Pondicherry Engineering College, Puducherry – 605014

(An Autonomous Institution of Government of Puducherry affiliated to Pondicherry University)



Curriculum and Syllabi for B.Tech. (Mechanical Engineering)

(With Effect from Academic year 2018-19)

(Approved in Fifth Academic Council Meeting held on 6th May 2019)

CURRICULUM

The Curriculum of B.Tech. (Mechanical Engineering) is designed to fulfil the Program Educational Objectives (PEO) and the Program Outcomes (PO) listed below.

PROGRAM EDUCATIONAL OBJECTIVES (PEO)

PEO1	To provide necessary background in science, particularly in advanced mathematics, physics and chemistry that underlie modern mechanical engineering and technology (Fundamentals)
PEO2	To produce graduates who are strong in basics of technical education and prove their competency in diversified areas of mechanical engineering so that they can secure suitable positions in any technological enterprises, companies, organizations and industries both at national and international levels (Employability).
PEO3	To encourage a majority of our graduates to pursue advanced studies in thrust areas of mechanical engineering and to carry out scientific, industrial and defence research and development so as to meet/satisfy current requirements in respective sectors (Higher Studies).
PEO4	To prepare our graduates to improve their self-reliant capabilities, soft skills, leadership qualities which would help in building their own careers and make them become successful entrepreneurs to serve the nation and the society responsibly and ethically (Entrepreneurship).
PEO5	To familiarize our graduates with international and national codes and standards for good engineering practice in core and interdisciplinary fields and to help them evolve sustainable development in technological sphere with greater emphasis on mitigation of environmental impact (Professional Ethics).

PROGRAM OUTCOMES (PO)

PO1	Engineering knowledge : Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization for the solution of complex engineering problems.
PO2	Problem analysis : Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design/development of solutions : Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.
PO4	Conduct investigations of complex problems : The problems: • that cannot be solved by straightforward application of knowledge, theories and techniques applicable to the engineering discipline. • that may not have a unique solution. For example, a design problem can be solved in many ways and lead to multiple possible solutions. • that require consideration of appropriate constraints/requirements not explicitly given in the problem statement. (like: cost, power requirement, durability, product life, etc.). • which need to be defined (modelled) within appropriate mathematical framework. • that often require use of modern computational concepts and tools.

	Modern tool usage: Create, select, and apply appropriate techniques, resources, and					
PO5	modern engineering and IT tools, including prediction and modelling to complex					
	engineering activities, with an understanding of the limitations.					
	The engineer and society: Apply reasoning informed by the contextual knowledge to					
PO6	assess societal, health, safety, legal, and cultural issues and the consequent					
	responsibilities relevant to the professional engineering practice.					
	Environment and sustainability: Understand the impact of the professional engineering					
PO7	solutions in societal and environmental contexts, and demonstrate the knowledge of,					
	and need for sustainable development.					
DOQ	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and					
FUO	norms of the engineering practice.					
POQ	Individual and team work: Function effectively as an individual, and as a member or					
FUS	leader in diverse teams, and in multidisciplinary settings.					
	Communication: Communicate effectively on complex engineering activities with the					
PO10	engineering community and with t h e society at large, such as, being able to					
1010	comprehend and write effective reports and design documentation, make effective					
	presentations, and give and receive clear instructions.					
	Project management and finance: Demonstrate knowledge and understanding of the					
PO11	engineering and management principles and apply these to one's own work, as a					
	member and leader in a team, to manage projects and in multidisciplinary environments.					
	Life-long learning: Recognize the need for, and have the preparation and ability to					
PO12	engage in independent and life-long learning in the broadest context of technological					
	change.					

PROGRAM SPECIFIC OUTCOMES (PSO)

PSO1	Graduates are acquainted well with the concepts and principles of Mechanical Engineering required for understanding and solving practical industrial problems of current interests to core mechanical industries.
PSO2	Graduates are initiated to work on Innovative Ideas that will eventually motivate them to pursue <i>Higher Studies and Research</i> in Mechanical &Allied Engineering and Management.
PSO3	Graduates can function in a <i>Multidisciplinary Environment</i> by being able to associate and integrate their domain knowledge with other disciplines.

Distribution of credits among the subjects grouped under various categories:

Courses are grouped under various categories and the credits to be earned in each category of courses are as follows:

SI. No.	Category	Credits	Course Category Code (CCC)
1	Humanities, Social Sciences and Management Courses	6+2/3*	HSM
2	Basic Science Courses (Mathematics, Physics, Chemistry and Biology)	25	BSC
3	Engineering Science Courses (Workshop, Drawing, Basics of Electrical/Mechanical/Computer etc.,)	25.5	ESC
4	Professional Core Courses	64.5	PCC
5	Professional Elective Courses (from chosen discipline)	15	PEC
6	Open Elective Courses (from other technical/ emerging disciplines)	10	OEC
7	Professional Activity Courses (Seminar, Entrepreneurship, Comprehensive Test, Internship, Project Work)	14	PAC
	Mandatory non-Credit Courses (Induction, Environmental		
8	Sciences, Indian Constitution, Essence of Indian Traditional	Non-credit	MCC
	Knowledge, Professional Ethics)		
	Total	160	

*included in the 10 credits under open elective category

Semester-wise Courses and Credits

Semester I

Course	Course		CET	Р	eriods		Cradite
Code	Course		SET	L	Т	Р	Credits
FY201	Induction Programme	MCC	-	-	-	-	0
MA201	Mathematics I	BSC	ΤY	3	1	0	4
PH201	Physics	BSC	ΤY	3	1	0	4
CY201	Chemistry	BSC	ΤY	3	1	0	4
HS201	English for Communication	HSM	ΤY	2	0	2	3
ME201	Workshop and Manufacturing Practice	ESC	LB	0	0	3	1.5
PH202	Physics Laboratory	BSC	LB	0	0	3	1.5
CY202	Chemistry Laboratory	BSC	LB	0	0	3	1.5
Total				11	3	11	-
	I OTAI				25		19.5

Semester II

Course	Course		CET	Pe	eriod	s	Cradita
Code	Course		SET	L	Т	Р	Credits
MA202	Mathematics II	BSC	ΤY	3	1	0	4
EE201	Basic Electrical Engineering	ESC	ΤY	3	1	0	4
CS201	Programming for Problem Solving	ESC	ΤY	3	0	0	3
MEDOD	Engineering Graphics and Computer Aided	ESC	ΤY	n	0	4	2
IVILZUZ	Drawing			Z	0	4	5
CE201	Environmental Science	MCC	-	3	0	0	0
EE202	Electrical Engineering Laboratory	ESC	LB	0	0	3	1.5
CS202	Programming Laboratory	ESC	LB	0	0	3	1.5
Total					14 2 10		-
	ισται						17

CCC - Course Category Code, SET – Semester Exam Type, TY – Theory, LB – Laboratory, PR - Project

Semester III

Course	Course			CET	Pe	eriod	s	Cradita
Code	Course				Т	Р	Credits	
MA204	Transforms, PDE and Statistics	BSC	ΤY	3	1	0	4	
ME203	Engineering Mechanics	ESC	ΤY	3	1	0	4	
ME204	Fluid Mechanics and Hydraulic Machines	PCC	ΤY	3	1	0	4	
ME205	Engineering Thermodynamics	PCC	ΤY	3	1	0	4	
ME206	Materials Technology	PCC	ΤY	3	0	0	3	
ME207	Machine Drawing	PCC	ΤY	2	0	3	3	
SH202	Indian Constitution	MCC	-	2	0	0	0	
	Total					3	_	
	iotal				26	22		

Course	Open Elective / Heners / Minor Course				eriods	Crodits		
Code	Open Elective, Honors, Minor Course		SET	L	Т	Р	creats	
ZZOXX*	Open Elective	OEC	ΤY	3	0	0	3	
MEH01	Engineering Optimization	PCC	ΤY	3	1	0	4	
MEM01	Heat Power Engineering	PCC	ΤY	3	1	0	4	

Semester IV

Course	Course				Periods		
Code			SET	L	Т	Р	Credits
SH201	Biology for Engineers	BSC	ΤY	3	0	0	2
EC234	Elements of Electronics	ESC	ΤY	3	0	0	3
ME208	Mechanics of Solids	ESC	ΤY	3	1	0	4
ME209	Thermal Engineering – I	PCC	ΤY	3	1	0	4
ME210	Machining Technology	PCC	ΤY	3	0	0	3
ME211	Kinematics of Machines	PCC	ΤY	3	1	0	4
ME212	Mechanical Engineering Lab –I (Fluid mechanics and machines/ Material technology /Machine shop)	PCC	LB	0	0	3	1.5
Total					3	3	-
	iotal						21.5

Course	Open Elective/ Honors/ Minor Course CCC SE		CET	Р	Cradita		
Code		SET	L	Т	Р	Creats	
ZZOXX*	Open Elective	OEC	ΤY	3	0	0	3
MEH02	Production Drawing and Cost Estimation	PCC	ΤY	3	0	1	4
MEM02	Manufacturing Technology	PCC	ΤY	4	0	0	4

*ZZ in ZZOXX is the Department Code of the department offering Open Elective

Semester V

Course	Course		CET	Periods			Cradita
Code			SET	L	Т	Р	Credits
ME213	Heat and Mass Transfer	PCC	ΤY	3	1	0	4
ME214	Manufacturing Processes	PCC	ΤY	4	0	0	4
ME215	Dynamics of Machines	PCC	ΤY	3	1	0	4
MEYXX	Professional Elective –I	PEC	ΤY	3	0	0	3
MEYXX	Professional Elective –II	PEC	ΤY	3	0	0	3
SH203	Essence of Indian Traditional Knowledge	MCC	-	2	0	0	0
ME216	Mechanical Engineering Lab –II (Dynamics Lab/ Special Machines / Heat Transfer Lab)	PCC	LB	0	0	3	1.5
Total				18	2	3	-
					23		19.5

Course	Open Elective/ Heners/ Miner Course		CET	Р	Cradita			
Code	Open Elective, Honors, Millior Course		SET	L	Т	Р	creats	
ZZOXX	Open Elective	OEC	TY	3	0	0	3	
MEH03	Computational biological thermo-fluid mechanics	PCC	ΤY	3	1	0	4	
MEM03	Machine Design	PCC	TY	3	1	0	4	

Semester VI

Course	Course		CET		Period	s	Credits
Code			JEI	L	Т	Р	
HS202	Industrial Economics and Management	HSM	ΤY	3	0	0	3
ME217	Thermal Engineering – II	PCC	ΤY	3	1	0	4
ME218	Metrology and Measurements	PCC	ΤY	4	4 0 0		4
ME219	Design of Machine Elements	PCC TY		3	1	0	4
MEYXX	Professional Elective –III	PEC	ΤY	3	0	0	3
ME220	Seminar	PAC	-	0	0	3	1
ME221	Mechanical Engineering Lab –III (Thermal Engineering Lab / Measurements Lab / Modelling, simulation and analysis lab)		LB	0	0	3	1.5
	Total						-
	Total			24			20.5

Course	e Open Elective/ Honors/ Minor Course		SET	Р	Cradita			
Code	Open Elective/ Honors/ Millior Course		SET	L	Т	Р	creats	
ZZOXX	Open Elective	OEC	ΤY	3	0	0	3	
MEH04	Product Design and Development	PCC	ΤY	3	1	0	4	
MEM04	Quality Control and Improvement Techniques	PCC	ΤY	3	1	0	4	

*ZZ in ZZOXX is the Department Code of the department offering Open Elective

Semester VII

Course	Course	CCC SET		Pe	Cradita			
Code			SEI	L	Т	Р	Credits	
ME222	Operations Research	PCC	ΤY	3	1	0	4	
ME223	Industrial Engineering and Management	PCC	ΤY	3	0	0	3	
ME224	Advanced Manufacturing Technology	PCC	ΤY	4	0	0	4	
MEYXX	Professional Elective –IV	PEC	ΤY	3	0	0	0 3	
MEYXX	Professional Elective –V	PEC	ΤY	3	0	0	3	
EP201	Entrepreneurship	PAC	ΤY	3	0	0	2	
ME225	Professional Ethics	MCC	-	3	0	0	0	
	Tetal						-	
	TOtal			23			19	

Course Open Elective / Honors / Minor Course			CET	Р	Cradita			
Code	Open Elective/ Honors/ Willior Course		SET	L	Т	Р	creuits	
ZZOXX	Open Elective	OEC	ΤY	3	0	0	3	
MEH05	Surface Engineering	PCC	ΤY	4	0	0	4	
MEM05	Process Planning and Cost Analysis	PCC	ΤY	3	1	0	4	

Semester VIII

Course	Course		СГТ	Р	Cradita		
Code			SET	L	Т	Р	Credits
SWOXX	Open Elective through SWAYAM	OEC	-	3	0	0	2
SWOXX	Open Elective through SWAYAM	OEC	-	3	0	0	2
ME226	Comprehensive Test	PAC	-	0	0	3	1
ME227	Internship (3 months duration)	PAC	-	-	-	-	2
ME228	Project Work	12	8				
	Total						-
							15

List of Professional Elective courses

Professional Electives	Course Code	Course	Semester	
	MEY01	Energy and Environmental Engineering		
	MEY02	Metal Forming Processes		
	MEY03	Engineering Tribology		
Professional Elective – I/II	MEY04	Automobile Engineering	V	
	MEY05	Mechatronics		
	MEY06	Fluid Power Automation		
	MEY07	Automotive Fuels, Pollution & Control		
Professional Elective – III	MEY08	Maintenance and Safety Engineering	VI	
	MEY09	Computer Aided Design		
	MEY10	Cryogenic Engineering		
	MEY11	Nano Technology and Surface Engineering		
Drefessional Floating IV ()/	MEY12	Design of Transmission Systems	N/II	
Professional Elective – IV / V	MEY13	Power Plant Engineering	VII	
	MEY14 Total Quality Management			
	MEY15	Finite Element Method		

List of Open Electives

Course Code	Course
MEO01	Renewable Energy
MEO02	Solar Power Engineering
MEO03	Fluid and Thermal Machines
MEO04	Marketing Management
MEO05	Elements of Project Management
MEO06	Introduction to Nanoscience and Nanotechnology
MEO07	Industrial Automation
MEO08	Quantitative Techniques for Engineers
MEO09	Finite Element Analysis

Courses offered under various categories:

ссс	Course Code	Course	Semester	Credit	Total Credit	
	MA201	Mathematics – I		4	0.00.00	
	PH201	Physics	I	4		
	CY201	Chemistry	I	4		
	PH202	Physics laboratory	I	1.5		
BSC	CY202	Chemistry Laboratory	I	1.5	25	
	MA202	Mathematics –II	II	4		
	SH201	Biology for Engineers	IV	2		
	MA204	Transforms, Partial Differential Equations		Д		
	111/201	and Statistics				
	ME201	Workshop and Manufacturing Practice		1.5		
	EE201	Basic Electrical Engineering	II	4		
	CS201	Programming for Problem Solving	II	3		
	ME202	Engineering Graphics & Computer Aided Drawing	П	3	25.5	
	EE202	Electrical Engineering Laboratory	II	1.5	25.5	
ESC	CS202	Programming Laboratory	II	1.5		
	ME203	Engineering Mechanics		4		
	ME208	Mechanics of Solids	IV	4		
	EC234	Elements of Electronics	IV	3		
	ME204	Fluid Mechanics and Hydraulic Machines	III	4		
	ME205	Engineering Applied Thermodynamics	III	4		
	ME206	Materials Technology		3		
	ME207	Machine drawing		3		
	ME209	Thermal Engineering - I	IV	4		
	ME210	Machining Technology	IV	3		
	ME211	Kinematics of Machines	IV	4		
	ME212	Mechanical Engineering Lab -I	IV	1.5		
	ME213	Heat and Mass Transfer	V	4		
PCC	ME214	Manufacturing Processes	V	4	64.5	
	ME215	Dynamics of Machines	V	4		
	ME216	Mechanical Engineering Lab -II	V	1.5		
	ME217	Thermal Engineering – II	VI	4		
	ME218	Metrology and Measurements	VI	4		
	ME219	Design of Machine Elements	VI	4		
	ME221	Mechanical Engineering Lab –III	VI	1.5		
	ME222	Operation Research	VII	4		
	ME223	Industrial Engineering and Management	VII	3		
	ME224	Advanced Manufacturing Technology	VII	4		
	MEYXX	Professional Elective – I	V	3		
	MEYXX	Professional Elective – II	V	3		
PEC	MEYXX	Professional Elective – III	VI	3	15	
	MEYXX	Professional Elective – IV	VII	3		
	MEYXX	Protessional Elective – V	VII	3		
OEC	ZZOXX	Open Electives offered by other Departments	III - VII	6	10	
	SWOXX	Open Electives offered under SWAYAM	-	4		

	ME220	Seminar	VI	1	
	EP201	Entrepreneurship	VII	2	
PAC	ME226	Comprehensive Test	VIII	1	14
	ME227	Internship	VIII	2	
	ME228	Project Work	VIII	8	
	HS201	English for Communication	I	3	
	HS202	Industrial Economics and Management	VI	3	6.
HSM	HSOXX Humanities Open Elective offered by HSS Department		-	3*	3*/2*
	SWOXX	Humanities Open Elective offered under SWAYAM	-	2*	
		Total			160

*included in the 10 credits under Open Elective category

Department : Humanties and Social Sciences Programme: B.Tech.											
Semester : F	irst			Course C	Categor	y Code	: MCC	Sem	ester l	Exam Type:	: -
Course Code	Cours	۵		Perio	ds / We	eek	Credit		Max	kimum Mai	rks
	Cours	C		L	Т	Р	С		CA	SE	ΤM
FY201	Induc	tion Pro	gramme	-	-	-	Non-Crec	lit	-	-	-
Prerequisite	-										
	The	course v	will enable the student to								
	CO1	Acquire	e social awareness & know	ledge for s	self-dev	elopm	ent				
Course	CO2	Be awa	are of nature & environmer	nt consciou	us and	of Inno	vative natu	ire.			
Outcome	CO3	Develo	p holistic attitude and harr	nony in th	e indiv	idual, fa	amily, and s	societ	у		
	CO4	Know a	about the art and culture, la	anguage a	nd liter	ature c	of this vast s	secula	ir natio	on	
	CO5	Integra	ating technical Education fo	r betterm	ent of s	society					
UNIT-I	Profic	iency in	English				Periods: 1	12			
Communicatio	n skills	– Diagr	nostic test on Grammar –	Synonym	ns, Ant	onyms,	Tenses, S	enten	ce Co	mpletion,	
Idioms & Phr	ases, C	One wo	rd substitution, Homophe	ones, Hor	nonym	s, Use	of Prepo	sition	s, Suk	oject-verb	CO1
agreement – V	Vriting	– Paragr	aph writing, Letter writing,	Essay wri	ting, St	ory Dev	elopment.				
UNIT-II Bridge course in Mathematics Periods: 12							T				
Fundamentals of differential and integral calculus: Theory, Practice & Test.											
Limit of function	on-Fund	lamenta	I results on limits-Continui	ty of a fur	nction-	Conce	ot of differ	entiat	ion- C	oncept of	
derivative- Sio	be of a	curve-Di	ifferentiation lechniques-	Derivative	S OT Ele	ementa	ry function	is tron	n tirst	principle-	
Derivatives of	nver	Difforon	tions-Logantininic different	ntiation- i onc ⊔igh	or ord	a or dor	ivativos Ir	I- DII	lerent	functions	CO2
containing line	ar func	tions-M	ethod of integration (Deco	mnosition	meth	nd met	hod of sub	nctitut	ion ir	tegration	
by parts) - De	finite ir	ntegrals.	Simple definite integrals	- Properti	es of [)efinite	integrals-	Redu	ction	formulae-	
Area and volun	ne- Len	gth of cu	rve- surface area of a solid								
UNIT-III	Unive	rsal hum	nan values				Periods: 1	12			1
Current Status	of the	society ((Sources of fear)-Reformat	ion throug	gh eduo	cation-S	Sanskar-Wh	nat is :	succes	s (getting	
good marks, co	ollege a	dmissio	n, Job etc)-What is aim of	life (happ	, iness,	Prospei	rity and co	ntinui	ty of l	nappiness	
and prosperity	y)-What	t is req	uired for happiness (rela	ationship,	physic	cal faci	ilities)-Rela	tionsh	nip inv	volves all	
emotions and	feeling	s-Physica	al facility-material things re	equired fo	or life-D	Differen	ice betwee	n anii	mal ar	nd human	CU3
consciousness-	Animal	conscio	ousness-depending on mon	ey, accum	nulating	g mone	y by wron	g mea	ans et	cHuman	.05
consciousness-	right th	ninking,	right understanding, right	feeling-H	appine	ss thro	ugh Harmo	ony in	the i	ndividual,	
family, society	and na	ature, lea	ading to fearlessness in th	e society	is the	purpos	e of holisti	ic edu	ication	or value	
education.			- •								
	Litera	ry activit	ties		Dalaat		Periods: 1	12			
Team building	activitie	es – Quiz	2 – Oral Exercises – Group d	liscussion,	Debat	e, Exter	npore, Role	e play	•		CO4
UNIT-V	Creati	ve arts	· · · -		~ 1	C+1	Periods: 1	12			
Introduction to	o painti	ng & rei	nowned artworks – Docur	mentary &	Short	tilms –	- Music – \	vocal,	Instru	ımental –	CO5
		ematic –	Tutorial Daria da	Due -+!!	Danie	J		Tatal	Davis	Ja. CO	
Lecture Period	s: 60		i utoriai Periods: -	Practica	Period	JS: -		Iotal	rerioo	15: 6U	
Reference B00	KS										
-											

Department : N	lathema	athematics Programme: B.Tech.							
Semester : F	irst		Course	e Categ	ory Coc	le: BSC	Semester Ex	am Type:	ТҮ
Course Code	Course	Name	Perio	ods / W	'eek	Credit	Max	imum Ma	rks
			L	Т	Р	С	CA	SE	ТМ
MA201	Mathe	matics-I	3	1	-	4	40	60	100
Prerequisite:	-								
	CO1	To apply differential calculus	to noti	ons of	curvatu	ire, evolute	es and involu	tes and the	ney will
		have a basic understanding c	of Beta a	nd Gar	nma fu	nctions			
Course	CO2	The mathematical tools need	led in ev	valuatir	ıg multi	iple integra	als and their u	usage.	
Outcome	<u> </u>	The effective mathematical	tools fo	or the	solutior	ns of diffe	rential equat	ions that	model
Outcome	COS	physical processes							
	CO4	Able to solve simultaneous li	near dif	ferentia	al equa	tions			
	CO5	Understands Vector calculus	and its	applica	tions				
UNIT-I	Differe	ential Calculus				Periods:	12		
Curvature, radi	us of cur	vature, evolutes and involutes.	Beta and	d Gamn	na func	tions and t	heir properti:	es.	CO1
UNIT-II	Multi variable calculus Periods: 12								
Multiple Integr	als, cha	nge of order of integration in	double	e integ	rals, A	oplications	: Plane area	is (double	
integration), Cl	nange o	f variables (Cartesian to polar), Doub	le and	triple	integratio	ns, Volumes	by triple	CO2
integration – Mass, Center of mass and Gravity (constant and variable densities).									
UNIT-III First order Ordinary Differential Equation Periods: 12									
Exact equation	s, First o	order linear equations, Bernoul	li's equa	ation, E	quatio	ns not of	first degree,	equations	
solvable for p,	equatio	ons solvable for y, equations s	olvable	for x	- Claira	aut's type	- simple ap	plications	CO3
orthogonal traje	ectories,	growth and decay.	-						
UNIT-IV	Higher	Order Ordinary Differential Equ	uation		.	Periods:	12	,	
Linear differen	tial equ	ations of higher order - with	constar	nt coef	ficients	, the ope	rator D, Eule	er's lineai	
equation of nig	gner ord	er with variable coefficients, s	imultan	eous II	near di	fferential	equations, so	olution by	CO4
	Vector	Calculus				Poriods:	17		
Gradient diver		d curl their properties and rela	ations 9	calar li	no into	orals vect	or line integr	als scalar	•
surface integra	ls, vecto	r surface integral. Theorems of	Green	Stokes	and G	auss diver	gence (witho	ut proof)	CO5
Simple applicat	ions invo	lying cubes, sphere and rectang	ular par	allelep	ipeds.		Benee (mane		
Lecture Periods	: 45	Tutorial Periods: 15	Practio	al Peri	ods:-		Total Period	ls: 60	
Reference Bool	(S:				0401				
1. Veerara	ajan T, E	ngineering Mathematics I, McG	raw-Hill	Educat	ion(Ind	ia) Private	Limited, 201	4	
2. Veerara	ajan T, Ei	ngineering Mathematics II, McG	iraw-Hill	Educa	tion(Ind	dia) Private	e Limited, 201	.5	
3. Venkata	araman	M.K., Engineering Mathematics,	Vol. 1&1	l, The N	lationa	l Publishin	g Company, C	Chennai, 2	008.
4. Erwin K	reyszig,	Advanced Engineering Mathema	atics (9 t	h Ed), J	lohn W	iley & Sons	s, New Delhi,	2011.	
5. Ramana	a B.V. <i>,</i> H	igher Engineering Mathematics,	Tata Mo	Graw I	Hill Nev	v Delhi, Ele	eventh Reprin	it, 2010.	
6. Bali N. a	and Goy	al M., Advanced Engineering Ma	themat	ics, Lax	mi Pub	lications P	vt. Ltd., New	Delhi, 9 th l	dition,
2011.									

Department : N	Department : Mathematics Programme: B.Tech.									
Semester : S	econd		Cours	e Categ	ory Coc	le: BSC	Semester Ex	am Type: '	ГҮ	
Course Code	Course	Name	Peri	iods / W	/eek	Credit	t Max	kimum Ma	rks	
	Matha		L	T	Р	C	CA 40	SE	TM	
	wathe	matics-ii	3	L	-	4	40	60	100	
Prerequisite:	-									
	CO1									
	CO2	The tool of Fourier series for	r learnin	g advar	iced Eng	gineering	Mathematics			
Course	CO3	The tool of Fourier transform	n for lea	irning a	dvance	d Enginee	ring Mathema	atics		
Outcome	CO4	The tools of differentiation	of fund	ctions o	f a con	nplex vari	able that are	used in v	/arious	
Cuttonic	04	techniques dealing engineer	ing prob	olems.						
		The tools of integration of	f functi	ons of	a comp	olex varia	ble that are	used in v	/arious	
	CO5	techniques dealing engineer	ing prol	olems.						
UNIT-I	Matric	es				Periods:	12			
Inverse and ra	ink of a	matrix, System of linear equ	uations,	Symme	etric, Sl	kew Symi	metric and C	Orthogonal		
matrices, Eigen	ivalues a	and Eigenvectors of a real mat	rix, Cha	racteris	tic equ	ation, Pro	perties of Ei	genvalues.	CO1	
Cayley-Hamilto	n Theore	em (statement only), Diagonaliz	ation of	matrice	es.					
UNIT-II	Fourie	r Series				Periods:	12		ş	
Dirichlet's cond	ditions -	Expansion of periodic functio	ns into	Fourie	r series	- Change	of interval-	Half-range		
Fourier series.	Complex	x form of Fourier series - Roo	t mean	square	value	- Parseva	l's theorem o	on Fourier	CO2	
coefficients - Ha	armonic	analysis.								
UNIT-III	Fourie	r Transform				Periods:	12			
Fourier Integra	al Theor	em(statement only)- Fourier	transfor	m, Inv	erse Fo	ourier tra	nsform, defir	nition and		
properties - Ev	aluation	of integrals- Fourier cosine and	d sine tr	anstorn	n, defin	itions and	evaluation o	of integrals	CO3	
using cosine an	a sine tr	ansforms.	•	-						
	Compl	ex Valued function and Conform		oping		Periods:	12			
Definition of a	Complex	(valued function f(z) and its de	erivative	e - Analy	tic fun	ctions -Ne	ecessary cond	ition for a		
sufficient con	be analy	rtic (in Cartesian) - Cauchy-Riem	iann equ	harmo	statem	ent of C-F	requation in p	polar form		
nroperties of a	nalvtic fi	inction – Construction of analytic	ic funct	ions Co	nforma	d manning	- Simple and	d standard	CO4	
transformation	s like w	$r = z^2$, e^z , $z+c$, cz , sinz, $1/z$, B	lilinear	transfo	mation	excludir	ng Schwarz-	Christoffel		
transformation).	_ , _ , _ , _ , _ , _ , _ , _ , _ , _ ,				(0.0000000	.8			
UNIT-V	Comple	ex Integration				Periods:	12		k	
Cauchy's Integ	ral theor	rem, Cauchy's integral formula	(witho	ut proo	f) and p	oroblems,	Taylor's and	Laurent's		
theorem (witho	out proof	f), Classification of singularities.	Residue	es and e	valuatio	on of resid	lues – Cauchy	's Residue	COF	
theorem, Conto	our integ	gration – Evaluation of real inte	egrals –	unit cir	cle and	semi-circ	ular contour	(excluding	COS	
poles on bound	laries).						*			
Lecture Period	s: 45	Tutorial Periods: 15	Practi	ical Peri	ods:-		Total Period	ls: 60		
Reference Boo	ks:									
1. Veerara	ajan T., E	ingineering Mathematics II , Mc	Graw-H	ill Educa	ation(In	dia) Privat	te Limited, 20	18		
2. Veerara	ajan I., I	ransforms and Partial Different	ial Equa	tions , l	VicGraw	-Hill Educ	ation(India) P	rivate Lim	ited,	
2016 2 Vanket	aramaa	M/K Engineering Methomatics		and		tional Duk	liching Como	2000		
3. Verikal	araman 'revezia	Advanced Engineering Mathematics	o, VUI. II latice (N	anu III, inth 드신:	tion)	honal PUD		any, 2008. Dalhi 201	1	
4. LIWIIIN 5 Raman	а в V н	joher Engineering Mathematics	Tata M	rGraw		v Delhi Fl	eventh Ronrin	1 2010 201	1	
6. Bali N	and Gov	al M., Advanced Engineering Ma	athemat	tics. Lax	mi Publ	ications P	vt. Ltd New	Delhi. Nint	h	
Edition	Edition, 2011.									

Department : Physics			Progra	mme:	B.Tech.				
Semester : F	irst/Sec	ond	Course	e Categ	ory Coc	le: BSC Sei	mester Ex	am Type: T	ſY
Course Code	Cours	~	Perio	ods / W	′eek	Credit	Max	kimum Mai	′ks
Course Coue	Course	5	L	Т	Р	С	CA	SE	ТМ
PH201	Physic	S	3	1	-	4	40	60	100
Prerequisite	-								
		The course will enable the stu	dent to:						
	CO1	Understand electric and magnet	etic fielc	l & pote	ential				
Course	CO2	Study the basics of dielectric m	naterials	and its	import	ance			
Course	CO3	Understand the concepts of wa	ave mec	hanics	and its	applications			
Outcome	CO4	To study the optical phenomer	na arisin	g due t	o interf	erence, diffra	ction and	polarizatio	n
	CO5	To discuss the fundamentals o	f Lasers,	fiber o	ptics ar	nd its real tim	e applicat	ions	
UNIT-I	Electro	omagnetic theory				Periods: 12			
Brief review of	⁻ electro	statics, electric field and potent	ial – div	rgenc	e and o	curl of electro	static fiel	d – Gauss	
law and its app	lication	s, Laplace's equation in one, two	and thr	ee dime	ension.				
Brief review of	magnet	ostatics, Biot-Savart law – diverg	gence ar	d curl	of statio	c magnetic fie	ld – Ampe	ere's law –	CO1
magnetic vecto	or poten	tial – comparison of electrostatic	s and m	agneto	statics.				
UNIT-II	Dielec	trics	Periods: 12						
Dielectric pola	rization	and its mechanisms – dielectric	loss – c	lielectr	ic breal	kdown – calcu	ulation of	electronic	
polarizabilities and ionic polarizabilities – temperature and frequency dependence of polarization – internal CC						CO2			
field in solids –	Clausiu	s-Mossotti relation – ferroelectri	city – fe	rroelec	tric hys	teresis.			
UNIT-III	Quant	um mechanics				Periods: 12			
Matter Waves	– de Bro	oglie hypothesis – uncertainty pri	nciple –	Schröd	linger v	vave equation	ıs – time c	dependent	
– time indepei	ndent –	physical significance of wave for	unction	– appli	cation	to particle in	a one di	mensional	603
potential box -	- conce	ot of quantum mechanical tunr	neling (v	vithout	derivat	tion) – applica	ations of	tunneling	
(qualitative) to	alpha d	ecay, tunnel diode, scanning tun	neling m	nicrosco	ppe.	,			
UNIT-IV	Wave	optics				Periods: 12			
Interference: a	airwedge	e – Newton's rings – Michelson'	s interfe	eromet	er – typ	pes of fringes	– determ	ination of	
wavelength of	a light so	ource.							
Diffraction: co	ncept of	resolution of spectral lines – Ra	yleigh's	criterio	on – res	solving power	of gratin	g, prism &	CO4
telescope.									
Polarisation: B	asic con	cepts of double refraction – circ	ular and	d ellipti	cal pola	arization – qu	arter and	half wave	
plates – optical	rotatio	n – specific rotatory power – Lau	rent's h	alf shac	le polar	rimeter.			
UNIT-V	Lasers	and Fiber optics	-			Periods: 12	-	-	1
Lasers: Princip	les of la	aser – spontaneous and stimula	ited em	issions	– Einst	ein's theory	of matter	radiation	
interaction – A	and B	coefficients – population inversion	ion and	laser a	ction –	optical resor	hators(qua	alitative) –	
types of lasers	-Nd:YA	, CO2 laser, GaAs laser – industi	rial & me	edical a	pplicati	ions of lasers ((any two).		CO5
Fiber optics: P	rinciple	and propagation of light in opti	cal tiber	— nun	nerical a	aperture and	acceptan	ce angle –	
step index and graded index fiber – qualitative ideas of attenuation in optical fibers – fiber optic									
communication (schematic), active and passive fiber optic sensors, endoscope.									
Lecture Period	s: 45	Tutorial Periods: 15	Practio	cal Peri	ods: -	То	tal Period	ls: 60	

Reference Books

- 1. David Griffiths, Introduction to Electrodynamics, 3rd Edition, Eastern Economy Edition., 2011
- 2. A.S. Vasudeva, Modern Engineering Physics, S. Chand & Co, 2006.
- 3. D. J. Griffiths, "Quantum mechanics", Pearson Education, 2014.
- 4. V. Rajendran, Engineering Physics, 2nd Edition, TMH, New Delhi 2011
- 5. Avadhanulu M. N., Engineering Physics, S. Chand & Co, 2007
- 6. David Halliday, Robert Resnick and Jearl Walker, Fundamentals of Physics, Wiley publications, 2013
- 7. H.J. Pain, The physics of vibrations and waves, Wiley publications, 2005
- 8. Ajoy Ghatak, Optics, 5th Edition TMH, New Delhi, 2012
- 9. Orazio Svelto, 2nd Edition, plenum Press, Principles of Lasers, 1982.
- 10. K. Thyagarajan and Ajoy Ghatak, Lasers Fundamentals and Applications, 2nd Edition, Springer 2010.

Department : P	hysics		Progra	amme:	B.Tech	•					
Semester : F	irst/Seco	ond	Cours	e Categ	gory Co	de: BSC	Semester I	Exam Type	e: LB		
Course Code	Course		Perio	ods / W	/eek	Credit	Ma	aximum N	1arks		
Course Coue	Course		L	Т	Р	С	CA	Semester Exam Type: LB Maximum Marks CA SE 1 40 60 1 etical curriculum			
PH202	Physics	s Laboratory	-	-	3	1.5	40	60	100		
Prerequisite	-										
	Th	e students will learn to experin	nentally	' measi	ure:						
	CO1	Optical parameters related	to the o	concep	ts inclu	ded in theo	retical curri	culum			
Course	CO2	Characteristic parameters of	of Laser	and o	otical fil	ber					
Outcome	CO3	Thermal conductivity and p	ressure	coeffic	cients						
	CO4	Magnetic field, electrical co	onductiv	vity and	Hall co	pefficient					
	CO5	Young's modulus, Rigidity n	nodulus	and a	ccelerat	ion due to	gravity				
Choice of 10-12	2 experir	experiments from the following									
1. Radius o	f curvatu	ire of a Lens - Newton's rings									
2. Thicknes	s of a thi	in object by air – wedge									
3. Spectror	neter – r	esolving power of a prism							601		
4. Spectror	neter – r notor h	esolving power of a transmission	on grati ordinon	ng urave k	w calcit	o pricm*			C01		
6. Lorent's	Half sha	de polarimeter – determination	n of spe	cific ro	tatory r	lower					
7. Determi	nation of	tion of wavelength of a laser source using transmission grating, reflection grating (vernier									
calipers)	& partic	le size determination	-		-	-					
8. Determi	nation of	numerical aperture & accepta	ince ang	gle of a	n optica	l fiber			CO2		
9. Determi	nation of	optical absorption coefficient	of mate	erials u	sing lase	er*					
10. Michelso	on s inter	rerometer" armal conductivity - radial flow	method	4							
12 Coefficie	ont of the	ermal conductivity – Lee's discu	method						500		
13. Iolly's bu	ilb annar	ratus experiment – determinati	ion of a	*					205		
14 Magneti	sm·I – H	rurve									
15. Field alo	ng the av	kis of a coil carrying current									
16. Vibration	magnet	ometer – calculation of magne	tic mon	nent &	nole str	ength			CO4		
17. Electrica	l conduct	tivity of semiconductor – two p	probe / 1	four pr	obe me	thod*					
18. Hall effe	ct in a se	miconductor*		-							
19. Determi	ination o	f Young's modulus and rigidity	modulı	JS							
20. Accelera	ation due	e to gravity - compound pendul	lum						CO5		
*Demonstratio	on experi	iments									
Lecture Period	s: 45	Tutorial Periods: -	Practi	cal Per	iods: -	•	Total Period	ls: 45			
Reference Boo	ks										
1. Physics Pra	ctical Ob	oservation Manual, Departmen	t of Phy	sics, Po	ondiche	rry Enginee	ering College	2.			

