3 - 3 3 20 30 50 100 Prior Knowledge of Nill Course Objectives: 1 100 100 100 Charge Objectives: This course aims at enabling students to get acquainted with, 1. Knowledge of Neural Networks and its use for controlling real time systems. 2. Knowledge of Neural Networks and its use for controlling real time systems. 2. Knowledge of Neural Networks and Fuzzy Logic 100 <th>Lec</th> <th>ture</th> <th>Practical</th> <th>Hours</th> <th>Credit</th> <th>IE</th> <th>MTE</th> <th>ЕТЕ</th> <th>Total</th>	Lec	ture	Practical	Hours	Credit	IE	MTE	ЕТЕ	Total		
Prior Knowledge of: Nil Course Objectives: This course aims at enabling students to get acquainted with, 1. Knowledge of Neural Networks and its use for controlling real time systems. 2. Knowledge about fuzzy set theory to solve various congineering problems. 3. Open-source software to perform NN toolbox and Fuzzy Logic Course Outcomes: Alfer learning the course, the students will be able to: 1. 1. Understand the architecture of Neural networks and types of Neural Networks. 2. 2. Apply backpropagation and optimizers algorithms to update weights of Neural Network 3. 3. Understand the architecture of Neural networks and types of Neural Networks. 4. 4. Understand the various fuzzification and defuzzification methods. 5. Apply a fuzzy logic control system to handle uncertainty and solve engineering problems. 7 1. Implement a fuzzy logic toolbox in fuzzy control system. 0. 1. Description 0. 1. modeling. Activation Function, Learning Teefold forward network, Recurrent Neural Network. 17 Network. Optimizers algorithms. Feedback networks, Associative Memory Network and if" types. 8 Discrete time hop field ne		3	-	3	3	20	30	50	100		
Course aims at enabling students to get acquainted with, 1. Knowledge of Neural Networks and its use for controlling real time systems. 2. Knowledge of Neural Networks and its use for controlling real time systems. 3. Open-source software to perform NN toolbox and Fuzzy Logic Course Outcomes: After learning the course, the students will be able to: 1. Understand the architecture of Neural networks and types of Neural Networks. 2. Understand the architecture of Neural networks, syntax of software and Train the neural networks using MATLAB toolbox. 4. Understand basic operators, packages, syntax of software and Train the neural networks using MATLAB toolbox. 4. Understand basic operators, packages, syntax of software and Train the neural networks using MATLAB toolbox. 4. Understand basic operators, packages, syntax of software and Train the neural networks using MATLAB toolbox. 4. Understand basic operators, packages, syntax of software and Train the neural networks using MATLAB toolbox. 4. Understand basic operators, packages, syntax of software and Train the neural networks using MATLAB toolbox. 4. Understand basic operators, packages, syntax of software and Train the neural networks. 7 1. Inderstand basic operators, packages, syntax of software and Trains. 7	Prior	Knowle	dge of: Nil								
This course aims at enabling students to get acquainted with, 1. Knowledge of Neural Networks and its use for controlling real time systems. 2. Knowledge about fuzzy set theory to solve various engincering problems. 3. Open-source software to perform NN toolbox and Fuzzy Logic Course Outcomes: After learning the course, the students will be able to: 1. Understand basic operators, packages, syntax of software and Train the neural networks using MATLAB toolbox. 4. Understand basic operators, packages, syntax of software and Train the neural networks using MATLAB toolbox. 4. Understand basic operators, packages, syntax of software and Train the neural networks using MATLAB toolbox. 4. Understand the various fuzz/inction and defuzz/inction methods. 5. Apply a fuzzy logic control system to handle uncertainty and solve engineering problems. 6. Implement a fuzzy logic toolbox in fuzzy control system. Duration 1. modeling, Activation Function, Leaning Techniques, Basic learning rules, Types of Neural Network. 7. Network: Single layer feed forward. Multi-layer feed forward networks, Associative Memory Neuron Neural Network (ANN) 7 1. Metwork: Single layer feed forward. Network, Associative Memory Network and it" (types B) 8 1. Network: Single layer feed forward. Network, Associative Memory Network (ANN) 7 1. Metwork: Single layer feed forward. Network, AN	Cour	se Objec	tives:								
1. Knowledge of Neural Networks and its use for controlling real time systems. 2. Knowledge about fuzzy set theory to solve various engineering problems. 3. Open-source software to perform NN todbox and Fuzzy Logic Course Outcomes: After learning the course, the students will be able to: 1. Understand the architecture of Neural networks and types of Neural Networks. 2. Apply backpropagation and optimizers algorithms to update weights of Neural Network 3. Understand basic operators, packages, syntax of software and Train the neural networks using MATLAB toolbox. 4. Understand the various fuzzification and defuzzification methods. 5. Apply a fuzzy logic control system to bandle uncertainty and solve engineering problems. 6. Implement a fuzzy logic toolbox in fuzzy control system. Detailed Syllabus: Duration (H) Architecture of Neural Network: Introduction, Biological neuron, Artificial neuron, Neuron modeling, Activation Function, Learning Techniques, Basic learning rules, Types of Neural Network (SNN Tool Artificial Neural Network (ANN) implementation, N Tool Artificial Neural Network (ANN) implementation, Recurrent Neural Network (ANN) implementation, N Tool Artificial Neural Network (ANN) implementation, Case studies- Problem Solving-1: Neural Network (N) Toolbox, NN Simulink Demos, Neural Network (ANN) implementation, Nation, Devariation, Perzy Logic: Classical sets, Fuzzy St, Membership function, Caradinality of fuzzy set, Fuzzy Complement, Fuzzy Logic	This c	course ain	ns at enabling	students to get	acquainted with,	,					
2. Knowledge about fuzzy set theory to solve various engineering problems. 3. Open-source software to perform NN toolbox and Fuzzy Logic Course Outcomes: After learning the course, the students will be able to: 1. Understand the architecture of Neural networks and types of Neural Network 3. Understand the avairous fuzzification and defuzzification methods. 4. Understand the avairous fuzzification and defuzzification methods. 5. Apply a fuzzy logic control system to handle uncertainty and solve engineering problems. 6. Implement a fuzzy logic toolbox in fuzzy control system. Detailed Syllabus: Detailed Syllabus: Detailed Syllabus: Detailed Syllabus: Detailed Syllabus: Detailed Syllabus: Int Description Juration (H) Architecture of Neural Network: Inroduction, Biological neuron, Artificial neuron, Neuron In modeling. Activation Function, Learning Techniques, Basic learning rules, Types of Neural Network, Single layer feed forward, Multi-layer feed forward network, Recurrent Neural Network. Neural Networks For Control: Loss function, Weight initialization, Back propagation Neural Network, Optimizers algorithms, Feedback network (ANN) implementation, Case studies. Fundamental of Fuzzy Logic: Classical sets, Fuzzy Sets, Membership function, Cardinality of fuzzy set, Fuzzy Logic Control: Fuzzy Composition, properties and operation on Fuzzy sets, Fuzzy Relation, Fuzzification. Fuzzy Logic Control: Fuzzy Logic Toolbox, NL Simulink Demos, Fuzzy Logic Controller fully Sugeno FIS. Designing Puzzy Controller, Fuzzy optimization, Introduction to generate a genetic algorithm, Applications of FIS. Total 45 Text Books: Lawards, Birder Sand Fuzzy Systems: A Dynamical Approach to Machine Intelligence", Prentice Hall, New Dethi, 2004. Rest J. J., "Fuzzy logic with engineering applications of Neural Publishers Dordrecht, 2001. Dinderwork, Hell Androud ot Hirzy Logic Controller (PLC) implem	1.	Knowled	ge of Neural N	letworks and it	s use for control	ling real time sy	stems.				
3. Open-source software to perform NN toolbox and Fuzzy Logic Course Outcomes: After learning the course, the students will be able to: 1. Understand the architecture of Neural networks and types of Neural Networks. 2. Apply backpropagation and optimizers algorithms to update weights of Neural Network 3. Understand basic operators, packages, syntax of software and Train the neural networks using MATLAB toolbox. 4. Understand basic operators, packages, syntax of software and Train the neural networks using MATLAB toolbox. 4. Understand the various fuzzification and defuzzification methods. 5. Apply a fuzzy logic control system to handle uncertainty and solve engineering problems. 6. Implement a fuzzy logic toolbox in fuzzy control system. Detailed Syllabus: Duration (H) Architecture of Neural Network: Introduction, Biological neuron, Artificial neuron, Neuron (H) Architecture of Neural Network (Nulli-Agen tework, Associative Memory Network and it" types, Discrete time hop field networks. Problem Solving-F:: Neural Network (NN) Toolbox, NN Simulink Demos, Neural Network (ANN) implementation, Care studies- Problem Solving-F:: Neural Network (NN) Toolbox, NN Simulink Demos, Neural Network (ANN) inplementation, Fuzzy Logic Control: Fuzzy Logic Toolbox, Fuzzy Logic Controller, Fuzzy Logic Con	2.	Knowled	ge about fuzzy	v set theory to s	olve various eng	ineering problem	ms.				
Course Outcomes: Aher learning the course, the students will be able to: 1. Understand the architecture of Neural networks and types of Neural Networks. 2. Apply backpropagation and optimizers algorithms to update weights of Neural Network 3. Understand basic operators, packages, syntax of software and Train the neural networks using MATLAB toolbox. 4. Understand the various fuzzification and defuzzification methods. 5. Apply a fuzzy logic control system to handle uncertainty and solve engineering problems. 6. Implement a fuzzy logic toolbox in fuzzy control system. Detailed Syllabus: Unit Architecture of Neural Network: Introduction, Biological neuron, Artificial neuron, Neuron (II) modeling. Activation Function, Learning Techniques, Basic learning rules, Types of Neural Network, Cotinizers algorithms, Feedback network, Associative Memory Network and it" types, Discrete time hop field networks. 7 Neural Network, Optimizers algorithms, Feedback network, Associative Memory Network and it" types, Discrete time hop field networks. 7 Fundamental of Fuzzy Logic Classical sets, Fuzzy Sets, Membership function, Cardinality of fuzzy set, Fuzzy complement, Fuzzy Consplicin, properties and operation on Fuzzy sets, Fuzzy Relation, Fuzzy Logic Control: Fuzzy Neuroperise and operation on Fuzzy togic Control fuzzy fication. 7 Fundamental of Fuzzy Logic Constront, Pruzzy Logic Simulink Demos, Fuzzy Logic Control fuzzy Relation, Fuzzy Logic Control f	3.	Open-sou	irce software t	o perform NN	toolbox and Fuzz	zy Logic					
After learning the course, the students will be able to: 1. Understand the acrivitecture of Neural networks and types of Neural Networks. 2. Apply backpropagation and optimizers algorithms to update weights of Neural Network using MATLAB toolbox. 4. Understand be acrous fuzzification and defuzzification methods. 5. Apply a fuzzy logic control system to handle uncertainty and solve engineering problems. 6. Implement a fuzzy logic toolbox in fuzzy control system. Detailed Syllabus: Unit Detailed Syllabus: Unit Architecture of Neural Network: Introduction, Biological neuron, Artificial neuron, Neuron modeling, Activation Function, Learning Techniques, Basic learning rules, Types of Neural Network: Single layer feed forward, Multi-layer feed forward, network, Recurrent Neural Network. Neural Networks. 7 Network, Optimizers algorithms, Feedback networks, Associative Memory Network and it" types, Discrete time hop field network (NN) Toolbox, NN Simulink Demos, Neural Network (ANN) implementation, NN Tool Artificial Neural Network (ANN) implementation, NN Tool Artificial Neural Network (ANN) implementation, Case studies- 7 Inference system: Mandani FIS. Sugeno FIS. Perzy Logic Controller, Fuzzy logic Toolbox, Puzzy Logic Toolbox, Puzzy Logic Toolbox, Puzzy Logic Simulink Demos, Neural Network (ANN) introduction to generate a genetic algorithm, Applications of FIS. 7 Fuoblem Solving-1: Neural Network (NN) Toolbox,	Cour	se Outco	mes:								
1. Understand the architecture of Neural networks and types of Neural Networks. 2. Apply backpropagation and optimizers algorithms to update weights of Neural Network 3. Understand basic operators, packages, syntax of software and Train the neural networks using MATLAB toolbox. 4. Understand the various fuzzification and defuzzification methods. 3. Apply a fuzzy logic control system. Detailed Syllabus: Duration Quartification to handle uncertainty and solve engineering problems. Implement a fuzzy logic toolbox in fuzzy control system. Detailed Syllabus: Duration Quartification methods. Network: Single layer feed forward, Multi-layer feed forward network, Recurrent Neural Network. Network: Optimizers algorithms, Feedback networks, Associative Memory Network and if" types, 8 Discrete time hop field networks. Problem Solving: 1: Neural Network (NN) Toolbox, NN Simulink Demos, Neural Network (ANN) Implementation, NN Tool Artificial Network (ANN) implementation, Cardinality of fuzzy set, Fuzzy complement, Fuzzy Composition, properties and operation on Fuzzy sets, Fuzzy Relation, Fuzzi focation deparatic algorithm, Applications of FIS. Furdemental of Fuzzy Logic Colssical sets, Fuzzy Sets, Membership function, Cardinality of fuzzy set, Fuzzy complement, Fuzzy Composi	After	learning	the course, the	students will b	be able to:						
2. Apply backpropagation and optimizers algorithms to update weights of Neural Network 3. Understand basic operators, packages, syntax of software and Train the neural networks using MATLAB toolbox. 4. Understand basic operators, packages, syntax of software and Train the neural networks using MATLAB toolbox. 5. Apply a fuzzy logic control system to handle uncertainty and solve engineering problems. 6. Implement a fuzzy logic control system to handle uncertainty and solve engineering problems. 7. Network Single Layer feed forward, Multi-Layer feed forward network, Recurrent Neural Network. 8. Neural Networks For Control: Loss function, Weight initialization, Back propagation Neural Network (North, Optimizers algorithms, Feedback networks, Associative Memory Network and it" types, Discrete time hop field network. 8 9. Problem Solving-1:: Neural Network (NN) Toolbox, NN Simulink Demos, Neural Network (ANN) implementation, Oxa studies, Fuzzy Composition, properties and operation on Fuzzy sets, Fuzzy Relation, Puzzification. 7 9. Fundamental of Fuzzy Logic Tolassical sets, Fuzzy Sets, Membership function, Cardinality of fuzzy set, Fuzzy complement, Fuzzy Composition, properties and operation on Fuzzy sets, Fuzzy Inference system: Mamdani FIS, Sugeno FIS, Designing Fuzzy Logic Controller, Fuzzy Logic Controller, Applications of FIS. 7 9. Problem Solving-1F: Fuzzy Logic Toolbox, Fuzzy Logic Simulink Demos, Fuzzy Logic Controller (FLC) implementation, Applications of FIS. 8 10. Kosko, B, "Neural Networks and Fuzzy Systems: A Dynamical Approach to Machine Intelligence", Prentice Hall, New Delhi,	1.	Understa	and the archite	cture of Neura	l networks and ty	pes of Neural N	Networks.				
3. Understand basic operators, packages, syntax of software and Train the neural networks using MATLAB toolbox. 4. Understand the various fuzzification and defuzzification methods. 6. Implement a fuzzy logic toolbox in fuzzy control system. Detailed Syllabus: Duration (H) Architecture of Neural Network: Introduction, Biological neuron, Artificial neuron, Neuron nodeling, Activation Function, Learning Techniques, Basic learning rules, Types of Neural Network: Single layer feed forward, Multi-layer feed forward network, Recurrent Neural Network. Networks For Control: Loss function, Weight initialization, Back propagation Neural Network, Optimizers algorithms, Feedback networks, Associative Memory Network (ANN) notemestopic fuzzy Logic: Classical sets, Fuzzy Sets, Membership function, Cardinality of fuzzy Logic Control: Fuzzy Composition, properties and operation on Fuzzy sets, Fuzzy Relation, Fuzzy Complement, Fuzzy Composition, properties and operation on Fuzzy sets, Fuzzy Nutwork Simulation, Simulani FIS, Sugeno FIS, Designing Fuzzy Controller, Fuzzy Logic Control: Fundamental of Fuzzy Logic Controller (FLC) implementation, Applications of FIS. Fundamental of Suzzy Logic Controller (FLC) implementation, Simulinin Houzy Logic Controller (F	2.	Apply ba	ckpropagation	and optimizer	s algorithms to u	pdate weights o	of Neural N	etwork			
 4. Understand the various fuzzification and defuzzification methods. Apply a fuzzy logic control system to handle uncertainty and solve engineering problems. 6. Implement a fuzzy logic toolbox in fuzzy control system. Detailed Syllabus: Unit Architecture of Neural Network: Introduction, Biological neuron, Artificial neuron, Neuron (H) Architecture of Neural Network: Introduction, Biological neuron, Artificial neuron, Neuron Network, Single layer feed forward, Multi-layer feed forward network, Recurrent Neural Network. Network, Spinizers algorithms, Feedback networks, Associative Memory Network and it" types, Biosrete time hop field networks. Problem Solving-1:: Neural Network (NN) Toolbox, NN Simulink Demos, Neural Network (ANN) implementation, Case studies- Fundamental of Fuzzy Logic: Classical sets, Fuzzy Sets, Membership function, Cardinality of fuzzy set, Fuzzy complement, Fuzzy Composition, properties and operation on Fuzzy sets, Fuzzy Sets, Puzzy Logic Control: Fuzzy Rule, Decision making Logic, Linguistic variables, Inferences, Fuzzy Inference system: Mandani FIS, Sugeno FIS, Designing Fuzzy Controller, Fuzzy optimization, 7 Introduction to generate a genetic algorithm, Applications of FIS. Problem Solving-11: Fuzzy Logic Conbox, Fuzzy Logic Simulink Demos, Fuzzy Logic Controller (FLC) implementation, Simulink Fuzzy Logic Controller (FLC) implementation, Simulink Fuzzy Logic Controller (FLC) implementation, Simulink Fuzzy Logic Controller (FLC) implementation, Applications of 8 Ftext Books: Kosko, B, "Neural Networks and Fuzzy Systems: A Dynamical Approach to Machine Intelligence", Prentice Hall, New Delhi, 2004. Ross T, J., "Tuzzy logic with engineering applications (Vol. 2)", New York: Wiley, 2004, ISBN: 9783030375478 Reference Books: 	3.	Understa	and basic oper	ators, packages	s, syntax of softw	are and Train	the neural 1	networks using MAT	LAB toolbox.		
5. Apply a fuzzy logic control system to handle uncertainty and solve engineering problems. 6. 6. Implement a fuzzy logic control system. Detailed Syllabus: Detailed Syllabus: Duration Architecture of Neural Network: Introduction, Biological neuron, Artificial neuron, Neuron 1. modeling, Activation Function, Learning Techniques, Basic learning rules, Types of Neural Network: Single layer feed forward, Multi-layer feed forward network, Recurrent Neural Network. 7 Network, Optimizers algorithms, Feedback networks, Associative Memory Network and it" types, Discrete time hop field networks. 8 3. Problem Solving-1: Neural Network (NN) Toolbox, NN Simulink Demos, Neural Network (ANN) implementation, NN Tool Artificial Neural Network (ANN) implementation, Defuzzification 7 4. fuzzy set, Fuzzy Complement, Fuzzy Composition, properties and operation on Fuzzy sets, Fuzzy set, Fuzzy Composition, properties and operation on Fuzzy sets, Fuzzy [1]; Neural Network, Puzzy Logic Controller, Fuzzy Logic Control	4.	Understa	and the various	s fuzzification	and defuzzificati	on methods.					
Detailed Sylabus: Duration Duration Indication Structure of Neural Network: Introduction, Biological neuron, Artificial neuron, Neuron modeling, Activation Function, Learning Techniques, Basic learning rules, Types of Neural Network: Single layer feed forward, Multi-layer feed forward network, Recurrent Neural Network. 7 Network, Single layer feed forward, Multi-layer feed forward network, Recurrent Neural Network. 7 Network, Optimizers algorithms, Feedback networks, Associative Memory Network and it" types, Discrete time hop field networks. 8 3. Problem Solving-1: Neural Network (NN) Toolbox, NN Simulink Demos, Neural Network (ANN) implementation, Case studies- 7 Fundamental of Fuzzy Logic Classical sets, Fuzzy Sets, Membership function, Cardinality of fuzzy set, Fuzzy complement, Fuzzy Composition, properties and operation on Fuzzy sets, Fuzzy Relation, Fuzzy Logic Control: Fuzzy Rule, Decision making Logic, Linguistic variables, Inferences, Fuzzy Inference system: Mamdani FIS, Sugeno FIS, Designing Fuzzy Controller, Fuzzy logic Controller (FLC) implementation, Simulink Fuzzy Logic Controller (FLC) implementation, Simulink Fuzzy Logic Controller (FLC) implementation, Simulink Fuzzy Systems: A Dynamical Approach to Machine Intelligence", Prentice Hall, New Delhi, 2004. 45 Text Books: 1. ats 45 I. Ack N. Zurada, "Introduction to Artificial Neural Systems", PWS Publishing Co., Boston, 2002. 2. Zimmerman HJ., "Fuzzy logic with engineering app	5.	Apply a f	tuzzy logic coi	itrol system to	handle uncertain	ity and solve en	gineering p	roblems.			
Unit Description Duration (H) Architecture of Neural Network: Introduction, Biological neuron, Artificial neuron, Neural modeling, Activation Function, Learning Techniques, Basic learning rules, Types of Neural Network: Single layer feed forward, Multi-layer feed forward network, Recurrent Neural Network. 7 Network: Single layer feed forward, Multi-layer feed forward network, Recurrent Neural Network. 7 Network, Optimizers algorithms, Feedback networks, Associative Memory Network and it" types, Discrete time hop field networks. 8 3. Problem Solving-I:: Neural Network (NN) Toolbox, NN Simulink Demos, Neural Network (ANN) implementation, NN Tool Artificial Neural Network (ANN) implementation, Case studies- fundamental of Fuzzy Logic: Classical sets, Fuzzy Sets, Membership function, Cardinality of fuzzy set, Fuzzy complement, Fuzzy Composition, properties and operation on Fuzzy sets, Fuzzy Relation, Fuzzification, Defuzzification 7 Fundamental Optime II: Fuzzy Rule, Decision making Logic, Linguistic variables, Inferences, Fuzzy Inference system: Mandani FIS, Sugeno FIS, Designing Fuzzy Controller, Fuzzy optimization, Introduction to generate a genetic algorithm, Applications of FIS. 8 Problem Solving-II: Fuzzy Logic Controller (FLC) implementation, Applications of FLC to Control System. 8 I. Kosko, B, "Neural Networks and Fuzzy Systems: A Dynamical Approach to Machine Intelligence", Prentice Hall, New Delhi, 2004. 88 I. Jack M. Zurada, "Introduction to Artificial Neural Systems", PWS Publishing Co., Boston, 2	0.	mpieme	a luzzy log.		Detailed						
Unit Description Duration (H) Architecture of Neural Network: Introduction, Biological neuron, Artificial neuron, Neuron modeling, Activation Function, Learning Techniques, Basic learning rules, Types of Neural Network: Single layer feed forward, Multi-layer feed forward network, Recurrent Neural Network. 7 Network: Single layer feed forward, Multi-layer feed forward network, Recurrent Neural Network. 7 Network, Optimizers algorithms, Feedback networks, Associative Memory Network and it" types, Discrete time hop field networks. 8 Problem Solving-1:: Neural Network (NN) Toolbox, NN Simulink Demos, Neural Network (ANN) implementation, NN Tool Artificial Neural Network (ANN) implementation, Case studies- fundamental of Fuzzy Logic: Classical sets, Fuzzy Sets, Membership function, Cardinality of fuzzy set, Fuzzy complement, Fuzzy Composition, properties and operation on Fuzzy sets, Fuzzy Relation, Fuzzification, Defuzzification 7 Fuzzy Logic Control: Fuzzy Rule, Decision making Logic, Linguistic variables, Inferences, Fuzzy Relation, Fuzzy Logic Toolbox, Fuzzy Logic Simulink Demos, Fuzzy Logic Controller (FLC) implementation, Simulink Fuzzy Logic Controller (FLC) implementation, Applications of FLS. 8 Problem Solving-II: Fuzzy Logic Toolbox, Fuzzy Logic Controller (FLC) implementation, Simulink Fuzzy Systems: A Dynamical Approach to Machine Intelligence", Prentice Hall, New Delhi, 2004. 8 I. Kosko, B, "Neural Networks and Fuzzy Systems": A Dynamical App					Detailed	i Synabus.			Dungtion		
Architecture of Neural Network: Introduction, Biological neuron, Artificial neuron, Neuron modeling, Activation Function, Learning Techniques, Basic learning rules, Types of Neural Network: Single layer feed forward, Multi-layer feed forward network, Recurrent Neural Network. 7 Neural Networks For Control: Loss function, Weight initialization, Back propagation Neural Network, Optimizers algorithms, Feedback networks, Associative Memory Network and it" types, Discrete time hop field networks. 8 3. Problem Solving-1: Neural Network (NN) Toolbox, NN Simulink Demos, Neural Network (ANN) implementation, NN Tool Artificial Neural Network (ANN) implementation, Case studies- Fundamental of Fuzzy Logic: Classical sets, Fuzzy Sets, Membership function, Cardinality of fuzzy set, Fuzzy complement, Fuzzy Composition, properties and operation on Fuzzy sets, Fuzzy Relation, Fuzzification, Defuzzification 7 Fundamental of Fuzzy Logic Toolbox, Fuzzy Logic Simulink Demos, Fuzzy Logic Controller, Fuzzy Logic Control: Fuzzy Rule, Decision making Logic, Linguistic variables, Inferences, Fuzzy Relation, Fuzzification, Simulink Fuzzy Logic Controller, Fuzzy Logic Controller, Fulce to Control System. 8 6. (FLC) implementation, Simulink Fuzzy Logic Controller (FLC) implementation, Applications of FLC to Control System. 8 1. Kosko, B, "Neural Networks and Fuzzy Systems: A Dynamical Approach to Machine Intelligence", Prentice Hall, New Delhi, 2004. 8 2. Reference Books: 1. 1. 7 3. Jirakov, Hellendroonb, "Introduction to Artificial Neural Systems", PWS Publishing Co.,	Unit				Descrij	otion					
Architecture of recuration function, Larging Techniques, Basic learning rules, Types of Neural Network: Single layer feed forward, Multi-layer feed forward network, Recurrent Neural Network. 7 Network: Single layer feed forward, Multi-layer feed forward network, Recurrent Neural Network. 7 Network: Optimizers algorithms, Feedback networks, Associative Memory Network and it" types, Biscrete time hop field networks. 8 3. Problem Solving-1: Neural Network (NN) Toolbox, NN Simulink Demos, Neural Network (ANN) implementation, NN Tool Artificial Neural Network (ANN) implementation, Case studies- 7 4. fuzzy set, Fuzzy complement, Fuzzy Composition, properties and operation on Fuzzy sets, Fuzzy Relation, Fuzzification 7 5. Inference system: Mamdani FIS, Sugeno FIS, Designing Fuzzy Controller, Fuzzy Logic Control System. 8 6. Fuel Books: 1 1 45 7 Network, M. Zurada, "Introduction to Artificial Neural Systems", PWS Publishing Co., Boston, 2002. 2 2. Zimmerman H.J., "Fuzzy set theory and its Applications", Kluwer Academic Publishers Sucon. <td></td> <td>Archit</td> <th>octure of Ne</th> <th>ural Networl</th> <th>z. Introduction</th> <th>Biological ne</th> <th>uron Arti</th> <td>ficial neuron Neuro</td> <td>(11)</td>		Archit	octure of Ne	ural Networl	z. Introduction	Biological ne	uron Arti	ficial neuron Neuro	(11)		
1. Indextung Technology, Technology, Datase Technology, Datase Technology, Datase Technology, Technology	1	modeli	ng Activation	n Function I	earning Techni	dues Basic le	arning rul	es Types of Neur	al 7		
Neural Networks For Control: Loss function, Weight initialization, Back propagation Neural Network, Optimizers algorithms, Feedback networks, Associative Memory Network and it" types, Discrete time hop field networks. 8 3. Problem Solving-I:: Neural Network (NN) Toolbox, NN Simulink Demos, Neural Network (ANN) implementation, NN Tool Artificial Neural Network (ANN) implementation, Case studies- 7 4. Fundamental of Fuzzy Logic: Classical sets, Fuzzy Sets, Membership function, Cardinality of fuzzy set, Fuzzy complement, Fuzzy Composition, properties and operation on Fuzzy sets, Fuzzy Relation, Fuzzification, Defuzzification 8 Fundamental of generate a genetic algorithm, Applications of FIS. 9 Inference system: Mamdani FIS, Sugeno FIS, Designing Fuzzy Controller, Fuzzy optimization, Introduction to generate a genetic algorithm, Applications of FIS. 7 Problem Solving-II: Fuzzy Logic Toolbox, Fuzzy Logic Controller (FLC) implementation, Applications of FLC to Control System. 8 Check Stem Total 45 Text Books: 1. Kosko, B, "Neural Networks and Fuzzy Systems: A Dynamical Approach to Machine Intelligence", Prentice Hall, New Delhi, 2004. 7 2. Zimmerman H.J., "Fuzzy logic with engineering applications", Nuw York: Wiley, 2004, ISBN: 9783030375478 7 Reference Books: 1. Jack M. Zurada, "Introduction to Artificial Neural Systems", NUW York: Wiley, Solon, 2002. 2 2. Zimmerman H.J.,	1.	Networ	k: Single lave	r feed forward	Multi-laver feed	forward netwo	rk Recurr	ent Neural Network			
2. Network, Optimizers algorithms, Feedback networks, Associative Memory Network and it" types, Discrete time hop field networks. 8 3. Problem Solving-I: Neural Network (NN) Toolbox, NN Simulink Demos, Neural Network (ANN) implementation, NN Tool Artificial Neural Network (ANN) implementation, Case studies- 7 4. fundamental of Fuzzy Logic: Classical sets, Fuzzy Sets, Membership function, Cardinality of fuzzy set, Fuzzy complement, Fuzzy Composition, properties and operation on Fuzzy sets, Fuzzy Relation, Fuzzification 8 5. Inference system: Mamdani FIS, Sugeno FIS, Designing Fuzzy Controller, Fuzzy optimization, Introduction to generate a genetic algorithm, Applications of FIS. 7 6. Problem Solving-II: Fuzzy Logic Toolbox, Fuzzy Logic Simulink Demos, Fuzzy Logic Controller (FLC) implementation, Simulink Fuzzy Logic Controller (FLC) implementation, Applications of FLC to Control System. 8 7 Total 45 7 Total 45 7 Reference Books: 1 1. Jack M. Zurada, "Introduction to Artificial Neural Systems", PWS Publishing Co., Boston, 2002. 2 2. Zimmerman H.J., "Fuzzy set theory and its Applications", Nueva Publishers, Dordrecht, 2001. 3 3. Introduction to Artificial Neural Systems", PWS Publishing Co., Boston, 2002. 2 3. Jack M. Zurada, "Introduction to Artificial Neural Systems", PWS Publ		Neural	Networks F	for Control	Loss function	Weight initializ	vation Bac	k propagation Neur	al		
Discrete time hop field networks. 7 3. Problem Solving-I: : Neural Network (NN) Toolbox, NN Simulink Demos, Neural Network (ANN) implementation, NN Tool Artificial Neural Network (ANN) implementation, Case studies- 7 4. Fundamental of Fuzzy Logic: Classical sets, Fuzzy Sets, Membership function, Cardinality of fuzzy set, Fuzzy complement, Fuzzy Composition, properties and operation on Fuzzy sets, Fuzzy 8 8 Relation, Fuzzification, Defuzzification 7 Fundamental of Suzzy Logic Control: Fuzzy Rule, Decision making Logic, Linguistic variables, Inferences, Fuzzy Inference system: Mandani FIS, Sugeno FIS, Designing Fuzzy Controller, Fuzzy optimization, 7 7 Introduction to generate a genetic algorithm, Applications of FIS. 7 Problem Solving-II: Fuzzy Logic Toolbox, Fuzzy Logic Simulink Demos, Fuzzy Logic Controller (FLC) implementation, Simulink Fuzzy Logic Controller (FLC) implementation, Applications of FIS. 8 Problem Solving-II: Fuzzy Logic Toolbox, Fuzzy Logic Controller (FLC) implementation, Applications of FIS. 8 Introduction to generate a genetic algorithm, Applications of FIS. 8 Problem Solving-II: Fuzzy Logic Toolbox, Fuzzy Logic Controller (FLC) implementation, Applications of FIS. 8 Introduction to generate a genetic algorithm, Applications (Vol. 2)", New York: Wiley, 2004, ISBN: 9783030375478 8 Text Books: 1 Kosko, B, "Neural Networks and Fuzzy Systems", PWS Publishing Co., Boston, 2002.<	2.	Networ	rk. Optimizers	algorithms. F	eedback networl	s. Associative	Memory N	Network and it" type	s. 8		
3. Problem Solving-I: : Neural Network (NN) Toolbox, NN Simulink Demos, Neural Network (ANN) implementation, NN Tool Artificial Neural Network (ANN) implementation, Case studies- 7 4. Fundamental of Fuzzy Logic: Classical sets, Fuzzy Sets, Membership function, Cardinality of fuzzy set, Fuzzy complement, Fuzzy Composition, properties and operation on Fuzzy sets, Fuzzy 8 8 8. Relation, Fuzzification, Defuzzification 8 9. Relation, Fuzzy Rule, Decision making Logic, Linguistic variables, Inferences, Fuzzy Inference system: Mamdani FIS, Sugeno FIS, Designing Fuzzy Controller, Fuzzy optimization, 7 7 9. Introduction to generate a genetic algorithm, Applications of FIS. 7 9. Problem Solving-II: Fuzzy Logic Toolbox, Fuzzy Logic Controller, Fuzzy Logic Controller (FLC) implementation, Simulink Fuzzy Logic Controller (FLC) implementation, Applications of FIS. 8 9. Total 45 7. 45 1. Kosko, B, "Neural Networks and Fuzzy Systems: A Dynamical Approach to Machine Intelligence", Prentice Hall, New Delhi, 2004. 8 2. Ross T. J., "Fuzzy logic with engineering applications", Kluwer Academic Publishers Dordrecht, 2001. 3 3. Jack M. Zurada, "Introduction to Artificial Neural Systems", PWS Publishing Co., Boston, 2002. 2 2. Zimmerman H.J., "Fuzzy set theory and its Applications", Kluwer Academic Publishers Dordr		Discret	e time hop fiel	ld networks.			1,1011101 9 1	oppo	<i>s</i> , v		
 implementation, NN Tool Artificial Neural Network (ANN) implementation, Case studies- Fundamental of Fuzzy Logic: Classical sets, Fuzzy Sets, Membership function, Cardinality of fuzzy set, Fuzzy complement, Fuzzy Composition, properties and operation on Fuzzy sets, Fuzzy Relation, Defuzzification Fuzzy Logic Control: Fuzzy Rule, Decision making Logic, Linguistic variables, Inferences, Fuzzy Inference system: Mamdani FIS, Sugeno FIS, Designing Fuzzy Controller, Fuzzy optimization, Introduction to generate a genetic algorithm, Applications of FIS. Problem Solving-II: Fuzzy Logic Toolbox, Fuzzy Logic Simulink Demos, Fuzzy Logic Controller (FLC) implementation, Simulink Fuzzy Logic Controller (FLC) implementation, Applications of FLC to Control System. Total 45 Text Books: Kosko, B, "Neural Networks and Fuzzy Systems: A Dynamical Approach to Machine Intelligence", Prentice Hall, New Delhi, 2004. Ross T. J., "Fuzzy logic with engineering applications (Vol. 2)", New York: Wiley, 2004, ISBN: 9783030375478 Reference Books: Jack M. Zurada, "Introduction to Artificial Neural Systems", PWS Publishing Co., Boston, 2002. Zimmerman H.J., "Fuzzy sets and fuzzy logic : Theory and application", PHI, ISBN: LauranceFausett, Englewood cliffs, N.J., "Fundamentals of Neural Networks", PearsonEducation, New Delhi, 2008 B Yegnanarayana : Artificial Neural Networks for pattern recognition , PHI Learning Pvt. Ltd., 14-Jan-2009 		Proble	m Solving-I:	: Neural Netwo	ork (NN) Toolbo	x, NN Simulink	Demos, N	leural Network (ANN	1) _		
Fundamental of Fuzzy Logic: Classical sets, Fuzzy Sets, Membership function, Cardinality of 8 4. fuzzy set, Fuzzy complement, Fuzzy Composition, properties and operation on Fuzzy sets, Fuzzy Relation, Fuzzification, Defuzzification 8 Fuzzy Logic Control: Fuzzy Rule, Decision making Logic, Linguistic variables, Inferences, Fuzzy Inference system: Mamdani FIS, Sugeno FIS, Designing Fuzzy Controller, Fuzzy optimization, Introduction to generate a genetic algorithm, Applications of FIS. 7 Problem Solving-II: Fuzzy Logic Toolbox, Fuzzy Logic Simulink Demos, Fuzzy Logic Controller (FLC) implementation, Simulink Fuzzy Logic Controller (FLC) implementation, Simulink Fuzzy Logic Controller (FLC) implementation, Applications of FLC to Control System. 8 Text Books: 1 Kosko, B, "Neural Networks and Fuzzy Systems: A Dynamical Approach to Machine Intelligence", Prentice Hall, New Delhi, 2004. 45 Reference Books: 1 Jack M. Zurada, "Introduction to Artificial Neural Systems", PWS Publishing Co., Boston, 2002. 2 Zimmerman H.J., "Fuzzy set theory and its Applications", Kluwer Academic Publishers Dordrecht, 2001. 3 Driankov,Hellendroonb, "Introduction to fuzzy control", Narosa Publishers, 2001. 4 G Klir, B Yuan, "Fuzzy sets and fuzzy logic : Theory and application", PHI, ISBN: 5 LauranceFausett, Englewood cliffs, N.J., "Fundamentals of Neural Networks", PearsonEducation, New Delhi, 2008 6 B Yegnanarayana : Artificial Neural Networks for pattern recognition ,PHI Learning Pvt. Ltd., 1	3.	implen	nentation, NN	Tool Artificial	Neural Network	(ANN) implem	entation, C	ase studies-	7		