Department : C	hemistry	/	Program	mme: E	B.Tech.				
Semester : F	irst/Seco	ond	Course	Catego	ory Code:	BSC	Semester	Exam Type	e: TY
	^		Peri	ods / V	Veek	Credit	M	aximum N	1arks
Course Code	Course		L	Т	Р	С	СА	SE	TM
CY201	Chemi	stry	3	1	-	4	40	60	100
Prerequisite:	-		<u>.</u>		<u>-</u>				
	The co	urse will enable the student to):						
	CO1	Analyse microscopic chemi	istrv in te	erms of	orbitals.	structure	and intermo	olecular fo	rces
Course	CO2	Rationalize the bulk proper	rties and	proces	ses				
Outcome	CO3	Study the concepts of elect	trochemi	istry an	d its app	lications			
	CO4	Understand the mechanism	n of cher	nical re	eactions a	and synthe	sis of molec	ules	
	CO5	Comprehension of the con	cepts of	analvti	cal techn	iaues.			
UNIT-I	Chemi	cal bonding and isomerism		, .		Periods:	12		,
Chemical bond	ing-valer	nce bond theory, overlapping	of orbita	als. Hyk	oridizatio	n in carbo	n compound	ds-sp, sp ²	and
sp ³ . Electron pa	ir repuls	ion. Hybridization and shape of	of water	, and an	nmonia n	nolecules.	Molecular o	orbital the	ory-
combination of	, atomic	orbitals. Bond order. Molecu	ılar orbit	al diag	rams for	homonuc	lear diatom	ic molecu	les-
(hydrogen to ne	eon). Ion	ic, dipolar and van der Waals i	interactio	ons.	, ,				
Structural and	stereo	isomerism-geometrical isome	rism in	alkene	s. Optica	I isomeris	m-optical a	nctivity, ch	niral CO1
carbon. Optica	lisomer	ism in lactic acid and tartaric	acid. Er	nantior	ners, dia	stereomer	s and meso	compour	าds.
Resolution of ra	acemic n	nixtures, racemization, asymm	etric syn	thesis,	Walden i	inversion.			
UNIT-II	Water	chemistry and reaction kineti	ics			Periods:	12		
Water chemis	try-hard	and soft water, removal	of hard	lness	by ion	exchange	and zeolit	e proces	ses.
Determination	of hardn	ess by EDTA method. Desalina	ation-Rev	erse o	smosis.				
Adsorption-ads	orption	of gases on solids-Freundlic	h and L	angmu	ir adsor	ption isot	herms. Fact	tors affect	ting CO2
adsorption of a	gases on	solids. Chemical kinetics-rate	e of a re	action,	factors a	affecting r	ate of react	tion, first	and
second order ra	te equa	tions. Half-life of reactions.							
UNIT-III	Electro	de potential and corrosion				Periods:	12		
Electrode poter	ntial, ele	ctromotive force, reference e	lectrodes	s-hydro	ogen, Ag/	'AgCl, calo	mel and gla	ss electro	des.
Nernst equatio	n and ap	plications. Electrolyte concen	tration c	ell. Bat	tteries-Pr	imary and	secondary	batteries.	Dry
cell, alkaline ba	ttery, Ni	-Cd battery and lead-acid batt	ery. Fuel	cell-H	ydrogen-o	oxygen fue	el cell.		CO3
Corrosion-dry a	and wet	corrosion, mechanism of elec	ctrochem	nical co	prrosion,	galvanic, p	pitting and o	concentrat	tion
cell corrosion. F	actors in	nfluencing corrosion. Corrosion	n control	l by cat	hodic pro	otection. A	nodization.		
UNIT-IV	Introdu	uction to reaction mechanism				Periods:	12		
Introduction to	o reactio	on mechanism-factors influer	ncing a r	reactio	n, homo	lytic and	heterolytic	bond fiss	ion.
Reaction intern	nediates	-carbonium ion, carbanion, fi	ree radio	cals an	d carben	es. Electro	ophiles and	nucleophi	les.
Mechanism of	free ra	dical substitution-chlorinatio	n of me	ethane	. Mecha	nism of e		substituti	on- CO4
bromination of	benzen	e. Nucleophilic substitution-s	NZ-nyara	nysis o	n metnyi	bromide,	SNI-NYULON	SIS OF T-D	utyi irin
promue. Elimin	ufanilar	vide and chloroquine	eactions-	nuclec	philic an	a electrop	ninc. Synthe	esis or asp	
	Analut					Porioda	17		
Absorption and		an of radiation. Poor Lambort		Itravia	lot and v	icible coor	12 stroscopy ba	cic princi	مامد
and instrument	tation R	asic principles and instrumen	tation of	f atomi	ic absorn	tion spec	rometry bo	llow cath	ode
lamn Conduct	tivity-eau	ivalent and molar conduct	tance c		nstant (Conductor	netric titrat	tion-types	of CO5
conductometri	r titratio	ons Potentiometry-principle	of acid	hase	titration	Chromat	ogranhy- P	rincinles	and
instrumentatio	n of gas	Chromatograph.	or acia	Susc		Chroniat	ography i	interpres	una
Lecture Period	s: 45	Tutorial Periods: 15	Practic	al Perio	ods: -	Total Per	iods: 60		
Reference Boo	ks	1							
1. P.C. Jain an	d Monik	a Jain. Engineering Chemistry.	Dhanpat	t Rai Pı	ublishing	Company.	New Delhi.	2016.	
2. S.S. Dara ar	nd S.S Ur	nare, A Textbook of Engineeri	ng Chem	istry, S	. Chand 8	k Co., Ltd.	New Delhi. 2	2013.	
3. Arun Bahl,	B.S. Bahl	and G.D. Tuli, Essentials of Ph	ysical Ch	emistr	y, S. Char	nd and Cor	, npany Ltd, N	New Delhi	, 2016
4. Arun Bahl a	ind B.S. E	Bahl, A Text Book of Organic C	hemistrv	, S. Cha	and and C	Company L	td, New Del	hi, 2011	
5. B.R. Puri, L.	R. Sharm	na and K.C Kalia, Principles of I	, norganic	Chem	istry, Mile	estone Pul	olishers, Nev	w Delhi, 20	007
6. G.R.Chatwa	al & S.K.A	nand, Instrumental Methods	of Chem	ical An	alysis, Hir	malaya Pul	blishing Hou	ise P Ltd, I	Delhi,2005
7. D.A. Skoog	F.J. Holl	er and T.A. Nieman. Principles	s of Instru	umenta	al Analysi	s. Thomso	n Asia Pvt. I	td. Singan	ore, 2004

Department : C	hemistr	γ	Programme: B.Tech.							
Semester : F	irst/Sec	ond	Course	e Categ	gory Coo	de: BSC	Semester	[.] Exam Typ	e: LB	
Course Code	Course	2	Peric	ods / W	/eek	Credit	N	laximum N	Marks	
	course	-	L	Т	Р	С	CA	SE	1T	М
CY202	Chemi	stry Laboratory	-	-	3	1.5	40	60	10)0
Prerequisite	-									
	The st	udents will learn to:								
	CO1	Determine rate constants and	d order o	of reac	tions					
Course	<u> </u>	Measure molecular/system p	propertie	es such	as surfa	ace tension	, viscosity,	partition c	oeffici	ent,
Outcome	02	hardness of water, adsorptio	n, sapon	ificatio	on value	e and acid v	alue			
	CO3	Analyze quantitatively the co	ntents o	of samp	oles					
	CO4	Use conductivity, potentiome	etric and	chron	natogra	phic technic	ques			
	CO5	Analyse a salt sample								
Choice of 10-12	D-12 experiments from the following:									
1. Kinetic	study o	f acid hydrolysis of ethyl acetat	e							CO1
 3. Partitio 4. Total hat 5. Freund 6. Saponif 7. Chlorid 8. Determ 9. Determ 10. Determ 11. Determ 12. Beer-La 13. Magnes 14. Acetic a 15. Dissolve 16. Determ 	n of ber ardness lich adso ication ination ination ination ination mberts sium con acid con ed oxygo ination	nzoic acid between benzene an of water - Determination by El orption isotherm - Adsorption of value and acid value of an oil nt of water - Determination by of oxalic acid by permanganom of ferrous by permanganomet of ferrous and ferric by dichron of carbonate and bicarbonate law - Determination of ferrous ntent in water - Determination tent in vinegar en content in water - Determin of available chlorine in bleachi	, d water DTA met of acetic Mohr's netry ry metry in a mixt by color by EDTA nation by ng powc	hod acid o metho ture rimetr A meth Winkl der.	n charco d y lod ler's me	oal				CO2 CO3
17. Conduc 18. Potenti 19. Thin lay	tometri ometric ver chro	c titration titration matography								CO4
20. Chemic	al analy	sis of salt for cations and anior	15							CO5
Lecture Periods	5:	Tutorial Periods: -	Practio	cal Per	iods: 4	5 T	otal Period	ls: 45		
 Reference Books 1. Lab Manual, Department of Chemistry, Pondicherry Engineering College, Puducherry, 2018. 2. V. Venkateswaran, R. Veeraswamy and A.R. Kulandaivelu, Basic Principles of Practical Chemistry, Sultan Chand & Sons, New Delhi, 2001. 										

 J. Mendham, R.C. Denney, J.D. Barnes and M. Thomas, Vogel's Text Book of Quantitative Chemical Analysis, Pearson Education, New Delhi, 2002.

Department : H	umaniti	ies and Social Sciences	Programme: B.Tech.								
Semester : Fi	rst/Sec	ond	Course	e Categ	ory Coo	le: HSM	Semester E	ixam Type	e: TY		
Course Code	Course	、 、	Perio	ods / W	/eek	Credit	Ma	emester Exam Type: TY Maximum Marks CA SE T 40 60 10 s ing prowess. ining. id enable them to articles s in communication. inciple and rechnical Image: Color and the state			
Course Coue	Course		L	Т	Р	С	CA	SE	TM		
HS201	English	n for Communication	2	-	2	3	40	60	100		
Prerequisite	-		-								
	CO1	To help the learners to develop	their te	echnica	l comm	nunication s	kills				
	CO2	To equip the learners with skills	s requir	ed for o	develop	ing their re	ading prowe	ess.			
Course	CO3	To enhance the writing skills of	learner	s by pr	oviding	practice in	writing.				
Outcome	<u> </u>	To instil confidence in learners	s to dev	elop tł	neir spe	aking skills	and enable	them to	articulate		
	04	with ease.									
	CO5	To facilitate vocabulary enhanc	ement a	and gra	mmati	cal correctn	ess in comn	nunicatior	۱.		
UNIT-I	TECHN	IICAL COMMUNICATION				Periods: 1	2				
Nature of Teo	chnical	communication - Forms of	Technie	cal Co	mmuni	cation – (General an	d Techn	ical		
Communication	ı – Impo	ortance and need –Organization	in Tech	nnical C	Commu	nication – S	Style – ABC	of Techni	col		
Communicatior	–Techr	nical Communication Skills.									
UNIT-II	UNIT-II COMPREHENSION AND ANALYSIS Periods: 12										
Technical and Non-Technical passages – Reading methods – Skimming – Scanning– Extensive and Intensive						ive coz					
reading – Inferr	ing – Co	ontextual meaning – summary – r	note ma	king.							
UNIT-III	PRACT	ICE IN WRITING				Periods: 1	2				
Sentence Struct	ures – I	Use of phrases and clauses in ser	ntences	– cohe	rence i	n writing –	principles for	or paragra	iph		
writing –Essay \	Nriting -	 describing – defining – classify 	ring – Βι	isiness	letters	– memorar	ndum – inst	ructions -	- E- CO3		
mail –reports.											
UNIT-IV	SPEAK	ING PRACTICE				Periods: 1	2				
Pronunciation -	-Basics	of Phonetics- Conversations and	d dialog	ues –fo	ormal p	resentation	s – Group E	Discussion	s – CO4		
Extempore spea	aking – [Debates- Role Plays– interview sk	kills.								
UNIT-V	GRAM	MAR AND VOCABULARY BUILDI	NG			Periods: 1	2				
Word formation	n – root	words from foreign languages	and the	ir use i	n Engli	sh – Prefixe	es and suffix	kes –subje	ect-		
verb agreemen	t – Art	icles – voice – preposition– in	nportan	ce of p	ounctua	tion – Red	undancies –	synonyi	ms, CO5		
Antonyms and s	standaro	d abbreviations- Indianisms.									
Lecture Periods: 30Tutorial Periods: -Practical Periods: 30Total Periods: 60											
Reference Books											
1. Sudarshana,	N.P and	C. Savitha. English for Technical	Commu	unicatio	on. Noie	da: CUP, 20	16.				
2. Shoba, K N a		des Joavani Rayen. Communicat	Ive Engl	lish. Ch	ennai:	LUP, 2017.					
3. KIZVI, ASTITAT	, IVI. EIT Fnølick	Pronouncing Dictionary Cambr	idge I In	enn: N iversitv		, 2017. 2003					
 Dutt, Kiranmai P and Geetha Rajeevan. Basic Communication Skills. New Delhi: CUP,2013 											

6. Sanjay Kumar and Pushpalata. Communication Skills. New Delhi: OUP, 2011.

7. Mohan, Krishna and Meera Banerji. Developing Communication Skills. 2nd edition. Delhi: Macmillan, 2012.

8. Relevant material from newspapers, magazines and journals will be used for integrated practice.

Department : N	lechani	cal Engineering	Progran	nme: B.	Tech.							
Semester : Fi	irst/Sec	ond	Course	Categor	y Code	: ESC	Semeste	er Exam T	ype: L	В		
Course Code	Cource	、	Peric	ods / We	ek	Credit	Semester Exam Type: Li it Maximum Marks CA SE 40 60 40 60 section and establish hand sheet metal shop and per Is and establish the import ufacturing processes which using different materials and shaping machine ods: 9 ercise. 1. Filing and Job ods: 6 ods: 12 mensions and 4.Cube in Total Periods: 45					
Course Coue	Course		L	Т	Р	С	CA	SE	TI	N		
ME201	Work	shop and Manufacturing Practice	0	0	3	1.5	40	60	1()0		
Prerequisite												
	CO1	To convey the basics of mechan	ical tools	used in	n carpe	entry see	ction and	l establis	h han	ds on		
		experience in making the differen	t carpent	ry joints	S							
	CO2	To gain knowledge on types of some exercises	tools and	l machii	nes use	ed in sh	eet meta	il shop a	nd pei	form		
Course		To develop basic welding and fitt	ing joints	s using t	he han	d tools	and esta	blish the	impor	tance		
Outcome	CO3	of joints and fitting in engineering	applicat	ions					•			
	CO4	To gain knowledge of the differ	ain knowledge of the different machines used in manufacturing processes which are									
		commonly employed in the indus	imonly employed in the industry, to fabricate components using different materials									
· · · · · · ·	CO5	I o carry out simple manufacturin	carry out simple manufacturing operations in latne, drilling and shaping machine									
UNIT-I	Carpe	ntry				Period	s: 9					
Study of tools a	nd mac	hines in carpentry								CO1		
Practice on :1.H	lalf Lap _.	joint 2.Corner Mortise joint and 3.	Dovetail	joint								
UNIT-II	Sheet	Metal				Period	s: 9					
Study of tools a	nd mac	hineries in sheet metal shop								ററാ		
1.Frustum of co	ne 2.W	aste collection tray and 3.Rectangu	lar box							002		
UNIT-III	Weldi	ng and Fitting				Period	s: 9					
Lectures/demo	nstratio	ns/videos on Welding and fitting	operatio	ons witl	h simp	le exerc	cise. 1. F	iling and	d of	CO3		
preparation 2. \	/-Fitting	g and 3. Simple lap joint			I							
UNIT-IV	Study	of tools and machines				Period	s: 6					
Study of tools a	nd mac	hines in manufacturing lab								CO4		
1. Lathe machin	ie 2.Dri	Iling machine and 3.Shaping machi	ne		I							
UNIT-V	Simple	e Exercises in Lathe/Drilling machir	ne/Shape	r		Period	s: 12					
Simple operatio	ons in la	the, drilling and shaping										
1.Facing and Tu	urning	2.Step Turning 3.Drilling in a fla	t plate w	vith diff	erent o	drill dim	ensions a	and 4.Cu	be in	CO5		
Shaping			1									
Lecture Periods	s: 3	Tutorial Periods: -	Practica	al Perioc	ds: 42		Total Per	iods: 45				
Reference Book	(S											
 Hajra Choudl and Vol. II 20 Kalpakjian S. India Edition, 	hury S.K 10, Me And Ste , 2002.	 Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., "Elements of Workshop technology", Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai. Kalpakjian S. And Steven S. Schmid, "Manufacturing Engineering and Technology", 4th edition, Pearson Education India Edition, 2002. 								08 on		

3. H.N.Gupta, R.C.Gupta and Arun Mittal, Manufacturing Processes, New Age Publications, 2001.

Department : N	1echani	cal Engi	neering	Progra	mme:	B.Tech	•			
Semester : F	irst/Sec	ond		Course	e Categ	ory Coo	de: ESC	Semester E	xam Type:	TY
Course Code	Course	2		Perio	ods / W	Veek	Credit	Ma	aximum M	arks
Course Coue	Course	2		L	Т	Р	С	CA	SE	TM
ME202	Engine Aided	eering G Drawin	iraphics and Computer	2	-	4	3	40	60	100
Prerequisite	-								-	
	CO1	Stude engin	nts learn to properly dim eering drawing practice.	nension	and ar	notate	engineerin	g drawings	as per star	ndards of
Course	CO2	Stude solids	nts are made to follow ar	nd unde	rstand	the bas	sics of engin	eering draw	ving with si	mple
Outcome	CO3	Stude	nts can properly apply an	ıd produ	ice sec	tional v	iews.			
	CO4	Stude	nts are able to properly c	reate m	ulti-vie	ew orth	ographic dr	awings from	n three dim	nensional
	04	diagra	ams. Students are able to	present	: a drav	ving in	orthographi	c and isome	etric projec	tions.
	CO5	Stude	nts learn the application	of engin	eering	graphi	cs through c	computer-ai	ded draftir	ıg.
UNIT-I	<u></u>						Periods: 1	8		
Introduction to	Engine	ering g	raphics, Standards for Er	ngineeri	ng Dra	wing p	ractice, Let	tering, Line	work and	
Dimensioning, I	Projection of Lines, Projection of Planes CO1									CO1
UNIT-II	Periods: 18									
Projections of s	imple so	olids					,			CO2
UNIT-III	<u> </u>						Periods: 1	8		
Sections of solid	ds and I	Develop	oment of surfaces							CO3
UNIT-IV							Periods: 1	8		
Isometric Proje	ctions a	nd Orth	ographic Projections							CO4
UNIT-V							Periods: 1	8		
Introduction to CAD script.	Compu	iter Gra	phics and Drafting, Auto) CAD, 2	2-D dia	grams o	of simple ge	eometries u	sing Auto-	CO5
Lecture Periods	s: 30		Tutorial Periods: -	Practio	cal Per	iods: 60)	Total Period	ls: 90	
Reference Bool	ks			<u>.</u>			L			
1. K.R. Gopala	krishna	and Su	dhir Gopalakrishna, Engin	eering (Graphic	cs, Inzin	c Publishers	s, 2007.		
2. K.Venugopa	al, Engir	neering	Drawing & Graphics + Aut	to CAD,	4 th edit	tion, Ne	w Age Int'l	Publication I	_td., 2004.	
3. BIS, Engine	ering Dr	awing p	practices for Schools & Co	llege, SF	9 46: 20	003.				
4. T. Jeyapoov	van, Eng	ineering	g Graphics using AUTOCA	D, 7 th eo	dition, '	VIKAS P	ublishing H	ouse (P) Ltd	., 2015.	
5. N.D. Bhatt,	Enginee	ering Dr	awing, 49 th edition, Charc	otar Pub	lishing	House,	2014.			
6. K.V. Natara	jan, A T	ext Boo	k of Engineering Drawing	, Dhanal	lakshm	i Publis	hers, 2006.			
7. M. B. Shah	and B. C	C. Rana,	Engineering Drawing, 2 nd	dition	, Pears	on Pub	lications, 20	18.		
8. Agrawal B.	& Agrav	val C. M	I. (2012), Engineering Gra	phics, T	MH Pu	blicatio	n			
9. http://www	. http://www.3ds.com/products/catia/									

10. http://en.wikipedia.org/wiki/CATIA

Semester : First/Second Course Category Code: ESC Semester Exam Type: TY Course Code Course Course Image: Course Code Image: Course Code EE201 Basic Electrical Engineering 3 1 - 4 40 60 10									
Course CoursePeriods / WeekCreditMaximum MarksLTPCCASETMEE201Basic Electrical Engineering31-44060100									
LTPCCASETNEE201Basic Electrical Engineering31-4406010									
EE201 Basic Electrical Engineering 3 1 - 4 40 60 10	Л								
	0								
Prerequisite -									
CO1 To understand the basic concepts of DC circuits and theorems.									
CO2 To explain the concepts of AC circuits and resonance.									
CourseCO3To understand the basic concepts of magnetic circuits and transformer.									
Outcome CO4 To explain the working principle, construction, applications of electrical machines.									
CO5 To Gain knowledge of working of power plants and fundamentals of switch gear earthing.	and								
UNIT-I DC Circuits Periods: 12									
Electrical circuit elements (R, L and C) - Definition of Voltage, Current, Power and Energy – Ohm's law, Kirchoff									
current and voltage laws, analysis of simple circuits with DC voltage – Division of current in series and parallel									
circuits – Star-delta conversion – Node and mesh method of analysis of DC circuits – Network Theorems:	CO1								
Thevenin, Norton and Superposition Theorems.									
UNIT-II AC Circuits Periods: 12									
Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive									
cover, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC CO2									
combinations (series and parallel). Resonance: Series and parallel resonance. Inree-phase balanced circuits:	series and parallel). Resonance: Series and parallel resonance. Three-phase balanced circuits:								
Voltage and current relations in star and delta connections – Power measurement by two wattmeter method.									
UNIT-III Transformers Periods: 12									
Laws of Electromagnetic Induction – Ampere's circuital law, Faraday's law and Lenz law – Dot rule. Magnetic	60 2								
regulation and efficiency. Auto-transformer and three-phase transformer connections	03								
INIT-IV Electrical Machines Prese transformer connections:									
Elementary concept of rotating machines – Elemming's right hand and left hand rule – DC Machines									
Construction and working of DC Machines - Generator and Motors - Emf equation of DC generator and back									
emf of DC motor -characteristics - Types of DC Machines. AC Machines: Construction and working of Single	CO4								
phase & three phase induction motors and synchronous generator (gualitative approach only).									
phase & three phase induction motors and synchronous generator (qualitative approach only).									
UNIT-V Power Plants and LT Switch gear Periods: 12									
UNIT-VPower Plants and LT Switch gearPeriods: 12Power Plants: Layout of thermal, hydro and nuclear power generation (block diagram approach only).									
UNIT-VPower Plants and LT Switch gearPeriods: 12Power Plants: Layout of thermal, hydro and nuclear power generation(block diagram approach only).Components of AC transmission and distribution systems – One-line diagram.	005								
UNIT-VPower Plants and LT Switch gearPeriods: 12Power Plants: Layout of thermal, hydro and nuclear power generation (block diagram approach only). Components of AC transmission and distribution systems – One-line diagram. Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables. Earthing.	CO5								
UNIT-VPower Plants and LT Switch gearPeriods: 12Power Plants: Layout of thermal, hydro and nuclear power generation (block diagram approach only). Components of AC transmission and distribution systems – One-line diagram. Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables. Earthing. Elementary calculations for energy consumption.	CO5								
UNIT-V Power Plants and LT Switch gear Periods: 12 Power Plants: Layout of thermal, hydro and nuclear power generation (block diagram approach only). Components of AC transmission and distribution systems – One-line diagram. Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables. Earthing. Elementary calculations for energy consumption. Lecture Periods: 45 Tutorial Periods: 15 Practical Periods: - Total Periods: 60	CO5								
UNIT-V Power Plants and LT Switch gear Periods: 12 Power Plants: Layout of thermal, hydro and nuclear power generation (block diagram approach only). Components of AC transmission and distribution systems – One-line diagram. Components of AC transmission and distribution systems – One-line diagram. Components of AC transmission and distribution systems – One-line diagram. Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables. Earthing. Elementary calculations for energy consumption. Lecture Periods: 45 Tutorial Periods: 15 Practical Periods: - Total Periods: 60 Reference Books Fractical Periods: - Fractical Periods: - Fractical Periods: -	CO5								
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UNIT-V Power Plants and LT Switch gear Periods: 12 Power Plants: Layout of thermal, hydro and nuclear power generation (block diagram approach only). Components of AC transmission and distribution systems – One-line diagram. (block diagram approach only). Components of AC transmission and distribution systems – One-line diagram. - One-line diagram. Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables. Earthing. Elementary calculations for energy consumption. Lecture Periods: 45 Tutorial Periods: 15 Practical Periods: - Total Periods: 60 Reference Books 1. D. P. Kothari and L. J. Nagrath, "Basic Electrical Engineering", 3rd Edition, Tata McGraw Hill, 2017. 2. 2. D. C. Kulshreshtha, "Basic Electrical Engineering", Tata McGraw Hill, 2011. -	CO5								
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E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
 V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

Department : E	lectrical	and Electronics Engineering	Programme: B.Tech.									
Semester : Fi	irst/Seco	ond	Cour	se Cate	egory (Code: ESC	Semest	er Exam T	ype: LB			
Course Code	Courso		Peri	ods / V	Veek	Credit	Ma	larks				
Course Coue	Course		L	Т	Р	С	CA	Semester Exam Type Maximum Mark CA SE 40 60 0 omponents. te the concepts of n sockets, fuses and er Method t.				
EE202	Basic E	lectrical Engineering Laboratory	-	-	3	1.5	40	60	100			
Prerequisite	-											
	CO1	To understand the principles of o	domes	tic wiri	ng and	electrical	compon	ents.				
Course	CO2	To illustrate handling of measuring theorems	ing ins	rumen	nts and	demonst	rate the c	concepts o	f network			
Outcome	CO3	To analyze RL,RC,RLC circuits										
	CO4	To introduce concepts of single/	e concepts of single/three phase circuits									
	CO5 To demonstrate the working principle of electrical machines											
Any 10 experim	Any 10 experiments											
lamp holde 2. Study of far 3. Stair case w 4. Bedroom w	 Study of Basic safety precaditoris. Concepts of domestic wiring- wires, switches, plugs, sockets, fuses and lamp holders. Study of fan and tube light connections and earthing Stair case wiring. Bedroom wiring. 											
 Ose of mea Verification Verification 	of Thev of Supe	enin and Norton theorems erposition Theorem.	voitag	e and c	urrent	law			CO2			
 8. Impedance 9. Measureme 10. Resonance: 	calculat ent of po Series a	ion of R-L, R-C & R-L-C circuits and ve ower & power factor in a single phase nd parallel.	erificat e AC ci	ion. rcuit us	sing th	ree Amme	eter Meth	od	CO3			
11. Measureme 12. Measureme 13. Energy mea	ent of va ent of th isureme	rious line and phase quantities for a ree phase power using two wattmet nt using single phase energy meter.	three er met	phase s hod.	star/de	elta ac circ	uit.		CO4			
14. Load test of 15. Load test of	n a singlo n a singlo	e phase transformer. e phase induction motor.							CO5			
Lecture Periods	5: -	Tutorial Periods: - Prac	tical P	eriods	: 45	Tot	tal Perioc	ls: 45	l			
Reference Bool	٢S					i						
1. Laboratory	Manual,	Department of Electrical and Electro	onics E	nginee	ring, P	ondicherr	y Enginee	ering Colle	ge.			

Department : C	ompute	r Science and Engineering	Progra	mme: l	B.Tech	•						
Semester : F	irst/Seco	ond	Course	e Categ	ory Co	de: ESC	Semester E	xam Type	e: TY			
Course Code	Cource		Perio	ods / W	/eek	Credit	Ma	aximum N	/larks			
Course Coue	Course		L	Т	Р	С	CA	SE	TM			
CS201	Progra	mming for Problem Solving	3	-	-	3	40	60	100			
Prerequisite	-											
	CO1	Understood the phases of pr	oblem s	olving t	technic	ues for simp	le problem	s.				
_	CO2	Able to write programs using	, the bas	ic lang	uage co	onstructs.						
Course	CO3	Able to build a larger prograr	ms using	functi	on orie	nted approa	ches.					
Outcome	CO4	Could write efficient progran	ns using	advand	ced cor	cepts to opt	imize the m	nemory.				
	CO5	Could write programs to acce	write programs to access data from the secondary storage efficiently.									
UNIT-I	Algorit	hmic Problem Solving				Periods: 9	-					
History and Cl	assificat	ions of Computers – Compone	ents of	Compi	uter –	Working Pr	inciple of	Compute	r –			
Hardware – So	ftware a	and its Types – Applications of	Compu	ters. (Genera	tions of Pro	gramming	Language	s –			
Introduction to	Numbe	r System. Problem solving tech	niques:	Progra	am dev	velopment li	fe-cycle – A	Algorithm	is – CO1			
building blocks	of algori	thms - Algorithmic problem solv	ing-Flov	vchart-	- Pseud	lo code.						
UNIT-II	Data, E	Expressions, Statements	Periods: 9									
Introduction to	С –С Рі	rogram Structure – C Tokens: K	eyword,	Identi	fiers, C	Constants, Va	ariables and	d Data ty	pes			
(simple and us	er-defin	ed) – Operators and its types	– Opera	ator Pro	eceden	ce – Expres	sion Evalua	tion – T	ype CO2			
Conversion –M	anaging	Input/output operations-Branch	ing Stat	ements	s – Loo	ping Stateme	ents.					
UNIT-III Arrays and Functions Periods: 9												
UNIT-III	Arrays	and Functions				Periods: 9						
UNIT-III Arrays – Two di	Arrays mensior	and Functions nal arrays, Multidimensional arra	ays. Chai	racter a	irrays.	Periods: 9			_			
UNIT-III Arrays – Two di Functions: Func	Arrays mensior ction Pro	and Functions nal arrays, Multidimensional arra ptotype, Passing Arguments to I	ays. Chai Functior	racter a n – Call	irrays. by Va	Periods: 9	by Referen	ce – Nes	ted CO3			
UNIT-III Arrays – Two di Functions: Func function call – L	Arrays mensior ction Pro ibrary F	and Functions nal arrays, Multidimensional arra ototype, Passing Arguments to I unctions – User-defined Function	ays. Chai Functior ns – Rec	racter a n – Call ursion.	irrays. by Va	Periods: 9	by Referen	ce – Nes	ted CO3			
UNIT-III Arrays – Two di Functions: Func function call – L Strings – String	Arrays mensior ction Pro ibrary F I/O func	and Functions nal arrays, Multidimensional arra ototype, Passing Arguments to I unctions – User-defined Function tions, String Library functions –	ays. Chai Functior ns – Rec Storage	racter a n – Call ursion. classes	nrrays. by Va	Periods: 9	by Referen	ice – Nes	ted CO3			
UNIT-III Arrays – Two di Functions: Func function call – L Strings – String UNIT-IV	Arrays mension ction Pro ibrary F I/O func Structu	and Functions nal arrays, Multidimensional arra ototype, Passing Arguments to I unctions – User-defined Function tions, String Library functions – ures, Unions and Pointers	ays. Chai Functior ns – Rec Storage	racter a – Call ursion. classes	by Va	Periods: 9 lue and Call Periods: 9	by Referen	ce – Nes	ted CO3			
UNIT-III Arrays – Two di Functions: Func function call – L Strings – String UNIT-IV Structures – Ar	Arrays mensior ction Pro ibrary F I/O func Structu rays and tializatio	and Functions nal arrays, Multidimensional arra ptotype, Passing Arguments to I unctions – User-defined Function tions, String Library functions – 1 ures, Unions and Pointers structures – Nested structures	ays. Chai Functior ns – Rec Storage s – Struc	racter a – Call ursion. classes ture as	by Va by Va argun	Periods: 9 lue and Call Periods: 9 nent to funct	by Referen tions–Unior	ice – Nes n. Pointer	ted CO3			
UNIT-III Arrays – Two di Functions: Fund function call – L Strings – String UNIT-IV Structures – Ar Declaration, Ini value – Pointer	Arrays mension ction Pro library F I/O func Structu rays and tialization	and Functions nal arrays, Multidimensional arra ototype, Passing Arguments to I unctions – User-defined Function tions, String Library functions – ures, Unions and Pointers I structures – Nested structures on and Accessing Pointer variable ings - Pointers and structures	ays. Char Functior ns – Rec Storage 5 – Struc e – Point	racter a – Call ursion. classes ture as ters and	by Va by Va argun d array	Periods: 9 lue and Call Periods: 9 nent to funct s – pointers	by Referen tions–Unior as argumen	nce – Nes n. Pointer nt and ret	ted CO3 rs – urn CO4			
UNIT-III Arrays – Two di Functions: Func function call – L Strings – String UNIT-IV Structures – Ar Declaration, Ini value – Pointers	Arrays mensior ction Pro ibrary F I/O func Structu rays and tialization s and str File Ma	and Functions nal arrays, Multidimensional arra ototype, Passing Arguments to I unctions – User-defined Function tions, String Library functions – 1 ures, Unions and Pointers I structures – Nested structures on and Accessing Pointer variable ings - Pointers and structures.	ays. Chai Functior ns – Rec Storage 5 – Struc 5 – Point	racter a – Call ursion. classes ture as ters and	by Va by Va argun d array	Periods: 9 lue and Call Periods: 9 nent to funct s – pointers a Periods: 9	by Referen tions–Unior as argumen	ce – Nes n. Pointer it and ret	ted CO3			
UNIT-III Arrays – Two di Functions: Fund function call – L Strings – String UNIT-IV Structures – Ar Declaration, Ini value – Pointer UNIT-V Introduction to	Arrays mension ction Pro ibrary F I/O func Structu rays and tializatic s and str File Ma File Cor	and Functions nal arrays, Multidimensional arra ptotype, Passing Arguments to I unctions – User-defined Function tions, String Library functions – ures, Unions and Pointers I structures – Nested structures on and Accessing Pointer variable ings - Pointers and structures. anagement neepts in C – File types – I/O op	ays. Char Functior ns – Rec Storage s – Struc e – Point erations	racter a – Call ursion. classes ture as ture as ters and s on file	arrays. by Va argun d array	Periods: 9 lue and Call Periods: 9 nent to funct s – pointers a Periods: 9 e modes – R	by Referen tions–Unior as argumen andom acco	nce – Nes n. Pointer nt and ret ess to file	ted CO3 rs – urn CO4			
UNIT-III Arrays – Two di Functions: Func function call – L Strings – String UNIT-IV Structures – Ar Declaration, Ini value – Pointer UNIT-V Introduction to Command line	Arrays mensior ction Pro- ibrary F I/O func Structu rays and tialization s and str File Ma File Cor argume	and Functions nal arrays, Multidimensional arra ptotype, Passing Arguments to I unctions – User-defined Function tions, String Library functions – 1 ures, Unions and Pointers d structures – Nested structures on and Accessing Pointer variable ings - Pointers and structures. anagement incepts in C – File types – I/O op ents. Dynamic Memory Allocati	ays. Char Function ns – Rec Storage 5 – Struc 2 – Point erations ion: MA	racter a – Call ursion. classes ture as ters and s on file LLOC,	arrays. by Va argun d array es – File CALLO	Periods: 9 lue and Call Periods: 9 nent to funct s – pointers a Periods: 9 e modes – R C, FREE, RE/	by Referen tions–Unior as argumen andom acco	n. Pointer n. Pointer and ret ess to file	ted CO3			
UNIT-III Arrays – Two di Functions: Func function call – L Strings – String UNIT-IV Structures – Ar Declaration, Ini value – Pointer: UNIT-V Introduction to Command line preprocessor:	Arrays mension ction Pro- ibrary F I/O func Structu rays and tializatic s and str File Ma File Con argume Macro	and Functions nal arrays, Multidimensional arra ptotype, Passing Arguments to I unctions – User-defined Function tions, String Library functions – ures, Unions and Pointers I structures – Nested structures on and Accessing Pointer variable ings - Pointers and structures. Anagement neepts in C – File types – I/O op ents. Dynamic Memory Allocati substitution directives – File	ays. Chai Functior ns – Rec Storage a – Struc e – Point erations ion: MA e inclus	racter a - Call ursion. classes ture as ters and s on file LLOC, ion di	arrays. by Va argun d array es – File CALLO rective	Periods: 9 lue and Call Periods: 9 nent to funct s – pointers a Periods: 9 e modes – R C, FREE, REA s –Compiler	by Referen tions–Unior as argumen andom acco ALLOC. Intr Control	n. Pointer n. Pointer and ret ess to file roduction directives	ted CO3 rs – urn CO4 es – to s – CO5			
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4. Ashok N Kamthane, "Computer Programming", Pearson education, Second Edition, 2012.

Department : C	omputer	Science and Engineering	Progra	amme:	B.Tecł	h.				
Semester : F	irst/Secor	nd	Cours	e Categ	gory Co	ode: ESC	Semeste	r Exam Typ	be: LB	
	_		Perie	ods / W	/eek	Credit	Ň	Aaximum N	Marks	
Course Code	Course		L	T	Р	С	CA	SE	ΤN	Λ
CS202	Program	nming Laboratory	-	-	3	1.5	40	60	10	0
Prereauisite	-			.LL		. L	L	ii.		
	CO1	Understood the program e	diting a	nd com	pilatio	on environm	ent.			
	<u> </u>	Able to write simple (prog	grams II	sing me	nst from	nuently used	l control sti	ructures		
Course		Apply the methods proble				unctions		luctures.		
Outcome	CO3	Apply the methods problem	ins usinį	g arrays	anu n					
	CO4	Learnt to handle data proc	essing u	using st	ructure	es for simple	e applicatio	ns.		
	CO5	Write programs that could	handle	file i/o	and po	ointers.				
Programming l	Jsing C									
1. Study of Com	pilation a	nd execution of simple C pro	ograms							
2. Basic C Progr	ams									
a. Arith	metic Ope	erations								CO1
b. Area	and Circu	Imference of a circle								01
c. Swap	ping with a	and without Temporary Vari	ables							
3. Programs usi	ing Branch	ning statements								
a. To cł	neck the n	umber as Odd or Even								
b. Grea	test of Th	ree Numbers								
c. Cour	iting Vowe	els								
d. Grad	ling based	on Student's Mark								
4. Programs usi	ing Contro	ol Structures								<u> </u>
a. Com	puting Fac	ctorial of a number								02
b. Fibo	nacci Serie	es generation								
c. Prim	e Number	Checking								
d. Comp	outing Sum	n of Digit								
5. Programs usi	ing Arrays									
a. Sum	of 'n' num	nbers								
b. Sorti	ng an Arra	ау								
c. Matr	ix Additio	n, Subtraction, Multiplication	n and Tr	ranspos	e					CU3
6. Programs us	ing Functio	ons								05
a. Com	puting nC	r								
b. Facto	orial using	Recursion								
c. Call b	y Value an	nd Call by Reference								
7. Programs usi	ing String	Operations								
a. Palin	drome Ch	lecking								
b. Sear	ching and	Sorting Names								
8. Programs usi	ing Structı	ure								CO4
a. Stud	ent Inform	nation System								
b. Emp	loyee Pay	Slip Generation								
c. Elect	ricity Bill (Generation								
9. Programs us	ing Pointe	rs								
a. Point	ter and Ar	ray								
b. Poin	ters as arg	gument and return value								
c. Point	ter and Str	ructure								CO5
10. Programs u	sing File C	peration								
a. Cour	iting No. c	of Lines, Characters and Black	к Spaces	S						
b. Cont	ent copy l	from one file to another								
c. Read	ing and W				• •					
Lecture Period	s: -	Tutorial Periods: -	Practi	cal Per	iods: 4	45 T	otal Period	ds: 45		
Reference Boo	ks									
-										

Semester : First/Second Course Category Code: MCC Semester Exam Type: - Course Code Course Code Course Code T Periods / Week Credit Maximum Marks CE201 Environmental Science 3 - Non-Credit - - Prerequisite - - Non-Credit - - - COUrse Outcome Able to understand about the environmental natural resources and adopting the methods for recycle and reuse of domestic water Able to dadress the environmental issues namely pollution, depletion of natural resources and degrading ecosystem Able to dadress the environmental friendly and work for sustainable development of the humanity. which are environmental friendly and work for sustainable development of the humanity. Able to ake the solid waste segregation and conduct events related environmental issues. Co1 Able to ake the solid waste segregation and conduct events related environmental issues. Co1 Activity - 1 Able to make the solid waste segregation and conduct events related environmental issues. Periods: 9 Co1 Activity - 2 Rainwater Harvesting-Methodogy, components, design of rainwater harvesting system for a single house (as periods: 9 / 2 / 2 / 2 / 2 / 2 / 2 / 2 / 2 / 2 /
Course Code Course Periods / Week Credit Maximum Marks CE201 Environmental Science 3 - Non-Credit - - Prerequisite - Non-Credit -
Course Code Course L T P C CA SE TM CE201 Environmental Science 3 - - Non-Credit - - - Prerequisite - - Able to understand about the environment and natural resources available -
CE201 Environmental Science 3 - Non-Credit - - Prerequisite - Able to understand about the environment and natural resources available - - - Course Outcome Able to design the Rainwater harvesting and adopting the methods for recycle and reuse of domestic water - - - - Course Outcome Able to develop models for resource and degrading ecosystem -
Prerequisite - C01 Able to understand about the environment and natural resources available Able to design the Rainwater harvesting and adopting the methods for recycle and reuse of domestic water Able to address the environmental issues namely pollution, depletion of natural resources and degrading ecosystem C04 Able to address the environmental issues namely pollution, depletion of natural resources and degrading ecosystem Able to address the environmental friendly and work for sustainable development of the humanity. C04 Able to participate in the Green initiatives in the society i.e. Energy conservation and Tree plantation. Able to make the solid waste segregation and conduct events related environmental issues. Periods: 9 Activity - 1 Vater resources. Vater (J974). C01 Activity - 2 Periods: 9 Activity - 3 Activity - 3 Periods: 9 Activity - 4 Activity - 4 Periods: 9 Activity - 4 Activity - 5 Periods: 9 Activity - 4 Activity - 4 Periods: 9 Activity - 4 Activity - 5 Periods: 9 Activity - 4 Activity - 6 Periods: 9 Activity - 4 Activity - 6 Periods: 9 Activity - 6
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Buildings, Greenhouse gas emissions and indoor air pollution, green construction materials, Green building
accossment system. Case study
Activity – 8 Periods: 9 CO5
Importance of Tree Plantation. Display of usefulness of trees. Method of tree planting. Identify the trees
available in the PEC campus, Mass Plantation inside/outside the campus in association with the H2EC /NSS of
PEC, Store the trees to the planted by the dignitaries with the help of horticulture of PEC.
Activity – 9 Periods: 9
Collection and segregation of solid waste in the PEC campus in association with the H2EC /NSS of PEC
Activity – 10 Periods: 9
Invite guest Lectures from the Environmental experts of DSTE (for environmental issues)/REAP (for energy CO6
efficient buildings)/Town and Country Planning/PWD of Puducherry, conducting competitions to students in
the topics of slogan making, poster and seminar presentations, debate and observing the important national
and international days on environmental issues to bring awareness among the students and public.
Activity Periods: 45 I utorial Periods: - Practical Periods: - Total Periods: 45
Networks 1 D Vugapanth D Kumaravalan Environmental Science and Engineering Science Dublications (Inida) D Ltd. Dabi
2017.
 Jonn Pichtel, Waste Management Practices: Municipal, Hazardous and Industrial, CRC Press, 2014 V S K V Harish, Arunkumar, Green Building Energy Simulation and Modeling, Elsevier Science & Technology 2018

- 4. Anubha Kaushik and C.P.Kaushik, Environmental Science and Engineering, New Age International (P) Ltd., New Delhi, 2010.
- 5. S.S.Dara, A text book of Environmental Chemistry and Pollution Control, S.Chand and Company Ltd., New Delhi, 2014.
- 6. IS:15797:2008, Roof Top Rainwater Harvesting-Guidelines, BIS, New Delhi
- 7. Energy Conservation Building Code, 2017, Bureau of Energy Efficiency, Ministry of Power, Government of India.