 fuzzy set, Fuzzy complement, Fuzzy Composition, properties and operation on Fuzzy sets, Fuzzy Relation, Fuzzification, Defuzzification Fuzzy Logic Control: Fuzzy Rule, Decision making Logic, Linguistic variables, Inferences, Fuzzy Inference system: Mamdani FIS, Sugeno FIS, Designing Fuzzy Controller, Fuzzy optimization, Introduction to generate a genetic algorithm, Applications of FIS. Problem Solving-II: Fuzzy Logic Toolbox, Fuzzy Logic Simulink Demos, Fuzzy Logic Controller (FLC) implementation, Simulink Fuzzy Logic Controller (FLC) implementation, Simulink Fuzzy Logic Controller (FLC) implementation, Applications of FLC to Control System. Total 45 Text Books: Kosko, B, "Neural Networks and Fuzzy Systems: A Dynamical Approach to Machine Intelligence", Prentice Hall, New Delhi, 2004. Ross T. J., "Fuzzy logic with engineering applications (Vol. 2)", New York: Wiley, 2004, ISBN: 9783030375478 Reference Books: Jack M. Zurada, "Introduction to Artificial Neural Systems", PWS Publishing Co., Boston, 2002. Zimmerman H.J., "Fuzzy set theory and its Applications", Kluwer Academic Publishers Dordrecht, 2001. Driankov,Hellendroonb, "Introduction to fuzzy control", Narosa Publishers, 2001. G Klir, B Yuan, "Fuzzy sets and fuzzy logic : Theory and application", PHI, ISBN: LauranceFausett, Englewood cliffs, N.J., "Fundamentals of Neural Networks", PearsonEducation, New Delhi, 2008 B Yegnanarayana : Artificial Neural Network" by Prof Dilin Kumar Pratihar. IIT Kharapur. 		Funda	mental of Fu	zzy Logic: C	lassical sets, Fu	zzy Sets, Mem	nbership fu	nction, Cardinality	of		
Relation, Fuzzification, Defuzzification Fuzzy Logic Control: Fuzzy Rule, Decision making Logic, Linguistic variables, Inferences, Fuzzy Inference system: Mamdani FIS, Sugeno FIS, Designing Fuzzy Controller, Fuzzy optimization, Introduction to generate a genetic algorithm, Applications of FIS. Problem Solving-II: Fuzzy Logic Toolbox, Fuzzy Logic Simulink Demos, Fuzzy Logic Controller (FLC) implementation, Simulink Fuzzy Logic Controller (FLC) implementation, Applications of FLC to Control System. Text Books: 1. Kosko, B, "Neural Networks and Fuzzy Systems: A Dynamical Approach to Machine Intelligence", Prentice Hall, New Delhi, 2004. 2. Ross T. J., "Fuzzy logic with engineering applications (Vol. 2)", New York: Wiley, 2004, ISBN: 9783030375478 Reference Books: 1. 1. Jack M. Zurada, "Introduction to Artificial Neural Systems", PWS Publishing Co., Boston, 2002. 2. Zimmerman H.J., "Fuzzy set theory and its Applications", Kluwer Academic Publishers Dordrecht, 2001. 3. Driankov,Hellendroonb, "Introduction to fuzzy control", Narosa Publishers,2001. 4. G Klir, B Yuan, "Fuzzy sets and fuzzy logic : Theory and application", PHI, ISBN: 5. LauranceFausett, Englewood clifts, N.J., "Fundamentals of Neural Networks", PearsonEducation, New Delhi, 2008 6. Y egnanarayana : Artificial Neural Networks for pattern recognition ,PHI Learning Pvt. Ltd., 14-Jan-2009 E-source: 1. </td <td>4.</td> <td>fuzzy s</td> <th>set, Fuzzy con</th> <th>nplement, Fuz</th> <th>zy Composition,</th> <th>properties and</th> <th>operation</th> <td>on Fuzzy sets, Fuzz</td> <td>y 8</td>	4.	fuzzy s	set, Fuzzy con	nplement, Fuz	zy Composition,	properties and	operation	on Fuzzy sets, Fuzz	y 8		
 Fuzzy Logic Control: Fuzzy Rule, Decision making Logic, Linguistic variables, Inferences, Fuzzy Inference system: Mamdani FIS, Sugeno FIS, Designing Fuzzy Controller, Fuzzy optimization, Introduction to generate a genetic algorithm, Applications of FIS. Problem Solving-II: Fuzzy Logic Toolbox, Fuzzy Logic Simulink Demos, Fuzzy Logic Controller (FLC) implementation, Simulink Fuzzy Logic Controller (FLC) implementation, Applications of FIC to Control System. Total 45 Text Books: Kosko, B, "Neural Networks and Fuzzy Systems: A Dynamical Approach to Machine Intelligence", Prentice Hall, New Delhi, 2004. Ross T. J., "Fuzzy logic with engineering applications (Vol. 2)", New York: Wiley, 2004, ISBN: 9783030375478 Reference Books: Jack M. Zurada, "Introduction to Artificial Neural Systems", PWS Publishing Co., Boston, 2002. Zimmerman H.J., "Fuzzy set theory and its Applications", Kluwer Academic Publishers Dordrecht, 2001. Driankov,Hellendroonb, "Introduction to fuzzy control", Narosa Publishers, 2001. G Klir, B Yuan, "Fuzzy sets and fuzzy logic : Theory and application", PHI ISBN: LauranceFausett, Englewood cliffs, N.J., "Fundamentals of Neural Networks", PearsonEducation, New Delhi, 2008 B Yegnanarayana : Artificial Neural Network' by Prof. Dilip Kumar Pratihar. IIT Kharagpur. 		Relatio	n, Fuzzificatio	on, Defuzzifica	tion	_					
 5. Inference system: Mamdani FIS, Sugeno FIS, Designing Fuzzy Controller, Fuzzy optimization, Introduction to generate a genetic algorithm, Applications of FIS. Problem Solving-II: Fuzzy Logic Toolbox, Fuzzy Logic Simulink Demos, Fuzzy Logic Controller (FLC) implementation, Simulink Fuzzy Logic Controller (FLC) implementation, Applications of FLC to Control System. Total 45 Text Books: Kosko, B, "Neural Networks and Fuzzy Systems: A Dynamical Approach to Machine Intelligence", Prentice Hall, New Delhi, 2004. Ross T. J., "Fuzzy logic with engineering applications (Vol. 2)", New York: Wiley, 2004, ISBN: 9783030375478 Reference Books: Jack M. Zurada, "Introduction to Artificial Neural Systems", PWS Publishing Co., Boston, 2002. Zimmerman H.J., "Fuzzy set theory and its Applications", Kluwer Academic Publishers Dordrecht, 2001. Driankov,Hellendroonb, "Introduction to fuzzy control", Narosa Publishers, 2001. G Klir, B Yuan, "Fuzzy sets and fuzzy logic : Theory and application", PHI, ISBN: LauranceFausett, Englewood cliffs, N.J., "Fundamentals of Neural Networks", PearsonEducation, New Delhi, 2008 B Yegnanarayana : Artificial Neural Networks for pattern recognition, PHI Learning Pvt. Ltd., 14-Jan-2009 		Fuzzy	Logic Contro	I: Fuzzy Rule,	Decision makin	ng Logic, Lingu	istic varial	oles, Inferences, Fuzz	zy		
Introduction to generate a genetic algorithm, Applications of FIS. Problem Solving-II: Fuzzy Logic Toolbox, Fuzzy Logic Simulink Demos, Fuzzy Logic Controller (FLC) implementation, Simulink Fuzzy Logic Controller (FLC) implementation, Applications of FLC to Control System. 8 Text Books: 1. Kosko, B, "Neural Networks and Fuzzy Systems: A Dynamical Approach to Machine Intelligence", Prentice Hall, New Delhi, 2004. 2. Ross T. J., "Fuzzy logic with engineering applications (Vol. 2)", New York: Wiley, 2004, ISBN: 9783030375478 Reference Books: 1. 1. Jack M. Zurada, "Introduction to Artificial Neural Systems", PWS Publishing Co., Boston, 2002. 2. Zimmerman H.J., "Fuzzy set theory and its Applications", Neurer Academic Publishers Dordrecht, 2001. 3. Driankov,Hellendroonb, "Introduction to fuzzy control", Narosa Publishers,2001. 4. G Klir, B Yuan, "Fuzzy sets and fuzzy logic : Theory and application", PHI, ISBN: 5. LauranceFausett, Englewood cliffs, N.J., "Fundamentals of Neural Networks", PearsonEducation, New Delhi, 2008 6. B Yegnanarayana : Artificial Neural Networks for pattern recognition ,PHI Learning Pvt. Ltd., 14-Jan-2009 E-source: 1. 1. Online course "Fuzzy logic and Neural Network" by Prof. Dilin Kumar Pratihar. IIT Kharagpur.	5.	Inferen	ce system: M	lamdani FIS,	Sugeno FIS, De	esigning Fuzzy	Controller	, Fuzzy optimizatio	n, 7		
Problem Solving-II: Fuzzy Logic Toolbox, Fuzzy Logic Simulink Demos, Fuzzy Logic Controller (FLC) implementation, Simulink Fuzzy Logic Controller (FLC) implementation, Applications of FLC to Control System. 8 Text Books: 1 Kosko, B, "Neural Networks and Fuzzy Systems: A Dynamical Approach to Machine Intelligence", Prentice Hall, New Delhi, 2004. 45 Reference Books: 1 Jack M. Zurada, "Introduction to Artificial Neural Systems", PWS Publishing Co., Boston, 2002. 2 Zimmerman H.J., "Fuzzy set theory and its Applications", Kluwer Academic Publishers Dordrecht, 2001. 3 Driankov,Hellendroonb, "Introduction to fuzzy control", Narosa Publishers,2001. 4. G Klir, B Yuan, "Fuzzy sets and fuzzy logic : Theory and application", PHI, ISBN: 5 5. LauranceFausett, Englewood cliffs, N.J., "Fundamentals of Neural Networks", PearsonEducation, New Delhi, 2008 6. B Yegnanarayana : Artificial Neural Networks for pattern recognition ,PHI Learning Pvt. Ltd., 14-Jan-2009 E-source: 1 1. Online course "Fuzzy logic and Neural Network" by Prof. Dilin Kumar Pratihar. IIT Kharagpur.		Introdu	iction to genera	ate a genetic al	gorithm, Applica	ations of FIS.					
 6. (FLC) Implementation, Simulink Fuzzy Logic Controller (FLC) Implementation, Applications of FLC to Control System. Total 45 Text Books: Kosko, B, "Neural Networks and Fuzzy Systems: A Dynamical Approach to Machine Intelligence", Prentice Hall, New Delhi, 2004. Ross T. J., "Fuzzy logic with engineering applications (Vol. 2)", New York: Wiley, 2004, ISBN: 9783030375478 Reference Books: Jack M. Zurada, "Introduction to Artificial Neural Systems", PWS Publishing Co., Boston, 2002. Zimmerman H.J., "Fuzzy set theory and its Applications", Kluwer Academic Publishers Dordrecht, 2001. Driankov, Hellendroonb, "Introduction to fuzzy control", Narosa Publishers, 2001. G Klir, B Yuan, "Fuzzy sets and fuzzy logic : Theory and application", PHI, ISBN: LauranceFausett, Englewood cliffs, N.J., "Fundamentals of Neural Networks", PearsonEducation, New Delhi, 2008 B Yegnanarayana : Artificial Neural Networks for pattern recognition ,PHI Learning Pvt. Ltd., 14-Jan-2009 		Proble	m Solving-II:	Fuzzy Logic	Toolbox, Fuzzy	Logic Simulink	C Demos, F	uzzy Logic Controll	er		
FLC to Control System. Total 45 Text Books: 1. Kosko, B, "Neural Networks and Fuzzy Systems: A Dynamical Approach to Machine Intelligence", Prentice Hall, New Delhi, 2004. 2. Ross T. J., "Fuzzy logic with engineering applications (Vol. 2)", New York: Wiley, 2004, ISBN: 9783030375478 Reference Books: 1. Jack M. Zurada, "Introduction to Artificial Neural Systems", PWS Publishing Co., Boston, 2002. 2. Zimmerman H.J., "Fuzzy set theory and its Applications", Kluwer Academic Publishers Dordrecht, 2001. 3. Driankov,Hellendroonb, "Introduction to fuzzy control", Narosa Publishers,2001. 4. G Klir, B Yuan, "Fuzzy sets and fuzzy logic : Theory and application", PHI, ISBN: 5. LauranceFausett, Englewood cliffs, N.J., "Fundamentals of Neural Networks", PearsonEducation, New Delhi, 2008 6. B Yegnanarayana : Artificial Neural Networks for pattern recognition ,PHI Learning Pvt. Ltd., 14-Jan-2009 E-source: I. Online course "Fuzzy logic and Neural Network" by Prof. Dilin Kumar Pratihar. IIT Kharagpur.	6.	(FLC)	Implementatio	on, Simulink F	uzzy Logic Col	ntroller (FLC)	implement	ation, Applications			
 Text Books: Kosko, B, "Neural Networks and Fuzzy Systems: A Dynamical Approach to Machine Intelligence", Prentice Hall, New Delhi, 2004. Ross T. J., "Fuzzy logic with engineering applications (Vol. 2)", New York: Wiley, 2004, ISBN: 9783030375478 Reference Books: Jack M. Zurada, "Introduction to Artificial Neural Systems", PWS Publishing Co., Boston, 2002. Zimmerman H.J., "Fuzzy set theory and its Applications", Kluwer Academic Publishers Dordrecht, 2001. Driankov, Hellendroonb, "Introduction to fuzzy control", Narosa Publishers, 2001. G Klir, B Yuan, "Fuzzy sets and fuzzy logic : Theory and application", PHI, ISBN: LauranceFausett, Englewood cliffs, N.J., "Fundamentals of Neural Networks", PearsonEducation, New Delhi, 2008 B Yegnanarayana : Artificial Neural Networks for pattern recognition, PHI Learning Pvt. Ltd., 14-Jan-2009 		FLC 10	Control Syste	111.			_	Tat	al 45		
 Kosko, B, "Neural Networks and Fuzzy Systems: A Dynamical Approach to Machine Intelligence", Prentice Hall, New Delhi, 2004. Ross T. J., "Fuzzy logic with engineering applications (Vol. 2)", New York: Wiley, 2004, ISBN: 9783030375478 Reference Books: Jack M. Zurada, "Introduction to Artificial Neural Systems", PWS Publishing Co., Boston, 2002. Zimmerman H.J., "Fuzzy set theory and its Applications", Kluwer Academic Publishers Dordrecht, 2001. Driankov, Hellendroonb, "Introduction to fuzzy control", Narosa Publishers, 2001. G Klir, B Yuan, "Fuzzy sets and fuzzy logic : Theory and application", PHI, ISBN: LauranceFausett, Englewood cliffs, N.J., "Fundamentals of Neural Networks", PearsonEducation, New Delhi, 2008 B Yegnanarayana : Artificial Neural Networks for pattern recognition ,PHI Learning Pvt. Ltd., 14-Jan-2009 	Tort	Poolea						100	ai 45		
 Rosko, B., Redual Retworks and Fuzzy Systems. A Dynamical Approach to Machine Intelligence 1, Hendee Hall, New Delhi, 2004. Ross T. J., "Fuzzy logic with engineering applications (Vol. 2)", New York: Wiley, 2004, ISBN: 9783030375478 Reference Books: Jack M. Zurada, "Introduction to Artificial Neural Systems", PWS Publishing Co., Boston, 2002. Zimmerman H.J., "Fuzzy set theory and its Applications", Kluwer Academic Publishers Dordrecht, 2001. Driankov, Hellendroonb, "Introduction to fuzzy control", Narosa Publishers, 2001. G Klir, B Yuan, "Fuzzy sets and fuzzy logic : Theory and application", PHI, ISBN: LauranceFausett, Englewood cliffs, N.J., "Fundamentals of Neural Networks", PearsonEducation, New Delhi, 2008 B Yegnanarayana : Artificial Neural Networks for pattern recognition, PHI Learning Pvt. Ltd., 14-Jan-2009 	1	Kosko I	R "Neural Net	tworks and Fuz	zy Systems: A T	Wnamical Appr	oach to Ma	chine Intelligence"	Prentice Hall		
 Ross T. J., "Fuzzy logic with engineering applications (Vol. 2)", New York: Wiley, 2004, ISBN: 9783030375478 Reference Books: Jack M. Zurada, "Introduction to Artificial Neural Systems", PWS Publishing Co., Boston, 2002. Zimmerman H.J., "Fuzzy set theory and its Applications", Kluwer Academic Publishers Dordrecht, 2001. Driankov, Hellendroonb, "Introduction to fuzzy control", Narosa Publishers, 2001. G Klir, B Yuan, "Fuzzy sets and fuzzy logic : Theory and application", PHI, ISBN: LauranceFausett, Englewood cliffs, N.J., "Fundamentals of Neural Networks", PearsonEducation, New Delhi, 2008 B Yegnanarayana : Artificial Neural Networks for pattern recognition ,PHI Learning Pvt. Ltd., 14-Jan-2009 E-source: Online course "Fuzzy logic and Neural Network" by Prof. Dilin Kumar Pratihar, IIT Kharagpur. 	1.	New De	$\frac{1}{100}$ $\frac{1}{100}$	tworks and Fuz	zy Systems. A I	ynannear Appi		tennie interligence,	Tentice Han,		
 Reference Books: Jack M. Zurada, "Introduction to Artificial Neural Systems", PWS Publishing Co., Boston, 2002. Zimmerman H.J., "Fuzzy set theory and its Applications", Kluwer Academic Publishers Dordrecht, 2001. Driankov,Hellendroonb, "Introduction to fuzzy control", Narosa Publishers,2001. G Klir, B Yuan, "Fuzzy sets and fuzzy logic : Theory and application", PHI, ISBN: LauranceFausett, Englewood cliffs, N.J., "Fundamentals of Neural Networks", PearsonEducation, New Delhi, 2008 B Yegnanarayana : Artificial Neural Networks for pattern recognition, PHI Learning Pvt. Ltd., 14-Jan-2009 E-source: Online course "Fuzzy logic and Neural Network" by Prof. Dilin Kumar Pratihar, IIT Kharagpur. 	2	Ross T	I "Fuzzy log	vic with engine	ering application	s (Vol 2)" Ne	w York [.] W	ilev 2004 ISBN 97	83030375478		
 Jack M. Zurada, "Introduction to Artificial Neural Systems", PWS Publishing Co., Boston, 2002. Zimmerman H.J., "Fuzzy set theory and its Applications", Kluwer Academic Publishers Dordrecht, 2001. Driankov, Hellendroonb, "Introduction to fuzzy control", Narosa Publishers, 2001. G Klir, B Yuan, "Fuzzy sets and fuzzy logic : Theory and application", PHI, ISBN: LauranceFausett, Englewood cliffs, N.J., "Fundamentals of Neural Networks", PearsonEducation, New Delhi, 2008 B Yegnanarayana : Artificial Neural Networks for pattern recognition, PHI Learning Pvt. Ltd., 14-Jan-2009 E-source: Online course "Fuzzy logic and Neural Network" by Prof. Dilin Kumar Pratihar, IIT Kharagpur. 	Refer	ence Boo	oks:	, e mai engine	ering upprovide			1. cy, 200 1, 1021 (197	0000000000000		
 Zimmerman H.J., "Fuzzy set theory and its Applications", Kluwer Academic Publishers Dordrecht, 2001. Driankov, Hellendroonb, "Introduction to fuzzy control", Narosa Publishers, 2001. G Klir, B Yuan, "Fuzzy sets and fuzzy logic : Theory and application", PHI, ISBN: LauranceFausett, Englewood cliffs, N.J., "Fundamentals of Neural Networks", PearsonEducation, New Delhi, 2008 B Yegnanarayana : Artificial Neural Networks for pattern recognition ,PHI Learning Pvt. Ltd., 14-Jan-2009 E-source: Online course "Fuzzy logic and Neural Network" by Prof. Dilin Kumar Pratihar. IIT Kharagpur. 	1.	Jack M.	Zurada, "Intro	duction to Art	ificial Neural Sys	stems", PWS Pu	ublishing C	o., Boston, 2002.			
 Driankov, Hellendroonb, "Introduction to fuzzy control", Narosa Publishers, 2001. G Klir, B Yuan, "Fuzzy sets and fuzzy logic : Theory and application", PHI, ISBN: LauranceFausett, Englewood cliffs, N.J., "Fundamentals of Neural Networks", PearsonEducation, New Delhi, 2008 B Yegnanarayana : Artificial Neural Networks for pattern recognition ,PHI Learning Pvt. Ltd., 14-Jan-2009 E-source: Online course "Fuzzy logic and Neural Network" by Prof. Dilip Kumar Pratihar, IIT Kharagpur. 	2.	Zimmer	man H.J., "Fuz	zzy set theory a	and its Application	ons", Kluwer Ad	cademic Pu	blishers Dordrecht, 2	.001.		
 4. G Klir, B Yuan, "Fuzzy sets and fuzzy logic : Theory and application", PHI, ISBN: 5. LauranceFausett, Englewood cliffs, N.J., "Fundamentals of Neural Networks", PearsonEducation, New Delhi, 2008 6. B Yegnanarayana : Artificial Neural Networks for pattern recognition, PHI Learning Pvt. Ltd., 14-Jan-2009 E-source: Online course "Fuzzy logic and Neural Network" by Prof. Dilip Kumar Pratihar, IIT Kharagpur. 	3.	Drianko	v,Hellendroon	b, "Introductio	n to fuzzy contro	ol", Narosa Publ	lishers,200	1.			
 LauranceFausett, Englewood cliffs, N.J., "Fundamentals of Neural Networks", PearsonEducation, New Delhi, 2008 B Yegnanarayana : Artificial Neural Networks for pattern recognition, PHI Learning Pvt. Ltd., 14-Jan-2009 E-source: Online course "Fuzzy logic and Neural Network" by Prof. Dilip Kumar Pratihar, IIT Kharagpur. 	4.	G Klir, l	B Yuan, "Fuzz	zy sets and fuzz	y logic : Theory	and application	", PHI, IS	BN:			
 6. B Yegnanarayana : Artificial Neural Networks for pattern recognition ,PHI Learning Pvt. Ltd., 14-Jan-2009 E-source: Online course "Fuzzy logic and Neural Network" by Prof. Dilip Kumar Pratihar. IIT Kharagpur. 	5.	Lauranc	eFausett, Engl	ewood cliffs, N	J.J., "Fundament	als of Neural N	etworks", l	PearsonEducation, No	w Delhi, 2008		
E-source: 1. Online course "Fuzzy logic and Neural Network" by Prof. Dilip Kumar Pratihar. IIT Kharagpur.	6.	B Yegna	anarayana : Ar	tificial Neural	Networks for par	tern recognition	n,PHI Lear	ning Pvt. Ltd., 14-Ja	n-2009		
I Unline course "Fuzzy logic and Neural Network" by Prof. Dilip Kumar Pratihar, IIT Kharagpur.	E-sou	irce:		1 • • • • •	1.1.1		D ("	1170 171			
https://mtal.og.in/courses/127/105/127105005/	1.	Unline c	course "Fuzzy	logic and Neur	al Network' by	Prof. Dilip Kum	har Pratihar	, III Kharagpur.			

Progra	nm:	S.Y.B. Tech. (A	ll Branches)			Semester: IV			
Course	e :	Professional sk	ills for Engine	ers		Code: BHM	4101		
		Teaching S	scheme			Evaluation S	Scheme		
Lect	ure	Practical	Hours	Credit	IE	MTE	ETE	Total	
1		2		2	30	-	20	50	
Prior k	cnowle	dge of							
a.	Basic	Language Skills	5						
Course	e Objec	tives:	donta						
	To in	troduce students t	o the fundame	ntals of effecti	ive communication				
1.	To in	troduce students t	to the skills to r	prepare and de	eliver effective prese	ntations and le	arn techniques o	of	
	maste	ering group discus	ssions.	1	·····		1		
3.	To in	troduce students t	o interview ski	lls and corpor	ate etiquettes				
4.	4. To introduce students to professional ethics and organizational skills								
Course	e Outco	omes:		hla ta					
Alter le	earning Unde	the course, the su	udents will be a	communicatio	on skills at the work	lace			
1.	Dem	onstrate presenta	tion skills and	group discussi	ions skills to excel in	the profession	al environment	t.	
3.	Appl	y interview skills	and corporate	etiquettes effe	ctively to hone the o	pportunities of	employability.		
4.	Anal	yze career manag	ement skills that	at can lead to	improved employme	nt.			
		1.0		Detailed	<mark>l Syllab</mark> us:				
Unit	Description							Duration (H)	
	Introduction and Fundamentals of Communication: Need for effective communication,								
1.	Func	tions of Comm nunication, Non-v	nunication, O	rganizational ication, Barri	Communication, ers to Effective Com	Verbal-Oral munication	and Written	11	
	Pres	entation Skills:	4Ps (Planni	ng, Preparat	ion, Practice, Pres	sentation), gu	idelines for		
	devel	loping PPT, Outli	ning, Effective	use of A/V a	<mark>iids and M</mark> odes of De	elivery			
2.	Mast	tering Group Di	iscussion skill	s: Skills eva	luated in Group di	scussion, Type	es of Group	12	
	discu Discu	Ission- Factual,	Abstract, Con	ntroversial ar	id Case studies, D	o's and Don'	ts in Group		
-	Inter	view Skills• In	terview Proces	s Types of	Interview: Job inter	view Apprais:	al Interview		
	Exit,	Interview, Pane	l Interview; S	elf Introduct	ion, Pre and Post	interview activ	vities, Skills		
	evalu	ated in interview,	, Do's and Don	'ts during Inte	erview				
3.	Cove	er letter & Resu	me: Job Appli	cation letter,	Difference between	n CV and Res	ume Writing	11	
	skills	, Resume writing	, Writing SOPs	5 			Destination		
	Corp	orate Etiquettes Etiquettes Email	s: Dressing Et	iquettes, Dini	ng Etiquettes, Tele	phonic etique	tte, Business		
	Drof	essional Ethics	· Integrity	Objectivity	Drofassional com	notonoo and	dua aara		
	Conf	identiality Profess	sional behavior	Objectivity,	rioressional com	petence and	due care,		
4.	Orga	anizational Skills	Physical Org	anization, Dig	gital Organization, P	lanning, Time	management	11	
	& Č0	ommunication					C		
							Total	45	
Text B	ooks:								
1.	R.Gaje	endra Singh Chau	han and Sange	eta Sharma, S	oft Skills-An Integra	ted Approach	to Maximize Pe	ersonality,	
D - 6	wiley	Publication, ISB	N: 987-81-265-	5639-7					
Keiere	nce во Murali	0KS: ikrishna C – Sunita	a Mishra, Com	munication Sl	cills for Engineers 2r	d edition Pear	rson 2 New D	elhi 2010	
2.	Indraji	t Bhattacharya, A	In Approach to	Communicati	ion Skills, DhanpatR	ai, Delhi, 2008	34.	2010	
3.	Simon	Sweeney, Englis	h for Business	Communicati	on, Cambridge Univ	ersity Press.			
4.	Sanjay	Kumar and Push	pa Lata, Comn	nunication Sk	ills, Oxford Universi	ty Press.			
5.	Barun	K.Mitra, Persona	lity Developme	ent & Soft Ski	lls, Oxford Universi	ty Press, 2012	New Delhi.		
E-sour	ces:	(notal as in /source	ns/100107101						
1. 2	https://	/nptel.ac.in/course /nptel.ac.in/course	-s/10910/121 -s/122106031h	ttns://www.co	ursera org/learn/prir	ciples-of-man	agement (Ethic	s)	
2.	https://nptel.ac.in/courses/122106031https://www.coursera.org/learn/principles-of-management (Ethics)								