Department : I	Mathemat	ics	Programme	e: B.Tec	h.							
Semester : T	「hird		Course Category Code: BSC / Semester Exam Type: T									
Course Code	Course N	2000	Period	s / Wee	k	Credit	Max	kimum N	Marks			
Course Coue	Course N		L	Т	Р	С	CA	SE	TM			
MA204	Transfor	ms, Partial Differential	2	1	0	Л	ester Exam Type: Maximum Ma CA SE 40 60 40 60 Periods: nsform of unit d first shifting and integrals, icients-Laplace Periods: grange's linear grouping and Periods: ial differential le solutions of Periods: Temperature r steady state Periods: d Continuous), cal parameters d Continuous), d Continuous), cal parameters d Continuous), d Cont	100				
1117204	Equation	s and Statistics	5	±	U	4	40	00	100			
Prerequisite:												
	CO1	Understands Transform C	Calculus									
Course	CO2	Understands how to form	n partial differ	ential e	quatior	าร						
Outcomo	CO3	Solve the Partial Different	tial Equations									
Outcome	CO4	Gain knowledge on solvin	ng Boundary V	alue Pro	blems							
	CO5	Understand basic statistic	s and distribu	utions								
UNIT-I	LAPLACE	TRANSFORMS						Period	ls: 12			
Definition of L	aplace Tra	nsform, Inverse Laplace Tran	sform, Linear	ity prop	erty, La	place tra	nsform	of unit				
step function,	Unit impu	lse function and some elem	entary function	ons, Cha	ange of	f scale an	d first s	hifting				
property, Der	ivatives a	nd integrals of Laplace tra	ansform, Trar	nsform	of der	ivatives a	and int	egrals,	CO1			
Application: Solution of single ordinary linear differential equation with constant coefficients-Laplace												
transform of Periodic functions.												
UNIT-II PARTIAL DIFFERENTIAL EQUATIONS Periods: 12												
General and Singular solution of PDE, Complete Solution of First order Non-linear PDE, Lagrange's linear												
equation of f	irst order,	Solution of the simultane	eous equation	ns by t	he me	thod of	groupin	ig and	CO2			
multipliers.												
UNIT-III	HIGHER	ORDER PDE AND BOUNDARY	YVALUE PROE	BLEMS				Period	ls: 12			
Homogeneous	linear PD	E of higher order with cor	nstant coeffic	cients. S	olutior	n of parti	al diffe	rential				
equation by th	ne method	of separation of variables.	Application of	f PDE: V	'ariable	e separabl	e soluti	ons of	CO3			
the one dimen	sional wav	e equation, Transverse vibra	tion of a stret	ched str	ing.							
UNIT-IV	ONE DIN	IENSIONAL AND TWO DIMEN	NSIONAL HEA	T FLOW				Period	ls: 12			
Heat Equatior	n, Variable	e and separable solution of	of one dime	nsional	heat e	equation,	Tempe	rature				
distribution w	ith zero a	nd non-zero boundary value	es, Two dime	nsional	heat fl	ow unde	r steady	/ state	CO4			
conditions(Car	tesian).											
UNIT-V	PROBAB	LITY AND STATISTICS						Period	ls: 12			
Probability, Ev	ents, Sam	ple space, Axioms of probal	bility, Randon	n variab	ole (Dis	crete and	Contin	iuous),				
Expectation, P	robability	Distribution: Binomial, Poisso	on & Normal	distribut	tion an	d statistic	al parar	neters	CO5			
of these distrib	outions, Co	rrelation and Regression, Rai	nk correlation).					L			
Lecture Period	s: 45	Tutorial Periods: 15	Practical Pe	eriods: -		Tot	al Peric	ods: 60				
Reference Boo	oks:			-			-					
1. Veeraraj	an T, Engin	eering Mathematics II, McGr	aw-Hill Educa	ition(Inc	lia) Priv	vate Limite	ed, 2014	1.	<i>.</i>			
2. Veeraraja Private L	an T, Tran imited, 201	sforms and Partial Different 16.	ial Equations,	, Third I	Edition,	, McGraw	-Hill Ed	ucation	(India)			
3. Venkatar Chennai,	aman M.H 2008.	K., Engineering Mathematics	s, Third Year	, Part-B	, The	National	Publishi	ing Con	npany,			
4. S.C.Gupt New Dell	a and V.K. ni, 2000.	Kapoor, Fundamentals of N	lathematical	Statistic	s, 10 th	Edition,	Sultan (Chand &	&Sons,			
5. Erwin Kre	eyszig, Adv	anced Engineering Mathema	atics (9 th Ed).	John W	iley & S	Sons, New	Delhi, 2	2011.				
6. Ramana	B.V., Highe	er Engineering Mathematics,	Tata McGraw	Hill Nev	v Delhi	, Eleventh	Reprin	t, 2010.				
7. Bali N. a 9 th Edition	and Goyal n. 2011.	M., Advanced Engineering	Mathematic	s, Laxm	i Publi	ications F	vt. Ltd	., New	Delhi,			

Semester : Third Course Category Code: ESC Semester Exam type: TY Course code Course Course Periods/week Credit Maximum marks Course code Engineering Mechanics 3 1 0 4 40 60 10 ME203 Engineering Mechanics 3 1 0 4 40 60 10 Prerequisite CO1 Students will able to determine the resultant force and moment for a given force system. Students will able to analyse planar and spatial systems to determine the forces in members of trusses, frames. Students will able to determine the centroid and second moment of area/mass through theoretic Outcomes CO3 Determination of friction force/ torque requires to operate the machine elements. Student will able to determine the centroid and second moment of area/mass through theoretic									
Course Credit Maximum marks Course C CA SE TN ME203 Engineering Mechanics 3 1 0 4 40 60 10 Prerequisite Students will able to determine the resultant force and moment for a given force system. CO2 Students will able to analyse planar and spatial systems to determine the forces in members of trusses, frames. CO3 Determination of friction force/ torque requires to operate the machine elements. Student will able to determine the centroid and second moment of area/mass through theoretic									
Course code Course L T P C CA SE TN ME203 Engineering Mechanics 3 1 0 4 40 60 10 Prerequisite CO1 Students will able to determine the resultant force and moment for a given force system. Students will able to analyse planar and spatial systems to determine the forces in members trusses, frames. CO2 Students will able to analyse planar and spatial systems to operate the machine elements. CO3 Determination of friction force/ torque requires to operate the machine elements. CO4 Student will able to determine the centroid and second moment of area/mass through theoretic									
ME203 Engineering Mechanics 3 1 0 4 40 60 10 Prerequisite CO1 Students will able to determine the resultant force and moment for a given force system. CO2 Students will able to analyse planar and spatial systems to determine the forces in members of trusses, frames. Students will able to determine the centroid and second moment of area/mass through theoretic Outcomes CO4 Student will able to determine the centroid and second moment of area/mass through theoretic									
Prerequisite CO1 Students will able to determine the resultant force and moment for a given force system. CO2 Students will able to analyse planar and spatial systems to determine the forces in members trusses, frames. Course CO3 Determination of friction force/ torque requires to operate the machine elements. Outcomes CO4 Student will able to determine the centroid and second moment of area/mass through theoretic									
CO1 Students will able to determine the resultant force and moment for a given force system. CO2 Students will able to analyse planar and spatial systems to determine the forces in members trusses, frames. Course CO3 Determination of friction force/ torque requires to operate the machine elements. Outcomes CO4 Student will able to determine the centroid and second moment of area/mass through theoretic									
CO1 Students will able to determine the resultant force and moment for a given force system. CO2 Students will able to analyse planar and spatial systems to determine the forces in members trusses, frames. Course CO3 Determination of friction force/ torque requires to operate the machine elements. Outcomes CO4 Student will able to determine the centroid and second moment of area/mass through theoretic									
CO2Students will able to analyse planar and spatial systems to determine the forces in members trusses, frames.CourseCO3Determination of friction force/ torque requires to operate the machine elements.OutcomesCO4Student will able to determine the centroid and second moment of area/mass through theoretic									
CourseCO3Determination of friction force/ torque requires to operate the machine elements.OutcomesCO4Student will able to determine the centroid and second moment of area/mass through theoretic									
Course Cos Determination of inction force/ torque requires to operate the machine elements. Outcomes Cos Student will able to determine the centroid and second moment of area/mass through theoretic									
Student will able to determine the centroid and second moment of area/mass through theoretic									
and experimental techniques									
Students will able to Calculate the motion parameters for a rigid body subjected to a given for									
CO5 system through Kinematics and Kinetics approaches									
UNIT- I Periods: 12									
Introduction – Units and Dimensions – Laws of forces — Vectorial representation of forces – Concurrent and									
non-concurrent coplanar forces. Conditions of static equilibrium for coplanar force system, stability and									
equilibrium, concept of free body diagrams. Fundamental Principles of mechanics: Principle of transmissibility.									
Principle of superposition, Law of gravitation, Law of parallelogram of forces. Application of Force System -									
Analysis of plane trusses – method of joints – method of sections.									
UNIT-II Periods: 12									
Friction: Laws of friction, Static dry friction, simple contact friction problems, simple screw jack, and Belt									
friction, Friction clutches, rolling friction, Journal bearing and thrust bearing friction. CO									
Unit-III Periods: 12									
Properties of Surfaces- Properties of sections – centroids, center of gravity, area moment of inertia, Parallel									
Axis Theorem, product moment of inertia, polar moment of inertia, radius of gyration, mass moment of inertia									
of Basic Shapes - Experimental Determination. CO									
Principle of virtual work – work done by force and couple – application to simple mechanical systems.									
Unit-IV Periods: 12									
Kinematics and Kinetics of Rigid Bodies. Circular Motion of Rigid bodies – Acceleration during circular motion –									
Rotation of rigid bodies – Angular motion – Relationship between Angular and linear motion – Kinetics of Rigid CO4									
body rotation – General plane of motion – Kinematics – Instantaneous Axis of rotation – kinetics of Rolling									
bodies – Kinetics of General plane motion.									
Unit-V Periods: 12									
Simple narmonic motion – vibration of mechanical systems - basic elements of a vibrating system – spring mass									
model – undamped free vibrations – Determination of natural frequency of 1D free vibration systems-									
Total Contact Hours: 45 Total Tutoriale: 15 Total Practical Classes: Total Hours: 60									
Reference Books:									
1 Prahhu T. J. Engineering Mechanics Scitech Publications (India) Put 1td 2015									
2. Bhavikatti S S and Bajashekarappa K G. Engineering Mechanics, New Age International (P) Itd. New Delhi									
2013.									
3. Beer, F.P and Johnson Jr. E.R, Vector Mechanics for Engineers, Vol. 1 Statics and Vol. 2 Dynamics. McGraw –									
Hill International Edition, 1997.									
4. Timoshenko, S., Young, D.H., Rao, J.V. and Sukumar Pati, Engineering Mechanics, Fifth edition, McGraw Hill									
Education (India) Pvt. Ltd., 2013.									
5. Dukkipati R.V, Textbook of Mechanical Vibrations, Prentice Hall India Learning Private Limited; 2 edition,									
2012.									

Department : N	/ echan	ical Engineering	Prog	amm	e : B.T e	ech (ME)							
Semester :T	hird		Cours	se Cat	e Category Code: PCC Semester Exam Type: TY								
Course Code		Course nome	Perio	ods / \	Week	Credit	Maximum Marks						
Course Coue		Course name	L	Т	Р	С	Semester Examination CA SE 40 60 fluid pressure us matical function d energy to solve mensional & mo flow bower required/ ydraulic machine 2 measurement- ces on surfaces: 2 r and cylindrical es and flow net- ynamics of fluid ts applications: 2 pipe and Hagen Compound pipe m for problems on to Boundary 2 ary and moving cation- Impulse pocity triangles- 2 tion of power quantities and ng pump-types-	SE	TM				
ME204	Fluid I Machi	Mechanics & Hydraulic nes	3	1	0	4	40	60	100				
Prerequisite:	В	asic laws of Physics											
	CO1	Able to determine the flui	d prop	erties	s of fluid	d, calculate f	luid pres	sure usi	ng				
	COI	manometer, solve probler	ms on	fluid s	tatics								
		Able to Understand types of fluid motion, various mathematical functions, calculate											
	CO2	velocity and acceleration,	apply	conse	rvation	of mass and	energy	to solve	fluid flow				
Course		problems											
Outcome	CO3	Able to solve problems or	n flow t	houg	h pipes,	perform din	nensiona	al & mod	lel analysis				
		for fluid flow problems, an	for fluid flow problems, and understand boundary layer flow										
	CO4	Able to apply impulse mo	mentu	m pri	nciple to	o calculate p	ower rec	quired/developed					
	by hydraulic machines												
	CO5	Able to understand the performance characteristics of hydraulic machines											
UNIT-I Periods: 12													
Fluid propertie	es. Fluic	statics: Pascal's law-hydi	rostatio	c law	-scale	of pressure	measure	ement-					
Manometer: si	mple, i	nclined differential U-tube	mano	mete	rs. Hydi	rostatic force	es on su	rfaces:	CO1				
centre of pressure and total pressure. Buoyancy and floatation.													
UNIT-II Periods: 12													
Kinematics of I		w: types of fluid flow, con	tinuity	equa	ition in	rectangular	and cyll	ndrical					
coordinate syst	ems-ve	ation volgeity notential fur	eam im	ies, pa	traama f	s, streak line	s and no	w net-	603				
flow: Equation	n - 100	action Eulor's equation	Porn			tion and its		n nuiu	02				
Venturimeter	Orifice i	meter and Pitot tube	Dem	oums	equal		s applic	ations.					
						Periods: 12							
Revnolds evner	iment:	Flow through nines: flow o	fvisco	us flu	id throi	igh circular r	nine and	Hagen					
Poiseuille form	ula Ene	ergy losses: major loss and	minor	losse	s - Daro	ry Formula-C	omnoun	nagen Id nine					
and equivalent	pipe. D	imensional analysis- Applic	cation	of Bu	ckingha	m Pi theorer	n for pro	blems	CO3				
in fluid mechar	nics -mo	odel analysis-Similitude-dim	nensior	nless i	number	s Introductio	on to Bo	undarv					
layer flow: Flov	v over a	flat plate (theoretical treat	tment	only)				, , ,					
UNIT-IV						Periods: 12	2						
Impulse mome	entum e	equation- impact of jet: Fo	orce ex	erted	by jet	on stationa	ry and r	noving					
plates/vanes -	-calcula	tion of work and power	. Hyd	raulic	turbin	es: classifica	ation- Ir	npulse	604				
Turbine-Pelton	whee	I- Reaction Turbine-Fran	cis an	id Ka	iplan t	urbines-velo	city tria	angles-	C04				
calculation of p	ower d	eveloped.											
UNIT-V						Periods: 12	2						
Hydraulic pum	nps: Cla	assification-Centrifugal pu	mp- v	elocit	y trian	gles-calculat	ion of	power					
required- pum	p effici	ency-priming. Performance	e of h	ydrau	lic mac	hines: Unit	quantitie	es and	CO5				
specific speed,	perfo	mance characteristics cur	ves –	Cavit	ation. I	Reciprocatin	g pump	-types-					
working princip	ole-air v	essels-gear pumps (theoret	ical tre	eatme	ent only).							
Lecture Period	s: 45	Tutorial Periods:15	Pract	ical P	eriods:	Nil Tot	al Period	ls: 60					

Reference Books:

- 1. R. K. Bansal, A textbook of fluid mechanics and hydraulic machines, Laxmi Publications, 2005.
- 2. P.N. Modi and S.M. Seth, Hydraulics and Fluid Mechanics Including Hydraulics Machines Rajsons publications Pvt Ltd, 2017
- 3. K. L. Kumar, Engineering Fluid mechanics, S. Chand, 2010.
- 4. Subramanya. K, Hydraulic machines, McGraw Hill Education (India) Private Limited, 2013
- 5. Robert W Fox & Alan T. McDonald, Introduction to fluid mechanics, John Wiley & sons, Inc., 2013
- 6. Frank M. White, Fluid mechanics, McGraw Hill Education (India) Private Limited, 2011
- 7. Yunus Cengel & John Cimbala, Fluid Mechanics: Fundamentals and Applications McGraw Hill Education (India) Private Limited, 2014.
- 8. Munson, Young, Okiishi and Huebsch, Fundamental of fluid mechanics, Wiley India Private Limited, 2009.
- **9.** Som. S & Gautham Biswas, Introduction to fluid mechanics and fluid machines, McGraw Hill Education (India) Private Limited, 2011.

Department :	Mechani	cal Engineering	Progra	mme :	B.Tech	.Tech (ME)									
Semester :	Third		Course Category Code: PCC Semester Exam Type: TY												
	C	Nama	Perio	ods / W	eek	Credit	Ν	Maximum Marks							
Course Code	Course	Name	L	Т	Р	С	CA	SE	Т	M					
ME205	Enginee	ering Thermodynamics	3	1	0	4	40	60	1	00					
Prerequisite:						-	<u>.</u>	<u>_</u>							
	CO1	Application of the first law ounder steady and unsteady	of therm conditio	nodynar ons.	nics for	simple o	closed ar	nd open	system	IS					
	CO2	Application of the second la of entropy changes and per	aw of the forming	ermody ; exergy	namics analysi	to thern is of proc	nodynan cesses.	nic cycle	es, calcu	lation					
Course Outcome	CO3	Use of modified equations of steam.	of state	for gase	es and ι	use of tak	oles / cha	arts for	propert	ies of					
	CO4	Derivation of relations invo changes in psychrometric p	lving pro	operties s.	of idea	al gases a	and calcu	lation c	of prope	erty					
	CO5	Calculation of air/fuel ratio thermodynamics to combus	Iculation of air/fuel ratio during combustion of fuel, application of first law of ermodynamics to combustion.												
UNIT-I	JNIT-I Periods: 12														
Continuum –	microsco	pic and macroscopic approa	ach – tł	hermod	ynamic	systems	s, prope	rty and	its						
types, process	s and its	s types, state – thermodyn	amic ec	quilibriu	m – p	ath and	point f	unction	s —						
temperature a	and its measurement scales – zeroth law of thermodynamics – energy – stored forms									CO1					
and transition	al forms	I forms of energy and their types – first law of thermodynamics applied to closed and													
open systems	open systems – steady and unsteady processes – first law efficiency.														
UNIT-II Periods: 12															
Limitations of	first law	of thermodynamics – heat e	engines -	- heat p	oumps -	- therma	l reservo	oirs – v	arious						
statements of	second	law of thermodynamics – re	versibili	ty – Cla	usius i	nequality	/ – entro	ppy – er	ntropy						
change in pro	cesses – e	entropy generation principle	and its	applicat	ions –	entropy	balance	of close	ed and	CO2					
open systems.	pen systems.														
exergy - rever	Exergy – reversible work, useful work for closed and open systems – decrease of exergy in processes –														
	ueau state – irreversibility – second law efficiency of thermal devices.														
Ideal and rea	al gases	– gas laws various equa	ations o	f state	– lav	of cou	respond	ling sta	ites —						
compressibility	v factor	and charts. Mixture of gase	s – laws	s - pror	perty c	orrelatio	ns – ent	tropy –	Gibbs						
function. Pure	, substan	ices – phase change process	s – dryn	ess frac	ction –	property	y tables	– 2D a	nd 3D	CO3					
charts – Mollie	er diagrar	n.	•				•								
UNIT-IV	Ŭ					Periods	5: 12								
Thermodynam	nic prop	erties correlations – Maxy	well's c	orrelati	ons –	Tds ec	quations	– inv	ersion						
temperature - mixture – prop	- Joule Ke perty tabl	elvin effect – Clausius Clapey les and charts – adiabatic sat	ron equ uration	iation. F	Psychro ature –	ometry – psychro	air and metric p	water v rocesse	apour s.	CO4					
UNIT-V						Periods	5: 12								
Combustion –	Stoichior	metry – air/fuel ratio – entha	lpy of fo	rmatior	n – entł	nalpy of o	combust	ion –firs	st law						
of thermodyna Mach number	amics app – relatio	blied to combustion – heating ns for stagnation fluid prope	g values. rties – is	. Compr entropi	essible c flows	flow – st through	tagnatio nozzles.	n states	-	CO5					
Lecture Period	ls: 45	Tutorial Periods: 15	Practic	al Perio	ods: -		Total P	eriods:	60						
Reference Boo	oks:		<u>.</u>												
1. Nag.P.H	K., "Engi	neering Thermodynamics",	, 6 th Edi	tion, M	cGraw	Hill Ind	ia, New	Delhi,	2017.						
2. Yunus / Delhi, 2	A. Cenge 2015.	l & Michael A. Boles, "The	rmodyn	amics"	', 8 th eo	dition, N	lcGraw	Hill Ind	ia, Nev	v					
3. C.P.Arc	ora, <i>"The</i>	rmodynamics". Tata McGr	aw Hill	Publish	ning Co	. Ltd N	ew Delł	ni, 2003	3.						
4. Rathak	rishnan	E, "Fundamentals of Engine	eering T	Thermo	dynan	<i>nics",</i> 2 ⁿ	^d Editio	n, PHI I	earnin	g Pvt.					
5 Claus R	orgnakk	, 2000. e & Richard F. Sonntag Fui	ndamer	ntals of	Therm	odvnar	nics 7 th	Edition	lohn V	Vilev					
and So	ns Inc. N	ew York, 2009.	aunen		mem	 Claus Borgnakke & Richard E. Sonntag Fundamentals of Thermodynamics 7th Edition John Wiley and Sons Inc. New York, 2009. 									

Department : Mec	hanical E	ingineering	Prog	ramme	e: B.	Tech (ME)							
Semester : Thire	d		Cour	se Cat	egory	Code: PCC	Semes	Semester Exam Type: TY					
Course Code	Course	Nama	Peric	ods / V	Veek	Credit		emester Exam Type: TY Maximum Marks					
Course Code	Course	Name	L	Т	Ρ	С	CA	SE	ТМ				
ME206	Materi	als Technology	3	0	0	3	40	60	100				
Prerequisite:						-							
	CO1	At the end of the cou Material selection	At the end of the course, the student will be able to: Mastery of the knowledg Material selection										
	CO2	Understanding the c	oncep	ts of p	hase	diagrams inc	luding ir	on-carbo	n diagram				
Course Outcome	СОЗ	Examining the prope applications	ng the properties of ferrous and non ferrous materials for different ions										
	CO4	Applying the different	nt med	hanica	al test	ing methods							
	CO5	Examining the differe	ent fail	ure m	echar	ism of meta	S						
UNIT-I							Ре	riods: 9					
Crystal structures	BCC, F	CC and HCP systems)	, aton	nic pa	cking	factor, den	sity, Cry	vstalline					
perfections; poin	t defect	s, line defects- edge	e and	screv	v dis	locations, s	urface o	defects,					
volume defects. N	Mechanis	sm of Elastic & plastic	c defo	rmatio	on (sli	p and twinr	ning), sli	p, work	CO1				
hardening theory	, Change	es in properties due t	o colc	l work	king 8	hot workir	ng. Micr	oscopy,					
specimen prepara	ation.												
UNIT-II							Ре	riods: 9					
Solid solution, Hui	me Ruthe	er's rule of solid, Allot	ropy, (Conce	pt of	solidification	of pure	e metals					
&alloys Cooling c	urves, l	Plotting of Equilibrium	n diag	rams,	Lever	^r rule, Euteo	ctic syst	em and					
eutectoid system.	Iron-iro	n carbide equilibrium	diagra	am, cr	itical	temperature	es, class	ification	CO2				
and application of	steels &	alloy steels, specificat	ion of	steels	. Class	sification & E	ffect of	alloying					
elements, example	es of alloy	y steels.											
UNIT-III							Ре	riods: 9					
Heat treatment of	of steels	: Annealing, Normal	ising,	Harde	ening	& Temperi	ng, que	nching					
media, other tre	eatments	such as Martempe	ering,	Auste	emper	ing, Ausfor	ming. t	emper					
embrittlement, q	uench cr	acks, Hardenability&	harde	enabili	ty tes	sting, Defect	ts due t	o heat	CO3				
treatment and rei	medial m	neasures.							COS				
Classification of su	urface ha	ardening treatments, (Carbur	ising,	heat 1	treatment af	ter Cark	ourizing,					
Nitriding, Carbo-ni	triding, F	lame hardening, and Ir	nductio	on har	denin	g.							
UNIT-IV							Ре	riods: 9					
Nonferrousmetals	sandallo	ys:Copper,Aluminium,	,Nicke	l,Zinca	andLe	adbasedallo	ys.Heat						
treatment of N	Nonferro	us metals: Precipi	tation	/ Ag	e Ha	ardening, s	olid so	olution	CO4				
strengthening, dis	spersion	strengthening.											
UNIT-V							Ре	riods: 9					
Studyofdestructiv	etesting	, Tensile test, engine	ering	stress	-strai	n curve, tru	e stress	s-strain					
curve, types ofs	tress-stra	ain curves, compres	sion t	est, d	iffere	nt hardness	tests-V	/ickers,	CO5				
Rockwell, Brinell,	Micro Ha	ardness Test, Impact t	est, fa	atigue	test,	creeptest.							
Lecture Periods: 4	15 Tu	utorial Periods: 0	Pract	tical P	eriods	s: 0	Total I	Periods: 4	5				
Reference Books:	L		<u>.</u>				<u>-</u>						
1. Raghavan	V,Physic	alMetallurgy–Principl	es and	d Prac	tice, F	Prentice Hall	India P	vt.Ltd., N	ewDelhi,2006.				
2. H.Avner, I 26th Repr	ntroduct int, 2009	ion to Physical Metal	lurgy,	Tata-N	ИсGra	aw Hill Publi	shing Co	b., New D	elhi, 2nd Ed.,				
3. Refe Don	ald R. As	keland, The Science a	nd En	gineer	ing of	f Materials,	Chapma	n and Ha	ll, 1990.				

4. G.E.Dieter, Mechanical Metallurgy, McGraw Hill Publishing Co., New York, 1988.

Department : Mechanical Engineering Programme : B.Tech.(ME)												
Semester : Thir	d		Cour	se Cat	egory Cod	e: PCC	PCC Semester Exam Type: TY					
Course Code	Course	Nama	Pe	riods ,	/ Week	Credit	N	/laximum M	arks			
Course Code	Course	Name	L	Т	Р	С	Semester Exam T Maximum N CA SE 40 60 cudents can prepare r manufacturing of ng to various design e or engine compo of miscellaneous g components. : 30 pins, keys, cotter, g assigning fits and e, Introduction to	TM				
ME207	Machin	e Drawing	2	0	3	3	40	60	100			
Prerequisite:												
	CO1	At the end of the course production drawing and product.	e, the s l assen	tuder nbly d	nt will be al rawings re	ble to : St quired fo	udents r manuf	can prepare acturing of	any			
	CO2	Acquire skill in preparing production drawings pertaining to various design										
Course Outcome	CO3	Acquire the knowledge miscellaneous machine	Acquire the knowledge of assembly of various machine or engine components and miscellaneous machine components									
	CO4	Draw the assembled components.	Draw the assembled views for the part drawings of miscellaneous machine components.									
	CO5	Perform basic sketching	erform basic sketching techniques to draw engineering components.									
PART - A Periods: 30												
PART - A Periods: 30 Conventions for sectioning and dimensioning, screw threads, rivets, bolts, nuts, pins, keys, cotter, gear, springs and welds. Introduction to geometrical tolerance -Component drawing assigning fits and tolerance machine symbol, surface finish - Introduction to AUTOCAD software, Introduction to Production drawing and concepts of P-7 drawing. PART - B Periods: 45 Preparation of drawings of parts and assembly of:- Joints Riveted joints - butt joints and lap joints C01 Cotter joints - sleeve, socket and spigot joints C03 Couplings C04 Split muff couplings, flexible type flange coupling, universal coupling C04 Cors Screw jack Connecting rods Tail stock								CO1 CO2 CO3 CO4 CO5				
Lecture Periods: 3	30	Tutorial Periods: -	Prac	tical P	eriods: 45		Total	Periods: 75				
Reference Books:	-	-										
1. Gupta, R.B, "Ma 2. Sidheswar, "Ma	chine Dr chine Dra	awing" ,Satya Prakasham, awing" Tata McGraw Hill e Sundamontals of Mashir	,1998. edition	, 2006 Wing	5. RHI 2005							

3. Sadhu Singh and P.L. Sah, Fundamentals of Machine Drawing, PHI 2005.

Departmen	t : Humantie	Department : Humanties and Social Sciences Programme : B.Tech.										
Semester	: Third		Subjec	t Cate	gory: M	CC	Semest	er Exam ⁻	Гуре: -			
Course Cod	e Course	Name	Periods / WeekCreditMaximum MaLTPCCASE2									
			L	Т	Р	C	CA	SE	TM			
SH202	Indian	Constitution	2	-	-	-	-	-	-			
Prerequisit	e -											
	The co	urse will enable the students to):		-	-						
C	CO1	understand the essence and s	ignificance o	of the	constitut	ion						
Course	CO2	recognize ones fundamental o	duties and ri	ghts			I					
Outcome	CO3	appreciate the structure and i	functions of	nmon	to and up	ion torrito	i judiciary					
	C04 C05	understand the centre-state r	elations and	funct	ioning of	constituti	onal hodi	26				
I INIT_I	Introd	understand the centre-state i		Tunci	Ioning of	Periods	• n 9	=5				
The Making of Indian Constitution - The Constituent Assembly - Sources of Indian Constitution -												
Preamble a	nd the Supr	eme Court's Judgments on Prea	mble.	urces	or maian	constituti	on		CO1			
UNIT-II	State,	Rights and Duties				Periods	: 09					
State and U	nion Territo	ries – Citizenship - Fundamenta	al Rights - Di	rective	e Principl	es of State	Policy -					
Fundament	al Duties.	·	U				•		CO2			
UNIT-III	Union	Government				Periods	: 09					
Union Gove	ernment - Tl	ne Powers and Functions of the	e President,	Vice-	Presiden	t, Council	of Ministe	ers, Prim	e			
Minister, Ju	idiciary, Sup	reme Court - Judicial Review -	Judicial Act	ivism-	Public Ir	terest Liti	gation - P	ower an	d CO3			
Functions o	f the Parlian	nent - Budget Power and Funct	ions of Parlia	ament	, Speakei	of Lok Sal	oha.					
UNIT-IV	State C	Sovernments				Periods	: 09					
State Gover	rnments – G	overnor - State Council of Mini	isters - Chief	Minis	ster- Legi	slative Ass	embly- Hi	gh Court	.S			
- Union Ter	ritories - Pai	nchayati Raj Institutions - 73th	and 74th Co	nstitu	tional An	nendment	- Gram P	anchayat	.s CO4			
- Block Pane	chayats - Mu	inicipalities.										
UNIT-V	Union	State Relations, Constitutiona	l Bodies			Periods	: 09					
Centre – S	tate Relatio	ons - Public Service - Election	Commissio	on - N	NTI Ayog	, Emerger	ncy Powe	rs of th	e			
President-	Constitution	n Amendment Procedure- Rig	ght to Info	rmatic	on Act -	Right to	Educatio	on. Majo	r CO5			
Constitution	hal Amendr	ients and their impact on Indiar	n Political Sy	stem.	•I -				-			
Lecture Per	iods: 45	Tutorial Periods:	Practio	al Per	riods:		Total Pe	eriods: 4	<u>5</u>			
Reference B	ooks:				6		1000					
1. Austin, G		e Indian Constitution: Cornersto	one of a Nat	on. U	xtord Uni	versity Pre	ess, 1999.		م ما حس م			
Z. Basu, Du Wadhwa	Nagour 20		.1011 01 111018.	2011	ea., mor	ougniy kev	, Lexis ine	EXIS BULLE	erwortins			
3 Choudhr	v Suiit et a	uo. L editors The Oxford Handhoo	k of the Indi	an Co	nstitutio		Iniversity	Dross 20	116			
4. Bakshi P	y, Sujit, et a Parvinrai Mu	Iwantrai, and Subhash C. Kashy	an. The Con	stituti	on of Ind	ia (Univers	al Law Pu	blishing	2016)			
5. Bhargava	a. Raieev. 'P	plitics and Ethics of the Indian C	Constitution	. 2009)			511511116,	2010,			
6. Rajeev B	hargava - 'T	he Promise of India's Secular De	emocracy', 2	010								
7. Chakraba	arty, Bidyut,	India's Constitutional Identity:	Ideological	Beliefs	and Pret	ferences (F	Routledge	, 2019)				
8. Jayal, Nii	raja Gopal, a	nd Pratap Bhanu Mehta, The O	xford Comp	anion	to Politic	s in India,	Oxford Ui	niversity	Press,			
2010												
9. Kashyap, 1994)	, Subhash C.	, Our Constitution: An Introduc	tion to India	's Con	stitution	and Const	itutional I	.aw (NBT	India,			
10. Kashyap, Trust, Inc	, Subhash C. dia, 2011.	Our Parliament: An Introductic	on to the Par	liame	nt of Indi	a. Revised	edition, N	lational I	3ook			
, 11. Subhash	C. Kashyap	Our Constitution Paperback –. ((NBT India, 2	012).								
12. Laxmikar of Law a	nth, M. &qu	ot;INDIAN POLITY". McG	raw-Hill Edu	, icatio	n "	Constitutic	on of Indi	a".	Ministry			
Department : N	Mechanical Engineering Programme : B.Tech.(ME)-Honours											
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Semester : T	hird		Course	Cate	gory Co	ode: PCC	Semeste	r Exam Type	: TY			
Course Code	C		Perio	ds / W	/eek	Credit	1	Maximum Ma	arks			
Course Coue	Course	e Name	L	Т	Р	С	CA	SE	TM			
MEH01	Engine	eering Optimization	3	1	0	4	40	60	100			
Prerequisite:												
	CO1	At the end of the cour Optimization Problem	se the st	udent	t is able	e to unders	stand: Knov	wledge in for	mulation of			
Course	CO2	Understanding the Sin	gle Varia	able O	ptimiza	ation Probl	ems					
Outcome	CO3	To get knowledge abo	ut Multiv	variab	le Opti	imization A	lgorithms					
	CO4	Explain the methods o	of optimiz	zation								
	CO5	Able to write algorithr	n to obta	ain op	timal s	ystems.						
UNIT-I							Per	iods: 12				
Introduction-O	ptimiza	tion Problem Formu	lation,	Desigi	n Var	iables, Co	onstraints,	Objective	CO1			
Function, Varia	nction, Variable Bounds, Engineering Optimization Problems, Optimization Algorithms.											
UNIT-II	NIT-II Periods: 12											
Single Variable	e Optin	nization Problems-Opti	imality (Criteri	on, Bı	racketing I	Methods:	Exhaustive				
Search Method	d, Boun	ding Phase Method. Re	egion Elir	ninati	on Me	thods-Inte	rval Halvir	ng Method,				
Fibonacci Sear	ch Met	hod, Golden Section Se	earch Me	ethod	. Point	Estimatio	n Method	-Successive	CO2			
Quadratic Estir	nation	Method. Gradient Base	ed Metho	ods-O	ne of t	the followi	ngs-Newto	on-Raphson				
Method, Bisect	ion Me	thod, Secant Method, C	ubic Sea	rch M	ethod	T						
UNIT-III							Per	iods: 12				
Multivariable (Optimiz	ation Algorithms-Optim	nality Cr	iteria,	Unidi	rectional S	earch, Dir	ect Search				
Methods: Any	two of	the following-Evolution	nary opt	imizat	ion m	ethod, Sim	plex Searc	h Method,				
Hooke-Jeeves	pattern	search method, Pow	ell's Cor	ijugat	e Dire	ction Met	hod. Grad	ient Based	CO3			
Methods-Cauci	ny's Ste	epest Descent Method.	Newton	ís me	thod, I	Marquardt	's Method	. Conjugate				
Gradient Meth	od, Vari	lable-metric Method					_	• • • •				
					-		Per	iods: 12				
Function Meth	otimizat od, Met	tion Algorithms, Kuhn I thod of Multipliers, Sens	lucker C sitivity ar	onditi nalysis	ons, li S	ransformat	ion Metho	ods-Penalty	CO4			
UNIT-V							Per	iods: 12				
Non-Traditiona	l Optir	mization Algorithms-Ge	enetic A	lgorit	hms: \	Working F	Principle,	Differences				
between Gas a	and tra	ditional methods, GAs	for cons	straine	ed opt	imization.	Other GA	operators.	CO5			
Simulated Anne	ealing-A	Analogy, Algorithm, App	lication									
Lecture Period	s: 45	Tutorial Periods: 15	Practic	al Per	riods: N	Nil	Total Pe	riods: 60				
Reference Boo	ks:	•										
1. Kalyanmoy	Deb, 20	010. Optimization for en	ngineerin	g desi	ign: alg	gorithms ar	nd example	es. Prentice-l	Hall of India			
Private Limi	ted, Ne	w Delhi.			-		-					
2. Singiresu S	2. Singiresu S Rao, 2009. Engineering optimization: theory and practice. Fourth Edition, New Age											
Internationa	al(P) Lin	nited Publishers, New D	elhi.									
3. Ravindran,	K. M.	Ragsdell, G. V. Reklaiti	s, 2006.	Engi	neerin	g optimiza	tion - me	thods and a	pplications.			
Second Edit	ion, Joł	nn Wiley & Sons, Inc. Ar	ndreas A	ntonic	ou and	Wu-Sheen	g Lu, 2007	. Practical O	ptimization:			

Algorithms and applications, Springer Science+Business Media, LLC

Department : N	Леchan	Iechanical Engineering Programme : B.Tech.(ME)-Minor									
Semester : T	hird		Course C	Category	Code	e: PCC	Seme	ster Exa	m Type:	TY	
Course Code	Cours	o Namo	Period	ls / Week	(Credit	Ν	/laximur	n Marks	5	
Course coue	Course		L	Т	Ρ	С	CA	SE	TN	Л	
MEM01	Heat F	Power Engineering	3	1	0	4	40	60	10	0	
Prerequisite:	St	tudied a course on Thermody	ynamics ir	n Basic Sc	ienc	es					
	CO1	Upon Completion students principles	will be at	ole to con	vey	the basics	of the t	hermod	ynamic		
Course	CO2	Able to understand IC Engli	nes ,its pe	rtormanc	ce ar	id analyse	air stan	dard cy	cies		
Outcome	CO3	Able to understand power	plants ,its	compon	ents	and analys	se vapo	ur powe	er cycles	-	
	CO4	Able to understand the rol	e of refrig	geration a	ina A	Air-conditio	oning as	energy	system	S	
	C05	Able to understand the Pril	Periods: 12								
			n and nuclear power plants, internal combustion engines, gas								
turbine and re equilibrium- pa Thermodynam	efrigera ath and ics, Seco	tion systems- Thermodynar l point functions - Tempera ond law of Thermodynamics.	nic syster nic syster ature - Ze	wer plan ms, prop roth law	ertie of	ternal con es and sta thermodyr	nbustio ite - Th namics	n engine Iermody – First	es, gas namic law of	C01	
UNIT-II							Perio	ds: 12			
IC engines – C	lassifica	tion – Working principles -	diesel and	d petrol e	engir	nes: two st	troke ar	nd four	stroke		
engines – Mer Testing of IC er	its and ngines.	demerits- Port and Valve tir	ming diag	rams- Air	sta	ndard cycle	es - Ott	o and D	iesel -	CO2	
UNIT-III							Perio	ds: 12			
Power Genera	tion Sys	stems – Conventional and I	Non-Conv	entional-	Lay	out of a n	nodern	steam	power		
plant, Steam g	generato	ors Classification – Construc	ctional fe	atures– E	Boile	r mountin	gs and	accesso	ories –	CO3	
Merits and den	nerits –	Applications - Steam turbine	es: Classifi	cation.	ſ						
UNIT-IV			_				Perio	ds: 12	-		
Basics of refrig	geration	 Methods of refrigeration 	n: ice refr	igeration	, eva	aporative i	refrigera	ation– l	Jnit of		
refrigeration – and systems - system – Lique	Reverse Proper faction	e Carnot cycle- p-h and T-s d ties of refrigerants- ODP & (– Solidification - Air conditic	liagrams - GWP-Gas oning syste	COP - Va refrigerat ems.	ipor tion	compressi cycle - Ab	on refri sorptior	geration n refrige	n cycle eration	CO4	
UNIT-V							Perio	ds: 12			
Air machines multistage com blower. Fan cer	- class npresso ntrifuga	ification-compressor-recipro r. Rotary compressor-centrif I and axial flow fans.	ocating c ugal and a	compresso axial flow	or-si com	ngle stag Ipressor. B	ge com llower-r	npressor oots an	r and d vane	CO5	
Lecture Period	s: 45	Tutorial Periods: 15	Futorial Periods: 15Practical Periods: NilTotal Periods: 60								
Reference Boo	ks:										
1. Nag, P. K Delhi, 20	., "Engiı 13.	neering Thermodynamics", 5	th editio	n, McGrav	w - ŀ	lill Educati	on India	a Pvt. Lt	d., New		
2. V.Ganesan, IC Engines, Tata Mc Graw Hill Publication, 1995											
3. Kothanda	araman,	, C. P., and Domkundwar, A c	course in T	Inermal E	ngir ים ווו	ieering, Dr ibliching Cr	nanpat F		,2013 Ihi 2001	h	
 Kothanda Arora, C. 	araman, P., Refr	, C. P., and Domkundwar, A c igeration and Air conditionir	course in T ng. Tata M	Thermal E IcGraw Hi	ill Pu	eering, Dh Iblishing Co	nanpat F o. Ltd., I	Rai & Co New Del	<i>,</i> 2013 lhi. 2000)	

5. Yahya S.M., Fundamentals of Compressible Flow, New Age International, New Delhi, 2012.

Department : C	hemistr	y	Progra	mme : B	.Tech.						
Semester : F	ourth		Subjec	t Catego	ry: BSC	Sen	nester Ex	am Type: 1	٢Y		
Course Code	Course	Nama	Per	iods / W	eek	Credit	Max	imum Ma	rks		
Course Coue	Course		L	Т	Р	C	CA	SE	ТМ		
SH201	Biolog	y for Engineers	3	-	-	2	40	60	100		
Prerequisite	-										
	After s	studying the course, the student will	l be able	e to:							
	<u> </u>	Convey that classification per se is	not wh	at biolog	gy is all a	about but	highlight	the under	lying		
	.01	criteria, such as morphological, bi	ochemio	cal and e	cologica	al					
Course	CO 2	Highlight the concepts of recessive	eness ar	nd domir	nance di	uring the p	passage c	of genetic			
Outcome		material from parent to offspring									
	CO3	Convey that all forms of life have	the sam	e buildin	g block	s and yet f	the manif	estations	are as		
		diverse as one can imagine									
	CO4 Gain a basic understanding of enzyme action and factors affecting their activity.										
	CO5 Identify and classify microorganisms.										
UNIT-I Classification Periods: 9											
Classification o	utline b	based on (a) cellularity- Unicellular	or mu	lticellula	r (b) ul	trastructu	ire proka	ryotes or			
eukaryotes (c)	Energy a	and Carbon utilisation -Autotrophs	, hetero	otrophs,	lithotro	pes (d) A	mmonia	excretion			
– aminotelic,	uricote	liec, ureotelic (e) Habitats- acqua	tic or	terrestri	al (e)	Molecula	r taxono	my three	CO1		
major kingdom	ns of life	e. •					-				
	Genet		•		•	Periods:	: 9 		1		
Mendel's laws,	Conce	pt of segregation & independent	assortm	ient. Coi	ncept o	f allele. H	Recessive	ness, and	CO2		
	ngle gen	e disorders in numans – Sickie cell c	lisease,	Рпепуке	etonuria	l. Douiodo	• •				
	BIOMO				• • • • • • •	Periods:	. 9	0			
Carbonydrates:	Types,	Structural & functional importan	nce. Lip	nas: Clas	sificatio	on - Simp contial ar	ole, com	pouna, &			
Lovels of pro	toin str	ucture structure & functional imp	ortance		ture, es:		nno acius	Enzymo	<u> </u>		
- Levels OI pro	s Spec	ific Activity Specificity Eactors aff			activity	Nucloic	Dennition	i, Elizyille Types and	COS		
importance	is, spec	ine Activity, specificity, factors an	ecting	enzyme	activity	. Nucleit	acius. i	ypes and			
	Metah	oolism				Periods	9				
Introduction: F	ood cha	in & energy flow Definitions - Ana	holism	& Catabo	olism P	hotosynth	nesis [.] Rea	ction and			
importance. Gl	vcolvsis	& TCA cycle. ATP – the energy curre	ency of c	ells	5115111. 1	nocosynti	10515. 1100		CO4		
UNIT-V	Micro	biology	,			Periods:	: 9				
Concept of sir	ngle cel	led organisms. Concept of spec	cies &	strains.	Identi	fication 8	& classifi	cation of			
microorganism	s. Virus ·	– Definition, types, examples.							CO5		
Lecture Periods: 45 Tutorial Periods: Practical Periods: Total Periods: 45											
Reference Books:											
1. Biology: A g	global ap	oproach: Campbell, N. A.; Reece, J. E	.; Urry,	Lisa; Cai	n, M,L.;	Wasserm	an, S. A.;	Minorsky,	P. V.;		
Jackson, R.	B. Pears	son Education Ltd									
2. Outlines of	Biocher	nistry, Conn, E.E; Stumpf, P.K; Bruer	ning, G;	Doi, R.H.	John W	/iley and S	Sons				
3. Principles of Biochemistry (V Edition), By Nelson, D. L.; and Cox, M. M.W.H. Freemanand Company											
4. Molecular	Genetics	s (Second edition), Stent, G. S.; and (Calende	r, R. W.⊦	l. Freem	ian andco	mpany, D	istributed	by		