Progr	am: B. Tech. (Mechanical) Sem						Semes	ter: IV	
Cours	se:	Computer A	ided Machir	e Drawing - II			Code:	BME4912	
		Teachi	ng Scheme	ſ			Evalua	ation Scheme	
Lect	ure	Practical	Hours	Credit	IE	MI	ſΈ	ETE	Total
-		2	2				•		
Prior	knowl	edge of:							
a.	2D,	3D drafting							
b.	Var	ious manufactu	uring process	es					
c.	Din	nensional tolera	ances, geome	tric tolerancesa	are essential.				
Cours	e Obj	ectives:			c · 1				
1.		develop an abi	lity to create a	assembly models o	f simple ma	chines			
2.	100	develop an abil	lity to create	2D drawings from	3D models	~			
) .		earn now effect	clively toleral	straints for assembly	ering drawin	ıg.			
5		develop ability	to create sur	face models for me	chanical cor	nnonents			
Cours	e Out	comes:	to create sur	luce mouels for me	indirical con	nponento	-		
After	learnin	g the course, the	he students sh	ould be able to:					
1.	CRI	EATE 3D asse	mblies that re	present mechanica	al application	ıs.			
2.	INT	ERPRET dime	ensioning, tol	erance, and surfac	e finish sym	bols from	product	tion drawing	
3.	API	PLY geometric	and dimensi	onal tolerance, sur	face finish s	ymbols in	drawin	gs	
4.	CR	EATE Kinema	tic simulation	for motion study.					
5.	CRI	EATE surface	models for m	echanical compon	ents				
	1			Detail	ed Syllabus				
Unit				Desc	ription				Duration
		LL M. L.P.			•				(H)
	Asse	mbly Modellin	ig ottom Un As	sambly approache					
	1.10 2 De	fining relation	shin between	various parts of m	achine				
1	2. De	only constraint	sinp between	various parts of fr	lacinine.				8
1	4 Ge	eneration of exi	s. ploded view						0
	5 De	esign for manu	facturing and	assembly concept	with suitable	e example	es		
	6. As	sembly model	ing by impor	ting parts from free	e online reso	urces.	05.		
	Prod	uction drawin	ng of mpon 1g						
- T	1. G	eneration of 2-	D sketches fi	rom parts and asse	mbly 3-D m	odel, Plac	ing Din	nensions to Views,	
2	Т	olerances, Not	es,						10
2	2. D	rafting Tools,	Bill of Mater	ial, Balloon Creati	on				10
	3. A	PPLY geometr	ric and dimen	sional tolerance, s	urface finish	symbols	in draw	ing. Case studies of	
	Ir	dustrial drawing	ng of mechan	ical components.	-		1000	2 - A 2 - A	
	Kine	matics Simula	ations	Internet #1	C PRESS	1-0-1			
3	Crea	ting a Mechan	usm, modifyi	ng a Mechanism,	completing	a Macro	Mecha	nism, Master Exercise:	6
	Crea Kino	te Motorbike S	o Modifying	and Plotting Evoi	g Kinematic	es Simula	tions, R	ecording and Editing a	
-	Intro	duction to su	rface modeli	and Flotting Exch	auons.				
4	Intro	duction to Sur	face Design (ng Treating Wirefram	e Geometry	Shape D	esion Co	ommon Tools	6
	Crea	ting Surfaces.	Understandin	g operations toolba	e Geometry, ar.	Shupe D	congin ex		v
				8 -F				Total	30
Text I	Books:		and the second second						
1. Bh	att, N.	D. and Pancha	l, V. M., (201	4), "Machine Drav	wing", Charo	otar Publi	shing H	ouse Pvt. Ltd, Anand, I	ndia,
ISE	3N-13:	978-93850392	232						
2. AS	ME Y	14.5 -2018, AS	SME, 2018						
3. CA	TIA F	or Engineers &	2 Designers V	75R16, Sham Tick	00				
Refer	ence B	ooks:	"G () I		T 1 ·	C 1 1	· 15		о IIII
I. Co	gorno,	G. K., (2020),	Geometric	Jimensioning and	Tolerancing	for Mech	anical L	Design", 3rd edition, Mic	Graw-Hill
2 Blc	weatton	l Gerardus (201	(0) "Geomet	ric Dimensioning	nd Toleranc	ing: A Co	mnlete	Guide 2020 Edition"	5STAR
	oks	Octatuus, (201	(<i>y</i>), Ocomet	The Dimensioning a		ing. A Co	mpiece	Guide - 2020 Edition,	JSTAK
3. Sta	ndards	: ISO/TR 2360)5:2018. ISO	1101:2017. SP 46	IS 15054(2)	001)			
List o	f Expe	riments:				- ~ - /			
1. As	signme	ent on assembly	y of the parts	using proper const	rained condi	tions and	generat	ion of exploded view.	
2. As	signme	ent on Assembl	y modeling f	or a product by im	porting parts	from fre	e online	resources	
3. Stu	dy, rea	ding and gene	ration of proc	luction drawing for	r given parts	and asser	mbly by	applying required GD	&T symbol
4. Cre	eate Ki	nematic simula	ation for assen	mbly.	-				-
5. Ass	signme	ent on surface r	nodeling of a	machine compone	ents				