Satish Kumar Jain for CBS Publisher

5. Microbiology, Prescott, L.M J.P. Harley and C.A. Klein 1995. 2nd edition Wm, C.Brown Publishers.

Department: Electronics and Communication Engineering Programme : B.Tech.(ME)									
Semester : Fo	ourth	Course Category Code:	ESC /	Seme	ster Ex	am Type:	TY		
Course Code	Cours	e	Peri	ods / V	Veek	Credit	Max	imum N	1arks
		-	L	T	P	C	CA	SE	TM
EC234	Eleme	ents of Electronics	3	0	0	3	40	60	100
Prerequisite	Nil								
	CO1	Understanding the basic theory of sem	icond	uctors	and di	odes.			
	CO2	Knowledge about various transistor	config	uratio	ns and	also cou	Id con	npreher	d the
Course		need for proper biasing of devices.							
Outcome	CO3	Understanding the operation of Field E	ffect ⁻	Fransis	stor dev	vices.			
	CO4	Gain knowledge on Thyristors and opti	cal de	vices.					
	CO5	Acquire knowledge on Transducers and	d Sens	ors.					
UNIT – I						Periods:	9		
Semiconductor	Funda	mentals and PN junction diode: Intro	oducti	on to	semic	onductors	5 — Typ	oes of	
semiconductors	-Ener	gy band diagram of semiconductor -	Diode	equiv	valent	circuit -D	iode c	urrent	
equation - Cons	tructio	n, working and VI characteristics of PN j	unctic	on dioo	de – En	ergy band	struct	ure of	CO1
open circuited F	PN junc	tion- Effect of temperature on PN juncti	on dic	des - (Capacit	tance effe	cts –Ty	pes of	
breakdown – Ze	ener di	ode - Application of diode as half wave	e, full	wave	and br	idge recti	fiers, C	lipper	
and Clamper cir	cuits. R	egulators - Zener diode as Voltage regu	lator.						
UNIT-II						Periods	9		
Bipolar Junctio	on Trar	sistor: Construction- Types of config	guratio	ons: C	Operati	on of Ni	PN and	1 PNP	
transistors- wor	king an	d characteristics of CE, CB and CC config	guratio	ons –E	arly eff	ect - Ther	mal rui	naway	CO3
– Heat sinks - N	leed fo	r transistor biasing – dc load line – Q p	oint-\	/oltage	e divide	er bias - A	pplicat	ion of	02
BJT as amplifier	and sw	vitch.							
UNIT-III						Periods:	9		
Field Effect Tra	ansisto	r: Types – Construction and operatio	n of	N-ch	annel	and P-cha	annel J	FET –	
Characteristics	and pa	rameters of JFET- JFET biasing circuit	s –fix	ed bia	is and	potential	divide	r bias	CO3
(derivations no	t requ	ired) Construction ,working and char	acteri	stics o	of E-M	OSFET ar	nd Dep	letion	
MOSFET - Work	ing and	application of CMOS as inverter.					-		
						Periods:	9	_	
Thyristors and (Optical	Devices: Construction, working and cha	racter	istics (of SCR,	DIAC, IR	IAC, UJ	I. 	
Construction, w	vorking	and characteristics of LED, LASER, Pl	N dio	de, AP	D, Op	tocoupler	. LDR,	photo	CO4
multiplier, LCD.			1			D	•		
			-		N 4	Periods:	9		
Transducers an	a sens	ors: Basic principle – Classification of	Iransc	lucers		chanical I	ransdu	cers –	
Displacement to) Pressu	are Transducer – Passive Electrical Trans	Dia	s – Re	sistive -		e - Capa		
Transducars D		lers – Active Electrical Transducers –	+ Son	relection		foct conc	− ⊓dii or Th	enect	CO5
Detector Sonce		tracenic concor Eibor optic pH and	Lumi	ditv. c	ndii ei	Chomic	וו – ונ חסצ ור	orc	
Somiconductor		tastoric Serisor – Fiber Optic pri aliu	пипп	uity s	ensor	- Chemic	al sen	5015 -	
Lecture Periods	· 15	Tutorial Periods: Practical Period	lc۰	То	tal Dar	riode: 15			
Reference Book	·· +J		13.			1003. 45			
1 I Millman	C Halki	as and Satvabrata "Electronic devices a	nd Cir	ruits"	Third	edition M	cGraw	Hill 202	10
2 Rohert I		and Louis Nashelsky "Flectron Dev	ices a	nd Cire	ruite Tł	neory " P	rentice	Hall of	India
11th Editio	n.2013		u			, , ,	. critice		manu,
3. David A Be	ell. "Ele	ctronic Devices and Circuits". Prentice H	lall of	India	5th Edi	tion. 2008	3.		
4. Theodore	F. Boga	rt, "Electronic Devices and Circuits". Pea	irson l	Educat	ion Inc	lia ,2011.			
5. Murthy D.	V. S, "T	ransducers and Instrumentation", Prent	tice Ha	all, 2nd	d Editio	n, 2012.S	.Salivał	nanan a	nd

etal, "Electronic Devices and Circuits", Tata Mcgraw Hill, Fifth Reprint, 2008.

Department : N	Леchan	ical Engineering	eering Programme : B.Tech.(ME)								
Semester : F	ourth		Course	e Cate	gory C	ode: ESC	Semes	ster Exa	m Type: TY		
Course Code	Cours	o Nomo	Perio	ds / V	/eek	Credit		Maxir	num Marks		
Course Coue	Cours	e Name	L	Т	Р	С	CA	SE	TM		
ME208	Mech	anics of solids	3	1	0	4	40	60	100		
Prerequisite:											
	CO1	Students will able to deflections for differer	analyse nt types	stres	sses, s ams.	hear force	and be	ending	moment dia	grams,	
	CO2	Students will Follow ar	nd under	rstand	the b	asics of Me	chanics	of solid	S.		
Course	CO3	Students will be able t and buckling of colum	o Learn ns.	the b	asic cc	oncept (elei	mentary) of thir	n shells, thick	< shells	
Outcome	CO4	Student will be able to Mechanics of solids.	Develo	o natı	ıral cuı	riosity to ex	plore th	ne vario	us facets		
	CO5 Students will able to Demonstrate about various types of loading and stresses induced in the machine components.										
UNIT-I							F	Periods:	12		
Simple Stresse	s and S	train – Relation betwee	en three	mod	ulus ar	nd Poisson'	's ratio ·	– Thern	nal Stress –		
Principal stress	and Pr	incipal planes - Shear Fo	rce – Be	nding	Mome	ent – Cantil	ever an	d simply	v supported	CO1	
beams subjecte	ed to po	oint loads and uniformly	distribu	ted lo	ads.						
UNIT-II	<u></u>						P	Periods:	12		
Theory of simp	le benc	ling - stress variation in	beam c	ross S	ection	; Normal aı	nd Shea	r stress	in Beams –	CO 2	
Beam of unifor	m stren	igth for bending, combir	ned dire	ct and	bendi	ng stresses					
UNIT-III	<u> </u>						F	Periods:	12	1	
Deflection of b	eams -	Double integration meth	nod – mo	omen	t area ı	method				CO3	
UNIT-IV							P	Periods:	12	_	
Torsion of circ	ular so	lid and Hollow shafts –	- Shafts	in Se	ries ar	nd parallel	– Comł	oined b	ending and		
torsion - Applic	ation o	f Torsion in helical sprin	gs: Oper	n and	closed	coil spring	s, Leaf S	prings.		CO4	
UNIT-V							P	Periods:	12		
Euler's Equatio	n – sho	ort and long column, Em	pirical f	ormul	ae: Jol	nnson – Ra	nkine. lı	ntroduc	tion to thin		
cylinder – Thicl	< cylind	er – Lame's Equation – C	Compou	nd Cyl	inders	– Interfere	nce fit.			CO5	
Lecture Period	s: 45	Tutorial Periods: 15	Practic	al Pe	riods: I	Nil	Total	Periods	: 60	i	
Reference Boo	ks:										
1. U.C.Jinda	l - Strer	ngth of Materials, Galgot	tia Publi	catior	n Pvt. L	td., New De	elhi, 199	98.			
2. R.K.Rajpu	ut - Stre	ngth of Materials, S.Cha	nd and (Comp	any Lto	d., New Del	hi, 2003	•			
3. Beer F, Jonston E R, DeWolf J, Mechanics of Materials, McGraw-Hill Publications, 2005											
4. R K Bansa	 R K Bansal, Strength of Materials, 4th Edition, Laxmi Publications, New Delhi, 2007 										

5. Bhavikatti. S. S., Strength of Materials, Vikas Publishing House (P) Ltd., New Delhi, 2nd Edition, 2002.

Department : N	Mechan	ical Engineering	Progra	mme :	B.Tec	h.(ME)				
Semester : F	ourth	<u> </u>	Course	Cate	ory Co	ode: PCC	Semes	ter Exan	n Type: TY	
	_		Perio	ds / W	eek	Credit		Maxim	um Marks	
Course Code	Cours	e Name	L	T	Р	С	CA	SE	TM	
ME209	Therm	nal Engineering - I	3	1	0	4	40	60	100	
Prerequisite:							<u>-</u>			
•	CO1	Able to analyse air sta combustion calculatio	indard cy	cles, k	now tł	ne propert	ies of fue	el and pe	erform	
Course	CO2	Able to identify different phenomena and analy	ent comp /se engin	onent e perf	s & sys orman	stems of IC ce	Engines	s, combu	ustion	
Outcome	СО3	Able to analyse vapou components of mode	ir power rn steam	cycles powe	and ui r plant	nderstand	the func	tions of	different	
	CO4	Able to analyse the pe	erforman	ce of s	team t	turbines ar	nd nozzle	es		
	CO5	Able to understand th towers and analyse th	e functione perform	oning c mance	f high of cor	pressure b ndenser	oilers, c	ondense	rs and cooli	ng
UNIT-I	<u> </u>						Р	eriods: 1	L 2	
Air standard cy	cles: Th	ne air standard Carnot o	cycle - Ai	r stand	dard O	tto cycle,	diesel cy	cle, dua	cycle and	
their comparise	on – Ga	s turbine - Brayton cycle	es and th	eir eff	icienci	es.				CO1
Fuels and Com	bustion	: Fuel properties and the	neir dete	rminat	ion - S	Stoichiome	try – rea	actant ar	nd product	
quantities	I									
					<u> </u>		P	eriods: 1	.2	
IC Engines-Clas	sificatio	on-Four stroke and two	o stroke	cycles	s- SI ai	nd CI Engi	nes-Port	and va	ive timing	
Compution in	SI ong	inos Ignition lag Elamo	propaga	tion a	hnorm	al combur	tion Kn	acking P	ating of SI	
engine fuels C	ombust	ines-ignition lag-riame	propaga	nockin	σ_Rati	ng of Clen	ging fug	JUNING-N Ic	ating of Si	CO2
Introduction to	onibust fuel su	nnly Cooling and Lubri	cation sv	stems		nd CI Engir	nes	15		
Testing of IC er	ngines-F	leat balance test-Engine	e perforn	nance	charac	teristics	105			
	<u> </u>	0								
UNIT-III							Р	eriods: 1	L 2	
Analysis of vap	our po	wer cycles-Rankine cyc	le- Rehea	at cycl	e-rege	neration c	P ycle- Re	eriods: 1 heat- re	L 2 generative	
Analysis of vap cycle-binary va	our po pour po	wer cycles-Rankine cyc wer cycle.	le- Rehea	at cycl	e-rege	neration c	P ycle- Re	eriods: 1 heat- re	L 2 generative	CO3
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Department : Mechanical Engineering Programme : B.Tech.(ME)										
Semester : I	Fourth		Course	Catego	ry Code	e: PCC	Semest	er Exam	Туре: ТҮ	
Course Code	Cours	o Namo	Perio	ds / W	eek	Credit	Ma	aximum	Marks	
Course Coue	Cours	e Name	L	Т	Р	С	CA	SE	ТМ	
ME210	Mach	ining Technology	3	0	0	3	40	60	100	
Prerequisite:		•								
	CO1	At the end of the cour operations on lathe.	se, the st	udent	shall k	be able to	, Describ	e the o	details and	
Course	CO2	Understand the mechanis	sm of meta	l cutti	ng in dri	illing and m	nilling ma	chines.		
Outcome	CO3	Identify the basic parts an	nd operatio	ons of s	shaper,	planner an	d slotting	; machir	ies.	
	CO4	Understand the evolution technology in modern ma	on, classi inufacturin	ficatioı g.	n and	need of	unconve	ntional	machining	
	CO5	Select cutting fluids and c	utting tool	mater	rials for	improving	machinal	bility an	d tool life.	
UNIT-I		•••••••••••••••••••••••••••••••••••••••				Periods: 9	9			
Lathe – Types,	Design	ation, Work holding device	es – Cuttin	g Spee	ed, Feed	and Dept	h of Cut,	Materi	al con	
Removal Rate	- Opera	tions, Machining Time.							01	
UNIT-II						Periods: 9	9			
Drilling Machi	ne – Ty	pes, Operations, Machining	g Time - B	oring,	Reamin	g and Tap	ping (Def	inition o	of	
operations onl	y).								സ	
Milling Machi	ne – Ty	pes, Process, Operations,	Machining	; Time	, Mate	rial Remov	al Rate a	and Gea	ar CO2	
cutting.										
UNIT-III						Periods: 9)			
Shaper – Type	s, Shap	ing Operations, Planner – T	Types, Plar	ining (Operatio	ons, Slottin	g Machin	e and i	ts CO3	
Operations.										
UNIT-IV						Periods: 9	9			
Unconvention	al Mac	hining Process - Classific	ation, Las	er Be	am Ma	achining, I	Electric [Discharg	e	
Machining, Ele	ectroche	emical Machining, Electroch	nemical Gr	inding	, Ultras	onic Machi	ining, Abı	rasive Je	et CO4	
Machining.										
UNIT-V						Periods: 9	9	-		
Tool Materials	, Nome	nclature and Geometry of C	Cutting Toc	ls, Toc	ol wear	Mechanisn	ns, Tool L	ife – To	ol	
Life Criteria.				<i>.</i>					CO5	
Cutting fluids -	- Functio	ons, characteristics and type	es, Selectio	on of c	utting fl	uids.				
Lecture Period	ls: 45	Tutorial Periods: Nil	Practica	l Perio	ds: Nil		Total P	eriods: 4	45	
Reference Boo	oks:									
1. P.N.Rao Compan	, "Manu y Ltd, 3'	ifacturing Technology- Meta ^d edition, New Delhi, 2013.	al Cutting a	and Ma	achine 1	Tools", - Ta	ta McGra	w Hill P	ublishing	
2. Amitabha 2 nd editid	i Ghosh on. New	and Asok Kumar Malliik, "N 7 Delhi. 2010.	Manufactu	ring So	cience",	Affliated E	ast- Wes	t Press	Private Ltd,	
3. Kalpakjai Delhi 20	n S, Schi 18	imd S, "Manufacturing Engi	neering ar	id Tecl	nnology	", Pearson	Educatio	n, 7 th eo	lition, New	
4. Sharma,	P.C., "A	Textbook of Production Te	echnology'	', S. Cł	nand &	Company	Ltd., New	ı Delhi,	8 th edition,	
	ttonadh	way "Machining and Machin	ne Tools"	M/ilov	India 21	711				
6. Roy A. Li 4 th editio	 A.B. Chattopathyay Machining and Machine Tools , whey mula, 2011. Roy A. Lindberg, "Processes and Materials of Manufacture ", Prentice Hall of India (P) Ltd, New Delhi, 4thedition, 2008. 									
	,			. .				rd	2005	

7. G Boothroyd, "Fundamentals of Machining and Machine Tools", CRC Press, NewDelhi, 3rd edition, 2005.

Department : N	Department : Mechanical Engineering Programme : B.Tech.(ME)									
Semester : F	ourth		Course (Category	Cod	e: PCC	Semes	ster Exa	m Type: TY	
Course Code	Caura	- Nama	Period	ls / Weel	k	Credit		Maxir	num Marks	
Course Code	Course	e Name	L	Т	Ρ	С	CA	SE	TM	
ME211	Kinem	atics of Machines	3	1	0	4	40	60	100	
Prerequisite										
	CO1	Students will able to un kinematic chain.	derstand	and vis	iualis	se any giv	ven pra	ctical m	nachines as s	imple
Course	CO2	Students will be able to de mechanism.	etermine	velocity	and	accelerati	on at ar	iy point	in the given p	lanar
Outcome	CO3	Student will be able to de	sign Four	bar and	slide	er crank m	echanis	m for si	mple applicati	ons.
outcome	CO4	Students will be able to ar	nalyse foll	ower mo	otior	n of the CA	M from	kinema	atic point of vi	ew
		and suggest suitable CAM	drive for	the give	n ap	plication.				
	CO5	Able to design gears with different gear trains given	interferer	nce prob	lem	and also a	ble to d	etermir	ne speed of	
UNIT-I							Ре	riods: 1	2	
Introduction: N	Леchan	isms and machines; Eleme	nts of kin	ematic	chair	n, mobility	and ra	nge of	movements,	
Definition & C	oncept	- inversion of single and d	louble slic	der chair	n an	d four bar	chain a	and its	applications.	
Mechanism wi	th lowe	r pairs -Pantograph, Straig	ht line m	echanisn	n- e>	act and a	pproxin	nate Mo	otion, Engine	
indicator, Mot	or car	Steering gears, Hooke je	oint, Tog	gle med	han	ism. Intro	duction	: Mech	nanisms and	CO1
machines; Elen	nents o	f kinematic chain, mobility	and rang	e of mov	veme	ents, Defir	nition &	Concep	ot - inversion	
of single and o	double	slider chain and four bar	chain and	d its ap	olica	tions. Me	chanism	n with I	ower pairs -	
Pantograph, St	raight I	ine mechanism- exact and	approxim	nate Mo	tion,	Engine in	dicator,	Motor	car Steering	
gears, Hooke jo	pint, Tog	ggle mechanism.			Ī				-	
UNIT-II						~ .	Pe	riods: 1	2	
Kinematic Ana	lysis of	Mechanisms: Analysis of	displacen	nent, ve	locit	y & accel	eration	diagrar	ns of simple	
planar mechan	isms by	graphical (Instantaneous d	center me	thod an	a rei	ative velo	city met	thod), a	nalytical and	CO2
	u metno		сгапк те	cnamsm	oniy	, conolis				
Vinomatic Sunt	hocic c	Anticastic Anticastic	cunthocid	aranh	ical	mothad u		nous: 1	Z	
Inversion meth	od and	overlay 3 noint synthesis n	rohlems -	Motion	nat	h & functi	on gene	aration	Chebyshey's	
spacing of accu	iracy po	ints. Freudenstein Method	of 3 poin	t synthe	, put sis o	f four link	mechan	nism and	d slider crank	CO3
mechanism. Co	upler c	urves.	or o poin	e synthe	0.0 0		eenan			
UNIT-IV							Pe	riods: 1	2	
Cams: Types o	of cams	and followers, displaceme	ent veloc	ity and	acce	leration c	urves fo	or unifo	orm velocity,	
uniform accele	ration a	and retardation, SHM, cycl	oidal mot	, tion, lay	out d	of profile	of plate	cams o	of the above	
types with rec	iprocati	ng, oscillating, knife-edge,	roller an	d flat fa	ced	followers.	Cylindi	rical and	d face cams,	CO4
polynomial car	ns, car	is with special contours. Ta	angent ca	ms with	rec	iprocating	roller f	ollower	, circular arc	
cam with flat fa	aced fol	lower.								
UNIT-V					ĺ		Pe	riods: 1	2	
Gears and Gea	r Train	s: Classification and termir	nology us	ed, Func	lame	ental law	of geari	ng – fri	ction wheel,	
teeth for posit	ive acti	on and condition for const	ant veloc	ity ratio.	Cor	njugate pro	ofiles cy	cloidal	and involute	
teeth profiles.	Involut	te construction, properties	and cor	nputatic	on of	f path of	contact	and c	ontact ratio.	CO5
Interference a	nd und	dercutting- Minimum num	nber of t	teeth to	avo	oid Interf	erence,	metho	ds to avoid	
Interference.	Introdu	ction, classification, exam	iples, gea	ar ratio	in	simple ar	nd com	pound	gear trains,	
Automobile ge	ar box,	Planetary gear trains-metho	ods of eva	luating	gear	ratio - Dif	rerentia	I gear b	ox.	<u> </u>
Lecture Periods: 45 Tutorial Periods: 15 Practical Periods: Nil Total Periods: 60										
Keterence Boo	KS:					/ ! ـ ! م	2047			
 Rattan S. S., Theory of Machines, McGraw Hill Education; Fourth edition (2017) Amitabha Ghosh and Ashok Kumar Mallik, Theory of Mechanisms and Machines, East West Press Pvt. Ltd., 										
New D	elhi (20	UU)								
 Shigley interna 	J. E. a Itional e	and John Joseph Uicker, 1 edition (2003)	neory of	. Machir	nes a	and Mech	anısms,	2nd e	aition McGra	w-Hill

4. Reuleaux F, The Kinematics of Machinery: Outlines of a Theory of Machines, Forgotten Books (2018)

Department : N	/lechani	cal Engineering	Program	ne : B.	۲ech.(۱	ME)			
Semester : F	ourth		Course C	ategory	[,] Code	: PCC	Semeste	er Exam 1	-ype: LB
Course Code	Course	.	Perioc	ls / We	ek	Credit	Max	imum M	arks
Course coue	Course		L	Т	Ρ	С	CA	SE	ТМ
	Mecha	anical Engineering Lab-I							
ME212	(Fluid	Mechanics & Machines/Material	0	0	3	1.5	40	60	100
	Techn	ology/Machine Shop)							
Prerequisite	Sti	udy of Fluid Mechanics & Machine	s/ Materia	ls Tech	nology	/Machini	ng Techno	ology.	
	At the	end of the course, the student wil	l be able to)					
	CO1	Understand the basics of fluid m	echanics w	ith app	licatio	ns			
	CO2	Understand the principles and w	orking of F	luid ma	chines	5			
Course	CO3	Understand the practical aspects	of specim	en prep	oaratio	n for mic	ro structu	ral Exam	ination
Outcome	CO4	Students will be able to unde	erstand th	e micr	ostruc	tures of	ferrous a	and non	-ferrous
		materials							
	CO5	Students gain hands on practical	learning in	lathe					
	CO6	Students gain hands on practical	learning in	shapir	ig and	milling in	machines	5	
Fluid Mechanic	s & Ma	chines Lab:							
1.Determinatio	n of Mir	nor and Major losses in a fluid flow	system						CO1
2. Determinatio	on of the	e coefficient of discharge of given (Jrifice met	er and	ventu	rimeter	and Cul		& COD
3. Conducting	experim	ients and drawing the characteri	stics curve	es ot ce	entritu	gai pump	and Sub	mersible	
Pullip 4 Conducting o	vnorim	ants and drawing the characteristic		f Pocin	rocatir	and Co	ar Dump		
5 Conducting e	vnerim	ents and drawing the characterist	ics curves o	of Impi	ilco ar	ng anu Ge	ai Fuilip on turbing	(Poltor	
and Francis)	лреппп	ents and drawing the characterist						(reitor	
Materials Tech	nology	Lab:							CO3
Microstructura	l examir	nation of mild steel and copper							&
	0/10/11								CO4
Machining Tech	nnology	Lab:							
1. Step turnin	g, and T	aper turning							
2 grooving ar	nd cham	nfering, V – thread cutting							CO5
3 Cube milling	g and St	ep milling							&
4 Shaping and	d groov	ing in shaping machine							CO6
5 Cylindrical g	grinding								
6 Spur gear h	obbing		•						
Lecture Periods	s: Nil	Tutorial Periods: Nil	Practical	Period	s: 45	Total P	eriods: 45	5	
Reference Bool	ks								
1. N. Kumaras	amy, Flu	id Mechanics and Machinery labo	ratory mar	nual, Ch	arotar	Publishir	ng House F	Pvt. Ltd. 2	2012.
2. P.N.Rao,"m	anufact	turingTechnology-MetalCuttinga	ndMachin	eTools	'-Tata	McGrawl	HillPublish	ning	
Company L	td, New	/Delhi,2008	_					• •	

3. RaghavanV, Physical Metallurgy – Principles and Practice, Prentice HallIndia Pvt. Ltd., New Delhi, 2006.

Department :	Mechar	ical Engineering	Pr	ogran	nme :	B.Tech.	(ME)	-Honou	rs	
Semester : F	ourth		Course Cate	gory	Code:	PCC	Sen	nester E	xam Type	e: TY
	6	-	Periods	/ Wee	ek	Crec	lit		Maxim	um Marks
Course Code	Course	9	L	Т	Р	C		CA	SE	TM
MEH02	Produ & Cos	ction Drawing t Estimation	3	0	1	4		40	60	100
Prereguisite:	М	achine drawing	L	1		.1		1	LL	
•	CO1	Acquiring the kn	owledge of c	onver	ntions	used in	the	Product	ion draw	ing.
		Internret and r	erform calcu	Ilatio	ns or	tolera	nces	and re	ading d	ifferent notations
	CO2			alatio	115 01	toreru	nees		aung u	increate notations
Course		Updarstand the	importance	faad	- actin					
Outcome	C03		importance c		. estin	iation a	nu so	Sive sim	pie cases).
	CO4	Grading and jud	ging the cost	estim	ation	parame	ters	of differ	rent jobs	
	CO5	Designing by stu	dying the ma	chinir	ng tim	e of diff	eren	t jobs		
UNIT-I	<u> </u>					Period	ds: 1	2		r
Standards and	Conve	ntions-ISO-Conve	ntions repres	sentat	ion fo	or dime	nsior	ning, see	ctioning	
and common n	nachine	elements - screw	threads, rive	ets, bo	olts, n	uts, pin	s, ke	ys, cotte	er, gear,	CO1
springs, welds	and sur	faces textures. E	lements of F	rodu	ction	Drawing	g, 2D	and 3D)– Need	
for Production	drawing	g – Advantages an	id disadvanta	ges.		Davia	J., 4	-		
UNIT-II		Doviation and Fita	Coomotrio	tolor		Perio		2	drulac	
Datum Form	Oriont	ation Desition		vialit		- Symbo ncontrio)IS, II	erms and	nmotry	<u> </u>
Bunout and Pro	ofile – S	imple Problems			y, CU	ncentric	lly a	anu Syn	innetiy,	02
		imple i robienis.				Period	ls: 12	7		<u> </u>
Objective of	cost	estimation-Char	acteristics-Im	porta	nce-lr	ntroduc	tion	to e-	Design-	
Fundamentals	of Cost	Analysis-Manufa	cturing cost	mode	ls-sof	tware fo	or co	ost estin	nations-	CO3
simple case stu	idies.	,	0							
UNIT-IV						Perio	ds: 1	2		<u>I</u>
Types of cost e	estimate	es-methods- estim	nates develop	ment	: - dat	a requir	eme	nts and	sources	
– allowances	in estir	nation- Estimatio	n different	types	of jo	bs – F	orgir	ng - We	elding -	CO4
Foundary					-		-	-	-	
UNIT-V						Period	ds: 1	2		
Production Co	st Estin	nation – Material	cost – labo	ur co	st – c	overhea	d co	st- alloc	ation –	
estimation of	machin	ing time for lath	e, drilling, b	oring	shap	ing, pla	nnin	g and g	grinding	CO5
operations – si	mple ca	se studies.								
Lecture Period	s: 45	Tutorial Period	ls: Pr	actica	al Peri	ods: 15		Tota	l Periods	: 60
Reference Boo	ks:									
 Engine Delhi 1 	ering D 10002	rawing Practice fo	or Schools &	Colle	ges, Sl	P 46:20	03, I	Bureau	Of In Dia	n Standards, New
2. Geome	etric Din	nensioning and To	lerancing for	Mech	nanica	l Desigr	n, Ge	ne R. Co	gorno, N	1cGraw Hill, 2006
3. Proces	s Plann	ing And Cost Est	imation, R. I	Kesav	an, C	. Elanch	nezhi	an, B. \	Vijaya Ra	imnath, New Age
Interna 4 Process	ational (c planni	r) Limited, Publisi	ners,2009	than	Now	Ngo lota	rnat	ional (D)	limitad	Publichare 2000
4. Proces	s piarini sioning	ng and cost estim	auon, IVI. Adi Iandhook Ba	unan, ut i r	ivew /		raw	ына (Р) Hill 100	a Limited,	Publishers,2009
6 Sustam		and Toleranding F	ntograted Do	ui J. D		anufact	iaw-	т Мариа	Singh L	ohn Wiely & Sons
New Yo	ork, 199	6	ntegrateu De	SIGUE		anulact	unne	s, indriud	ı oluğu, J	UTTT VVIETY & SUIIS,

Department : I	artment : Mechanical Engineering Programme : B.Tech.(ME)-Minor										
Semester : I	ourth		Cour	se Cat	egory	Code: PCC	Seme	ster Exa	m Type	: TY	
Course Code	Cours	o Nomo	Perio	ods / ۱	Week	Credit		Maxir	num M	arks	
Course Coue	Cours	endille	L	Т	Р	С	CA	SE		ТМ	
MEM02	Manu	facturing Technology	4	0	0	4	40	60		100	
Prerequisite:											
	CO1	At the end of the course knowledge in various m	e, the s netal ca	tuder sting	it shall proces	be able to: ses.	Gain th	eoretica	al and p	oractical	
Course	CO2	Discuss in detail about v	various	weld	ing pro	cesses and	the phy	vsics of v	welding		
Outcome	CO3	Study the details of vari	ious me	etal fo	rming	processes a	nd tech	niques	associa	ted.	
	CO4	Identify, understand an	d apply	varic	ous sur	face finishir	ng proce	esses.			
	CO5	Explain the steps involv	ed in p	owde	r meta	llurgy techr	nique fo	r prepa	ration o	of products.	
UNIT-I							F	Periods:	12		
Metal Casting	Proce	sses – Casting, steps	involve	d in	makir	ng a castir	ng, adv	antages	s and		
applications o	f metal	casting, pattern makir	ng, typ	es of	patte	rn, pattern	allowa	ances, r	mould	601	
materials, moulding tools and equipment, properties of moulding sand, solidification of casting,											
special casting processes-centrifugal, investment, die casting, continuous casting, casting defects.											
UNIT-II	UNIT-II Periods: 12										
Metal Joining	Process	ses – Classification of w	elding	proce	ess, ad	vantages a	nd disa	dvantag	ges of		
welding, applic	cations o	of welding, types of welde	ed joint	s, Ml	G and 1	rig welding	, Resista	ance we	elding,	603	
spot welding,	orojectio	on welding, ultrasonic we	elding, f	rictio	n weld	ing, heat af	fected z	zone, w	elding	02	
defects, solder	ing, bra	zing.									
UNIT-III							F	Periods:	12		
Metal Formin	g Proce	sses – Roll forming, fle	exible (die fo	orming	, peen for	ming, s	waging	, cold		
heading, threa	d rollin	g, spinning, drawing, typ	bes of	presse	es and	press tool	s, blank	ing, pie	ercing,	CO3	
		S) oriods:	12		
Surface Einich	ing Dro	cossos Grinding Type	oc of (rindi	na Tv	noc of griv	r ndina n	achino	12 c and		
specifications	grindin	a operations grinding fly	uide di	fforor	ng, iy ht type	pes of abrasi	Nos and	l bond	s anu	604	
lapping, honing	g, polish	ing and buffing.	uius, ui	nerei	it type		ves and	i bonu	types,	04	
UNIT-V							F	Periods:	12		
Powder Metal	lurgy – I	ntroduction to powder m	netallur	gy pro	ocess, p	preparation	of pow	ders, ty	vpes &		
function of bin	ders, gr	een compaction, sinterin	g proce	ess an	d its ef	fect on the	produc	t, advar	ntages	CO5	
of powder met	allurgy	products, applications of	powde	r met	allurgy	products.					
Lecture Period	ls: 60	Tutorial Periods: Nil	Pract	ical P	eriods	: Nil	Total	Periods	: 60		
Reference Boo	oks:	I									
1. Rajput 2017.	R.K., "A	Text Book of Manufactu	ring Te	chnol	ogy", L	axmi Public	ations,	New De	elhi, 2 nd	edition,	
2. Shan⊦	I.S., "Ma	anufacturing Processes",	Volume	e — I, 1	Lst Edit	ion, Pearso	n Educa	ation, No	ew Delł	ni, 2012.	
3. Roy A. 4 th edit	Lindber	g, "Processes and Materi 8.	ials of N	/anuf	acture	", Prentice	Hall of	India (p) Ltd <i>,</i> N	ew Delhi,	
4. Georg	e.E. Diet	er, "Engineering design (A mate	rials a	and pro	cessing ap	oroach)'	", Tata N	McGrav	v Hill, 4 th	

edition, 2008.

Department : N	artment : Mechanical Engineering Programme : B.Tech.(ME)													
Semester : F	ifth		Course	Category	[,] Code	PCC	Semester Exam	Type: 1	Γ Y					
Course Code	Cours	e Name	Perio	ods / We	ek	Credit	Maximum	Marks	;					
course coue	cours		L	Т	Р	C	C Semester Exam Type: TY edit Maximum Marks C CA SE TM 4 40 60 100 ass transfer ably 12 t conduction – heat with heat sources; ts – measurement of trical analogy. 12 convection, external							
ME213	Heat	and Mass Transfer	3	1	0	4	40	60	100					
Prerequisite:														
Course Outcome	CO1 CO2 CO3	At the end of the course t to distinguish clearly diffe to apply methods of estin to apply the knowledge to	the stude erent mod nation of o design o	nt is able des of he heat trai of heat e	e at and nsfer xchan	mass tra	ansfer							
	CO4	to apply methods of estin	nation of	mass tra	nsfer	suitably								
	CO5	to apply the knowledge to	o real-tim	ne applica	ations									
UNIT-I	<u> </u>				Perio	ods: 12								
Heat Transfer conduction eq extended surfa thermal conduc	conduction conduction													
UNIT-II	INIT-II Periods: 12													
flow, laminar a turbulent flow Condensation condensation. Boiling – pool pattern, heat fl	nd turb through – conc boiling; ux.	ection and with Phase Ch pulent flow over flat plate, on circular tubes – free conve ept of condensation – ty regimes – nucleate boilin	ection, lange co ection, langes - Nu ng, film b	minar flo minar flo usselt's t oiling, ci	re – ir w ove heory ritical	r plates a – heat heat flux	w, laminar and and tubes. transfer during	C	02					
UNIT-III	l				Perio	ods: 12								
Heat Transfer k law, Kirchoff's factors – conce electrical analo	by Radia law, in pt of gr gy.	ation: Nature of thermal ra itensity of radiation -radia rey body radiation betweer	idiation-c itive heat n surface:	concept c t exchan s separat	of blac ge be ced by	k body, S tween si non-abs	Stefan-Boltzman urfaces – shape orbing medium-	C	03					
UNIT-IV					Perio	ods: 12								
Double pipe he (LMTD) – mul effectiveness – effectiveness V	eat exc ti pass – effeo s NTU c	hangers, parallel and cour heat exchangers, analys ctiveness expressed in te charts.	nter flows is using erms of	s – Log I correctio NTU fo	Mean on fao or diff	Tempera ctors – ferent c	ature Difference heat exchanger onfigurations –	C	04					
UNIT-V	<u> </u>				Perio	ods: 12								
Similarity betw Fick's Law of c state molecular and mass trans	Similarity between phenomena of heat transfer and mass transfer – diffusion mass transfer, Fick's Law of diffusion, species conservation equation-initial and boundary conditions, steady state molecular diffusion-diffusive mass transfer and convective mass transfer– momentum, heat and mass transfer analogies, convective mass transfer correlations, evaporation of water into air.													
Lecture Period	s: 45	Tutorial Periods: 15	Practica	al Period	s:		Total Periods: 6	0						
Reference Boo	ks:													
 Incropera, F.P. and Dewitt, D. P., Fundamentals of Heat and Mass Transfer, IV Edition, John Wiley &Sons, 2000. Holman, J.P., Heat Transfer, X Edition, McGraw Hill Book Company, NY, 2009.E.Paul DeGarmo, Bejan, A., Heat Transfer, John Wiley & Sons, 1993, Ozisik, M. N., Heat Transfer: A Basic Approach, McGraw Hill Book Company, New York, 1985. 														

5. Sachdeva, R. C., Fundamentals of Engineering Heat and Mass Transfer, Wiley Eastern Ltd., 1997.

Department : I	Mechanical Engineering	Programme : B.Tech.(ME)							
Semester : F	ifth	Course	Catego	ry Co	de: PCC	Semester E	xam Typ	e: TY	
Course Code	Course Nome	Perio	ds / We	eek	Credit	Maxir	num Mai	⁻ ks	
Course Code	Course Name	L	Т	Р	С	CA	SE	ТМ	
ME214	Manufacturing Processes	4	0	0	4	40	60	100	
Prerequisite:									
	CO1 Students will able to get go	od expos	ure at	oout t	he manufa	acturing pro	cesses		
Course	CO2 Mastery in casting design	and proc	ess						
Course	CO3 to choose and demonstra	te propei	^r meta	l joini	ng process	5			
Outcome	CO4 Demonstrate knowledge i	in metal f	ormin	g and	surface fi	nishing oper	ations		
	CO5 Explain the different type	s of polyr	ners a	nd the	eir industr	al applicatio	ons		
UNIT-I				Perio	ods: 12				
Introduction	to manufacturing processes – cl	assificatio	on – s	steps	involved	in casting _[orocess	-	
different type	s of casting – pattern and core m	aking – n	nateria	als, ty	pes and al	lowances –	mouldin	g CO1	
tools and equ	ipment - properties of moulding sa	and - cast	ing de	fects	and remed	lies.			
UNIT-II				Perio	ods: 12				
Typesofweldir	ngprocesses-weldability-gasweldir	ng—oxyace	etylene	eweld	ing-Introd	uction t	to ar	с	
welding- typ	es and equipment–resistance v	welding-1	ypes	and	applicatio	ns-welding	defects	– CO2	
Introduction t	o welding standards–welding of di	ssimilar r	netals	and n	on-metals	5			
UNIT-III				Perio	ods: 12				
Classification of	of metal forming processes – Rollin	g, Forging	g, Extri	usion,	Drawing a	nd other Sh	leet meta	al CO3	
operations: te	rminology used, processes, machir	nes and d	efects		-				
UNIT-IV				Perio	ods: 12				
Surface Finishi	ng Processes: Surface Finish and Su	rface Rou	ghness	s, Hon	ing – Lapp	ng – Superfi	nishing –		
Abrasive Belt	Finishing – Mass Finishing Processe	s – Polish	ing – I	Buffin	g. Grinding	: Types of g	rinding –	CO4	
Types of	Grinding machines–Sizeandsp	becificatio	notGri	ndingi	machines-\	NorkHolding	Devices–		
GrindingOpera	itions-Grinding Fluids – Grinding Sp	eed, Feed	d and l	Jepth	of Cut.				
				Perio	ods: 12				
Plastics and	polymers – structure of polymo	ers – ad	ditives	s in	plastics –	thermopla	stics an	d	
thermosetting	plastics – manufacturing of plast	ic produc	ts — ai	tterer	it mouldin	g methods	– tormin	g CO5	
or snaping me	f plastics	achining	or pla	stics -	- joining c	r plastics –	industria	11	
applications o	r plastics	Dractics	l Douio			Total Daria			
Lecture Period		Practica	ii Perio	as:		Total Perio	005: 6U		
	no. gendra Darachar & P.K. Mittal. Elom	onts of M	lanufa	cturin		Drontico U	allIndia D	vt 1+d	
1. D.J.INd		IEIIIS UI IV	anuid	cturin	5 FIULESSE	S, FIEILILE H		vi. Llu.,	
2003. 2 IDVa	shish_ManufacturingProcessos P	anticalla	Illodia	D\/+ +	4 2008				
2. J.F.Nau 2. E.Davil				r vt.Lt	· · · · ·				
	$DeGarmo Ronalo \Delta kocoor = 0.031$	priale and	1 Proce		in Manuta	cturing Pro	ntice Hal	India	

4. RoyA.Lindberg-ProcessesandMaterialsofManufacture,PrenticeHallIndiaPvt.Ltd.,2002.

5. S.K.Hajra Choudry - Workshop Technology, Vol.-I,&II, Media Promoters and Publishers Pvt. Ltd., 1997.

Department : N	/lechan	ical Engineering	Programme : B.Tech.(ME)							
Semester : F	ifth		Course (Categoi	ry Code	e: PCC	Semes	ster Exa	m Type:	TY
Course Code	Cours	Nama	Perio	ds / We	ek	Credit	N	1aximu	m Marks	5
Course Coue	Course	e Name	L	Т	Р	С	CA	SE	TN	Л
ME215	Dynar	nics of Machines	3	1	0	4	40	60	10	0
Prerequisite:				•	•					
	CO1	Students will able to Maste	ery of the	knowle	edge in	dynamics	of slide	r crank	mechan	ism.
		Students will Understand	and des	ign of	simple	e single d	egree fi	reedom	longitu	ıdinal
	CO2	vibrating systems subjected	d to free a	and for	ced da	mped/und	lamped	vibratic	ons.	
Course	<u> </u>	Students will Able to calcu	ulate natu	ral fre	quenc	ies of sim	ole singl	e degr	ee trans	verse
Outcome	03	and torsional vibrating syst	ems of de	esign su	uch sys	tems.				
	<u> </u>	Student will Explain the p	rinciples o	of mec	hanism	ns used fo	r speed	contro	l (Flywh	eel &
	04	centrifugal Governors).								
	CO5	Students will able to get kn	nowledge	about	stabilit	y of Auton	nobiles,	ships a	nd airpla	ines
UNIT-I					Perio	ds: 12				
D'Alembert's P	rinciple	-Inertia forces of reciprocati	ng parts,	Dynam	ic anal	ysis of fou	r link an	id slide	r-crank	
mechanisms, E	Ingine	force Analysis Turning mor	ment on	cranks	haft, [Dynamicall	y Equiv	alent s	ystem,	CO1
Inertia forces i	n a reci	iprocating engine , Turning	Moment	diagrar	ns, Flu	ictuations	of Ener	gy and	speed,	
Flywheel.						• • • •				
	· - · ·				Perio	ds: 12			<u> </u>	
Basic concepts	of S.H.	M, Causes and effects of vit	bration ar	nd degi	rees of	freedom.	Natural	freque	ency of	
tree oscillation	s – equ	dom system – energy m	ietnoa –	simple	probl	ems, Dam	ped free	e vibra	tion of	CO2
vibration absor	of free	dom system, forced vibrati	ION. Basic	OFVI	oration	i isolation,	, Transn	nissidili	ty and	
	DE13.				Porio	ds. 12				
Transverse vibr	ations	of heams-Natural frequency	hy energy	, meth	n enio	nkerly's m	ethod V	Vhirling	of	
shafts calculati	on of w	hirling speed for loaded shaf	fts. Torsio	nal vib	rations	-causes of	Torsion	al vibra	ation.	
Torsional Vibra	tion of	two and three rotor systems	. Equivale	nt sha	ft syste	em, Geared	d system).		CO3
		· · · · · · · · · · · · · · · · · · ·	•		,	,	,			
UNIT-IV					Perio	ds: 12				
Governors - T	ypes -	Centrifugal governors - C	Gravity co	ontrolle	ed and	d spring o	controlle	ed cent	trifugal	
governors – C	haracte	eristics - Effect of friction	- Contro	lling F	orce -	other Go	overnor	mecha	inisms.	CO4
Gyroscopes -	Gyrosc	opic forces and lorques	- Gyroso	copic s	stabiliz	ation - G	iyroscop	oic effe	ects in	
Automobiles, s	nips and	d airplanes.			D ! -	-l 12				
UNIT-V	anaia ka	lanaing of votating manager	:	محامد ا	Perio	as: 12	:		+!	
masses of inline		and radial engines	in amere	nt plan	les - p	artiai Daiai	icing of	recipit	JCating	CO5
	c, v, vv c• 45	Tutorial Periods: 15	Practica	l Porio	dc• Nil		Total	Poriodo	• 60	L
Reference Boo	s. 45 ks:		Tractica		us. IVII		Totari	CHOUS		
1. I.E.Shie	lev and	J.J.Uicker - Theory of Machi	ines & Me	chanis	ms. M	Graw Hill	Internat	ional F	dition. 2	012.
2. Rattan	- Theor	v of Machines. Tata McGraw	/ Hill, 201	4.					2.10.011, 2	
3. J.S.Rao	and R.V	V.Dukkipati - Mechanism and	d Machine	Theor	y, New	/ Age Inter	national	l, 2010.		
4. Thoma	s Bevan	- Theory of Machines, CBS F	Publishers	& Dist	ributo	rs, 2004.		-		
5. P.L.Bal	laney - l	Mechanics of Machines, Kha	nna Publi	shers, 2	2005.					
6. Robert	F.Steid	el Jr An introduction to Me	echanical [•]	Vibrati	ons, Jo	hn Wiley &	& Sons Ir	nc. <i>,</i> New	York, 2	008.

Department : I	lumanti	es and Soci	al Sciences	Prog	ramme :	B.Tech.						
Semester : F	ifth			Subj	ect Categ	ory: MC	C	Sem	ester E	xam Ty	pe: -	
Course Code	Course	Nama		P	eriods / V	Veek	Cre	Credit		iximum	Marks	
Course Code	Course	Name		L	Т	Р	C	2	CA	SE	TI	M
SH203	Essenc Knowl	e of Indian edge	Traditional	2	-	-	-		-	-	-	-
Prerequisite	-											
Course	The co	urse will er	hable the studen	t to:								
Outcome	CO1	understa scientific	nd connect up perspective	and explain	basics of	Indian	tradi	tiona	l know	ledge i	n mod	ern
UNIT-I							Per	iods:	23			
Basic structure health care.	of India	n knowledį	ge system, Mode	ern science an	a Indian K	nowieu	ge sys	stem,	TUga a			
Basic structure health care. UNIT-II Philosophical t	radition,	Indian ling	uistic tradition, I	ndian artistic	radition.	knowled	Per	iods:	22		C(01
Basic structure health care. UNIT-II Philosophical t Lecture Period	radition,	Indian ling	uistic tradition, I	ndian artistic f	radition.	ods:	Per	iods: Tota	22 al Perio	ds: 45	C(01
Basic structure health care. UNIT-II Philosophical t Lecture Period Reference Boo	radition, s: 45 ks:	Indian ling	uistic tradition, I	ndian artistic f	radition.	ods:	Per	iods: Tota	22 al Perio	ds: 45	C	01

Department : N	1echani	cal Engineering	Program	me : B.	Гесh. (ME)			
Semester : F	ifth		Course C	ategory	Code:	PCC	Semeste	er Exam T	ype: LB
	C		Perio	ds / We	ek	Credit	Max	imum Ma	arks
Course Code	Course		L	Т	Р	С	CA	SE	ТМ
	Mecha	anical Engineering Lab-II		0	`	1 Г	40	<u> </u>	100
ME216	(Dynar	mics lab/Special Machines/Heat	U	U	3	1.5	40	60	100
	Transf	er Lab)	<u> </u>					<u> </u>	
Prerequisite	Sti	udy of Fluid Mechanics & Machine	s/ Materia	ls Techi	nology,	/Machinir	ng Techno	logy.	
	At the	end of the course, the student wil	l be able t	0					
	CO1	know how to avoid resonance an	d proper u	use of d	ampers	s for diffe	rent appli	cations.	
	<u> </u>	Select a governor for given appli	cations, ta	ictics to	baland	e rotary	machiner	ies and to	o tackle
Course	COZ	gyroscopic effects in Automobile	s, ships an	d airpla	nes.				
Outcome	CO3	Develop process planning of any	simple pro	oduct m	anufac	turing.			
	CO4	Estimate machining time involve	d and its c	ost anal	ysis.				
	CO5	Understands basics of thermody	namics and	d heat t	ransfer	with app	lications		
	CO6	Understands the principles and w	vorking of	differe	nt heat	transfer	equipmer	nt	
Dynamics Lab:									
1. Determinatio	on of rac	lius of gyration of a given compou	nd pendul	um					CO1
2. Determination	on of ra	dius of gyration, moment of inert	ia – bifila	r susper	nsion n	nethod –	trifilar su	spension	&
method									CO2
3. Determinatio	on of cha	aracteristic curves of Watt, Porter,	Proell and	spring	loaded	governo	rs.		
4. Resonance f	requend	cy of equivalent spring mass systemeters	em – und	amped	and da	amped co	ondition (a	a)To plot	
amplitude Vs fr	equenc	y graph for different damping.							
5. Whirling of s	hafts/ d	etermination of critical speed with	and with	out Roto	ors				
Special Machin	es Lab:								
Lathe:									
1. Turning bet	ween ce	enters							CO3
2. Square thre	ad cutti	ng							&
3. Multi start t	nread c	utting							C04
4. Shaping Mac	chine: v	- Shaping							
J. Willing Wat	ah.								
Determination	au. of Hoat	transfer coefficient by natural con	vection						
Determination	of Heat	transfer coefficient by forced conv	vection						CO5
Determination	of thern	al conductivity and thermal resist	ance of co	mnosit	a wall				20J &
Determination	of tem	nerature distribution and effecti	veness fo	r Pin fi	n ann:	aratus hv	forced	/ natural	CO6
convection.	or term	perdure distribution and effect	veness to		ii upp		ioreeu ,	nacarar	
Performance ar	nalvsis o	f parallel flow and counter flow he	eat exchan	ger/ co	oling to	wer.			
Lecture Periods	5: -	Tutorial Periods: -	Practical	Period	s: 45	Total P	eriods: 45	5	
Reference Bool	٢S				_				
1. J.S.Rao	and R.V	Dukkipati - Mechanism and Mach	ine Theor	y, New A	Age Int	ernationa	al, 2010.		
2. Kalpak	jain S, S	Schimd S, "Manufacturing Engin	eering an	Id Tech	nology	,", Pears	on Educa	tion,	
7 th editi	ion. Ne	w Delhi. 2018.	0		- 01	,		,	
3. Enginee	ering Th	ermodynamics By PK.Nag							
4. Heat ar	nd Mass	Transfer by Holman.							

Department : I	Mechan	ical Engineering	Program	me : B.T	ech.(ME)-Hond	ours		
Semester : F	ifth		Course (Category	Code	: PCC	Semes	ster Exam Ty	pe: TY
Course Code	Cours	o Namo	Perio	ds / Weel	k	Credit	N	laximum Ma	arks
Course coue	Cours		L	Т	Р	С	CA	SE	ТМ
MEH03	Comp	utational Biological	3	1	0	4	40	60	100
	Thern	no-Fluid Mechanics		-		•			
Prerequisite:									
	CO1	Mechanism of transport p charge taking place at mul	phenomen ti scales of	a at the ftempora	leve al anc	l of speci I spatial c	es, mon ontexts	nentum, ene	ergy and
6	CO2	Use of mathematical/com implants	puter mo	dels for v	virtua	l prototy	ping of ı	medical dev	ices and
Outcome	CO3	Understanding of fundar physiological systems	mental pl	nysical p	orinci	ples and	interac	tion with	complex
	CO4	Introducing Multidisciplina and analysis	ary and N	lulti-phys	sics n	ature of	computa	ational inve	stigation
	CO5	, Role of computational mod	delling as i	ndispens	able	tool for sl	kill set de	evelopment	
UNIT-I		.i	<u> </u>	•			Period	ds: 12	
Review of Mo	delling	and Simulation in Medicine	e and Bio	logy – T	ypes,	Scaling,	ODEs –	Examples,	CO1
Solver impleme	entatior	าร							COI
UNIT-II							Period	ds: 12	
PDEs – Modelli	ng, Equ	ations, Boundary Conditions	s, Numeric	al Solutio	on – F	DM, FEM	and FVI	M	CO2
UNIT-III							Period	ds: 12	L
Solid Mechanic	s and E	lectrical Stimulation – Respi	rator Strap	tension	, Myc	ocardial sł	near, Ele	ctrode disc	
resistance, Ner	ve Cuff	, Deformation Analysis of Co	rnea						CO3
UNIT-IV							Period	ds: 12	r
Fluid Mechani flow, Intravent	cs, Hea ricular I	t Transfer and Species Diffu Flow analysis, RF Atrial Ablat	usion – Pł ion	nysiology	, Dru	g delivery	y, Mode	lling blood	CO4
UNIT-V							Period	ds: 12	
Model based d	iagnost s GA G	ics, Multiscale Modelling, Ev P. Cellular Automata - Appli	olutionary	y comput	ing –	global op	otimizati	on, natural	CO5
Lecture Period	c. 45	Tutorial Periode: 15	Dractica	l Pariada	•		Total	Pariode: 60	
Reference Boo	s. 45 ks:	Tutonai Tenous. 15	Tractica	i i citous	•		Totari		
1. Socrates	Dokos	(2017), Modelling organs. tis	sues, cells	and dev	ices,	Springer.	New Yor	·k.	
2. James W	. Haefn	er, (2005), Modeling Biologic	cal System	s, Spring	er, Ne	ew York.			
3. Tomislav	Maric,	Jens Hopken and Kyle Mod	oney (2014	4), The O	penF	OAM Tec	hnology	Primer, So	urceflux,
Duiburg.									
4. Masao T New Yor	anaka, k.	Shigeo Wada and Masanor	ri Nakamu	ıra (2012	2), Co	mputatio	nal Bior	nechanics, S	Springer,
5. H. Verste Delhi.	eg and	W. Malalasekra (2016), An	Introducti	on to Coi	mput	ational Fl	uid Dyna	amics, Pears	on, New

Department : N	/lechan	ical Engineering	Program	me : B.T	ech.(ME)-Min	or		
Semester : F	ifth		Course C	ategory	Code	e: PCC	Semest	er Exam ⁻	Гуре: ТҮ
Course Code	C	- NI	Perioc	ls / Weel	‹	Credit	M	aximum I	Marks
Course Code	Course	e Name	L	Т	Р	С	CA	SE	TM
MEM03	Machi	ine Design	3	1	0	4	40	60	100
Prerequisite									
	CO1	Students will able To under	rstand the	fundam	ental	ls of Mach	nine Desi	gn.	
Course	CO2	Students will To understan	d the diffe	rent the	ories	of failure	and Ma	nufacturii	ng process.
Outcome	CO3	Students will be able to des	sign simple	e joints a	nd b	elt drives	•		
Outcome	CO4	Student will be able to desi	ign shafts	and coup	olings	s for simp	le config	urations.	
	CO5	Students will able to select	rolling ele	ement be	aring	gs and cyl	inders.		
UNIT-I		•					Period	ls: 12	
Introduction to	o desigr	n - Design philosophy, Opti	mised des	ign. Rev	iew	of comm	on engir	eering	
materials and t	heir pr	operties, Different types of r	materials -	– Metalli	c Fer	rous, No	n Ferrous	s, Non-	CO1
metallic, Comp	osites,	ceramic, Plastics, Polymers,	etc. Imp	rovemen	t of	propertie	s throug	h heat	01
treatment and	alloying	3.							
UNIT-II							Period	ls: 12	
Modes of failu	re, Revi	iew of stress calculation in w	arious sit	uations -	axia	l, bendin	g, torsior	1 loads	
and combined	effect,	stress concentration, Facto	or of safe	ty, Theo	ries	of failure	and cho	pice of	CO2
failure theory	of desi	gn. Manufacturing aspects	of design	– Manu	factu	uring pro	cesses (c	asting,	
forming, machi	ning, w	elding etc.) Fit and tolerance	e, surface i	oughnes	S.				
							Period	ls: 12	
Design of joints	s – Stat	ic and Symmetric - Load onl	ly – weld j	joint – G	ib an	nd cotter	– knuckle	e joint.	CO3
Design of Faste	ners to	r Static Load. Beit drives –Fia	it beits.		7				
UNIT-IV	-						Period	ls: 12	
Design of Shaft	, key ar	nd splines- Couplings.							CO4
UNIT-V							Period	ls: 12	
Design of rollin	g eleme	ent bearings – Thin cylinders	and Thick	Cylinder	s.				CO5
Lactura Dariad	· /E	Tutorial Pariada: 15	Dractical	Doriodo	•		Total D	orioda: 60	`
Reference Boo	5. 4J ke:		Flactical	renous	•		TULAIP	enous. or	J
1 V B Bha	ndari D	esign of Machine Flements	Tata McG	raw Hill I	Puhli	shing Cor	nnany Py	titd Ne	w Delhi
2010		congri of Muchine Liements,			ubii	Shing con	inpunyiv		w Denn,
2. T. I. Prab	hu. Des	ign of Transmission Flement	s. Mani Of	fset. Che	nnai	2008			
3. S. G. Kulk	arni. M	achine Design. Tata McGraw	Hill Publi	shing Co	mpar	nv Pvt. Lto	d New D	elhi. 2010).
	,	ian of Machinory Lifth Editi					, <u> </u>	, , <u>, , , , , , , , , , , , , , , , , </u>	• •
4. R. L. Nort	on, Des	sign of iviachinery, Firth Euro	on, Tata Iv	1cGraw F	till Pu	Jolisning	Company	/ Pvt. Ltd.,	New

5. B. J. Hamrock, B. Jacobson and S. R. Schmid, Fundamentals of Machine Elements, Third Edition, Tata McGraw Hill Publishing Company Pvt. Ltd., New Delhi, 2014.

Department : H	lumani	ties and Social Sciences	ces Programme : B.Tech.						
Semester : F	ourth		Course	Category C	ode	: HSM	Semes	ter Exam	Туре: ТҮ
	<u> </u>		Perio	ds / Week		Credit	Ν	Maximun	n Marks
Course Code	Cours	e Name	L	Т	Ρ	С	CA	SE	TM
HS202	Indus Mana	trial Economics and gement	3	0	0	3	40	60	100
Prerequisite:			<u>.</u>						
Course	CO1 CO2	Assess the knowledge of m macroeconomics. Implement various manag	nathemat	ics to und	ersta base	and indus	strial mio	cro econ	omics/
Outcome	CO3	Implement various invest	, ment eva	Iuation ba	sed (on the ne	eeds		
	CO4	Apply formula and workou	ut probler	n					
	CO5	Case studies on General, F	Production	n and Fina	ncial	manage	ment		
UNIT-I			Toddetto		Pe	riods: 9			
MICRO AND N	MACRO	FCONOMICS AND ITS AP	PLICATIO	NS: Natur	re ar	nd Scope	of Eco	nomic s	cience:
Micro – Macro	Econo	mics. Economic decisions a	nd Techr	nical decisi	ons.	Demano	d and Si	innly cou	ncents:
Types of Dema	and. De	terminants of Demand and		concept o	f Fa	uilibrium	Flastic	ity of De	mand.
cost compone	nts. Cor	cepts of ISO-Quant – Brea	ik Even A	nalvsis – I	Mark	et struct	ture – P	rice of P	roduct CO
Nature of prici	ng in dif	fferent types of competition	Small Sci	ale Industi	ries -	- Role of	SSI in In	dian Eco	nomv.
Macro Econom	nics: Na	ture and functions of Mone	ev – Natio	nal Incom	e – (GNP and	Savings	– Inflati	on and
Deflation conce	ept – Bi	usiness Cycle – Foreign Trad	e and Bal	ance of pa	vme	nt.	64.1		
UNIT-II				F	Pe	riods: 9			
MANAGEMEN	Т ТЕСН	NIOUES: Types and Princi	ples of I	Manageme	ent -	– Eleme	nts of I	Managen	nent –
Planning, Orga	nising.	Staffing, Directing, Coordin	ating Co	ntrolling -	Sco	pe of M	lanagem	ient – Tv	pes of CO
Organization N	1erits ai	nd Demerits – Types of (Ow	nership) c	of a firm M	lerits	and Der	merits.	,	•
UNIT-III		· · · · · · · · · · · · · · · · · · ·			Ре	riods: 9			i.
INDUSTRIAL FI	NANCE	: Need for Finance – Types	of finance	e – Source	s of	finance –	- Types d	of Invest	ment –
Evaluation of I	nvestm	ent – Preparation of Tradin	g, Profit a	and loss Ad	cou	nt and B	alance S	heet – ty	pes of CO
accounting and	l signifi	cance of each types.							
UNIT-IV					Ре	riods: 9			<u>-</u>
PRODUCTION	MANA	GEMENT: Theory of Prod	luction F	unction –	Typ	bes of F	Productio	on Meri	ts and
Demerits – Pr	ocess F	Planning – Routing – Sche	duling –	Material	Cont	rol Conc	epts of	Product	ivity – CO 4
Measurement	of Prod	uctivity – Inspection and Dis	spatches.						
UNIT-V					Ре	riods: 9			
MARKETING M	IANAG	EMENT: Core Concepts of I	Marketing	g -0 Needs	s – V	Vants –	Demand	l, Marke	ting Vs
Selling – Produ	ucts an	d Markets – Pricing and re	elated fac	tors – Ch	anne	els of Di	stributio	n – Proi	motion CO !
Advertising – N	/larket l	Research Vs Marketing Rese	arch						
Lecture Period	s: 45	Tutorial Periods: Nil	Practica	l Periods:	Nil		Total P	eriods: 4	15
Reference Boo	ks:								
1. Varshney	/ Mahes	swari "Managerial Economic	cs"S Cha	nd & Co, N	lew l	Delhi 201	L1		
2. Dutt & Si	undarar	n, "Indian Economy" S Chan	nd & Co N	ew Delhi 🛛	2015				
3. Pandey I.	.M, "Ele	ements of Financial Manager	ment" Wi	ley Easter	n Ltd	New De	elhi 2015		
4. H.L. Ahuj	a, "Mao	cro Economics for Business a	and Mana	igement, S	Cha	nd & Co	mpany L	td 2011.	
5. O.P Khan	ina, "Ind	dustrial Engineering and Ma	inagemen	t, Dhanpa	at Ra	i and Sor	ns, 2009.		
6. Philip B K	Kotler, "	Marketing Management, N	/lac Millar	n, New Yor	k 20	11.			

Semester : Sixth Course Category Code: PCC Semester Exam Type: TY	
Course Code Course Name Periods / Week Credit Maximum Marks	
L T P C CA SE TM	
ME217 Thermal Engineering - II 3 1 0 4 40 60 100	
Prerequisite: Studied a course on Thermodynamics	
CO1 Identify different types of refrigeration systems, and calculate the performance of vapour compression refrigeration system.	
CO2Able to understand principle of vapour absorption system, types & properties of refrigerants and fundamentals of cryogenics	
Outcome CO3 Identify the different types of air-conditioning systems and their components	
CO4 Calculate load on air conditioning system and subsequently estimate the capacity of air conditioner	r-
CO5 Able to analyse the performance of reciprocating and rotary air handling equipment.	
UNIT-I Periods: 12	
Air refrigeration system- Reversed Carnot cycle – Carnot COP-limitations-reversed Brayton cycle -	
Unit of refrigeration - simple vapour compression system: p-h and I-s diagrams - Effect of CO1	
evaporator pressure, condenser pressure, sub-cooling and super heating on performance- Actual	
vapour compression cycle-Analysis and problems	
UNIT-II Periods: 12	
Simple and practical vapour absorption refrigeration system- comparison between vapour	
Compression and vapour absorption reingeration-COP.	
reportion of refrigerants. Selection of refrigerants ODD & CWD	
Introduction to Cryogonics (Theoretical treatment only): Liquefaction Air liquefaction system	
simple Linde cycle Claude cycle	
Air conditioning Dequirement for comfort air conditioning Easters governing human comfort	
Comfort chart. Air-conditioning systems: summer air-conditioning and winter air-conditioning –	
Central unitary and unitary-central air-conditioning systems – Air-conditioning equipment and CO3	
components: Package units and central units air cleaners air filters humidifiers dehumidifiers	
fans and blowers – cooling towers	
UNIT-IV Periods: 12	
Sources of heat load – Conduction load – Sun load – Load from occupants – Equipment load –	
Infiltration air-load – Load from moisture gain – Fresh air load – ASHRAE standards –room sensible	
heat factor-grand sensible heat factor-effective room sensible heat factor- Calculation of load on	
air-conditioning system	
UNIT-V Periods: 12	
Air machines: Compressor-classification, reciprocating compressor –single stage compressor with	
and without clearance-multistage compressor with inter cooling-calculation of power required and	
efficiencies	
Rotary compressors (Theoretical treatment only): centrifugal and axial flow compressor. Blowers:	
roots and vane blower. Fans: centrifugal and axial flow fans.	
Lecture Periods: 45 Tutorial Periods: 15 Practical Periods: Nil Total Periods: 60	
Reference Books:	
1. Kothandaraman, C. P., and Domkundwar, A course in Thermal Engineering, Dhanpat Rai & Co, 2013	
2. Sarkar, B.K,"Thermal Engineering" Tata McGraw-Hill Publishers, 2007	
3. Rudramoorthy, R, "Thermal Engineering ", Tata McGraw-Hill, New Delhi, 2003	
4. Ramalingam. K.K., "Thermal Engineering", SCITECH Publications (India) Pvt. Ltd., 2009.	
5. Arora, C. P., Refrigeration and Air conditioning, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 2000	
6. Stoecker, W. F. and Jones, J. W., Refrigeration and Air conditioning, McGraw Hill Book Publishing Conditional Media Neuroperty 1995	о.
LLU., NEW YORK, 1995 7 S. N. Sanali Refrigeration and Air Conditioning second Edition, PHL May 2014	

Department : N	Леchan	ical Engineering	Programme : B.Tech. (ME)						
Semester : S	ixth		Course (Category	Code:	PCC	Semest	er Exa	m Type: TY
Course Code	Cours	o Nama	Perio	ds / We	ek	Credit	Ma	aximui	m Marks
Course Code	Course	e Name	L	Т	Р	С	CA	SE	TM
ME218	Metro	ology and Measurements	4	0	0	4	40	60	100
Prerequisite:			.	:		<u>.</u>			<u>.</u>
	CO1	Ability to understand the s	ignificance	e of mea	surem	ent in inc	lustrial a	oplicat	ions.
		Understanding the correct	t procedu	re to be	adopt	ed to me	asure th	e dime	ension of the
	CO2	components.							
Course	CO3	Identify the uses of gauges	, compara	tors, co	ordina	te measu	ring macl	nine in	industries.
Outcome		Study various methods and	d handling	of geon	netric	form like	flatness,	round	ness, thread,
	CO4	, gear measuring instrumen	ts						
	COF	Interpret measurements o	f field vari	ables lik	e force	e, torque	and press	sure ar	nd
	COS	Comprehend the fundame	ntals of th	iermo-co	ouple a	and strain	measure	ment.	
UNIT-I							Periods	: 12	
Introduction to	Metro	logy – Need – Elements – W	ork piece,	Instrum	ents –	Persons -	-		
Environment –	their ef	fect on Precision and Accura	acy – Erroi	rs – Erroi	rs in N	leasurem	ents – Ty	pes	CO1
– Control – Typ	es of st	andards.							
UNIT-II	<u></u>						Periods	: 12	
Linear Measuri	ng Insti	ruments – Evolution – Types	s – Classifi	cation –	Limit (gauges –	gauge de	sign	
 terminology 	– pro	cedure – concepts of int	erchange	ability	and	selective	assembl	у —	CO2
Angular measu	ring ins	truments – Types – Bevel pr	otractor c	linomete	ers ang	gle gauges	s, spirit le	vels	
sine bar – Angl	e alignn	nent telescope – Autocollima	ator – App	lications	5.				
UNIT-III				-	_		Periods	: 12	
Basic concept o	of lasers	S Advantages of lasers – lase	r Interferc	meters -	- type	s – DC and	d AC Lase	ers	
interferometer	– Appli	ications – Straightness – Alig	nment. B	asic cond	cept of	t CMM – ⁻	Types of		CO3
CMM – Constru	uctional	features – Probes – Accesso	ories – Sof	tware –	Appli	cations –	Basic		
concepts of Ma	ichine V	/ision System – Element – Ap	oplications	5.			D		
	N 1 0 + 1				The	al 100	Periods	: 12	
Principles and	ivietho	us of straightness – Flatnes	s measure	ement –	Inrea	ia measui	rement, g	gear	CO4
measurement,	surrace	a finish measurement, Round	iness mea	suremer	ιτ – Αρ	plications	s. 		
	<u> </u>						Periods	: 12	
Force, torque	, powe	er - mechanical, Pneuma	itic, Hydr	aulic ar	nd Ele	ectrical t	ype. I	low	
measurement:	ventur	rimeter, Urifice meter, rota	imeter, pi		e — Te	mperatur	e: bimet	allic	CO5
Strip, thermoo		, electrical resistance the	ermomete	r — ке	liabilit	y and C	alibratio	n –	
		Tutorial Dariada Nil	Dractica	Dorioda	. NII		Total D	orioda	. 60
Reference Roc	5. 0U ke•		FIACUCA	renoas	. INII		TOLATP	enous	. 00
1 Jain R K	"Engine	pering Metrology" Khanna P	uhlishars	2005					
1. Jan N.K.	- "Eng	incering Metrology", Maillid P	Dhannatrai Publications 2005						
2. Oupla. I.	C., Ellg	Chathalt "Matralage for Fr			2005.			AEA 44	200

3. Charles Reginald Shotbolt, "Metrology for Engineers", 5th edition, Cengage Learning EMEA,1990.

4. Backwith, Marangoni, Lienhard, "Mechanical Measurements", Pearson Education, 2006

Department : I	Mechan	ical Engineering	Program	me : B.T e	ech.(ME)							
Semester : S	Sixth		Course C	Category	Code	e: PCC	Seme	ster Exam	Туре: ТҮ				
Course Code	6	- N	Period	ls / Week	(Credit	٨	/laximum	Marks				
Course Code	Cours	e Name	L	Т	Ρ	С	CA	Semester Exam Type Maximum Mark CA SE Ti 40 60 10 ased on 1-D ased on 1-D ased on 1-D ased on 1-D Periods: 12 periods: 12 Ited Joints under Periods: 12 Design of Clutches. Periods: 12 ad-Design of Leaf Periods: 12 in curved beams. erg and Goodman					
ME219	Desig	n of Machine Elements	3	1	0	4	40	60	100				
Prerequisite:													
	CO1	Students will be able to de assumptions.	sign simpl	e machin	e coi	mponents	based o	on 1-D					
Course	CO2	Demonstrate understandir	ng of vario	us design	con	sideratior	ns.						
Outcome	CO3	Design machine elements	for static a	is well as	dyna	amic loadi	ng						
	CO4	Design machine elements	on the bas	is of stre	ngth	/ rigidity o	concepts	5					
	CO5	Use design data books in d	lesigning v	arious co	mpo	nents							
UNIT-I							Perio	ds: 12					
Fundamentals	of mac	hine design - Design philoso	phy- Engi	neering N	Лate	rials- Brie	f overvi	ew of des	ign				
and Manufact	uring –	Principal Stresses -Failure Th	neories - D	esign of	Weld	ded Joints	-Types	– Strengtl	h – CO1				
Eccentric Load	ed weld	led joints – Welded joints sul	bjected to	fluctuati	ng lo	ad.							
UNIT-II							Perio	ds: 12					
Strength and	Stabilit	y Criteria, Design of Powe	er Screws	. Thread	ed J	oints – I	Bolted .	loints und	der coz				
fluctuating loa	d, Com	pined Stresses, and eccentric	loading.		•				02				
UNIT-III							Perio	ds: 12					
Design of Coup Types of Brake	olings – s – Desi	Design of Rigid and flange C ign of Brakes.	Couplings -	– Types c	of Clu	itches and	d Design	of Clutch	es. CO3				
UNIT-IV							Perio	ds: 12	I				
Introduction t	Desig	n of Helical Springs-Design	of Helica	I Springs	for	Variable	Load-De	esign of L	eaf				
Springs- Desigr	n of Pipe	e Joints – Cotter and Knuckle	e joints.					C	CO4				
UNIT-V							Perio	ds: 12					
Design of Shaf	ts unde	r static load: members subje	ected to Ec	centric lo	badir	ng – stress	ses in cu	irved bear	ns.				
Design of Shaf	ts unde	r Fluctuating Load: Design f	or Finite a	nd Infini [.]	te lif	e – Sode	rberg a	nd Goodm	ian CO5				
equations – co	mbined	stresses.											
Lecture Period	s: 45	Tutorial Periods: 15	Practica	l Periods	: Nil		Total	Periods: 6	0				
Reference Boo	ks:												
1. V.B.Bh	andari -	Design of Machine Elements	s, Tata Mc	Graw Hill	pub	lishing Co	., 2010.						
2. Sharm	a and P	urohit, Design of Machine Ele	ements, P	HI, 2009.									
 Ganes Noida, 	n Babu, 2009	K. and Srithar, K., Design of	Machine E	lements,	McG	Graw Hill E	ducatio	n (India) P	vt. Ltd.,				
4. T. Jaga	deesha	, Design of Machine Element	ts, Univers	ities Pres	s(Inc	lia) Privat	e limited	l, Hyderab	oad,2018				
5. J. Shig	ey, Med	chanical Engineering Design,	McGraw H	- Hill Intern	atio	nal Editior	n, 2011.						
6. Abdul	Mubech	n, Machine Design, III Edition	i, Khanna I	Publisher	s, 19	98.							
7. Sadhu	Singh, N	Machine Design, III Edition, K	(hanna Pul	olishers, 2	2001								
8. Design	Data H	and Book, PSG College of Te	chnology,	Coimbate	ore								

Department : I	Mechar	ical Engineering	Progra	amme	: B.Te	ch.(ME)				
Semester :	Sixth		Cours	e Cate	egory (Code: PAC	Semester	Exam Typ	e: -	
Course Code	Cours	o Nama	Perio	ds / W	/eek	Credit	Maximum Marks			
Course Coue	Cours		L	Т	Р	С	CA	SE	TM	
ME220	Semiı	nar	-	-	3	1	100	-	100	
Prerequisite:										
	CO1	To write technical of completed	docume	ents a	and gi	ve oral prese	entations re	elated to	the work	
Course	CO2	To utilize technical res	sources	5						
Outcome	CO3	To work in actual worl	king en	vironr	nent					
	CO4	To Identify, understan	d and d	discus	s curre	nt, real-world	issues.			
	CO5	To Apply principles of	[:] ethics	and re	espect	in interaction	with others.			
		Seminar is a course in the students will be a student has to condu- report. The student v answer session. The S assessment committee weekly class session. The Dress properly • E	n which assigne ict a de vill ma eminar ee for a The foll Behave	n stud ed a Se etailec ke an r (pres a tota owing well •	ents a emina l study oral p entati l of 1 etiquy Portr	re trained for r Topic in the //survey on th presentation for on and report) 00 marks Presente ette are to be f ay good image	presentatio current and e assigned blowed by a will be eval centation wi followed as a profess	n skills. E I frontier topic and a brief qu uated by ill take pl sional	ach one of areas. The prepare a estion and an internal ace during	
Lecture Period	ls: -	Tutorial Periods: -	Pra	ctical	Period	s: 45	Total Peri	iods: 45		

Depart	ment : N	Mechanical Engineering			Prog	ramme	ne : B.Tech.(ME)				
Semes	ter : S i	ixth			Cour	se Cat	egory Co	ode: PCC	Semeste	er Exam 1	ype: LB
6		6	_		Per	iods /	Week	Credit	Max	imum M	arks
Course	Code	Course	e		L	Т	Р	С	СА	SE	тм
ME221		Mecha (Thern Model	anical I nal Eng Iling, Si	E ngineering Lab-III gg. Lab/ Measurements lab/ mulation & Analysis lab)	0	0	3	1.5	40	60	100
Prereq	uisite	St M	udy easure	of Thermodynamics, Hea ments/design of machine ele	it Tra ments,	ansfer, , Engin	, Ther eering N	mal Engir ⁄Iechanics, I	neering/ Mechanic	Metrol s of Solid	ogy & s.
		At the	end of	the course, the student will I	be able	e to					
		CO1	Unde cond	erstands fundamentals of I itioning and its applications	Heat	transfe	er, IC e	engines an	d Refrige	eration	and air
_		CO2	Unde	erstands the principles and wo	orking	of IC	engines,	calorimete	rs and HV	AC.	
Course		CO3	Calib	rate the simple mechanical m	easure	ement	instrum	entation an	d their us	es.	
Outcor	ne	CO4	Dem Com	onstrate different measureme oonents.	ent Te	chniqu	ies for th	ne precise r	neasurem	ent of In	dustrial
		CO5	Get t	he skill of solving the problem	ns usin	g com	puter pr	ogramming	•		
		CO6	Get t wher	he skill of using computer aid e they get employed.	ed dra	ifting a	ind mod	elling softw	vare availa	able in in	dustries
Therm	al Lab:										
1.	Determ	ination	of fla	sh point and fire point and o	calorifi	c valu	es of ga	seous fuel	using Jur	nkers gas	; CO1
	calorim	eter.									&
2.	Determ	ination	of kir	nematic viscosity using Redu	wood	viscon	neter ar	nd determi	nation of	calorific	: CO2
	values	of solid/	/ liquid	fuels using Bomb calorimeter	r.						
3.	Perforn	nance te	est on `	Vapour compression retrigera	ition sy	/stem.					
4. 5	Perforn	nance te	est on s	single/ multi cylinder diesel /	petrol	engine	2.				
5.	Heat ba	lance to	est in a	i single cylinder 45 diesel engi	ne.						
Ivieasu	rements	Lap:	ofton	vrusing Sino Por							
1. 2	Moasur	ement	of Proc	er using sine bar.							CO3
2. 3	Measur	rement	of Ford	e using Transducers							203 &
3. 4.	Study o	of Displa	acemen	it using LVDT and RVDT.							CO4
5.	Measur	rement	of spee	ed using stroboscope.							
6.	Inspect	ion of g	gear too	oth profile using profile projec	ctors.						
Model	ling, Sim	ulation	and A	nalysis Lab:							
1.	Plane S	tress Ar	nalysis	on Plate with Central hole							
2.	SF and	BMD dia	agrams	s for all kinds of beams							
3.	1-D hea	at transf	fer ana	lysis of a simple plate.							
4.	Compu	ter aide	ed desig	gn of machine components							
De	sign and	drafting	g of the	e following components using	FORT	RAN /	C or C++	/ Matlab			CO5
_	a)	Transm	nission	shafts, b) Journal bearings, c)	Flang	e coup	lings etc		6 . 1		&
5.	Write p	orogram	is in FC	ORTRAN/C or C++ / MATLAB to	or the	tollow	ing: a) F	inding root	s of the gi	ven non	· CO6
	linear e	equation	n with :	single variable using Newton	Raphs	on ivie	ethod. D) Solution (of system	ot lineal	
	intogra	tion usi	ing Gau	ass elimination / Gauss Se	third	rulo	d = 0	umerical s	Kutta me	thad for	: c
	solving	first or	nig uid der ord	inary differential equations	uniu	uie.		aer nunge	Rutta IIIt		
6.	Assemb	olv mod	lelling c	of components having a minin	num of	f six m	achine e	lements.			
Lecture	e Periods	s: Nil		Tutorial Periods: Nil	Prac	tical P	eriods: 4	5 Total P	eriods: 4	5	<u>i</u>
Refere	nce Bool	ks			1		_				
1.	IC engir	nes – V.	Ganes	an.							
2.	Gupta,	I.C., "Er	ngineer	ing Metrology", Dhanpat Rai	Publica	ations	(P) Ltd.,	2003.			
3.	Ajeet S	ingh, M	lachine	Drawing Includes AutoCAD,	Tata N	1cGrav	v-Hill Pu	blishing Co.	, New De	elhi, 5th	Reprint,
	2011										

Department : I	Mechan	ical Engineering	Programme : B.Tech.(ME)-Honours							
Semester :	Sixth		Course 0	Category	Code	e: PCC	Semes	ter Exam Type	e: TY	
Course Code	C	a Nama	Period	ls / Week	‹	Credit	N	laximum Marl	ks	
Course Code	Cours	e Name	L	Т	Р	С	CA	SE	ТМ	
MEH04	Produ Devel	ict Design and opment	3	1	0	4	40	60	100	
Prerequisite:					.11				<u>.</u>	
Course Outcome	CO1 CO2 CO3 CO4 CO5	Students will develop cro realization tools in a multi- Students know how to a quantify machine elements Students know the variet need for quality and contin Students get the knowledg Students know the product	oss-discipl disciplinar pply mech s in the de ty of mech ue earnin ge of pater t manufac	ine prod ry team so nanical e sign of co hanical c g. nting a ne turing asi	ucts ettin ngin omm comp comp	and prot ng. eering de nonly used ponents av roduct	totype t sign the mechar vailable	hem using p ory to identi ical systems. and emphasi	fy and ize the	
LINIT-I Deriode: 12										
Introduction to product design and manufacturing, product design: definition and evolution, Product design morphology, Product design morphology: Preliminary and detailed design. NPD and PAP										
UNIT-II							Perio	ls: 12	<u>.</u>	
Value Engineer Case study in V (DFM), Design Assessment.	ring: a p Value Er for Ma	product design approach, Ele ngineering – Product manufa anufacturing and Assembly	ements of acturing: F (DFMA),	Value En Process se Design fo	gine elect or Er	ering, Valu ion, Desig ivironmen	ue Engin in for Ma it: Life C	eering tools, anufacturing Cycle Impact	CO2	
UNIT-III							Period	ls: 12		
Product costin and alloys, Ma Development. Quality monito defects, Qualit	g: Eleme iterial s oring: Co y Assura	ents of product cost, Product election: Plastics, Ceramics, ontrol charts for processes, ance.	t costing: Rubber- Quality m	Life Cycle ntegrated onitoring	Cos d Pro g: Co	ting Mater oduct and ntrol char	rial selec Process ts for at	tion: Metals Design and tributes and	CO3	
UNIT-IV							Perio	ls: 12	<u>.</u>	
Patenting: Cre Principles of Pr	eativity ototypi	versus Innovation, Patent ng, methods of prototyping.	ing: need	and pr	oces	sses, Prot	otyping:	Basks and	CO4	
UNIT-V							Period	ls: 12	-	
Product manu manufacturing and mass custo	facturin aspect omizatio	ng aspects: Layout design, s: Process simulation, Mar on.	Product n naging cor	nanufactu npetitive	uring	g aspects: :: Benchm	Soft to arking,	ols, Product Outsourcing	CO5	
Lecture Period	s: 45	Tutorial Periods: 15	Practica	l Periods	: Nil		Total P	eriods: 60		
Reference Boo1.Epping2.Magradesigndesign3.Boothinpp505a	ks: er, S. ar b, E.B., and de royd, G. -520.	nd Ulrich, K., 2015. Producdt Gupta, S.K., McCluskey, F.F velopment: the product real ., 1994. Product design and	design an P. and Sar ization pro manufact	d develo ndborn, F ocess. CR cure and	pme P., 20 C Pre asse	nt. McGra 209. Integ ess. embly. Cor	w Hill Hi rated pr mputer-/	gher Educatic oducts and p Aided Design,	on. process 26(7),	
4. Beniar	nın W. N	Neibel and Alanb, Daper Proc	auct Desig	n and Pro	oces	s Engineer	ing. McC	araw Hill Book	CO.	