Program	B. Tech.	(All branche	es)				Semester	: IV			
Course :	Life Skill	s-IV					Code : B	HM4940			
	Tea	ching Schen	ne	_		Semester: IV Code : BHM4940 Evaluation Scheme ITE ETE TW PR OR Tota - - - - - - re in the country. erns. y, society and environment at large. - - - - able to: iltures. gh various art forms. ms eliminating their unhelpful thoughts, feelings & pursue them for holistic development of the individual. ed is: Duration n(H ural resources awareness etc, Donation ges, Contribution in social activity like Pani Id/Animals/Birds/Trees etc., Activity based Duration					
Lecture	Practical	Hours	Credit	IE	MTE	ЕТЕ	TW	PR	OR	Total	
-	2	-	-	-	-	-	-	-	-	-	
Prior kno	wledge of: N	Nil									
Course O	bjectives:										
1. 7	To learn about	the social fu	unctioning ar	nd diverse	culture in the	country.					
2. 7	To be aware a	nd improve i	nterpersonal	behaviora	l patterns.	•					
3. 7	To inculcate c	aring and ser	ving qualitie	es towards	family, socie	ty and env	vironment at	large.			
Course Outcomes:											
After Suc	cessfully com	pleting the c	ourse the stu	idents shou	ald be able to:						
	Apply social v	vork practice	es in the cont	ext of dive	erse cultures.						
2. 1	Develop a broa	ad understan	ding of India	an culture	through vario	us art forn	18. air unhalnfu	1 thought	e feelinge	Q-	
5. F	ctions	e ways of m	terpersonar t	Jenaviorai	patterns enni	maning une	en unnerpru	n mought	s, leenings	α	
4. I	Develop skills	which are n	ecessary to i	nitiate idea	as and pursue	them for h	nolistic deve	elopment	of the indi	vidual.	
	1.00	1 A 1	, in the second s	Ι	Detailed			-			
		1.00		S	yllabus:					-	
Unit	0.25			Desc	ription				5 N.	Duratio	
1.	Social Welfare Environment awareness such as Tree Plantation, Natural resources awareness etc, Donation Camp, Visit to Orphanage, Old Age home and Villages, Contribution in social activity like Pani Foundation, Swaccha Bharat Abhiyan, Save Girl Child/Animals/Birds/Trees etc., Activity based on societal projects / Project Exhibitions etc. Cultural Awareness 1. Divisions of Indian classical music: Hindustani and Carnatic, Dances of India, Various Dance forms: Classical and Regional, Rise of modern theatre and Indian cinema. or Transaction Analysis Introduction to TA, Basic Assumptions of TA, Theory of Personality Ego States, Strucural and Functional, Ego States Diagnosis, Egogram, Structural Pathology, Contamination, Theory of Communication, Types of Transactions, Stroke, Stroke Economy, Theory of Life Positions										
2.	Caring and Hospital Ca Cooking, etc	service ring, Person	al Safety, Fi	rst Aid, D	isaster Manag	gement Ga	urdening, O	rganic far	ming,	12	
									Total	24	
Reference 1. H 2. H 3. N 4. H 5. H 6. H 7. H	e Books: K. Singh, "An Bishnu Mohar Martin Davies Anita Kainthla Aroup Chatter mproving Bel Analysis, Gile	introduction Dash, Mith , "Social wo a, "Baba Am jee , "Mothe haviour and I s Barrow, Et	to Social W ilesh Kumar rk with Child te – A Biogr r Teresa – T Raising Self- nma Bradsh	Vork", 14 A , D. P. Sin dren and F aphy", 1 J he untold s Esteem in aw, Trudi	April 2011. gh, Siddheshy amilies", 201 anuary 2006. story", 1 Janu the Classroon Newton, Day	war Shukla March 201 ary 2006. m, A Pract id Fulton l	a, "Indian S 2. tical Guide Publishers	ocial Wor to Using ' 1 October	rk", 1 Octo	ber 2020. nal	