Benjamin W. Neibel and Alanb. Daper Product Design and Process Engineering, McGraw Hill Book Co.
 A.K.Chitale and R.C. Gupta, Product Design and Manufacturing, McGraw Hill International Edition 2004.

Department : N	Nechan	ical Engineering	Program	me : B.Te o	ch.(M	ME)-Mino	r				
Semester : S	ixth		Course (Category Co	ode:	PCC	Semes	ster Exa	m Type:	TY	
Course Code	Course	a Nama	Perio	ds / Week		Credit	N	laximui	m Marks		
course coue	Course	endine	L	Т	Ρ	С	CA	SE	TN	1	
MFM04	Qualit	y Control and	3	1	0	4	40	60	10	0	
	Impro	vement Techniques		-	U				10	0	
Prerequisite:											
	CO1	Understanding the impo	ortance	of improv	/ing	quality	ofap	roduct	/proces	is to	
		meet the target specifica	tions and	d reduce v	wast	tages					
Knowledge on how Quality control measures directly improve cost benefits, relia										bility	
	factors and overall productivity										
Course	Course Procedures for Process reversal by estimating the shift in target value by scrutini										
Outcome	Outcome the defectives and defects.										
	Overview of the adaptation of sampling & inspection procedures to maintain qu										
throughout the transformation process											
	CO5	Learn the fundamental me	ethods of	measuren	nent	, precisio	n &acci	uracy, n	neasure	ment	
devices & testing methods											
UNIT-I Periods: 12											
Importance of quality, meaning of quality, quality dimensions, quality planning, quality											
control, SQC	control, SQC, Quality assurance, quality costs, economics of quality, quality and CO1										
productivity, q	uality ar	nd reliability, quality loss fun	ction.								
UNIT-II							Perio	ods: 12			
Process variati	on,– Sta	atistical basis, 3 – sigma cor	ntrol limit	s, Rational	sub	-grouping	g, X, Ra	and S ch	narts,		
Interpretation	of	charts, warning a	and m	odified	cor	ntrol I	imits,	oper	ating	CO2	
characteristic	curve	for X – chart, SPC -	-process	capability	ar	nalysis –	- Ср,	СРК,	Cpm,		
	illity, Ga	iuge capability.					Dorio	dc. 17			
	and	ku charte domorite cor	ntrol cha	rt Multi		variable	chart	indiv	/idual		
P, NP, C, U	anu charte –	Ku charts, dements con moving average and moving	ntron cha	arts qualit		variable ntrol in s		, maiv	liuuai	CO3	
		moving average and moving		ai ts, quaii							
			- (- 1 1 -	Perio	ds: 12	1		
Need for A	cceptar	ice sampling, economics	of sai	npling, s	amp 	ble sele	ction,	single	and		
Double samp	oling -	- U.C. curves, Average	e outgo	ing quai	ity 	(AUQ),	Avera	ge sa	imple	CO4	
Number (ASN)	, Avera	ge total inspection (AII), N	viultiple a	na sequer	ntial	sampling	g, samp	ling pla	ans –		
military standa	ras, Do	age – Roming, is 2500.					D	de. 13			
UNIT-V			0				Perio				
Fundamental	Fundamental methods of measurement, precision & accuracy, measurement devices -Linear and										
Angular - Coordinate Measuring Machine, Destructive and Non- Destructive Testing methods. Design of											
Evnorimonto C	dinate N	Measuring Machine, Destruct	tive and N	ion- Destri	JCUV	eresting	metho				
Experiments, S	dinate N ix Sigma	Aeasuring Machine, Destruct a concepts.	tive and N	Ion- Destru			Total	Dorioda	• 60		
Experiments, S	dinate N ix Sigma s: 45	Measuring Machine, Destruct a concepts. Tutorial Periods: 15	tive and N Practica	l Periods: I	Nil	e resting	Total	Periods	: 60		
Experiments, S Lecture Period Reference Boo	dinate M ix Sigma s: 45 ks:	Aeasuring Machine, Destruct a concepts. Tutorial Periods: 15	Practica	I Periods: I	Nil		Total	Periods	: 60	. .	
Experiments, S Lecture Period Reference Boo 1. Douglus	dinate N ix Sigma s: 45 ks: C. N	Measuring Machine, Destruct a concepts. Tutorial Periods: 15 Iontgomery, Introduction	tive and N Practica to S	I Periods: I tatistical	Nil Qu	ality Co	Total	Periods John	: 60 Wiley	[,] &	
Experiments, S Lecture Period Reference Boo 1. Douglus Sons, 2004	dinate N ix Sigma s: 45 ks: C. N I.	Measuring Machine, Destruct a concepts. Tutorial Periods: 15 Iontgomery, Introduction	tive and N Practica to S	I Periods: I tatistical	Nil Qu	ality Co	Total	Periods John	: 60 Wiley	. &	
Experiments, S Lecture Period Reference Boo 1. Douglus Sons, 2004 2. Statistical	dinate N ix Sigma s: 45 ks: C. N I. Quality	Measuring Machine, Destruct a concepts. Tutorial Periods: 15 Nontgomery, Introduction Control, Eugene L. Grant and	tive and N Practica to S d Richard S	I Periods: I I Periods: I tatistical S. Leaven V	Nil Qu Norl	ality Co	Total ontrol,	Periods John Editior	: 60 Wiley n, 2000	[,] &	

4. Statistical Quality Control, M. Mahajan, Dhanpat Rai & co (P) Ltd 2012

Department : Mechanical Engineering Programme : B.Tech.(ME)										
Semester :	Seventh		Course	Category C	Code	: PCC	Semes	ster Exa	m Type: TY	
Course Code	Course	Namo	Perio	ds / Week		Credit	Maximum Ma		mum Marks	
Course Coue	Course	Ndiffe	L	Т	Ρ	С	CA	SE	TM	
ME222	Operati	ion Research	3	1	0	4	40	60	100	
Prerequisite:										
	CO1	At the end of the course t Problem	he stude	nt is able to	o un	derstand	l about	operat	ions research	
Course	CO2	Understanding the necess	sity of Inv	entory Cor	ntrol	and its p	oroblem	าร		
Outcome	CO3	To get knowledge about I	Linear Pro	ogramming	3					
	CO4	Explain the various metho	ods.							
	CO5	Able to solve problems to	obtain o	ptimal syst	ems					
UNIT-I							P	eriods:	12	
Basics of Operations Research-Development of Operations Research, Definition of Operations Research, Characteristics of Operations Research, Scope of Operations Research, Operations Research and Decision-Making, Scope of Operations Research in Management, Scope of OR in Financial Management, Application of various OR Techniques, Objective of Operations Research									CO1	
UNIT-II							P	eriods:	12	
Inventory Control-Necessity for Maintaining Inventory, Inventory Costs, Inventory Control Problem, Classification of Fixed Order Quality Inventory Models, Inventory Models with Deterministic Demand, Model 1(a).Classical EOQ Model(Demand Rate Uniform, Replenishment Rate Infinite),Model 1(b).(Demand Rate Non-Uniform, Replenishment Rate Infinite),Model 1(c).(Demand Rate Uniform, Replenishment Rate finite),Model 2(a).(Demand Rate Uniform, Replenishment Rate infinite, shortage allowed),Model 2(b). (Demand Rate Uniform, Production Rate finite, shortage allowed), Inventory Models with Probabilistic Demand, Inventory									CO2	
UNIT-III							P	eriods:	12	
Linear Progra Solution, The Problem The	mming-Ir General	ntroduction, Formulation Linear Programming proble Simplex Method Analyti	of Linea em, Canc cal Met	r Program	min Stan rial	g proble dard Fo	ems, G rms of ror Me	raphica Linear I	I Method of Programming The Simplex	CO3
Method(Techr	nique or A	Algorithm).Artificial Variable	es Techni	aues. The l	Big-ľ	M Metho	d. The	Two-Ph	ase Method	
UNIT-IV					U		P	eriods:	12	
The Transpor Terminology, Additional Pro Earliest Start using Optimist problem, Max (PERT), Netwo	tation M Formulat bblems. N Time (ES) tic, Most timal flow ork repres	lodel-Introduction to the tion and solution of Tran letwork Analysis-Network () Latest Start Time (LS), Ea likely, pessimistic times of v problem, Critical Path N sentation of simple projects	Model, sportatio models, I irliest Eve f activitie f activitie fethod (0	Definition on Models, Draw netw ent Time (I es, Minimal CPM), Prog g of projec	of , Va ork ET), I spa gram t du	the Tra riants ir diagram Latest E nning tr Evaluat ration	nsporta Trans Analyz vent Tin ee prot	tion M portatio e the n me (LT) plem, Sl d Revie	lodel, Matrix on Problems, etwork using , Apply PERT hortest route w Technique	CO4
UNIT-V							P	eriods:	12	
The Assignment Model-Definition of the Assignment Model, Mathematical Representation of the Assignment Model, Comparison with the Assignment Model, The Hungarian Method for Solution of the Assignment Problems, Formulation and solution of the Assignment Models, Variations of the Assignment Problem, The Travelling Salesman Problem. Sequencing Models-Sequencing problems, Assumptions in Sequencing Problems, Processing n Jobs through one Machine, Processing n Jobs through two Machines, Processing n Jobs through three Machines, Processing two Jobs through m Machines, Processing n Jobs through m Machines, Problems related to Sequencing(Routing Problems in Networks),Minimal Path Problem									CO5	
Lecture Period	ds: 45	Tutorial Periods: 15	Practica	al Periods:	-		Total	Periods	: 60	
Reference Boo	oks:						-			
 Operations Research : Principles and Practice 2nd Edition, Ravindran, Solberg, Phillips, Wiley, 2008 Introduction to Operations Research 9th Edition, Ferald J. Lieberman, Badhibrata Nag, Tata McGraw Hill, 2011 Operations Research 2nd Edition Paperback R. Panneerselvam, PHI, 2011 Operations Research, an Introduction by Hamdy Taha Introduction to Operations Research by Hillier & Lieberman Operations Research by V K Kapur 										

Department : N	/lechan	ical Engineering	Program	nme : B.Tech.(ME)							
Semester : S	eventh		Course Category Code: PCC Semester Exam Type: TY									
Course Code	Cours	o Namo	Peric	ods / Week	Credit	Ν	/laximur	n Marks				
Course Coue	Cours		L	T P	С	CA	SE	TM				
ME223	Indus Mana	trial Engineering and gement	3	0 0	3	40	60	100				
Prerequisite:			<u>.</u>		<u>.</u>	. <u>.</u>						
	CO1	At the end of the course formulate and solve engine	e the stu	dent will be oblems	able to l	nave ar	n ability	to identify,				
	CO2	an ability to use the tech	niques, s	kills, and mo	dern engi	neering	tools r	ecessary for				
Course	Course CO3 an ability to design and conduct experiments as well as to analyze and interpret dat											
Outcomo	CO3 an ability to design and conduct experiments, as well as to analyze and interpret da											
Outcome	CO4	realistic constraints such a and safety, manufacturabil	realistic constraints such as economic, environmental, social, political, ethical, he and safety, manufacturability, and sustainability									
	CO5	the broad education neces	sary to u	nderstand the	e impact c	of engin	eering s	olutions in a				
	-	global, economic, environm	nental, an	d societal con	text							
	<u></u>	VOUT & MAATCOLAL		+ 1 + + - + ¹ ¹	- f l	Peri	ods: 9					
	ON, LA	YOUT & MATERIAL HANDLI	ING: Plan	t Location : II	nfluencing	factors	s – rura	and				
urban location	s – eva	aluation of location alternat	tives for	Single facility	location	probler	ns – sc	iving				
simple problem	15. alaasifia				hasia tu			line CO1				
Plant Layout :	Classific	ation of production systems	5 – princij	Dies of layout	- basic ty	pes or	layout -	- line CO1				
balancing – simple problems in line balancing using Ranking Positional Weight Method.												
Material Hand	ling : 1	functions – principles – cla	assificatio	n of materia	i nandling	g equip	ments	(only				
classification ai	na no a	escription) - factors to be con	nsidered i	n selection of	material r	nandling	g equipn	ient.				
				· · · · · · · ·		Peri	oas: 9					
WORK STUDY:	Ivietho	d Study : objectives - basic	procedur	e - various re	cording te	cnnique	es – pro	cess				
charts, multip	le acti	ivity charts, SIIVIO chart,	FIOW CI	agram, string	g diagran	n, cycle	egrapn	and				
chronocyclegra	ipn - pi	incipies of motion economic	y – men	Silgs - micron	iotion stu	uyan	iemomo	non				
Study.	mont .	nurnese basis presedure	variou	tochniquos	of work m		mont	cton CO2				
watch time stu	dv tin	pulpose - basic procedure	- various	s techniques	or work in	ieasure		stop				
	uy – tin rk. com	nling simple problems in	ent syster	the determin	ation of	ig – tim standar	e allowa	and				
compensation		pling – simple problems i	Involving	the determin		Stanuai	u time	anu				
						Pori	ods. 0					
		GEMENT: Production Plan	ning and	l Control :	functions		litativo	and				
	chniqu	les of forecasting - simple	o proble	ns in forece	sting usin	g movi	ing ave	rage				
weighted movi	ng ave	rage simple exponential sm	oothing a	and regression	n methods		ng – lo:	ading CO3				
and scheduling		rent methods of scheduling.	– evnedit	ing - disnatch	ing – func	tions ar	ng iod nd obied					
of materials ma	anagem	ent – Introduction to invent	ory contro	and ABC and	alveis		la objec	,cives				
UNIT-IV						Peri	ods: 9					
GENERAL & E	ΙΝΔΝΟΙ	AI MANAGEMENT Manage	ement [.] B	asic Concent	s – Scient	ific ma	nageme	nt –				
Favol's principl	es - fun	ctions of management		Lot Concept								
Financial Mana	gemen	it : fixed and working capit	tal - sour	ces of financ	e - evalua	ation of	f invest	ment CO4				
alternatives us	ing pres	sent worth / future worth / a	annuity /	rate of return	methods	– differ	ent met	hods				
of determining	depred	iation - Elements of cost & co	ost ladder	- break-even	analysis –	simple	problen	ns.				
UNIT-V					, 5.0	Peri	ods: 9					
MARKETING &	HUMA	N RESOURCES MANAGEMEI	NT: Mark	eting Manage	ment : Coi	ncepts d	of Marke	eting				
- products and	marke	ts – pricing - channels of dis	stribution	- sales prom	otion - ad	vertisin	g - basi	cs of				
market resear	ch Hur	nan Resources Managemei	nt : indi	vidual and g	roup beh	aviour	– Masl	ow's				
hierarchy of n	eeds –	motivation and morale – fa	atigue : c	auses & rem	edy – acci	idents :	causes	and CO5				
, prevention - m	nanpow	er planning – job analysis –	- job eval	uation and m	erit rating	g - man	agemer	it by				
objectives (MB	0).					•	U	•				
Lecture Period	s: 45	Tutorial Periods: -	Practica	l Periods: -		Total	Periods	: 45				

Reference Books:

- 1. R .Panneerselvam Production and Operations Management, Prentice Hall of India Pvt. Ltd., 2003.
- 2. O.P.Khanna Industrial Engineering and Management, Dhanpat Rai Sons (P) Ltd., 1999.
- 3. Martand Telsang Industrial and Business Management, S.Chand & Co., 2001.
- 4. Joseph Monks Operations Management, McGraw Hill, New York, 1986.
- 5. R.M.Barnes Motion and Time Study, John Wiley Eastern, New York, 1985.
- 6. Roger G.Schroeder Operations Management, III Edition, McGraw Hill, New York, 1989.

Department : I	Mechanical Engineering	Program	me : B.Te	ech.(N	VE)						
Semester :	Seventh	Course (Category	Code:	PCC	Seme	ster Exar	n Type: TY			
Course Code	Course Name	Perio	ds / Wee	k	Credit	Ν	/laximun	n Marks			
Course Coue	Course Name	L	Т	Р	С	CA	SE	TM			
ME224	Advanced Manufacturing	4	0	0	4	40	60	100			
Proroquisito	Теспноюзу				L		<u>I</u>				
Trerequisite.	CO1 Get a broad view about a	itomated r	nanufacti	iring	system						
Course	CO2 Useful for modern industr	rial environ	ment usi	ng NC	, CNC, Dr	NC					
Outcome	CO3 Work in automated produ	iction envir	onment (using	robotics						
	CO4 Familiarize with group tec	hnology ar	d flexible	e man	ufacturin	ig syster	ns				
LINIT I											
UNIT-I						Perio	ods: 12				
Automation:	introduction to Automation in N	/lanufactur	ing – Ty	/pes	of Autor	mation	 Need 	-			
Automation S	trategies - Study of the principles	s of single	spindle	and	multi spi	ndle au	itomates	; -			
Applications.	Automated flow lines – transfer	machines	– types	– n	hechanisr	ns – al	oplicatio	ns, CO1			
Transfer, Hand	dling, Location, Orientation and Pa	arts feedin	g devices	s. Intr	oduction	to Ind	ustry –	4.0			
concepts.											
UNIT-II Periods: 12											
NC machines -	- Introduction, Types, Advantages	and Applic	ations. Cl	NC, D	NC (Dire	ct and L	Distribute	ed)			
and Adaptive	Control. Introduction to Programm	ling langua	ges, APT	Prog	ramming,	Examp	les on C	NC CO2			
Turning, Millin	g & Drilling operations.			I		- •					
				_	- · ·	Perio	ods: 12				
Robot Anatom	ny and Configurations, Work volu	me, End e	ffectors-	Туре	s of grip	pers, to	ols as e	nd			
effectors. Rob	ot sensors- External and Internal,	Types – P	osition se	ensor	s, Velocit	y Senso	ors, Tact	^{ile,} co3			
Proximity and	Range sensors, Machine vision	 Applicat 	ions. Aut	tomat	ted Mate	erial Ha	ndling a	nd			
Storage System	ns- Types, Major components.			Ī		- ·	1 4 9				
				_		Perio	ods: 12				
Group Techno	logy: Part families – parts classific	cations and	l coding,	Exam	iples, Ap	plicatio	ns. Flexi				
Manufacturing	Systems: Types, Components, Pi	anning and	implem	entat	ion issue	es. Intro	auction	to CO 4			
Lean and Agile	Manufacturing Systems – Compari	son.		Ī		- ·	1 4 9				
	fact in a David Card of Charles			1.0	1 C:	Perio	ods: 12	_			
Additive Manu	iracturing: Basic Concept - Classific		ina Rase	a sys	tem – St	ereo liti	nograph	y -			
Principle, Proc	ess, Advantages and Applications -	- Solid Basi	ed Systen	n –Fu	sea Depo	DSITION I	viodeling	; – CO5			
Principie, Proc	ess, Advantages and Applications –	3D Printing					- • •	~~			
Lecture Period	Interial Periods:	Practica	Periods:	•		lotal	Periods:	60			
Reference Boo		~ ·					<i>.</i>				
1. Mikel P	. Groover, Automation, Production	n Systems	and Com	puter	Integrat	ed Man	ufacturi	ng, PHI Lto			
New De	eini, 2003. Israel et al. Astana die Assaulte al.										
2. G. Boot	nroyd et al, Automatic Assembly, N	iarcel Dekk	er inc., N	ew Yo	orк, 1993		T L: 1 C				
3. Chua C.	K., Leong K.F., And Lim C.S., "Rapid	Prototypin	g: Princip	les ar	nd Applic	ations",	inird Ec	lition, Wor			
Scientif	c Publishers, 2010				1.1.1.	1002					
4. P.N. Rad	et al, Computer Aided Manufactu	ring, Tata N	/icGraw F	iiii Pu	blishers,	1993.		-			
5. P. Radh	akrishnan and S. Subramanian – CA	AD/CAM/CI	M, Wiley	Easte	ern Ltd., 2	2000.N.[). Bhatt,	Engineerir			
Drawing, 49 th edition, Charotar Publishing House, 2006.											

6. P. Radhakrishnan, NC Machine Tools, Dhanpat Rai & Sons, New Delhi, 2000.

Department : II	EDC		Program	me : B.Tecl	h.						
Semester : S	eventh		Course C	Category Co	de: P	AC	Seme	ster Exa	m Type:	ΤY	
	6	- NI	Perio	ds / Week	(Credit	٨	/laximur	n Marks	5	
Course Code	Cours	e Name	L	Т	Р	С	CA	SE	TN	Λ	
EP201	Entre	preneurship	3	0	0	2	40	60	10	0	
Prerequisite:											
	<u> </u>	The student will gain co	onceptual	understan	nding	of En	trepren	eurship	and d	esign	
	01	thinking.									
Course	CO2	The students will become k	knowledge	eable about	t busiı	ness mo	odel dev	/elopme	ent and	MVP	
Outcome	CO3	The students will gain know	vledge ab	out costing	and r	revenue	2.				
	CO4	The students will learn abo	out marke	ting and sa	les.						
	CO5	Student will get understand	ding of te	am formati	ion a	nd com	pliance	require	ments.		
UNIT-I					Perie	ods: 9					
PROBLEM AND	BLEM AND CUSTOMER: Effectuation, Finding the flow. Entrepreneurial style, business opportunity,										
problems wort	h solvir	ng, methods for finding prob	olems, pro	blem interv	views	. Desigr	า Thinki	ng, Con	sumer	CO1	
and customer,	market	t types, segmentation and ta	argeting, e	early adopt	ers, C	Gains, P	ains an	d "Jobs	-To be	COI	
done, Value Pro	opositic	osition Canvas (VPC), Identifying Unique Value Proposition (UVP).									
UNIT-II	Periods: 9										
BUSINESS MODEL AND VALIDATION: Types of Business Models, Lean Canvas, Risks. Building solution											
demo, solutio	n inter	views, problem-solution te	st, comp	etition, Blu	ue Oo	cean St	rategy.	MVP-	Build-	CO2	
Measure-Learn	feedba	ack loop, MVP Interviews, M	VP Presen	tation.							
UNIT-III					Perie	ods: 9					
REVENUE AND	COST:	Revenue Streams-Income, o	costs, gro	ss and net	marg	ins - pr	imary a	and seco	ondary		
revenue strean	ns- Diffe	erent pricing strategies - pro	duct costs	and Opera	ations	costs;	Basics c	of unit co	osting.	CO3	
Financing New	Ventur	e- various sources - investor	expectati	on- Pitching	g to Ir	ivestors	5.				
UNIT-IV					Perio	ods: 9					
MARKETING A	ND SAL	ES: Difference between proc	duct and b	rand - posit	tionin	ng state	ment. E	Building	Digital		
Presence, Socia	al media	a- company profile page – Sa	lles Planni	ng - buying	decis	sions, Li	stening	skills, ta	argets.	CO4	
Unique Sales Pi	ropositi	on (USP), sales pitch, Follow	-up and cl	osing a sale	2.						
					Perio	ods: 9	<i>c</i>				
IEAM AND SU	PPORT:	Team Building - Shared lead	dership - r	ole of a go	od te	am - te	am fit -	definin	g roles		
and responsib	liities -	collaboration tools and te	ecnniques	- project n	nanag	gement	, time	manage	ement,	CO5	
workflow, dele	gation	of tasks. Business regulation	ons - star	ting and op	perati	ing a b	usiness	- comp	bliance		
requirements.											
Lecture Periods: 45 Tutorial Periods. Practical Periods. Total Periods: 45											
	KS:	montals of Entronronourshi	n" Drontic	o Hall India	2012)					
1. INditudil Π	, Funda F_Digita	amentais of Entrepreneursin	y ,Fiendo		1,2013 MAN IO). Iarnwic	ora				
2. Leanwis 3. Khanka S	S "Fntra	enreneurial Develonment" S	Chand &	Company 2	007		2.018				
4 Sangeeth:	a Sharm	a "Entrenreneurshin Develo	nment"_	Prentice Ha	all Ind	ia 2017					
5 Anil Kuma	r S "Fn	Sharma, Entrepreneurship Development – New Age Publishers, 2003.									

5. Anil Kumar.S, "Entrepreneurship Development" – New Age Publishers, 2003.

Department : I	Mechan	ical Engineering	Progra	mme	B.Teo	ch.(ME)						
Semester :	Seventh	1	Course	e Categ	gory C	ode: MCC	Semeste	er Exam Ty	m Type: -			
Course Code	Course	Namo	Periods / Week Credit			Credit	Maximum Marks					
Course Coue	Course		L	Т	Р	С	CA	SE	TM			
ME225	Profes	sional Ethics	3	0	0	0	-	-	-			
Prerequisite:												
	CO1	Upon completion of this course the students are motivated to strive for higher ethical standards.										
6	CO2	Student will be capable discipline of Mechanical	tudent will be capable of understanding basic cultural / social issues inherent in the liscipline of Mechanical Engineering.									
Outcome	СО3	3 Student will be capable of understanding legal / safety issues inherent in the discipline of Mechanical Engineering.										
	CO4	Student will be capabl Mechanical Engineering	e of ur	dersta	Inding	moral issu	es inherer	nt in the	discipline of			
	CO5	Students will be capable	e of unde	erstand	ding th	ne societal re	esponsibilit	ies and hu	ıman rights.			
		 Engineering Ethics Engineering as Exp Engineer's respon Responsibilities ar Global issues of er 	s – Mora perimen sibility f nd rights ngineeri	l issue tation or safe ng ethi	s, Ethi – Cod ty ics	cal theories e of Ethics	and their u	ISES				
Lecture Period	ls: 45	Tutorial Periods: -	P	ractica	l Perio	ods: -	Total	Periods: 4	5			
Reference Boo	ks:						i					
 Mike W. Govinda 2004. 	. Martin rajan M	and Roland Schinzinger, " , Natarajan S, Senthil Kum	Ethics ir Iar V. S,	i Engin "Engin	eering eering	g", Tata McG g Ethics", Pre	iraw Hill, N entice Hall	lew Delhi, of India, N	2003. ew Delhi,			

- 3. Charles B. Fleddermann, "Engineering Ethics", Pearson Prentice Hall, New Jersey, 2004.
- 4. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, "Engineering Ethics Concepts and Cases", Cengage Learning, 2009.
- 5. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New Delhi, 2003.
- 6. Edmund G Seebauer and Robert L Barry, "Fundametals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001.
- 7. Laura P. Hartman and Joe Desjardins, "Business Ethics: Decision Making for Personal Integrity and Social Responsibility" Mc Graw Hill education, India Pvt. Ltd., New Delhi 2013.
- 8. World Community Service Centre, "Value Education", Vethathiri publications, Erode, 2011.

Department : Me	echan	ical Engineering	Program	me : B.Tec	:h.(№	IE)-Hond	ours			
Semester : Se	venth		Course C	ategory Co	ode:	PCC	Seme	ster Exa	m Type	e: TY
Course Code	<u></u>	Nomo	Perio	ds / Week		Credit	Ν	/laximui	n Mar	ks
Course Code	Lourse	e Name	L	Т	Ρ	С	CA	SE	Т	M
MEH05	Surfac	e Engineering	4	0	0	4	40	60	1	00
Prerequisite:										
(01	Explain the important of su	irface engi	neering in	indu	stries				
Courso	C O2	To control the factors that	affects the	e metal cor	rosi	on.				
Outcome	C O 3	Explain the process and me	echanism o	of different	t coa	ting prod	cess			
	C O 4	To prevent corrosion by co	atings and	l inhibitors	, etc					
	C O 5	To explore the possibility o	f various t	esting met	hods	s in corro	osion			
UNIT-I Periods: 12										
Introduction tribology, surface degradation, wear and corrosion, types of wear, roles of friction and										
lubrication- over	view	of different forms of corrosi	ion, introc	luction to	surfa	ace engi	neering	, import	ance	CO1
of substrate- sur	face o	leaning- selection and classi	fication of	cleaning p	proce	esses.				
UNIT-II					<u> </u>		Perio	ods: 12		
Surface pre-treat	tment	, deposition of copper, zinc,	nickel and	d chromiur	n - p	rinciples	and Pr	actices,	alloy	
plating, electro composite plating, Electroless plating of copper, nickel phosphorous, nickel-boron; CO2										
Electroless comp	osite	plating; application areas, p	properties	, test Stan	dard	IS (ASTIV	I) for as	sessme	nt of	
quality deposits.					I		D			
						Manager	Perio	Das: 12	a t i a a	
SURFACE MODIF	ma or	UN PROCESSES: Thermal sp bancod chomical Vanour	dopositio	ngs – cher	nicai ical	Vapour	donosi	tion co	ating	
processes – plas	illa-ei illm d	enosition - reactive evanors	ation and	n – pnys as evano	icai ratio	vapour n – snut	ter den	osition	ating – ion	CO3
plocesses vace	m-assi	isted denosition – arc denosi	ition – ion	imnlantati	ion –	diffusio	n coatir	as	1011	
	11 455			implantati		unrusio	Perio	ods: 12		
ENGINEERING M	ATERI	ALS: Introduction – Advance	ed allovs -	- Super all	ovs.	Titanium	n allovs	Magne	sium	
alloys, Aluminiur	n allo	ys, and Nickel based alloys –	Ceramics	– Polymer	rs — E	Biomater	rials – A	pplicati	ons –	CO4
Bio Tribology Na	no Tri	bology.		,						
UNIT-V							Perio	ods: 12		
TESTING: Purpos	e of c	corrosion testing - Classificat	tion - Suso	ceptibility t	tests	for inte	rgranul	ar corro	sion-	
Stress corrosion	test.	Salt spray test humidity and	d porosity	tests, acce	elera	ted wea	thering	tests. A	ASTM	CO5
standards for cor	rosio	n testing and tests for assess	ment of w	/ear			.,			
Lecture Periods: Tutorial Periods: Practical Periods: Total Periods: 60										
Reference Books:										
1. ASM Har	ndboo	k, Vol.5, Surface Engineering	g", ASM In	ternationa	l, 199	94.				
2. Fontana and Greene. "Corrosion Engineering". McGraw Hill Book Co. New York. USA, 1986										
3. Varghese	e C.D,	'Electroplating and Other Su	rtace Trea	itments - A	N Pra	ctical Gu	ide', TN	1H,1993		
4. Denny A	. Jone:	s." Principles and Prevention	of Corrosi	on" 2nd E	nitin	n. Prenti	ce Hall (nt India	1006	
5. Unlig. H.			- 1// 1 - 1-						1990.	
	H. "Co	prosion and Corrosion Contr	ol". John	Wiley & So	ns. N	lew York	. USA. 1	1985	1990.	
5. Uhlig. H.						.,	00 i i ani i	Ji maia,	1990.	

Delhi, 2005

Departmer	t : Mechan	ical Engineering	Programme : B.Tech.(ME)-Minor							
Semester	: Seventh	1	Course	e Categ	ory Coc	de: PCC	Semes	ter Exam Typ	e: TY	
Course Cos		o Namo	Peri	ods / V	Veek	Credit	M	laximum Ma	rks	
Course Cou	le Cours	e Name	L	Т	Р	С	CA	SE	TM	
MEM05	Proce	ss Planning & Cost Analysis	3	1	0	4	40	60	100	
Prerequisit	e:									
	CO1	At the end of the course the manufacturing industry	student	will be	able to	o:do effec	tively pro	ocess plannir	ng for a	
Course	CO2	Conduct method study and a	pply the	e princi	ples of	motion eq	conomy	in a manufac	turing	
Outcome	CO3	Use process planning and me	ethod st	udy to	increase	e the proc	luctivity			
	CO4	Estimate the cost of a produc	ct							
	CO5	Estimate the machining time	for vari	ous op	erations	S				
UNIT-I							Periods	: 12		
INTRODUC	TION TO	PROCESS PLANNING: Introd	duction-	meth	nods of	f process	s plann	ing-Drawing		
interpretat	ion-Materia	al evaluation – steps in proc	cess sel	ection-	.Produc	tion equi	pment	and tooling	CO1	
selection.										
UNIT-II Periods: 12										
PROCESS I	PLANNING	ACTIVITIES: Process paramet	ers calo	culatior	n for va	arious pro	oduction	processes-		
Selection c	f jigs and f	fixtures - selection of quality a	assuranc	e metł	nods - S	Set of doo	uments	for process	CO2	
planning-E	conomics o	f process planning- case studie	s							
UNIT-III							Periods	: 12		
INTRODUC	TION TO C	COST ESTIMATION: Importance	e of cos	sting a	nd estir	mation –r	nethods	of costing-		
elements o	of cost est	imation –Types of estimates	– Estin	nating	proced	ure- Estir	nation I	abour cost,	CO3	
material co	st- allocatio	on of overhead charges- Calcul	ation of	depred	ciation o	cost.				
UNIT-IV							Periods	: 12		
PRODUCTI Estimation	ON COST E of Welding	STIMATION: Estimation of Dif Shop, Estimation of Foundry S	fferent 1 Shop.	Types c	of Jobs ·	- Estimati	on of Fo	orging Shop,	CO4	
UNIT-V							Periods	: 12		
MACHININ	G TIME C	ALCULATION: Estimation of	Machini	ing Tin	ne - In	nportance	of Ma	chine Time		
Calculation	- Calculati	on of Machining Time for D	Different	: Lathe	opera	tions ,Dr	illing ar	nd Boring -	CO5	
Machining	Time Calcu	lation for Milling, Shaping and	Plannin	g -Macl	hining T	์ ime Calcเ	lation fo	or Grinding.		
Lecture Periods: 45 Tutorial Periods: 15 Practical Periods: Total Periods: 60										
Reference	Books:									
1. Peter 2002.	Scalon, "Pr	ocess planning, Design/Manuf	acture	nterfac	ce", Else	evier Scie	nce Tec	hnology Boo	ks, Dec	
2. Sinha.I										
	S.P., Wech	anical Estimating and Costing"	, Tata M	lcGraw	-Hill, Pu	ıblishing (0.,1995			

4. Russell R.S and Tailor B.W, "Operations Management", 4th Edition, PHI, 2003.

5. Chitale A.V. and Gupta R.C., "Product Design and Manufacturing", 2nd Edition, PHI, 2002.

Department : N	Mechan	ical Engineering	g Programme : B.Tech.(ME)									
Semester :	Eighth		Cour	rse Ca	tegory C	ode: PAC	Seme	Semester Exam Type: -				
Course Code	Cours	a Namo	Per	iods /	Week	Credit		Max	imum Marks			
Course Coue	Course		L	Т	Р	С	CA	SE	TM			
ME226	Comp	rehensive Test	0	0	3	1	100	-	100			
Prerequisite:												
	CO1	Student will be able to	expla	in the	satisfac	tory operati	on of ai	ny mec	hanical system			
	CO2	O2 Student will possess the knowledge of principles of operation of all mechanical machines, devices and equipment										
Course Outcome	СОЗ	Student will exhibit manufacturing of mec	Student will exhibit his talent in adopting procedural methods in design and manufacturing of mechanical components									
outcome	co4 Student will become capable to identify any trouble shooting in m systems								ing in mechanical			
	CO5	Student will become capable of understanding the basic principles of the Mechanical Engineering subjects.										
		 The student is required to take a comprehensive test on a scheduled date in the beginning of the VIII semester. Comprehensive test is meant for testing the high order and critical thinking of the student in the respective domain. This test will have the standard of GATE examination. The comprehensive test is conducted through an objective type examination of hours' duration. The test shall carry 100 marks and cover the syllabi of all mechanic core courses. The question paper contains 50 questions of 2 marks each. The question shall be framed to test the critical thinking of the students and of the standard of any national level competitive examination. A committee comprising of two faculty members will coordinate the conduct a evaluation of comprehensive test. 										
Lecture Periods: - Tutorial Periods: -				Pra	actical P	eriods: 45	Tota	l Perio	ods: 45			

Department : Mechanical Engineering Programme : B.Tech. (ME)											
Semester :	Eighth		Course	Categ	ory Co	de: PAC	Semester	^r Exam Typ	e: -		
Course Code	Cours	o Namo	Perio	ds / W	'eek	Credit	ſ	Maximum Marks			
Course coue	Cours		L	Т	Р	С	CA	SE	TM		
ME227	Intern	iship	0	0	3	2	100	-	100		
Prerequisite:		-									
	CO1	Experience of applyi identify when new e	ring existing engineering knowledge in similar or new situations; to engineering knowledge is required, and apply it								
	CO2	Ability to integrate e	xisting a	nd nev	v techr	nical knowl	edge for in	dustrial ap	plication		
Course	CO3	Ability to demonstra development	te the ir	npact	of the	internship	on their l	earning an	d professional		
Outcome	CO4 Understanding of lifelong learning processes through critical reflection of internship experiences and It Provide students with the skills and experience										
	CO5	opportunity to seek, identify and further develop an appropriate level of professionalism									
Final year students of B. Tech program undergo a mandatory semester long internshi leading organizations as a part of their curriculum. This enables them to get exposur tackling live problems that occur in the working of an individual entity. These internships, a with various industrial visits keep the students informed about latest industrial trends. This is a two credit course, compulsory for all students where the student is evaluated committee comprising of two faculty members by evaluating the internship report and the presentation by the student. The duration of the internship is of 12 weeks between January to April, making the stude comprehensive package for the industry. The main purpose of the internship is to enhance the general professional outlook capability of student to advance his chances of improving the career opportunities. students should get approval from the head of the department before undertaking											
Lecture Period	s: -	Tutorial Periods	5: -	Prac	tical Pe	eriods: 45	Total	Periods: 4	5		
Department : Mechanical Engineering Programme : B.Tech. (ME)											
--	---	---	---	--	---	--	--	--	--	--	--
Semester : I	Eighth		Course	Categ	gory C	ode: PAC	Semester	Exam Typ	oe: PR		
Course Code	Cours	e Name	Period	ds / W	eek	Credit	Ν	/laximum	Marks		
course coue	cours		L	Т	Р	С	CA	SE	TM		
ME228	Projec	t Work	0	0	3	8	60	40	100		
Prerequisite:		•									
	CO1	Student will becom component and test	e compo their stro	etent ength	to m and p	odel / pro erformance	duce any i using adva	mechanica nced tech	al system and iniques		
	CO2	Student will exhibit his/her ability to design parts of mechanical machines, devices and equipment using prevailing norms and standards									
Course	CO3	Student will expose through a coordinate	se his/h ed appro	ier sl ach w	kill to ith tea	o execute am mates	different	mechanic	al operations		
Outcome	CO4	Student will reveal involved in fabricatio	his/her n and as	kno semb	wledg ling of	e in handl ⁻ mechanica	ing moder I componer	n tools nts	and machines		
	CO5	Student will den mathematical meth and components ind	nonstrat ods for ividually	e ca off-li or col	apabil ine p lective	ity to de erformance ely	evelop su analysis o	uitable i of mecha	numerical or anical systems		
	The si optior labora a proj the cc intern The p metho the pi desigr At the expec literat nature The p evalua report	tudent shall carryout in to carry out this intory/Higher learning li- ect guide from the de- ollege an external guide al guide from the depa- roject work is to acquid of conducting a det roblem. The work main and fabrication. In fea- end, a student or a grited to show clarity of ure and analytical/exp e for the current and the project work will be ation committee as a c will be examined by t	a project project nstitute. partment de from artment. naint the ailed lite y be pu w cases t roup of s of thoug periment ne future continu part of he panel	t wor c eith The p it. In t releva stude rely t che pro- tuden ht an al/des e need ously intern	rk in er in project the ca ant or ent in e surv heore oject o ts sha d exp sign st ls of th moni nal eva amine	the eighth s the instit would be c se of studer ganization s the analysi ey and revie tical / analy can also invo all prepare a pressions, cr reams. The ne country. tored and aluation and ers through y	semester. T cute or in carried out of the carrying hall be assist s of proble ewing the sist ytical / corr olve the about ritical appro- project wo assessed k d at the en viva-voce.	The stude an indu- under the out the p igned in a ms posed tate of art npletely e ove all. a project of eciation of rk should by the gu d project	ent is given an ustry/Research supervision of project outside addition to the I to him in the t in the area of experimental / report which is of the existing be of relevant uide / project work and the		
Lecture Period	s: -	Tutorial Periods	: -	Prac	tical F	Periods: 45	Total	Periods: 4	15		

Professional Elective Courses

Department: Mechanical Engineering Programme: B Tech. (ME)									
Semester: Fift	h		Cours	e Categ	ory Coc	le: PEC	Semeste	r Exam Typ	be: TY
Course Code	Course	e Name	Period	ds/weeł	<	Credit	Max	kimum mar	rks
			L	Т	Р	C	CA	SE	TM
MEY01	Energy Engine	and Environmental ering	3	0	0	3	40	60	100
Prerequisite									
	At the	end of the course the s	tudent i	is able					
	CO1	to know different ene	ergy cor	nversior	n system	ns and pol	lutions		
Course Outcome	CO2	to understand how en point of view of conse	nergy m ervatior	าanagen า	nent co	uld effecti	vely be ap	plied from	the
	CO3	to understand the me	ethods o	ofenerg	gy conse	ervation th	nrough cas	e studies	
	CO4	To identify different t	ypes of	polluta	nts and	l their imp	act on env	vironment	
	CO5	to implement pollution	on conti	rol mea	sures to	be adopt	ed for maj	or sources	of
Unit – I		<u></u>			P	eriods: 9			
Energy conver	sion – g	lobal energy scenario –	Indian	context	of ene	rgy – envi	ronmenta	l aspects	
of fossil, nucle	ear, hyd	ro and biomass energy	conve	rsion –	gaseou	s emissio	ns – solid	waste –	CO1
liquid waste.									
Unit – II					Р	eriods: 9		·····	
Energy manag	ement –	need for energy conser	rvation	– energ	y auditi	ing – role (of energy I	manager	CO2
 – energy audit 	instrum	ents – first and second	law app	proach t	owards	energy co	onservatio	n.	
Unit – III					P	eriods: 9			
Energy conser	vation i	n boilers – procedure f	or effic	iency c	alculati	on – ener	gy conserv	vation in	
sets, electrical	mps, fan motors,	is, compressed air syste , variable speed motors.	ems, ref	rigerati	on and	air condit	ioning sys	tem, DG	CO3
Unit – IV					Р	eriods: 9			
Pollutants – ty	pes – pł	nysical and chemical pro	perties	of air p	ollutant	ts – behav	iour and fa	ate of air	
pollutants – a	ir pollut	ants and global climate	– air p	ollutant	t effects	s. Pollutio	n control l	aws and	CO4
regulation – r	ational	and international – rol	le of er	vironm	iental n	nonitoring	; in enviro	nmental	
management	systems	– continuous emissions	monito	oring sys	stems.	• • •			
Unit – V					P	eriods: 9			
Pollution cont	rol – rev	iew of pollution control	metho	ds in the	ermal p	ower plan	ts – indust	rial –	CO5
nuclear –autor	nobiles	- disposal/treatment of	solid a	na iiqui	d waste	s – alterna	ate fuels.	aulada. AF	
Lecture Period	15: 45 	iutoriais Periods:	ŀ	ractica	i Perioc	15:	i otal P	erioas: 45	
	ν νν σε	ncinles of Enorgy Conve	ncion N	AcGrave	, Lill Da	ok Co 10	01		
I. Cuip, A	A.VV., PM	Air Pollution Control	Engingo	viculdW ving M	r Elli BO cGraw I	Hill Book (о 2000 Эт		
2. NUELU 3. Rao C	S = Fnvi	ironmental Pollution Co		nginoori	ng New	v Δσe Inte	rnational [Nt 1th 10	995
4. Callag	han. P.O	Energy Management	McGra	w Hill R	ook Co	. 1993		vi. Liu., 13	
5. http://	/nptel.iit	m.ac.in/courses/Webco	ourse-co	ontents		,			

Department : N	Mechan	ical Engineering	Program	me : B.T e	ech.(ME)				
Semester : F	ifth		Course (Category	Code	e: PEC	Seme	ster Exar	n Type: TY	
Course Code	Cours	a Nama	Perio	ds / Week	(Credit	٨	/laximun	n Marks	
Course Coue	Cours	endine	L	Т	Ρ	С	CA	SE	ТМ	
MEY02	Metal	Forming Processes	3	0	0	3	40	60	100	
Prerequisite:		·								
	CO1	Upon completion of th understand the importar	ne cours	e, the s e metal f	stud orm	ents sho ing proce	uld ha sses,	ve the	ability to	
Course	CO2	To choose right metal fo	rming m	achine to	ools					
Outcome	CO3	To select suitable proces	ses to fa	bricate a	n er	ngineerin	g produ	ıct.		
outcome	CO4	Students are expected experimentally as well as	to deter analytica	mine th ally	ie fo	orming	force,	stress	and strain	
	CO5	To understand the mecha	nisms of	different	Higl	h Energy F	Rate for	ming pr	ocesses	
UNIT-I							Perio	ods: 9		
Classification of temperature, s forming process	of form speed a sses. Bas	ing processes – flow curves and metallurgical structure sic concepts of yield criteria -	s and the on form –types.	ir signific ing proce	cance esses	e in formi 5 – Effect	ing – Et of frict	ffect of ion on	CO1	
UNIT-II					ľ		Perio	ods: 9	L	
Classifications of forging processes - Forging equipment – forging die design procedure for										
simple products – forging defects – determination of forging load – concept of P/M forging – CO2										
							Perio	ds: 9		
Rolling mills –	Estima	tion of rolling load and powe	er – rolling	defects -	– Ap	plications.				
Direct extrusion extrusion stres	on equi ss - extr	ipment - hydrostatic extru rusion defects – Application	sion - ex 1s	trusion o	of tu	bes – det	ermina	tion of	CO3	
UNIT-IV							Perio	ds: 9		
Drawing of roo metal formin drawing, rubb	ds, wire g: Shea er pad	es and tubes-Determinatior aring, blanking, bending, forming –Applications	n of draw punchin	ing loads g, piercii	throng,	ough conio stretch fo	cal dies orming,	, sheet deep	CO4	
UNIT-V							Perio	ods: 9		
High rate ene microstructure Water hamme	ergy fo es – Ex er formi	rming processes: Introduc plosive forming, Electro h ng.	tion - Ef ydraulic	fect on forming	mec – Ele	hanical p ectromagi	ropertionetic fo	es and orming,	CO5	
Lecture Period	Lecture Periods: 45 Tutorial Periods: Practical Periods: Total Periods: 45									
Reference Boo	ks:									
 Dieter, M P.C.Sharr Serope I Educatio GyrilDon 	lechani ma,Proc Kalpakji m, 4th I aldson,	cal Metallurgy, McGraw-Pub ductionEngineering,S.Chand& ian, Steven R Schmid, "Ma Edition,2003. ToolDesign,TataMcGrawHillF	lishing Co &Co.,New anufactur Publishing	., New Yo Delhi,199 ing Proc Co.Ltd.,19	ork,19 5. ess 989.	998. for Engine	eering	Materia	ls" Pearson	

5. AltanT., Metalforming–Fundamentalsandapplications–AmericanSocietyofMetals, Metalspark, 2003

Department : I	ical Engineering	Programme : B.Tech.(ME)							
Semester : F	ifth		Course	Category	Code	e: PEC	Semes	ter Exa	m Type: TY
Course Code	C		Perio	ds / Wee	k	Credit	N	laximu	m Marks
Course Code	Course	e Name	L	Т	Р	С	CA	SE	ТМ
MEY03	Engine	eering Tribology	3	0	0	3	40	60	100
Prerequisite:			<u>.</u>						
	CO1	Students will be able to id the components.	lentify th	e surface	e rela	ted proble	ems whi	ch lead	to failure of
_	CO2	Students are made to follo	w and un	derstand	the l	basic of En	gineerin	g Tribo	logy.
Course Outcome	CO3	Students will be able to c	come up	with ide	as to	design a	gainst tr	ibologi	cal problems
	CO4	Students are made to solve	nrohlem	is on Rev	nolds	Fouation	iournal	And the	rust hearings
	CO5	Students will be able to un	derstand	the basic	cond	ents of lu	brication		
UNIT-I			acrotana				Period	ls: 9	
Introduction to	tribolo	pev-Factors influencing Tribo	ological p	henome	na-En	gineering	surfaces	-	
Surface Chara	cterizat	ion, Computation of surf	ace para	ameters.	Surf	ace mea	suremen	t	CO1
techniques-Ap	oarent a	and real area of contact							
UNIT-II					Ī		Perio	ls: 9	
Genesis of fric	tion-Var	ious laws and theory of fric	tion-frict	ion in co	ntact	ing rough	surfaces	;-	
sliding and roll	ing frict	ion-frictional heating and ter	mperatur	e rise. Fr	iction	and Wea	r: Laws c	f	
friction, types,	frictio	n coefficient, wear, types,	control o	of wear.	Wea	r and we	ar types	-	CO2
Mechanisms o	f wear -	Adhesive, abrasive, corrosiv	ve, erosio	n, fatigue	e, fret	tting, etc.,	-Wear c	f	
metals and nor	n-metals	s- Wear models – wear maps	s-wear da	mage.		0, ,			
UNIT-III				-			Perio	ls: 9	
Introduction	o lubr	ication-Lubrication regimes	s-Thick F	ilm, EH	L, N	lixed, Bo	undary	-	
Hydrodynamic	Journ	al and Thrust Bearings-	Genera	l Reyno	lds	equation-	Variou	s	
mechanisms o	of press	sure development in oil f	ilm-Perfo	rmance	para	meters. [Design c	f	CO3
hydrodynamica	ally lub	ricated bearings using Ra	aimondi-l	3oyd ch	arts.	Composi	tion an	d	
properties of lu	bricant	, Evaluation and testing of lu	ubricants.		-				
UNIT-IV							Period	ls: 9	
Surface modifi	cation t	echniques-Improving wear r	esistance	-Surface	coati	ng technio	ques suc	h	
as electrochen	nical de	positions, anodizing, therm	al sprayi	ng, Chen	nical	Vapour D	epositio	n	CO4
(CVD), Physical	Vapour	Deposition (PVD), etc. and t	their appl	ications.	-				
UNIT-V							Period	ls: 9	
Micro/Nano-tr	ibology	and applications – Tribology	/ for MEN	1S, wear	resist	tant coatir	ngs - Nev	v	
industrial appli	cations	of tribology – Nano scale we	ear, Micro	o scale sc	ratch	ing and M	icro scal	e	CO5
wear - Wear	mappi	ng and Nano lubrication	and spe	cialized	mate	rials sele	ction fo	r	205
NanoTribology	- tribol	ogical case studies.	7						
Lecture Period	s: 45	Tutorial Periods:	Practica	l Period	5:		Total I	Periods	: 45
Reference Boo	ks:			-					
1. Halling, J	., Princi	ples of Lubrication, Macmilla	an Press L	td., 1975					
2. Cameror	, A.Basi	c lubrication theory, Ellis-Ha	rwood Lir	nited, 19	76.				
3. Hamrock	, B.J. SC	hmid S.R., Jacobson B.OFund	amental	s of fluid	film I	ubrication	1, 2nd E C .,	Marce	1
Dekkar,2	004. hushan			0	2002				
4. Bridial B	nusnan,	Introduction to Tribology, Jo	Doorings	& SUIIS.	2002. Julich	ore 1002			
5. Majullu	al, D.C. I	and Abuia Eundamontals of	Tribolog			eis, 1992.			
0. Basu, Sei 7 Bhushan		Cupta RHandbook of Tribe		torials ('ootin	as and Su	rfaco Tro	atmon	ts McGraw
Hill New	anu D. I Y∩rk		Jugy. Ivid		Jaim	55 and 50		aunen	
	eTribol	ogy Handhook Rutterworth	Publicatio	'n					
9 Athre K	Biswas	SBearings selection and Mair	ntenance	Galcotia	Pub	ishers 20	04		
	ther Luk	prication. Baily Brothers and	Swinfen	imited					
14 Krazalali	. Frictio	n. Wear and Lubrication. Vol	, , , _	MIR Puhl	isher	s. 1983			
II. Krageiski		,	.,,,			,			

Department : N	Леchan	ical Engineering	Program	me : B.T	ech.(ME)					
Semester : F	ifth		Course C	ategory	Code	: PEC	Semes	ter Exar	n Type: TY		
Course Code	Cours	o Nama	Period	ls / Weeł	(Credit	N	laximun	n Marks		
Course Coue	Course	endine	L	Т	Ρ	С	CA	SE	ТМ		
MEY04	Auton	nobile Engineering	3	0	0	3	40	60	100		
Prerequisite:											
	CO1	understand the layout and	arrangem	ent of pr	incip	al parts o	f an auto	omobile			
Course	CO2	understand the power tran	smission	system o	of an	automob	ile				
Outcome	CO3	understand the suspension	system o	of an auto	omok	oile					
Outcome	CO4	understand the braking sys	stem of a	n automo	obile						
	CO5	know automobile electrica	al and air c	ondition	ing a	nd passer	ngers saf	ety feat	ures		
UNIT-I	<u></u>						Perio	ds: 9			
Classification c	of vehic	les – drives - general layout	t. Engine	- Diesel a	and I	Petrol an	d hybrid	engine	s for		
automobiles - electric vehicle - comparison of performance - factors affecting choice - power											
requirements of	of an au	utomobile - rolling, wind an	d gradien	t resulta	nt-fa	ctors affe	cting re	sistance	and		
power requirer	nent.				<i>.</i>						
UNIT-II	NIT-II Periods: 9										
Power transmi	er transmission system - requirement of transmission system – clutches - plate clutches - semi										
automatic & a	omatic & automatic clutches - Gear box: manual shift four speed and positive speed gear boxes -										
synchromesh d	levices ·	-fluid transmission - fluid flyv	wheel and	torque o	conve	erter-auto	omatic tr	ansmiss	ion -		
drive line - diff	erential	, conventional and non-slip t	ypes - driv	/e axle.	7						
UNIT-III	<u> </u>				L		Perio	ds: 9	•••••		
Suspension sys	tem – r	equirements - rigid axle and	lindepend	lent susp	ensi	on - types	s of susp	ension	- leaf		
spring - coil sp	ring - to	orsion rod and air suspensio	on - shock	absorbe	rs. Fr	ont axle	: types -	front w	/heel		
geometry - co	nditions	s for true rolling. Steering §	geometry	- Ackerr	nan	and Davi	s steerir	ng - ste	ering CO3		
linkages - steer	ing gea	r box-power and power assis	sted steer	ing. Whe	el ali	gnment -	Tyres: n	naterials	and		
types static and	d rolling	properties of pneumatic tyr	es.		T						
UNIT-IV							Perio	ds: 9			
Braking system	n - hyd	raulic braking systems - dr	um type	and disc	type	e brakes	- power	and p	ower		
assisted brake	s - fact	ors affecting brake perform	nance - te	ests on b	rake	s - skid a	and skid	preven	tion. CO4		
Chassis - types	of bodi	es - chassis frame - integral b	ody - veh	icle stabi	lity.						
UNIT-V							Perio	ds: 9			
Battery: types	- Chem	ical reaction – charging - b	attery rat	ing - bat	tery	life - bat	tery test	ing. Sta	rting		
motor and alt	ernator	: constructional features an	nd Ignitior	: types	- ign	ition coil	- conta	ct break	cos		
distributor - fir	ing ord	er - spark plug. Automotive	e lighting	- Electroi	nics i	n automo	bile. Au	tomobil	e air		
conditioning- p	assenge	ers safety features in automo	obiles.								
Lecture Periods: 45 Tutorial Periods: Practical Periods: Total Periods: 45											
1. William H.	crouse	& Donald L. Anglin, Automo	tive Mech	anics, I'N	ин, 1	Uth Editic	on, 2007.	15BN: 1	3:978-0-07-		
0634350					I	D I. I					
2. K.K.Ramali 818842949	ngam, I 31. ISBN	Fundamentals of Automobile	e Enginee	ring, SCI I	ecn I	olteolidu	ons (India	aj pvt. L	ta: ISBN: 10-		

R. B. Gupta, Automobile Engineering, Satya Prakashan, 4th Edition.1984. ISBN: 9788176843799.

Department : N	/lechan	ical Engineering	Progran	nme : B.Tech.	(ME)				
Semester : F	ifth		Course	Category Cod	e: PEC	Semest	er Exan	n Type:	TY
	_		Perio	ods / Week	Credit	М	aximun	n Mark	S
Course Code	Cours	e Name	L	TI	> C	CA	SE	TI	M
MEY05	Mech	atronics	3	0 () 3	40	60	10	0
Prereguisite:									
	CO1	Students understands the	role of ele	ectronics in di	fferent me	chanical	system	IC	
		Emphasize the importance		atronics in a	nginooring		moncu	romont	ts and
Course	CO2	mechanical systems.	e or meci		ngineering	, uesign,	measu	remen	.s anu
Outcome	CO3	Students understands the mechanical systems.	e role o	of interfacing	and ima	ge proc	essing	in dif	ferent
	CO4	Students understands how	to develo	op models in (different m	nechanic	al syste	ms.	
	CO5	Students understands the	role of ele	ectronics in di	fferent bio	-mechar	nical sys	stems	
UNIT-I						Perio	ods: 9		
Introduction to Design Parame Industrial desig	mecha eter– Tr n and e	atronics system – key elemer raditional and Mechatronics ergonomics, safety - Mechatr	nt Mech designs ronics App	hatronics Desi – Advanced a proach.	gn process approache	s – Types s in Mea	of Desi chatron	ign ics	CO1
Introduction	lnnut ic	polation DC amplifier neuro	r amplifia	r and diffora	ntial amal	ifior fo	odback	0	
Ampelectrome galvanometric systems – Tele	ter an - X-Y, r metry	nplifier, carrier Amplifier nagnetic recorder, storage o Principles – Bio telemetry.	– instr oscillosco Electroca	rument pow pes – electro rdiograph me	er supply n microsco easuremer	/. Oscill ppe – PN its – blo	agraph IMC wi od pres	ic – riting ssure	CO2
measurement:	by ultra	asonic method – pietnysonoj	grapny.			.			
						Perio	ods: 9	1405	
communication- IEEE 488 standard interface -GUI card-GPIB-Ethernet switch -Man machine interface. Introduction –Fuzzy based Washing machine – pH control system – Autofocus Camera, exposure control– Motion control using D.C.Motor & Solenoids – Engine management systems. – Controlling temperature of a hot/cold reservoir using PID- Control of pick and place robot – Part identification and tracking using RFID – Online surface measurement using image processing, System principle - Component design – System design – Scaling laws – Micro actuation – Micro robot – Micro pump –									CO3
UNIT-IV						Perio	ods: 9		
Introduction-m	odel c	ategories-fields of applica	ition-mod	el developm	ent-mode	l verific	ation-m	nodel	
validation mod	lel simu	lation-design of mixed syste	ems-elect	ro mechanics	design-me	odel trar	sforma	tion-	CO4
domain-indepe	ndent o	description forms-simulator	coupling.						
UNIT-V						Perio	ods: 9		
Blood flow me method – pho Anesthetic ma equipment and hazards. Centra	easuren onocard chine – d applic alized p	nent by electromagnetic flo liography – vector cardiogr Basic ideas of CT scanner- cation – cardiac pacemaker atent monitoring system.	ow meter raphy. He – MRI an – DC – c	r cardiac out eart lung ma d ultrasonic s lefibrillator p	put measi chine – a scanner – atient safe	urement artificial Bio-teler ety - elec	by diluventilat netry – ctrical s	ution or – laser hock	CO5
Lecture Period	s: 45	i utoriai Periods:	Practica	ai Periods:		i otal P	eriods:	45	
Keterence Boo	KS:								2002
 George p Devdas S Vikas put Bolton, N Addison V 	hetty, Ne hetty, I blishing Aechatr Wesley	chatronics Systems: Modelli Richard A. kolk, " Mechatror house, 2001. ronics – Electronic control sy Longman Ltd, 1999.	ng and sii nics Syste ystems in	mulation with m Design", Ti mechanical a	homson Le	in Wiley earning F ical Engii	and sor Publishii neering	ng Ltd, <i>i</i> ng Com - 2 nd Ec	2003. ipany, dition,
4. Bishop, R	, lobert H	I, Mechatronics hand book, (CRC press	, 2002.					
5. Bradley, chapman	D.Daws	son, N.C. Burd and A.J. Lo all, London 1991. "Handbook of biomodical inc	bader, Me	echatronics: I	Electronics	in prod	ucts ar	nd Proo	cesses
7. Arumuga	m M., '	'Bio Medical Instrumentation	n", Anura	dha agencies	pub., 2002	2.			

- 8. Geddes L.A., and Baker, L.E., "Principles of applied bio Medical Instrumentation", 3rd Edition, John Wiley and sons, 1995.
- 9. David G. Aliciatore and Mecheal.B> Histand, Introduction of Mechatronics and Measurement Systems, McGraw Hill International Edition, 1999.

Department : N	/lechan	ical Engineering	Program	me : B.Te	ch.(N	1E)				
Semester : F	ifth		Course C	Category C	ode:	PEC	Semes	ster Exar	n Type: T	Υ
Course Code	Cours	a Nama	Perio	ds / Week		Credit	N	1aximun	n Marks	
Course Coue	Cours	ename	L	Т	Р	С	CA	SE	TM	
MEY06	Fluid I	Power Automation	3	0	0	3	40	60	100	
Prerequisite:										
		On completion of the cou	rse the st	udents wi	ll be	able to	apply t	he conc	epts of fl	luid
	CO1	power and pneumatic circ	cuits for a	utomatior	n in	mechanic	cal field	, device	s associa	ted
		and operation, maintenand	e and safe	ety of such	ı syst	ems.				
Course	CO2	students will be able to app	oly the co	ncepts of f	luid	power for	r contro	l system	S	
Outcome	CO3	students will be able to app	oly the co	ncepts of f	luid	power for	r actuat	ing mecl	hanism.	
Outcome	CO4	students will be able to a mechanical devices.	pply the	concepts	of p	neumatic	circuit	s for au	tomatior	ו in
	CO5	students will be able to a circuits for automation in n	pply the onechanica	concepts o I systems.	of co	mbined	fluid po	wer and	d pneum	atic
UNIT-I							Peri	ods: 9		
Introduction to	Fluid	power - Advantages- Filters	- Seals -	Hydraulic	pum	ps - Class	sificatio	n - selec	tion _	<u>01</u>
factors - Hydra	ulic Act	uators - Linear - Rotary fluid	motors.						Ľ	UI
UNIT-II							Peri	ods: 9		
Pressure – Dire	ection -	Flow control valves, relief valves,	alves, nor	i-return ar	nd sa	fety valv	es - Ac	cumulat	ors -	റാ
Linear circuits -	Regen	erative circuits- Intensifier ci	rcuits - me	etering - In	our	circuits.			`	02
UNIT-III							Peri	ods: 9		
Reciprocation	operati	on of multi cylinder - Quick	return -	Sequencin	g - A	Accumula	tor circ	uits - Us	se of	
pressure switc	hes & I	imit switches - Hydrostatic t	transmissi	on circuits	5 - Fl	uid powe	er main	tenance	and C	03
safety.										
UNIT-IV							Peri	ods: 9	······	
Basic principle	es of Pr	neumatics – Types of Comp	ressors –	Elements	of F	Pneumati	c syste	ms – Fil	ters, c	04
lubricator, Muf	fler – T	ypes of directional control va	alve - Air n	notors - Ai	r cyli	nder				•••
UNIT-V							Peri	ods: 9		
Basic Pneumat	tic circu	iits - Speed control - Sequer	ncing of m	otion - Hy	/dro	pneumat	tic circu	its - case	cade	
methods - Aut	omatio	n and Principle of circuit des	sign – PLC	C- SCADA-F	Pneu	matic coi	ntrol ap	plicatior	ns in C	05
machine tool a	nd othe	er mechanical fields – Mainte	nance				_			
Lecture Period	s: 45	Tutorial Periods:	Practica	Periods:			Total	Periods:	45	
Reference Boo	ks:									
1. Anthor	iy Espo	seto – Fluid power with Appl	ication, IV	Edition, P	rent	ice Hall, 1	1980.			
2. S.R. M	ajumda	ar – Pneumatic systems –	Principles	and mai	nten	ance, Ta	ita McG	Fraw Hil	II Publish	ling
Compa	Company Ltd, 1995.									

3. Dudley A. Pease – Basic Fluid power, II Edition, Prentice Hall, 1998

4. John J. Pippinger and Andrew Parr – Hydraulic and Pneumatic, Jaico Publishing House, 1999

Department : I	Mechan	ical Engineering	Program	nme : B.	Tech.(I	ME)					
Semester : S	Sixth		Course	Category	y Code	: PEC	Semes	ter Exam ⁻	Гуре: ТҮ		
Course Code	Cours	e Name	Peric	ods / We	ek	Credit	N	laximum N	Лarks		
	cours		L	Т	Р	C	CA	SE	TM		
MEY07	Autor and C	notive Fuels , Pollution ontrol	3	0	0	3	40	60	100		
Prerequisite:											
	CO1	At the end of the course t	he studen	nt is able	e to un	derstand	the app	lications o	f different		
		types of automotive fuels,	its proper	rties							
	CO2	At the end of the course t	the studer	nt is able	e to un	derstand	the har	mful emis	sions from		
A A A A		SI Engines /automobiles ar	nd the me	ethods o	t contr	ol of pollu	ution		· · · · ·		
Course	CO3	At the end of the course t	ne studer	it is able	e to un	derstand	the har	mtul emis	sions from		
Outcome		At the end of the course t	the stude	et is abl		derstand	the em	ission star	dard and		
	CO4	testing of emission	line stude			luerstanu	the em	1551011 5181			
		At the end of the course t	the stude	nt is abl	e to ur	derstand	the en	nission sta	ndard and		
	CO5	the role of alternate fuels i	in reducin	g polluti	ion and	replacin	g convei	ntional fu	els		
UNIT-I				01			Period	ls: 9			
Liquid fuels: gasoline and diesel – thermo-chemistry - properties-testing of fuels-specific gravity-calorific											
value, boiling range, flash point, ignition temperature, viscosity, cloud and pour point, flammability											
limits, Octane rating and Cetane rating-fuel additives-requirement of additives, petrol and diesel fuel CO1											
additives-fuel	specific	cation. Different pollutant	from IC	engines	-their	effect or	n humai	n health	and		
environment					1						
UNIT-II							Period	ls: 9			
SI engine pollu	itants-n	nechanism of formation of	unburnt i	nydrocai	rbon, c	arbon me	onoxide	and nitro	gen		
oxides. Facto	onginos	thermal and catalytic react	iulanis- e	effect o	ductio	n and 2 w	ies. Em	lytic react	ors CO2		
closed loon fe	engines edhack	control catalysts and subs	trates-rec	rent dev	velonm	ent in SI	engine	for emise	sion		
control-lean bu	urn engi	ine-stratified charge engine-	multipoin	t fuel ini	iection		engine	for enits.			
UNIT-III							Period	ls: 9			
CI engine pollu	itants-fo	ormation of hydrocarbons, o	xides of n	itrogen	and pa	rticulate	matter-	smoke and	d its		
types factors a	ffecting	smoke formation-diesel eng	gine emiss	sion con	trol –e	ffect of er	ngine va	riables-red	ent		
developments	in Cl er	ngine for emission control- lo	ow heat re	ejection	engine	e-dual fue	el engine	-common	rail CO3		
diesel injectio	n systei	m ultra-high pressure diese	el injectio	n- HCCI	engin	e-lean de	e-NOx ca	atalysts-di	esel		
particulate filte	ers.				I			-			
							Perioc	ls: 9			
Emission stand	lards, te	est procedures, driving cycles	s. Measur	ement c	of CO, F	HC, NOx, I	PM and	smoke -Bo	osch cO4		
smoke meter-h	Hatridge	e smoke meter-measuremen	t of partic	culate m	eter.		Doriod				
Altornativo fue	le for (amission control: hindiasal :	and othar		 	coous fu		notural (500		
biogas- produc		hydrogen, nhysical and cher	mical pror	or, gası Serties-	Fngine	comhust	ion nerf	ormance a	and COS		
emission chara	cteristi	cs		Serties	Lingine	combust	ion peri	onnance			
Lecture Period	s: 45	Tutorial Periods: Nil	Practica	l Period	s: Nil		Total F	Periods: 4	5		
Reference Boo	ks:		.1	_			1				
1. John b	Heywo	od, IC Engine Fundamentals,	McGraw	hill inte	rnatior	nal editior	n,1988				
2. V.Gane	esan, IC	.Engines, Tata Mcgraw Hill in	ternation	al Editio	n,1995	5					
3. 3.Pund	lir, Engi	ne Emission, Narosa Publishi	ng House	,New De	elhi, 20	07					

Department: Mec	hanical Engir	neering	Programm	ne: B.Tec l	h.(ME)				
Semester: Sixth			Course Ca	tegory Co	ode: PEC	Sem. Ex	am. Typ	e: TY	
Caura Cada	Causa Nasa		Periods/w	veek		Credit	Maxim	num mai	·ks
Course Code	Course Nam	ie	L	Т	Р	С	CA	SE	TM
MEY08	Maintenand Engineering	ce and Safety	3	0	0	3	40	60	100
Prerequisite			L		L		.ii		
•	At the end o	of the course the s	student is a	ble					
	CO1	to understand t	he obiective	es of maii	ntenance				
Course	CO2	to identify the m	nethods of	maintena	nce to mat	ch with ar	oplicatio	ns	
Outcome	CO3	to understand t	he trouble s	shooting	n devices v	vith exam	ples		
	CO4	to understand t	he necessity	v for safe	ty so as to a	avoid acci	dents		
	CO5	to know safety r	neasures a	nd standa	rds to be f	ollowed a	s precau	itions	
l Init — I		to know salety i	incusures u		Periods	• 9	precuu		
Objectives of mai	ntenance - tv	nes of maintenar	nco – Broak	down nr	oventive ar	. J nd prodict	ivo mair	tonance	
- Repair cycle -	Renair Com	pes or maintenar plevity Lubricati	on system	– Lubri	conte - ine	nection	Maintar		f CO1
Mechanical trans	niepan com	ms - align machir	on system orv – stati	and dyn	anic halan	pection. 		iance o inte - ai	
conditioning – wa	ter purificatio	nno angir macini on – environment	al control	c and dyr		icing pro		ints ai	
Linit – II					Poriode	• 0			
Dradictiva Mainta	nance - vibra	tion analysis date	a and noise	ac main	Ferious	. J al _ waar	dobris a	nalysis	
Condition monite	ring concer	the applied to in	a anu noise ductrios —	diagnos	o faulte –			ting and	4
massurement using approved procedures. Total Productive Maintenance (TPM). Economics of CO3									
Maintonanco Cor	nig approve	maintonanco m	notar Prou	stico mo	dorn man	tacturing	- ECONC	Jines 0	
	iiputei alueu	maintenance – n	iouern prac	Lice – Inc	Doriodo		aspects	•	
Doliability, Dofinit	tion concont	t of roliability be	and docior	failura	roto MTT		failura	nattorn	
system reliability:	Sorios Dara	llol and Mixed co	seu uesigi	i, iailuie	ability and	r, IVIIDF, Maintain	ability c	onconto	,
system renability.	Series, Para	iner and initial of	udraulie cou	nonont	ability allu	wa machin		olicepts	-
dismontlo inspo	ct NDT acc	sombly fans n	yuraulic coi	nponent:	inge stati		iery – is lie coale		- נטא
Linit – IV	ct = NDT - ass	sembly – Tans – pr	unps – vaiv	es – Deai	Doriodo	• o	iic seais.		
Cofety and produ		usos of accidents	in inductr	ioc oc	renous	· J	invoct	igation	
monsuring sofety	norforman	ses of accidents	ni nuusu	and fund	stions	nting and	a invest	ruloc	
Manufacture Sto	rage and Im	nort of Hazardou	inizations		Evolocivo	act - Cas		r rulos -	- 004
Floctricity act	lage and in			i iules -	LAPIUSIVE d		cynnuei	i iules -	
Liectricity act.					Pariode	• 0			
Safaty Codos and	Standards	Air Quality in	door out	door c	ofo drinkin	. J	Gonor	al Cafati	,
salety coues allo	Matorial H	- All Quality - Il	nte Maek	uuuu = s	ale utilikili	rioc proce			
considerations in		anuling equipment	monte o	noration	and incod	nes-press	ovtingu	sels alle	
pressurized piper	ines – ibk	- weiung equip	filents – O	EDA Stan	anu inspe darde ISO	14000	extingu	isliels -	-
Locturo Doriodo		Tutorials Deriod		rra Stall	ariada Nil	14000. Tot	al Daria	da. AE	
Reference hooks	IJ			actical P	citous. IVII	101		us. 43	
1 Considerist		anarii A K Ma-:	ntononco	nd Spars	Darta Mar		<u>ר ווח</u>	arnina ()/+ +4
1. Gopalakristii Now Dalbi 2	1411, P. 411U D 012	allerji, A. K., ividi		inu spare		lagement	, Phile	arning i	-vi. Liu.,
2 Datrick D. T.	O_{10}^{\prime}	ractical Poliability	Enginoorin		2000				
2. Pallick D. I.	Engineering	Safaty Eurodam	ontal Tachn	ig, wiley,	2000. A Applicatio	na Warla	Ccionti	fic 2002	
5. Dillion, B. S., 4. Michra P. C.	, Engineering	Salety – Fullualli K. Maintonanco E		and Man		DULLoorni	ng Dut I	td Nov	V Dolhi
4. iviisiira, k. C. 2012	anu Patriak, I	K., Wantenance E	ngmeering	anu wan	iagement, F		ng PVt. L	, Nev	v Deini,
5. Garg, H.P., In	dustrial Mair	ntenance, S.Chand	d & Co Ltd.,	New Del	hi <i>,</i> 1990				
6. Arora, C. P., I	Refrigeration	and Air condition	ing, Tata M	cGraw Hi	ll Publishin	g Co. Ltd.,	2000.		
7. Birolini, Relia	bility Engine	ering, Springer, 20)14.			- ,			
8. Rolland P.Bla	ke - Industria	al Safety, Prentice	Hall of Indi	a Pvt. Ltd	., New Dell	ni, 1973.			
9. http://nptel.	iitm.ac.in/cou	urses/Webcourse	-contents		• •				
10. http://ocw.m	nit.edu/cours	es/mechanical en	gineering.						
• • •	•	-							

Department : I	Mechan	ical Engineering	Progran	nme : B.T	ech.	(ME)				
Semester : S	Sixth		Course	Category	Code	e: PEC	Semes	ter Exam	ו Type:	TY
Course Code	Cours	e Name	Perio	ds / Wee	k	Credit	N	laximum	n Marks	;
NAEVOC	C	- tou Aidod De-i	L	T	P	C	CA	SE		Л Ю
IVIEYU9 Droroguicitor	Comp	outer Alded Design	3	U	0	3	40	60	10	U
Frerequisite.		At the end of the course	tha studa	nt will bo	ahle	a to Stude	nts will i	indersta	nd the	hasic
	CO1	working principle of drafti	ng and mo	odelling s	oftw	are.		indersta		Dasic
	CO2	Understand geometric cor	nstruction							
Course	CO3	Student will get ability to u	use standa	ards for m	node	l transforr	nation.			
Outcome	~~~	Get idea about how to wri	te effectiv	ve softwa	re w	ith proper	data ba	se to dev	velop a	n
	C04	expert system.							-	
	CO5	Get knowledge about Com	nputer aid	ed desigr	n and	l the appli	cation of	^f comput	ter aide	ed .
		design in research and dev	velopmen	t areas.						
UNIT-I			-				Perio	ds: 9		1
Design proces	s - Mo	orphology of design, Type	s of des	ign mod	els,	Applicatio	on of de	esign m	odels,	
concurrent En	gineerir	ng – CAD system architectu	ire. CAD I	Hardware	: wo	rkstation	– CPU,	mass sto	orage,	CO1
input devices	(keyboa	ard, light pen, thumb whee	el joy stic	k, mouse	, dig	itizer etc.	,) and o	utput d	evices	
(printers, plott	ers) Dis	play Devices			1		Daria			<u> </u>
UNIT-II Proconhom's li	no and	circlo algorithms. Transform	nation in (ranhice		rdinato a	reno	ad in Cr	anhicc	
and windowing	ne anu and v	iew port transformations (iation in C	nidden lir	co-o o oli	imination	2D tran	sformati	ions –	
rotation scal	ing tr	anslation mirror reflect	ion and	shear	– h	omogene	ous tra	nsforma	itions-	CO2
concatenation	3D Tra	nsformation – orthographic	and Persi	pective Pr	oiec	tions		nsionna		
UNIT-III					-)		Perio	ds: 9		<u>.</u>
Classification	of Geo	metric Modelling – Wire	frame, S	urface a	nd S	olid Moc	lelling, a	application	ons –	
representation	of curv	ves and surfaces – Parametr	ic form – I	Design of	curv	ed shapes	s- Cubic s	spline – I	Bezier	
curve – B-splin	e – Des	sign of Surfaces - features o	f Surface	Modellin	g Pa	ckage – So	olid Prim	itives, C	SG, B-	602
rep and descr	iption d	of other modelling techniqu	ues like P	ure prim	itive	instancin	g, cell d	ecompos	sition,	LUS
spatial occupa	ncy enu	meration, Boolean Operatio	ons (join, c	ut, inters	ectic	on), Creati	ng 3D ol	ojects fro	om 2D	
profiles (extrus	sion, rev	volving etc.)								
UNIT-IV							Perio	ds: 9	-	T
Standards for	comput	er graphics (GKS) and Data	exchange	e standar	ds –	IGES, STE	P. Data	structur	es for	
Entity storage	- Data	a structures for interactive	modellin	g- Relatio	onal	database	s introd	uction to	o SQL	CO4
ianguage. Kole	OT UUF	'S IN CAD.						• ~		<u> </u>
UNIT-V						~ ·	Perio	ds: 9		Ī
Expert System	ns —stra	ategies for Knowledge Ac	quisition,	represe	ntatio	on of kn	owledge	e – Inte	erence	
schemes. Para	metric	and variational modelling, F	eature ba	sea moa	elling	g, Design i	nformat	ion syste	em an	C05
Locture Deried		Tutorial Parioda	, IDEAS, SU		- ell		Total	orioda	ΛΓ	
Reference Boo	5: 45 ke	Tutorial Perious:	Practica	ii Perious	•		TOLAT	renous:	40	
1 Chris Mc	mahon	and limmie Browne - CAD/(AM – Priv	nciple Pra	ctice	and Man	ufacturi	ng Mana	gemen	t. 2 nd
Edition	Addisio	n Wesley England. 2000.	<i></i>				andetain	- Finand	ochich	-, <u>-</u>
2. Sadhu Singh - Computer Aided Design and Manufacturing, II Edition, Khanna Publishers, New Delhi, 2014										
3. P.Radhal	rishnar	n et al - CAD/CAM/CIM, New	Age Inte	rnational	P Lto	d., New De	elhi, 2012	2.	,	
4. M.P.Gro	over an	d E.W.Zimmers - CAD/CAM;	Compute	r Aided D	esigr	n and Mar	nufacturi	ng, Tata	McGra	w
Hill Publi	shing C	o. Ltd., New Delhi, 2010.								
5. Ibrahim	Zeid - C	AD/CAM Theory and Practic	e. Tata Mo	cGraw Hil	l Put	olishing Co	. Ltd N	ew Delhi	i. 2013	

Semester : Seventh Course Code: Vector									
Periods / WeekCreditMaximum MarksCourse CodeCryogenic Engineering1TPCCASETMMEY10Cryogenic Engineering30034060100Prerequisite:CourseCourseCO1At the end of the course the student is able to understand operation of low temperature technologiesCO2to analyse cryogenic liquefaction systems and corrents effectivelyCO2to analyse select cryogenic refrigeration systems according to requirementsCO4to choose and design cryogenic systems according to requirementsCO4to solve problems associated with real-time applicationsPeriods: 9Basics of cryogenics and liquefaction systems:Introduction to cryogenics – Applications involving									
Course CodeCourse NameLTPCCASETMMEY10Cryogenic Engineering30034060100Prerequisite:Vertice Engineering30034060100Prerequisite:Vertice Engineering30034060100Prerequisite:Vertice Engineering30034060100Prerequisite:Vertice Engineering30034060100Prerequisite:Vertice Engineering30034060100Prerequisite:Vertice Engineering30034060100Colspan="4">ColAt the end of the course the student is able to understand operation of low temperature technologiesVertice EngineeringVertice EngineeringVertic									
MEY10Cryogenic Engineering30034060100Prerequisite:C01At the end of the course the student is able to understand operation of low temperature technologiesC02to analyse cryogenic liquefaction systems and course the student is able to understand operation of low temperature technologiesC03to analyse select cryogenic refrigeration systems and course with applications to choose and design cryogenic systems accordance with applicationsC04to choose and design cryogenic systems accordance to requirementsC05to solve problems associated with real-time applicationsUNIT-IBasics of cryogenics and liquefaction systems:Introduction to cryogenics - Applications involving									
Prerequisite: CO1 At the end of the course the student is able to understand operation of low temperature technologies Course CO2 to analyse cryogenic liquefaction systems and components effectively CO3 to analyse select cryogenic refrigeration systems in accordance with applications CO4 to choose and design cryogenic systems according to requirements CO5 to solve problems associated with real-time applications UNIT-I Periods: 9 Basics of cryogenics and liquefaction systems: Introduction to cryogenics – Applications involving									
CO1 At the end of the course the student is able to understand operation of low temperature technologies CO2 to analyse cryogenic liquefaction systems and components effectively Outcome CO3 to analyse select cryogenic refrigeration systems in accordance with applications CO4 to choose and design cryogenic systems according to requirements CO5 to solve problems associated with real-time applications UNIT-I Periods: 9 Basics of cryogenics and liquefaction systems: Introduction to cryogenics – Applications involving									
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CO3 to analyse select cryogenic refrigeration systems in accordance with applications CO4 to choose and design cryogenic systems according to requirements CO5 to solve problems associated with real-time applications UNIT-I Periods: 9 Basics of cryogenics and liquefaction systems: Introduction to cryogenics – Applications involving									
CO4 to choose and design cryogenic systems according to requirements CO5 to solve problems associated with real-time applications UNIT-I Periods: 9 Basics of cryogenics and liquefaction systems: Introduction to cryogenics – Applications involving									
CO5 to solve problems associated with real-time applications UNIT-I Periods: 9 Basics of cryogenics and liquefaction systems: Introduction to cryogenics – Applications involving									
UNIT-I Periods: 9 Basics of cryogenics and liquefaction systems: Introduction to cryogenics – Applications involving									
Basics of cryogenics and liquefaction systems: Introduction to cryogenics – Applications involving									
Basics of cryogenics and liquefaction systems: Introduction to cryogenics – Applications involving									
cryogenic engineering – Cryogenic fluids and properties – Low-temperature properties of solids: CO1									
mechanical, thermal, electrical and magnetic properties – Superconductivity – Super fluidity.									
UNIT-II Periods: 9									
Gas liquefaction systems: Production of low temperature: Joule-Thomson effect – Inversion curve –									
Adiabatic expansion – Cryogenic liquefaction systems: Linde-Hampson system, pre-cooled Linde-									
Hampson system, Linde dual pressure system, Claude system, pre-cooled Claude system, Kapitza									
system, Heylandt system, Collin's helium liquefaction system and Simon helium-liquefaction system.									
UNIT-III Periods: 9									
Cryogenic refrigerators and gas-separation and gas-purification: Joule-Thomson refrigeration system –									
Cascade Joule-Thomson refrigeration system – Expansion-engine refrigeration system – Cold gas									
refrigeration system – Philips refrigerator – Solvay refrigerator – A.D. Little refrigerator – Vuilleumier CO3									
refrigerator – Refrigerators using solids as working media – Principles of gas separation – air-separation									
systems – hydrogen-separation systems – helium-separation systems – gas-purification methods.									
UNIT-IV Periods: 9									
Cryogenic instrumentation: Properties characterizing cryogenic instrumentation – strain gauges –									
displacement and position transducers – pressure measurement – temperature measurement – flow CO4									
measurement – liquid level measurement – density measurement.									
UNIT-V Periods: 9									
Cryogenic fluid storage and transfer systems: Insulation concepts – expanded-foam insulation – gas-									
filled powder and fibrous insulation – vacuum insulation – evacuated-powder and fibrous insulation –									
opacified-powder – storage vessels – basic vessel and design – liquid shielded vessels – vapour-shielded									
vessels –suspension systems – piping – drain and access ways – safety devices. Transfer systems –									
uninsulated lines – porous-insulated lines – vacuum-insulated lines – cryogenic valves and pumps – cool									
down of storage and transfer systems – vacuum technology in cryogenics.									
Reference Books:									
1 Randall Barron Cryogenic Systems McGraw Hill Book Publishing Co. Ltd. New York 1966									
2. Timmerhaus, K. D. and Flynn, T. M., Cryogenic Process Engineering, Plenum Press, New York, 1989									
3. Haselden, G. G., Cryogenic Fundamentals, Academic Press, 1971									

Department : I	Mechani	ical Engineering	Program	me : B.Tech	n. (N	1E)					
Semester : S	Seventh		Course (Category Co	de: I	PEC	Semes	ter Exa	m Type	e: TY	
Course Code	C	News	Perio	ds / Week		Credit	N	1aximui	m Marl	٢S	
Course Code	Course	e Name	L	Т	Ρ	С	CA	SE	Т	Μ	
MEY11	Nano Engine	Technology and surface sering	3	0	0	3	40	60	1	00	
Prerequisite:	Ū		<u>i</u>	LL.	i						
•	CO1	Get a broad view about nar	notechnol	ogy concept	ts ar	nd basics	5				
	(02	Expose to methods of synth	hesis of na	ano materia	lc						
Course	CO2	Know characterization tech	niques		15						
Outcome	CO3	Familiarize with Motal close	ningues	nroviow on	curf		incoring				
		Explore the concents of Tr	ining anu	Acposts of 9	Surr		lourface	coatin	a c		
	LUS	Explore the concepts of Th	IDOIOBICAI	Aspects of 3	Surr	aces and	Dori		gs		
UNII-I	Nono '	Tashaalaan Tlamaata of Na		a and Nana	. .		Perio	Das: 9			
Introduction to		rechnology: Elements of Na) tec	nnology	, tunda	mentals	sand	601	
overview of N	ano sci	ence, Nano revolution of the	ne 20th c	century, Pro	per	ties at i	vano sc	ale (op	itical,	CO1	
electronic and	magnet	ic). Theory, definitions and s	caling				- ·				
UNII-II							Perio	ods: 9			
Synthesis of I	Nano m	aterials, Synthesis of bulk	Nano –	structured	ma	iterials,	sol gel	proces	ssing,		
Mechanical all	oying ai	nd mechanical milling and I	nert gas (condensatio	n te	echnique	e. Nano	lithogra	aphy,	CO2	
chemical synt	hesis, C	.VD, wet deposition techr	niques, se	elf-assembly	(S	upra m	olecular	appro	ach),		
Molecular desi	gn and r	nodelling.						• -			
UNIT-III Periods: 9											
Physical and C	Physical and Chemical Characterization Techniques: Characterization – Scanning Electron Microscopy										
(SEM), Scanniı	ng Prob	e Microscopy (SPM), TEM	and EDA	X analysis, 1	X-Ra	ay diffra	iction, F	luoreso	ence	CO3	
Microscopy an	d Imagir	ng, STM – AFM and their app	lication ir	n Nanotechn	olo	gy.		-			
UNIT-IV							Perio	ods: 9	T		
Metal cleaning	g and pro	eview on surface engineerin	ng: Need A	And Relevan	ice (Of Surfa	ce Engir	neering,	Pre-		
Treatment Of	Coating	g, General Cleaning Process	5 For Feri	ous And N	on-l	Ferrous	Metals	And A	lloys,		
Selection Of C	leaning	Process – Alkaline Cleaning	– Emulsic	on Cleaning-	Ult	rasonic	Cleaning	g – Acic	And	CO4	
Pickling Salt Ba	ath Desc	aling – Abrasive Bath Clean	ing– Polis	hing And S	hor	t Peenin	g – Clas	sificatio	on Of		
Surface Engine	ering Pr	ocesses.									
UNIT-V							Perio	ods: 9	1		
Tribological As	spects o	f Surfaces and surface coat	tings: Trik	ological asp	pect	s of adl	nesion,	friction	and		
wear – Friction	n and Fr	iction Types – Theories of N	Macro and	l Nano scale	e fri	ction –	Differen	ce betv	veen		
macro and Mi	cro/ Na	no tribology - Characterizat	ion techr	iques for fr	rictio	on and	wear –	Tribom	eter,	CO5	
Friction Force	Micros	copy and Nano scratching	- Surface	Coatings -	hot	t dip co	ating a	nd diffu	usion		
coatings.											
Lecture Period	s: 45	Tutorial Periods:	Practica	l Periods:			Total I	Periods	: 45		
Reference Boo	ks:										
1. Charle	s Poole,	Jr., and Frank J. Owens, Intro	oduction	to Nanotech	nol	ogy, Joh	n Wiley	and sor	ıs, 200	3.	
2. Nano (2005.	chemisti	ry: A Chemical Approach to	Nanomat	erials – Roy	/al S	Society o	of Chem	istry, C	ambric	lge UK	
3. CNR R	ao, Achi	m Muller andAnthony K. Cl	heetham,	Chemistry of	of N	lanomat	erials: S	ynthesi	is, prop	perties	
and ap	and applications, John Wiley & Sons, 2004										
4. Cullity	, B.D., El	ements of X-ray Diffraction,	4th Editio	n, Addison V	Wile	ey, 1978.					
5. Loretto	э, М. Н.,	Electron Beam Analysis of N	/laterials,	Chapman ar	nd H	lall, 1984	4.				
6. T.A. De	elcher, V	acuum Physics and Techniqu	ues, Chapi	man & Hall.							
7. Gabe.	D.R., "Pr	inciples of Metal Surface Tre	eatment a	nd Protectio	on",	Pergam	on, 199	0			
8. Ryan R	lichards,	Surface and Nano molecula	r Catalysis	s, Taylor & F	rand	cis, Boca	Raton,	2006.			
9. Niku-L	avi, "Adv	vances In Surface Treatment	s", Pergar	non, 1990.							