- 8. Transactional Analysis, 100 Key Points and Techniques, Mark Widdowson, 8 September 2009.
- 9. Benjamin Colodzin, "Helping ourselves by Helping Others", 3 August 2020.
 10. Smith Mark K. "The Art of Helping Others", Jessica Kingsley Publishers, 15 April 2008.
 11. Chip Heath, "Decisive: How to Make Better Choices in Life and Work", March 26, 2013.

Program:	B. Tech. (Mec	chanical)			Semester: IV			
Course:	Environmenta	al Sciences			Code : BHM9961			
Teaching Scheme			Evaluation Scheme					
Lecture	Hours	Credit	IE	MTE	MTE ETE			
1	1	-						
Prior knowl	edge of: Nil							
Course Obje	ectives:							

- 1. To gain an understanding on the concepts and strategies related to sustainable development and identify and analyse various conservation methods for renewable and non-renewable resources.
- 2. To examine biotic and abiotic factors within an ecosystem and to identify energy flow in ecosystem.
- 3. To understand the value of biodiversity and identify current efforts for it's conservation at national and local level
- 4. To provide comprehensive overview of environmental pollution & technology associated with monitoring & control.

Course Outcomes:

After completion of this course, the students will be able to,

- 1. Demonstrate an integrative approach to environmental issues with a focus on sustainability and identify the role of organism in energy transfer in different ecosystem.
- 2. Distinguish between renewable and non-renewable resources and analyse consumption of resources
- 3. Identify key threats to biodiversity and develop appropriate policy options for it's conservation.
- 4. Analyse the impact of environmental pollution and the science behind those problems and potential solutions.

	Detailed Syllabus:	
Unit	Description	Duration (H)
1.	Multidisciplinary nature of environmental studies: Definition, scope and importance, Need for Public awareness, Natural Resources : Renewable and non- renewable resources: Natural resources and associated problems) Forestb) Waterc) Mineral d)Food e) Land f) Energy, Role of an individual in conservation of natural resources, Use of resources for sustainable lifestyle.	3
2	Ecosystems : Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposer, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids, Characteristic features, Case study on Forest ecosystem, Aquatic ecosystem.	3
3.	Biodiversity and its conservation: Introduction – Definition: genetic, species and ecosystem diversity, Biogeographical classification of India, Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic values, Biodiversity at global, national and local levels, India as a mega-diversity nation, Hotspots of biodiversity, Threats to biodiversity, Conservation of biodiversity, Case study on any one Hotspot of biodiversity.	3
4.	Environmental Pollution: Definition, Cause, effects and control measures of different pollution: a. Air b. Water c. Soil d. Noise e. Thermal f. Nuclear hazards, Solid waste management, Relevance of environmental ethics for environmental protection, Social Issues and the Environment: From Unsustainable to Sustainable development, Urban problems related to energy, Water conservation, Impact of Climate change, Innovative ideas for creating public environmental awareness.	3
	Total	12
Text Bo 1. Cu Ho 2. Ag	poks: Inningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T., "Environmental Encyclopedia", Jaico Pub Duse, 1 st edition, 2000, ISBN-13: 978-8172247867 garwal, K.C, "Environmental Biology", Nidhi Publishers, 2 nd edition ,2008, ISBN-13978-8189153021	lications

Reference Books:

1. BharuchaErach, "The Biodiversity of India", Mapin Publishing Pvt. Ltd., 1st edition, 20021, ISBN-108188204064

0	gram: B. Tech. (Mechanical) Semester: IV						
Course:	Constitution of	India			Code: BHM9962		
	Teac	ching Scheme		Е	valuation Scheme		
Lecture	e Hours	Credit	IE	MTE	ЕТЕ	Total	
1	1	-	-	-	-	-	
Prior kno	owledge: Nil						
Course 0 1. To 2. To 3. To 4. To	Dejectives: enable the student to u identify individual rol understand human rig know about central an	understand the impo le and ethical respon- thts and its implicat ad state government	ortance of constitutio nsibility towards nati ions t functionalities in Ind	n on. dia.			
After learn 1. Un Ann 2. Ide Sys 3. Diff 4. Co	Putcomes: ning the course, the st derstand the functions nendments. entify and explore the stem in India. fferentiate and relate the mprehend the fundam	udents will be able s of the Indian gover basic features, mode he functioning of In ental rights and abi	to: rnment and get acqua alities about Indian c ndian Political system de the rules of the Ind	ainted with knowle onstitution and as at the Central and dian constitution.	edge of Constitutiona sessment of the Parlia I State level.	ıl amentary	
- 6	1575	De	atailad Syllabus:				
		D	etaneu Synabus.				
Unit			Description	1		Duration (H)	
Unit 1.	Introduction to Co constitution, Salien Fundamental Rights Citizenship.	nstitution: Meanin it features and ci , Directive Principle	Description ng of the constitution haracteristics of th es of State Policy, Fu	a law and constitut e Constitution of undamental Duties	ionalism, making of f India, Preamble, and it's legal status,	Duration (H)	
Unit 1. 2.	Introduction to Co constitution, Salien Fundamental Rights Citizenship.System of Governm Structure and Functi Parliament, Suprem legislative and finan	nstitution: Meanin it features and c , Directive Principle nent- Center & Sta on of Central Gove ne Court of India, cial powers between	Description ag of the constitution haracteristics of th es of State Policy, Fu ate level and local le ernment, President, V , Judicial Review, 1 n the Union and the S	a law and constitut e Constitution of undamental Duties vel fice President, Prin Federal structure States, local self-g	ionalism, making of of India, Preamble, and it's legal status, ne Minister, Cabinet, and distribution of overnment	Duration (H) 3	
Unit 1. 2. 3.	Introduction to Co constitution, Salien Fundamental Rights Citizenship.System of Governm Structure and Functi Parliament, Suprem legislative and finanJudiciary: Governo Courts and other Sul	nstitution: Meanin it features and c , Directive Principle nent- Center & Sta on of Central Gove ne Court of India, cial powers between or, Chief Minister, Pa	Description ag of the constitution haracteristics of th es of State Policy, Fu ate level and local le ernment, President, V , Judicial Review, I n the Union and the S Cabinet, State Legis arliamentary Form of	a law and constitut e Constitution of indamental Duties vel fice President, Prin Federal structure States, local self-g lature Judicial Sys f Government in In	ionalism, making of f India, Preamble, and it's legal status, ne Minister, Cabinet, and distribution of overnment stem in States, High ndia.	Duration (H) 3 3 3	
Unit 1. 2. 3. 4.	Introduction to Co constitution, Salien Fundamental Rights Citizenship.System of Governm Structure and Functi Parliament, Suprem legislative and finanJudiciary: Governo Courts and other SulConstitution Funct President's Rule, Emergency Provisio	nstitution: Meanin it features and ci , Directive Principle on of Central Gove ne Court of India, cial powers between or, Chief Minister, bordinate Courts, Pa ions: Indian Federa Constitutional An ns, Assessment of v	Description ag of the constitution haracteristics of th es of State Policy, Fu ate level and local le ernment, President, V , Judicial Review, I n the Union and the S Cabinet, State Legis arliamentary Form of al System and it's ch mendments and poworking of the Parlia	a law and constitut e Constitution of indamental Duties vel fice President, Prin Federal structure States, local self-g lature Judicial Sys f Government in In maracteristics, Cent owers, Constituti mentary System	ionalism, making of f India, Preamble, and it's legal status, ne Minister, Cabinet, and distribution of overnment stem in States, High ndia. er& State Relations, onal Functionaries,	Duration (H) 3 3 3 3	

 Clarendon Press, Subhash C, Kashyap, "Our Constitution: An Introduction to India's Constitution and constitutional Law", NBT, 5th edition, 2014, ISBN-9781107034624

Reference Books:

- 1. Maciver and Page, "Society: An Introduction Analysis ", Laxmi Publications, 4th edition, 2007, ISBN-100333916166
- PM Bhakshi, "The constitution of India", Universal Law Publishing An imprint of Lexis Nexis, 14th edition, 2017, ISBN-108131262375

Progr	am:	B. Tech. (Mech	anical)		Semester: I	Semester: IV			
Cours	e:	Emotional Inte	lligence		Code: BHN	19963			
		Teaching Sche	me		Evalua	ation Scheme			
Le	cture	Hours	Credit	IE	MTE	ETE		Total	
	1	1	-	-	-	-		-	
Prior l	knowledge	e of: Nil							
Course 1. 2. 3. 4.	e Objectiv To develo To unders To unders To know	es: op an awareness of I stand intelligence ar stand how you use c and utilize the diffe	Emotional Intelligen ad develop emotion emotion to facilitate rence between reac	nce models al competence thought and behav tion and considered	ior 1 response				
Course After c 1. 2. 3. 4.	 Course Outcomes: After completion of this course, the students will be able to, 1. Understand how to manage emotions, behavior and self-control in any situation resulting in better productivity 2. Employ emotional intelligence competencies to effectively interact with people, colleagues and employees in building stronger relationships at work and at home 3. Articulate emotions using the right verbal and non-verbal language 4. Use tools to regulate their emotions and recognize and respond appropriately to emotions in self and others 								
	1.7	691	Detaile	ed <mark>Syll</mark> abus:		202	1		
Unit		1	D	escription	5			Duration (H)	
1.	Intelligen interpers	ction to Emotion nce and various EI onal skills, Underst	nal Intelligence models, The EQ co and EQ and its imp	(EI): What is E mpetencies of self- ortance in life.	Emotional Inte regulation,mot	lligence, Emoti ivation, empathy	onal and	3	
2.	Self-awa Tools : T Self-Reg	reness (SA): Seein Think, Feel, Act Car Tulation/Managing	g the other side, giv ds, Plutchik's Whe Emotions: The s	ving in without give el of Emotions& E cience of Emotion	ing up. motional intelligns, Self-emotion	gence test nalquotient		3	
3.	Gaining Activitie Emotion accuratel Activitie	Control: Use of s: Be the Fog, Tem recognition in o y in others to build s: Mindful Listening	Coping Thought perament Analysis. thers: The univer empathy ng, Perceptual Posit	s and Relaxation sality of emotionations	Techniques to	o manage emoti perceiving emot	ons, ions	3	
4.	Emotion empathy Cohesive	al Intelligence at and trust in relation team building, Te	Work place: Impo nships, building efi sts : My Colored H	rtance of Emotiona fective work relatio at, —I Am∥ Circle,	ll Intelligence a onships, conflic Empathy Card	t Work place, rol et resolution strat s	e of egy,	3	
							Total	12	
Text B 1. 2.	Books: Daniel Go 2005, ISB Steven C. Commitme	leman, "Emotional N: 978-055338371 Hayes, Spencer S ent Therapy", Read	I Intelligence – WI 3 Smith, "Get Out (How You Want, []	hy It Matters Mor Of Your Mind A Large Print] edition	e Than IQ,", E nd Into Your 1, 2009, ISBN-1	Bantam, 10th An Life: The New 13 : 978-1458717	niversa Accej 7108	ry edition,	
Refere 1. 2.	ence Books Steven Ste Drew Bird	s: in, "The EQ Edge" I , "The Leader's C	, Jossey-Bass, 3rd Guide to Emotional	edition, 2011, ISBN Intelligence", Cre	N-13: 978-0470 atespace Indepo	681619 endent Pub, Kind	lle Edi	tion, 2016,	

ISBN-13 : 978-1535176002

Progra	am :	B. Tech. (All br	anches)			Semester : IV		
Cours	e:	Entrepreneurs	hip Development			Code : BHM996	54	
		Teaching Scho	eme		Evaluati	on Scheme		
Lect	ure	Hours	Credit	IE	MTE	ЕТЕ	1	Total
1		1	-	-	-	-		-
Prior	knowl	edge of : Nil						
 Course Objectives: To inspire students and help them imbibe an entrepreneurial and start-up mind-set To develop and strengthen entrepreneurial quality among students. To understand the abilities to become an Entrepreneur. To acquaint with legalities in product development, IPR, Trademarks, Copyright and patenting To know the facets of Business plans, Entrepreneurial Finance Course Outcomes: After learning the course, the students will be able to: Develop an entrepreneurial mind-set by learning key skills such as product design, salesmanship, marketing interpersonal skills. Interpret their own business plan and analyse factors that contributed to the failure of a start-up understand how to determine the best source of capital for a company & how to find revenue & engages 								
4.	assum Under	ptions rstand the legalities	in product developr	nent, I <mark>PR,</mark> Tradema	irks, Copyright a	nd patenting		
		p-1	Det	tailed Syllabus:				
Unit			- An	Description	-			Duration (H)
1.	Cone Why Proc	cept and Scope: E to become entrep ess, Design Validat	Entrepreneurship as reneur, Entrepreneu tion, Types of Start-	a career, Traits of rship Development ups	Successful Entra Phases, Problem	epreneur/ Entrepre n Solving and Ide	eneur, eation	3
2.	Creating Entrepreneurial Venture : Sources of Innovation, methods of generating ideas, Prototype preparation and validation, Legal Issue, Private/Public Limited Company formation requirements, Intellectual Property Protection: Patents Trademarks and Copyrights, Entrepreneurial Failure : Case study of patterns, Early failures: Good idea bad planning, False start , False positive, Late-stage failures: Speed trap, Cascading miracle, False confidence							
3.	Busi budg Cany	ness Plan Prepar geting, Marketing _I vas (BMC), Financi	ation: Sources of polan for the new ve tal plan- proforma in	product for busine nture, steps in prep ncome statements, F	ss: Feasible stuc paring marketing atio Analysis.	dy, Ownership, ca g plan, Business M	ipital, Iodel	3
4.	Fina assur Anal Leas	ncial Modeling mptions, Metrics cu lysis, Entrepreneu e Financing; Fundi	and Metrics: Sproustomer Acquisition rial Finance: venturing opportunities for	eadsheets, Benchn cost and life time ure capital, financia Start-ups in India,	narks, Revenue model, Metrics al institutions su Crowd funding,	assumptions, exp viral coefficient, Fu pporting entrepren Angel investing	pense unnel neurs,	3
						,	Total	12
Text B 1.	looks: Kui Ind	nar Arya, "Entrep ia, First edition, 20	reneurship: Creatin; 12, ISBN-10: 81317	g and Leading an 65784; ISBN-13: 9	Entrepreneurial 78-8131765784	Organization", Pe	earson	Education

 S.S.Khanka, "Entrepreneurial Development", S Chand and Company Limited, Revised 2012th edition, 2012, ISBN : 81-219-1801-4

Reference Books:

- 1. Taneja, Gupta, Entrepreneur Development New Venture Creation", Galgotia Publishing Company, 2nd edition. 2017, ISBN: 9788185989594
- Charantimath, Poornima, "Entrepreneurship Development and Small Business Enterprises" Pearson Education, 3rd edition, 2018, ISBN: 8177582607, 9788177582604
- 3. Blake Masters and Peter Thiel, "Zero to One", Plata Publishing, 2nd edition, 2014, ISBN-10 : 9780804139298 ISBN-13 : 978-0804139298



Progra	m: B. Tech. (Mechani	cal)	Semester: IV					
Course	Research Article V	Vriting			Code: BHM9965			
	Teaching Sch	eme		Evaluatio	on Scheme			
Lectu	re Hours	Credit	IE	MTE	ЕТЕ	Total		
1	1	-	-	-	-	-		
Prior k	nowledge of: Nil	-						
Course 1. T 2. T 3. T 4. T	e Objectives: o understand about how to o create awareness about g o develop a full-length arti o familiarize the basic met	write effective research rammar, lexical choice cle, proposal or confer- hods and techniques of	h article\ s, citations in the t ence presentation research writing	ext				
Course After co 1. U 2. C 3. D 4. W do	e Outcomes: ompletion of this course, the Inderstand necessary traits comprehend the importance Develop an ability of critica Write a research article, revi emonstrate importance of t	te students will be able to write effective resea e of citations, indexing, l thinking necessary to ew article, thesis chapt evising and proofreadi	to, irch article with ap indexed articles a analyse a research ter and other relate ng for writing rese	propriate gramm nd plagiarism reports d academic resea arch article	atical & lexical choic arch text effectively an	es in text nd		
	1 - 1 - 1	Detaileo	d S <mark>yllab</mark> us:					
Unit	S-1-11	De	escription			Duration (H)		
1.	Introduction to Resear Writing ⁴ , Qualities and suitable journal/conferer Selection of keywords, d	ch Writing: What is skills required in a Re ace/book chapter, How efining problem statem	a research articles esearch writer, Ty to conduct an est tent.	e? Understandin pes of Research ffective Researc	g what is Research writing, choosing a h, Abstract Writing,	3		
2.	Sources of citations: Un Understanding impact far articles quickly and effor and how to use them, avo Plagiarism tools: iThent Citation Tools :Mendel	derstanding of giving of ctor, Importance of Ind tlessly, Using Your So piding plagiarism icate, Grammarly ey, ,BibMe, Citefast, A	citation to other wo lexing and Indexed urces Wisely: wha PA, MLA	orks, Identifying articles, learnin t to cite, where t	relevant citations, g to scan research o find good sources	3		
3.	Drafting : Structure of a draft, Understanding the proposed system, Experim	basic research paper, e components of an mental section, result a	stages of writing article: Abstract, nalysis and discuss	and research, le Introduction, Pr sion, Conclusion	arn to write the first reliminary concepts, , Reference.	3		
4.	Revising and Editing: Point address of reviewe usage of Grammar and se	Importance of revision or comments, What/Wentence formatting, Ste	n, Understanding t hatnot to revise, E ps for submitting t	the comments of Emphasis on Jou he revised manu	f reviewer, Point-to- rnal formats, Proper script/article	3		
					Total	12		
Text B 1. 2.	ooks: Charles A. MacArthur 1462529313, ISBN-13: 9 Margaret Cargill, Patrick ISBN: 978-1-118-57070	, "Handbook of Writh 978-1462529315 c O'Connor, "Writing S -8	ing Research", Th Scientific Research	ne Guilford Pres	ess; 2 nd edition, 2016, ey-Blackwell, 2 nd Edi	ISBN-10: tion, 2013,		
Refere 1.	nce Books: Booth W., Colomb G. an ISBN-13: 978-02262397	d Williams J., "The Cr 36	aft of Research", U	Jniversity of Chi	cago Press,4th edition	n, 2016,		

 Jennifer Peat, Elizabeth Elliott, Louise Baur, Victoria Keena, "Scientific Writing Easy when you know how", Wiley & Sons, Inc, 2nd edition, 2013, ISBN:9780727916259