Department : Mechanical Engineering Programme : B.Tech.(ME)									
Semester : S	eventh		Course (Category C	ode:	PEC	Semes	ter Exam Type	e: TY
Course Code	Cours	a Nama	Perio	ds / Week	۲	Credit	N	laximum Marl	ks
Course Code	Cours	endme	L	Т	Ρ	С	CA	SE	ТМ
MEY12	Desig	n of Transmission Systems	3	0	0	3	40	60	100
Prerequisite:									
	CO1	Students will able to under	stand the	design pri	ncipl	es of vari	ous trai	nsmission syst	ems.
	CO2	Students are made to get k	nowledge	in bearing	g and	l bearing	materia	lls.	
Course	CO3	Students will be able to co Buckingham equation.	me up wit	th ideas to	o desi	ign of bel	t drives	and types ba	sed on
Outcome	CO4	Student will able to Selec catalogue.	t bearing	s for a gi	ven a	applicatic	on from	the manufac	turers
	CO5	Students will able to solve	design pro	blems on	gear	drives ar	nd wear	criteria.	
UNIT-I							Perio	ods: 9	
Theory of hydr hydrostatic bea – selection of r	odynar arings – olling co	nic bearing –design of jourr bearing materials and lubric ontact bearings for radial and	hal bearin cants. Roll d axial loa	g – heat o ing contac ds	dissip t bea	ation – e arings – lo	element bad capa	ary ideas of acity and life	CO1
UNIT-II							Perio	ods: 9	
Belt drives – ty	/pes –	selection and design of flat	and V-be	lts Chain d	drive	s – roller	chains	– polygonal	
effect – sprock	et whee	els – silent chain						1 /0	CO2
UNIT-III							Perio	ods: 9	
Advantage of g	ear driv	ves over other drives, nomer	nclature, f	ailures of ${ m g}$	gear	tooth, de	sign of s	spur gears &	<u> </u>
helical gears -b	ased or	h bending and wears criteria	 based o 	n Lewis an	nd Bu	ckingham	n equati	on.	COS
UNIT-IV							Perio	ods: 9	
Bevel gears - n Buckingham eq	omencl uation,	ature, design of gears – base worm and worm wheel – no	ed on ben omenclatu	ding and v ire – desig	wear n pro	criteria– ocedure	based c	on Lewis and	CO4
UNIT-V							Perio	ods: 9	
Geometric prog gear box – cons	gressior stant m	n – standard step ratio – ray esh gear box – design of mul	[,] diagram, Iti speed g	kinematio ear box.	cs lay	out – des	sign of s	liding mesh	CO5
Lecture Period	s: 45	Tutorial Periods: Nil	Practica	Periods:	Nil		Total I	Periods: 45	
Reference Boo	ks:								
 T.J.Prabh T.J.Prabh T. Jagade J.E.Shigle S.K.Basu, Sadhu sir 	u, Desi u, Fund esha, D y, Mecl Design ngh, Ma	gn of transmission elements, lamentals of machine design besign of Machine Elements, hanical engineering design, I of machine tools, Oxford & ichine design, Khanna publisl	Madras b , Madras l Universiti metric ed IBH., 1990 hers, 2001	book house book hous es Press(Ir ition, McG).	e, Cho e, Ch ndia) Graw	ennai, 19 Iennai, 19 Private li Hill Interi	97. 997. mited, H national	Hyderabad,20 Edition, 2011	18

7. R.B.Gupta, Auto Design, Satyaprakashan, 1990.

8. Design Data Hand Book, PSG College of Technology, Coimbatore

Department : I	Department : Mechanical Engineering Programme : B.Tech.(ME)											
Semester : S	eventh		Course	Categ	ory Code	PEC	Seme	ster Exa	m Type:	TY		
Course Code	Course	Nama	Perio	ds / ۱	Neek	Credit	Ν	/laximu	m Marks	5		
Course Coue	Course	: Name	L		T P	С	CA	SE	TN	1		
MEY13	Power	Plant Engineering	3		0 0	3	40	60	10	0		
Prerequisite:												
	CO1	Able to understand essenti	al compo	nents	of steam	i power p	lant					
Course	CO2	Able to understand compo	onents of	gas tu	irbine po	wer plant	S					
Course	CO3	Able to the design and wor	king of H	ydroe	lectric po	wer plan	ts					
Outcome	CO4	Able to the design and wor	king of n	uclear	power p	lants						
	CO5	Able to understand load es	timation	and t	he econo	mics of po	ower pla	ants				
UNIT-I							Peri	ods: 9				
Steam Power	Plant: I	ayout- Accessories: Feed w	vater Pur	np, e	conomise	er, air-pre	eheater,	super	heater,			
steam separa	eam separator, Separator drums, Feed water heaters. Fuel handling: layout of fuel handling											
equipment, Co	mbustic	on equipment for steam boi	lers: Bur	ners–	Fluidised	bed com	nbustior	n. Air ha	andling	CO1		
system: forced	draugh	t fans, primary and seconda	ary air sys	stem f	for solid f	uels. Ash	handlir	ng equip	oment.			
Chimney draug	ht- natu	iral, forced and induced drau	ughts. Inc	lian B	oiler Act							
UNIT-II			-			-	Peri	ods: 9				
Gas turbine p	plant-sit	e selection-classification –	layout-	classif	ication c	of gas tu	irbines-	fuels-co	onstant			
pressure and c	onstant	volume combustion turbin	es-effect	of op	erating v	ariables o	on therr	nal effi	ciency-	CO2		
combined gas	turbine	and steam plant cycles										
UNIT-III							Peri	ods: 9				
Hydro Electric	Power P	lant: Application-advantage	s and dis	advan	tages-Site	e selectio	n - Esse	ntial ele	ements			
like catchment	: area, ı	eservoir, dam, spill way et	c., Classi	ficatio	on of Hyd	ro Electr	IC POW	er Plant	t (LOW,	CO3		
medium and	nign no	ead). Hydrology-nydrologic	cycle, i	measu	irement	of run-o	tt-nyara	ographs	- TIOW			
		11 ve.					Pori	odc: 0				
Nuclear Power	Dlant: (Conoral acousts of nuclear of	nginoorin	σ_ <u>ρ</u> ιμ	cloar road	tors_class	ren	DUS. 9				
Components c	fanc. C	lear nower nlant Nuclear	fuels –	coola	nts - m	nderators	– radi	ation sl	, bvin- hield –			
Nuclear Powe	r Plant	Lavout – Waste disposal-si	ite select	tion-a	dvantage	s and an	plicatio	ns of r	nuclear	CO4		
power plants.	i lanc				arantage		pricatio		lacical			
UNIT-V							Peri	ods: 9				
Power Plant E	conomic	s and Tariffs: Load curve, lo	oad durat	ion ci	urve, diff	erent fact	tors rela	ated to	plants			
and consumer	s, Cost	of electrical energy, deprec	iation, g	enera	tion cost	effect o	f load f	actor o	n unit			
cost. Fixed an	d opera	ting cost of different plant	s, role o	of load	d diversit	y in pow	er syste	em eco	nomy.	CO5		
Objectives and	l forms	of Tariff: Causes and effec	ts of low	/ pow	er factor	, advanta	ages of	power	factor			
improvement,	differen	mprovement different methods for nower factor improvements										
Lecture Period	s: 45	cinethous for power factor			1		Total	Dariada				
Reference Books:												
Reference Boo	ks:	Tutorial Periods: Nil	Practica	al Peri	ods: Nil		TOLAI	Perious	: 45			
1. P.K.Na	ks: g, Powe	Tutorial Periods: Nil	Practica Graw Hil	al Peri 1, 2000	ods: Nil		TOLAT	Perious	: 45			
1. P.K.Na 2. P.C.Sha	ks: g, Powe arma, Po	Tutorial Periods: Nil r Plant Engineering, Tata Mc wer Plant Engineering, Dew	Practica Graw Hill vanSanjee	al Peri I, 2000 ev Kun	ods: Nil). nar Katar	ia, 1994.	TOLAI	Perious	: 45			
1. P.K.Na 2. P.C.Sha 3. Freder	ks: g, Powe arma, Po ick T.Mo	Tutorial Periods: Nil r Plant Engineering, Tata Mc ower Plant Engineering, Dew orse, Power Plant Engineerin	Practica Graw Hill vanSanjee g, Affiliat	l, 2000 ev Kun ed Ea	ods: Nil D. nar Katar st-west P	ia, 1994. ress Ltd.,	1953.	Periods	:: 45			
1. P.K.Na 2. P.C.Sha 3. Freder 4. Willian	ks: g, Powe arma, Po ick T.Mo n A.Vape	Tutorial Periods: Nil r Plant Engineering, Tata Mc ower Plant Engineering, Dew orse, Power Plant Engineerin ert, Power Station Engineerin	Practica Graw Hill vanSanjee g, Affiliat ng and Ec	l, 2000 ev Kun ed Ea conom	ods: Nil D. nar Katar st-west P ny, Tata N	ia, 1994. ress Ltd., lcGraw H	1953. ill, 1972		:: 45			
1. P.K.Na 2. P.C.Sha 3. Freder 4. Willian 5. M.D.Bu	ks: g, Powe arma, Po ick T.Mo n A.Vape urghardi	Tutorial Periods: Nil r Plant Engineering, Tata Mc ower Plant Engineering, Dew orse, Power Plant Engineerin ert, Power Station Engineerin c, Engineering Thermodynam	Practica Graw Hill vanSanjee g, Affiliat ng and Ec nics with	l, 2000 ev Kun ed Ea conom Applic	ods: NII D. nar Katar st-west P ny, Tata N cations, H	ia, 1994. ress Ltd., 1cGraw H arper Rov	1953. ill, 1972 w, 1986		: 45			

Department : N	Mechan	ical Engineering	ng Programme : B.Tech.(ME)							
Semester : S	Seventh		Course (Category	Code:	PEC	Semest	ter Exam Typ	e: TY	
Course Code	Course	e Name	Peric	ods / Wee	k	Credit	M	aximum Mar	ks	
	0013		L	Т	P	С	CA	SE	TM	
MEY14	Total	Quality Management	3	0	0	3	40	60	100	
Prerequisite:		•								
	CO1	At the end of the course th	e student	is able to	o unde	erstand b	asics abo	ut TQM cond	cepts	
Course	CO2	Understanding the necessi	ty of TQN	l in an org	ganiza	tion and	its proble	ems		
Outcome	CO3	To get knowledge about TO	QM appro	ach						
	CO4	Explain the various QC tool	ls							
	CO5	Able to solve problems on	quality sy	stem				-		
UNIT-I		-		•			Perio	ds: 9		
Introduction t	o TQM	, Concept of quality, Nee	d for qu	ality, Evc	olutior	n of qua	lity, Dim	ensions of		
manufacturing and service quality, Basic concepts of IQM, Definition of IQM, IQM Framework, CO1 Barriers to TOM quality control and quality management										
Barriers to TQM, quality control and quality management										
UNIT-II Periods: 9 TOM Principles, Loadership, Strategie quality planning, Quality statements, Customer forus, Customer										
orientation Cu	s, Ledue	satisfaction Customer com	ning, Qua niainte Ci	istomer r	otont	, Custonni ion Empl		- Customer		
Motivation Fr	nnower	ment Team and Teamwor	k Recogr	nition and		ard Peri	formance	annraisal	CO2	
Continuous pr	ocess in	nprovement. PDSA cycle, 5s	s. Kaizen	- Supplie	r part	nership.	Partnerir	ng. Supplier	002	
selection. Supp	olier Rat	ing) naizen	ouppile	, pure	incromp)	arener in	ib) oupprici		
UNIT-III							Perio	ds: 9		
Science of qu	ality, h	uman resources and quali	ty, Qualit	y organi	zatior	n and ma	anageme	nt, Quality		
manual, quality	y cost, q	uality related tasks. Quality	informati	on systen	n: Plar	nning, hai	dware-s	oftware.	CO3	
UNIT-IV							Perio	ds: 9		
The seven tra	ditional	tools of quality, New mar	nagement	tools, S	ix-sigr	ma: Conc	epts, me	ethodology,		
applications to	manufa	acturing, service sector inclu	ding IT, B	ench mar	king, I	Reason to	bench n	nark, Bench	CO4	
marking proce	ss, FME	A – Stages, Types, Quality c	ircles, Q	uality Fur	nction	Deploym	ent (QFD	D), Taguchi	04	
quality loss	.									
UNIT-V							Perio	ds: 9		
Statistical pro	ocess o	control and quality depl	oyment	techniqu	es, c	controlling	g qualit	y through		
measurement	and thr	ough counting, Quality syste	em and LS	5.O. 9000	serie	s, Quality	assuran	ce. Reports	CO5	
on quality, qua	lity aud	it, quality training, newer qu	ality man	agement	appro	baches, Q	uality too			
Lecture Period	s: 45	i utorial Periods: Nil	Practica	I Periods	: NII		I otal P	erioas: 45		
Reference Boo		Managamant 2rd Edition Da		torfield (Carol	Doctorfiel	d Micho	o More Doct	orfiold	
I. TOLAL C	Juanty i Glon H	Bester field Hemant Urdhw	are n. Bes	cerneia, (ashmi Uri	-dr0i dhwai	rosho Do	u iviiciiii arson 20	a, wary besi 10	erneid	
2 Mukha	oriee Pl	N "Total Quality Manageme	ant" Pron	tice Hall /	of Ind	ialtd Na	a son, 20 aw Delhi	2006		
3. Total C)uality N	Management (TOM). R. Ashle	ev Rawling	. Auther	nouse	. 2008	, Denni,	2000.		
4. James	R. Evan	s and William M. Lindsav. "T	he Mana	gement a	ind Co	, ontrol of (Qualitv".	6th Edition.	South-	
Wester	rn (Thor	mson Learning), 2005.						· ·····		
5. Oaklan	Id, J.S., '	"TQM – Text with Cases", Bu	tterworth	– Heiner	mann	Ltd., Oxfo	ord, 3rd E	dition, 2010		
6. James	l Bosser	t, "Quality Function Deployn	nent", AS	QC Qualit	y pres	ss, Wiscoi	nsin, 199	4.		
7. Kanish	ka Bedi,	"Total Quality Management	t", Oxford	Universit	ty Pre	ss 8th Im	pression,	2011.		

Department : I	ertment : Mechanical Engineering Programme : B.Tech.(ME)												
Semester : S	eventh		Course Category Code: PEC Semester Exam Type: TY										
Course Code	Cours	o Namo	Perio	ds / We	eek	Credit	N	1aximur	n Marks	5			
Course Coue	Cours	endine	L	Т	Р	С	CA	SE	TN	Л			
MEY15	Finite	Element Method	3	0	0	3	40	60	10	0			
Prerequisite:													
	CO1	Students will able to under	stand the	funda	menta	als of finite	elemen	t metho	d.				
	CO2	Students will able to apply	finite elei	ment n	netho	d for bar ar	nd truss	applicat	ions.				
		Students will able to appl	y finite e	lemen	t met	hod for pl	ane stre	ss, plar	ne straii	n and			
Course	CO3	axisymmetric conditions.	-			-		-					
Outcome	<u> </u>	Student will be able to dete	ermine te	empera	ature d	distribution	in one	and two	dimen	sional			
	C04	engineering applications.											
	CO5 Students will get idea about how to Implement finite element method us												
isoparametric elements and introduction to ANSYS software.													
UNIT-I Periods: 9													
INTRODUCTION: Historical Background – Mathematical Modeling of field problems in Engineering –													
Governing Equ	ations.	Relevance and scope of finit	e elemen	t meth	ods -	strain vs di	splacem	ent rela	tions -	CO1			
stresses and e	quilibriu	um - natural and essential be	oundary	conditi	ons -	Rayleigh R	itz - Gal	erkin m	ethod-				
FEM procedure	e - Discr	etization of domain-element	shapes, t	types, s	size, lo	cation and	numbe	rs.					
UNIT-II							Period	s: 9		r			
ONE-DIMENSI	ONAL E	LEMENTS: Coordinate system	n types-g	lobal, l	ocal a	nd natural,	, shape t	functior	n of 1D				
bar element -F	inite ele	ement formulation - stiffness	s matrix,	load ve	ector,	boundry co	ondition	and ass	sembly	CO2			
of global equa	tion-1D	bar element and two node	truss ele	ement-	probl	ems in 2D	truss. Ir	ntroduct	tion to				
beam element	•						- ·						
			• •				Period	Is: 9	• • •	r			
TWO-DIMENSI			Second	i Order	ZD EC	quations in	volving S	scalar V	ariable				
Functions – va	riationa	in formulation —Finite Elemen		ation –	Iriang	gular eleme	ents – Sr	hape fur	1CTIONS	CO3			
and element n	Oundri	and vectors. Application to	Field Pro	opto	- The	rmai probi	ems – i	orsion	or non				
	Quaui	inateral elements – fingher Or		ents.			Poriod	c• 0		L			
			S. Eau	ations	of ala	sticity – Pla	no stros	s plane	strain				
and axisymme	tric prol	hlems – Body forces and terr	3 . Lyu merature	acions o offort	c = St	ress calcula	nie stres	os, piarie Plate an	d shell	CO4			
elements.		being body forces and ten	iperature	. chicci	.5 50			late an	u shen				
UNIT-V							Period	s: 9		L			
ISOPARAMETR	RIC FOR	MULATION: Natural co-or	dinate sv	/stems	— Ise	oparametri	c elem	ents –	Shape				
functions for i	so para	metric elements – One and	two dim	ension	is – Se	erendipity	element	s – Nur	nerical	CO5			
integration and	d applica	ation to plane stress problem	ns - Introc	luction	to An	ialysis Softv	ware.						
Lecture Period	s: 45	Tutorial Periods: Nil	Practica	al Perio	ods: Ni	i	Total P	eriods:	45				
Reference Boo	ks:												
1. David	V. Hutto	on, Fundamentals of Finite Ele	ement Ar	nalysis,	Tata N	McGraw Hi	ll Publisł	ning Cor	npany F	vt.			
Ltd., N	ew Delł	ni, 2005.											
2. Reddy	J.N., "A	In Introduction to the Finite	Element I	Metho	d", 3rc	d Edition, T	ata McG	raw-Hil	l, 2005				
3. Logan,	D.L., "A	first course in Finite Elemen	t Methoo	d", Tho	mson	Asia Pvt. Lt	:d., 2002						
4. S. S. Ra	io, Finit	e Element Method in Engine	ering, Else	evier Ir	ndia, 2	005.							
5. Robert	D. Coo	k, s. David , Malkucs Michael	E. Plesha	, Conc	epts a	nd Applicat	tions of	Finite					
6. Elemei	nt Analy	sis, John Wiley, New Delhi,20	007.										
7. T. R.	Chandri	upatia and A. D. Belegund	du, Intro	ductior	n to	Finite Eler	nents E	ngineer	ing, Pe	arson			
Educat	ion, Ne	w Delhi, 2002.				1. I'. I -	045						
8. S.S.Bł	navikati,	. Finite Element Analysis, Nev	N Age Inte	ernatio	onal Pu	iblishers, 2	015.						

Open Elective Courses

Department : N	Mechan	ical Engineering	Program	nme : I	B.Tech.					
Semester : T	hird to	Eighth	Course	Catego	ory Code:	OEC	Seme	ster Ex	am Type: TY	
Course Code	Cours	o Namo	Peri	ods / V	Veek	Credit	Ν	laximu	ım Marks	
Course Coue	Cours	endine	L	Т	- P	С	CA	SE	TM	
MEO01	Renev	wable Energy	3	C) 0	3	40	60	100	
Prerequisite:										
	CO1	Understand the basic cor	ncept of	solar	radiation	and dif	ferent	types	of active and	
		passive solar system and pl	hotovolta	aic prin	ciple					
	CO3	To identify the site sele	ection ar	nd win	id data	estimatio	on and	also	study safety,	
Course		environmental aspects of v	vind pow	er gen	eration					
Outcome	CO3	Understand the concepts a	nd energ	y conv	ersion pr	inciple of	fgeothe	ermal p	ower plants.	
	CO4	Understand the concepts	and en	ergy co	onversio	n princip	le of o	cean a	and hydrogen	
		energy systems								
	CO5	To understand the biogas,	ethanol a	nd bio	diesel pi	roductior	۱.			
UNIT-I	<u> </u>						Peri	ods: 9		
Introduction to	o solar	energy- Solar radiation-radi	ation at	the ea	rth's sur	face–mea	asurem	ent of		
solar radiation	- Solar	r water heating system – So	olar air h	eating	system	– Solar c	ooling-	Solar	CO1	
power systems	s –elect	rical power generation (dire	ct –indire	ect)–so	lar therm	nal power	r plants	–low,		
medium and hi	igh tem	perature power generation s	systems.							
UNIT-II		-					Peri	ods: 9		
Wind Data and	Energy	/ Estimation – Types of Wind	Energy S	ystem	s –Perfor	mance -	Site Sel	ection	CO2	
–Details of Wir	nd Turbi	ne Generator – Safety and E	nvironme	ental A	spects.					
UNIT-III	<u> </u>			-			Peri	ods: 9		
Geothermal E	nergy-o	rigin- geothermal resources	s-classific	ations [.]	-hydro-tr	nermal sy	/stem-	water		
dominated an	d vapo	our dominated fields, hot	dry rock	syste	ms, utili	zation of	r geoth	ermal		
resources – di	rect uti	lization – electricity general	tion – ar	y stea	m powei	r plants -	- Tiasn	steam	03	
power plant –	Dinary	cycle power plants – geothe		SII NYD	na powe	er plants -	– geoth	ermai		
	I						Pori	odc: 0		
	 //////////	nergy - Open and Closed OT		_ Sm-		alactric n		stome		
– Hydrogen an	d Stora	ge - Fuel Cell Systems – Hybri	id System	s — 51116 nc	an riyurud		Uwer sy	stems	CO4	
			iu system	13.			Pori	ods. 0		
Biomass — reg	SUILCOS	- conversion systems -	σacifiers	- Riod	zas nlan	ts —Dige	stors_Fi	hanol		
production – Bi	o diesel	– Riomass Applications	gasmers	DIU	503 piùn	LS DIGC		manor	CO5	
Lecture Period	s: 45	Tutorial Periods: Nil	Practica	al Peric	ods: Nil		Total	Period	s: 45	
Reference Boo	ks:									
1. S.P.Sukhat	me. Sol	ar Energy –Principles of The	rmal Coll	ection	and stor	age. Tata	McGra	w Hill F	Publishing Co	
New Delhi	, 1996.					0-,			0,	
2. N.K.Bansal	2. N.K.Bansal et al, Renewable Energy Sources and Conversion Technology, Tata McGraw Hill Publishing Co.,									
New Delhi	, 1990.	<i>.</i>				- • ·			•	
3. Rai. G.D., "	'Non Co	onventional Energy Sources",	Khanna	Publish	ners, New	/ Delhi, 20	011.			
4. Twidell, J.\	N. & W	eir, A., "Renewable Energy So	ources", l	EFN Sp	on Ltd., l	JK, 20				
5. B.H.Khan "	' Non –	Conventional Energy Resour	ces" Mc	Graw H	lill Publis	hing Co.,	Chenna	i — 201	.7	
6. Godfrey Bo	oyle, "R	enewable Energy, Power for	a Sustain	able Fu	uture", O	xford Uni	versity	Press, l	J.K., 1996.	
7. Tiwari. G.M	N., Sola	r Energy – "Fundamentals D	Design. N	Iodellir	ng & Apr	lications	". Naros	a Pub	lishing House.	

New Delhi, 2002

Department : I	Department : Mechanical Engineering Programme : B.Tech.									
Semester : 1	Third to	Seventh	Course	Categ	ory Co	de:	OEC	Semes	ster Exa	m Type: TY
	<u> </u>	- N	Peri	ods /	Week		Credit	N	1aximui	n Marks
Course Code	Course	e Name	L		Т	Ρ	С	CA	SE	TM
MEO02	Solar I	Power Engineering	3		0	0	3	40	60	100
Prerequisite:										
	CO1	Able to analyse the tech systems	niques a	and n	nethoo	ls ir	nvolved	in sola	r energ	y harvesting
Course	CO2	Able to design and develop	o a protot	type n	nodel d	of so	lar powe	er syster	n.	
Outcome	CO3	Able to synthesis a new op	tion for a	a solar	powe	r sys	stem			
	CO4	Able to evaluate the perfor	rmance c	harac	teristic	s of	a solar d	lirect po	wer sys	stem
	CO5	Able to analyse the suitabil	lity of ap	plicati	on of s	olar	system	over co	nventio	nal system
UNIT-I		•••••••••••••••••••••••••••••••••••••••						Peri	ods: 9	
Introduction to	o solar e	energy – solar energy utilizat	tion in In	dia - S	Solar r	adia	tion – r	neasure	ement	
of solar radiat	ion - so	lar radiation data geometry	y – solar	radia	ition o	n h	orizontal	and in	clined	CO1
surfaces – rela	tionship	among absorption and emit	ttance an	nd refl	ectanc	e – 9	Selective	surface	s.	
UNIT-II	·	•						Peri	ods: 9	
Solar thermal of	devices:	Flat plate collectors – mater	rials for f	lat pla	te coll	ecto	or - collec	tor effi	ciency	
– overall heat	loss co	efficient – performance of t	flat Plate	colle	ctor. (Conc	entrating	g collec	, tors –	
improving effi	ciency o	of flat collector – cylindric	al parab	olic c	ollecto	or –	compou	, Ind par	abolic	CO2
collector – cen	tral rece	eiver collector.						-		
UNIT-III								Peri	ods: 9	
Solar heating	– air h	eating system – solar ener	gy heat	numr) svste	m –	- solar w	vater h	ating	
system: forced	and na	atural circulation system –	nassive s	solar l	neating	ייי ז געי	stem –Sc	olar coo	ling –	CO3
absorption coc	oling – se	plar dryers - solar pond – sol	ar furnac	e.	leating	5 5 9 5	50000			
UNIT-IV	8	/ / /						Peri	ods: 9	
Photovoltaic P	rinciple	– materials for photovolta	aic cells	– effi	ciencv	of	solar cel	I – sola	ar cell	
materials - pe	rforman	ice analysis of photovoltaic	cells – ⁻	Therm	noelect	ric	generato	r solar	cell –	CO4
photochemica	l solar ce	ells – photovoltaic applicatio	ons				5			
UNIT-V			_					Peri	ods: 9	
Solar power sy	vstems –	- electrical power generation	n – solar	thern	nal pov	ver	plants –	low. me	edium	
and high tem	perature	power generation system	s: using	flat r	olate c	olle	ctors or	solar n	onds.	CO5
concentrating	collecto	rs. central receiver and solar	chimnev	$v_{\rm S} - s_{\rm C}$	olar en	ergv	process	econon	nics	
Lecture Period	s: 45	Tutorial Periods: Nil	Practic	, al Per	iods: N	- o, Iil		Total	Periods	: 45
Reference Boo	ks:									
1. S.P. Su	khatme	Solar Energy – Principles of	Therma	l Colle	ction a	and	storage	Tata Mo	Graw F	lill Publishing
Co Ne	ew Delh	i. 2008		i conc		and .	5101450)			
2. J.A. Du	iffie & W	/. Beckmann. Solar Thermal	Processe	s. Joh	n Wile	v. 19	980.			
3. H.P.Ga	rg and J	. Prakash. Solar Energy. Tata	McGraw	v – Hil	l Publis	shin	g Compa	nv Limit	ed .200	17
4. G.D. R	ai. Solar	Energy Utilization. Khanna P	Publisher	s. 200	5		0	.,	,	-
5. Solar (Cells – C	perating Principles. Technol	logy and	Syste	m Apr	licat	tions /M	artin A.	Green/	Prentice Hall
Inc.	•		- 07 00	-,010	P		,		2. 20.17	
6. John T	widell a	nd Tony Weir, Renewable Er	nergy Res	Source	s. Rou	tled	ge: 2 Edit	tion (24	Novem	ber 2005)
7. G.D.R	ai Non-C	Conventional Energy Sources	Publishe	ed 201	.1 bv K	han	na Publis	hers		/
8. Dr. R.K	. Singal	Non-conventional energy re	esources	S.K. K	(atara	pub	lication li	mited		
9. liu She	ng Hsie	h. Solar Energy Engineering	Prentice	Hall	1991					
10. M.A.G	ireem, S	olar Cells, Prentice Hall Inc.	Englewo	od Cli	ffs, 19	82.				

Department : Mechanical Engineering Programme : B.Tech.											
Semester : 1	hird to Seventh		Course (Categ	ory Co	ode:	OEC	Semes	ster Exai	m Type:	TY
Course Code	Course Name		Peric	ods /	Week		Credit	N	/laximur	n Mark	S
Course coue			L		Т	Ρ	C	CA	SE	T	Л
MEO03	Fluid and Thermal N	lachines	3		0	0	3	40	60	10	0
Prerequisite:											
Course Outcome	CO1 At the end o Problem CO2 Understandin CO3 To get knowl	f the course t ng the necessi edge about tu	the stude ty of hydr Irbines an	nt is aulic d pui	able to machi nps	o ga ines	iin knowl and its p	edge at	s	id mech	nanics
	CO4 Explanation of	on various pur	nps and it	ts effi	ciency	,					
	CO5 Performance	and characte	ristics of S	Stean	י. turbi	ne r	ower pla	int			
UNIT-I							•	Peri	ods: 9		
Fluid mechanic energy equatic	s-Introduction; Reync ns; Eulerian and Lagra	olds Transport Angian view-po	Theorem pints; Con	; Inte stitu	gral fo	orm latic	of contin ons; Navie	uity, m er Stoke	omentu s equati	m and ions	CO1
UNIT-II								Peri	ods: 9		
Exact solutions averaged equa	; Potential flow; Bou tions; Turbulent flows	ndary layer th in pipes and o	heory; Sej channels;	parat com	ion an pressib	nd d ble f	rag; Turk lows	oulent fl	low: Re	ynolds	CO2
UNIT-III								Peri	ods: 9		
plant, Impulse Diagram and A Pumps: Roto- performance – indicator diagr.	Turbine:- principle, nalysis, Working prop dynamic and positi priming – cavitation - am – use of air vessel	construction ortions, Desig ve displacem - Specific spee	al feature n parame nent pun d – recipr	es, li eters, nps rocati	nstalla Perfor – cer ng pur	tion maintrif	of Pelt nce chara ugal pur parts, wo	on Turl acteristic np: pa prking, p	bine, Vo cs, Gove orts, wo perform	elocity erning. orking, ance –	CO3
UNIT-IV								Peri	ods: 9		1
Similitude - T Quantities, Mc Water Lifting D	ypes of similarities, del Testing: - Applica evice: - Air lift pumps	Dimensionles ition to hydra , Hydraulic Rai	s numbe ulic turbi m, Subme	r an ne ar ersible	d thei nd hyd e pumi	r si Irod p, R	gnificanc ynamic p egenerat	e, Unit oumps, l ive pum	and S Miscella ps	pecific neous	CO4
UNIT-V								Peri	ods: 9		
Steam turbine simple, Rankin compounding problems in sir	power plant- Propert e cycle – reheating of impulse turbines, nple Rankine cycle	ies of steam – regeneratic governing of	– steam t on – stea steam tu	turbir m tu urbin	ne pow Irbines es – c	ver : in conc	plant: co npulse ai lensers a	mponer nd reac and coo	nts, wor tion tur ling tov	king – bines, vers –	CO5
Lecture Period	s: 45 Tutorial Peri	ods:	Practica	l Per	iods:			Total	Periods	: 45	
Reference Boo	ks:										
 Cengel, M. (2010). Currie, I. Hydraulia Mechani Fluid Me 	 and Cimbala, J., Flu <i>Fundamental Mecl</i> & Compressible Flow of Fluids, Merle C. F chanics, John F. Dougl 	id Mechanics: nanics of Fluid Turbo-machi Potter, CL-Eng as, Pearson	<i>Theory c</i> <i>s,</i> McGrav nes, A. T. ineering	and A w-Hill Saye	<i>pplica</i> , New rs, Mc [.]	tion Yor -Gra	s, McGra k, 1993. aw Hill.	aw-Hill E	Educatic	on, New	York
6. Balaney Engineer	P L, "Thermal Engine ng, Prentice Hall, 199	ering", Khann 1	a Publish	ers,	New D	elhi	i, 2007Jiu	ı Sheng	Hsieh,	Solar E	nergy

M.A. Greem, Solar Cells, Prentice Hall Inc., Englewood Cliffs, 1982.

Department : Mechanical Engineering Programme : B.Tech.										
Semester : T	hird to	Seventh	Course (Category C	ode:	OEC	Seme	ster Exa	m Type	e: TY
Course Code	Cours	Namo	Peric	ds / Week	(Credit	Ν	/laximui	m Marl	٢S
Course Coue	Course	endine	L	Т	Ρ	С	CA	SE	Т	М
MEO04	Marke	eting Management	3	0	0	3	40	60	1	00
Prerequisite:										
Co	CO1	At the end of the course th are used for different mark	ne studen lets	t will be at	ole to	o explain	the diff	erent st	trategie	es that
Outcome	CO2	Understand the theories ar	d practic	echobind	tho r	nent anu		riablos		Ketilig
Outcome		Demonstrate an understan	ding of th	es perintu	uie i	ting proc	s IIIIX va	nables		
		Distinguish botwoon the sn	unig of th	uro of diff		ting proc	and c	and cor	wicos	
	COS	Distiliguisti between the sp			erem	linarkets	, guuus Pori		vices	
UNIT-I Periods: 9 MARKETING PROCESS: Definition Marketing process dynamics needs wants and demands marketing										
concepts, envi	ronmer er mark	it, mix, types. Philosophies	, selling	versus ma	s, wa Irketi	ing, orga	nizatior	is, indu	istrial	CO1
				us, prouut		and eny.	Pori	ods: 9	<u>l</u>	
		AND MARKET SEGMENTAT		ural dem	nora	nhic fact	ors mo	tives t	VNAS	
buying decision process. patter	ns, segn	nentation factors - demogra	phic - Psy	cho graph	nic ar	nd geogra	aphic se	gmenta	ation,	CO2
UNIT-III							Peri	ods: 9	i	
PRODUCT PRIC	LING AI	ND MARKETING RESEARCH:	Obiectiv	es. pricing	. de	cisions ai	nd prici	ng met	hods.	
pricing manage	ement. l	ntroduction, uses, process o	f marketi	ng researc	'n.		•	0	,	CO3
UNIT-IV							Peri	ods: 9		
MARKETING P formulations a	LANNIN nd the r	NG AND STRATEGY FORML marketing process, implemer	JLATION: ntations, p	Compon portfolio ai	nents nalys	of marl is, BCG, C	keting p GEC grid	olan-stra ls.	ategy	CO4
UNIT-V							Peri	ods: 9		
ADVERTISING, types, and sa wholesaling, re Marketing.	SALES les pro etailing,	PROMOTION AND DISTRIE pmotions - point of purch channel design, logistics, a	BUTION: hase - un and mode	Advertisin nique sell ern trends	g: Cl ing in i	haracteris propositi retailing,	stics, in on. Ch Moder	npact, g aracteri n Trenc	goals, istics, ls, e-	CO5
Lecture Period	Lecture Periods: 45Tutorial Periods:Practical Periods:Total Periods: 45									
Reference Books:										
 Philip Kolter & Keller, "Marketing Management", Prentice Hall of India, 14th edition, 2012. Chandrasekhar. K.S., "Marketing Management Text and Cases", 1st Edition, Tata McGraw Hill, 2010. Czinkota & Kotabe, "Marketing management", Thomson learning, Indian edition 2007 Adrain palmer, "Introduction to marketing theory and practice", Oxford university press IE 2004. Philip Kotler and Gazy Armstrong "Principles of Marketing" Prentice Hall of India, 2000 										

6. Graeme Drummond and John Ensor, "Introduction to marketing concepts", Elsevier, Indian Reprint, 2007.

Department : N	nent : Mechanical Engineering Programme : B.Tech.								
Semester : 1	hird to	Seventh	Course C	Category	/ Code	: OEC	Semester	Exam T	ype: TY
Course Code	Cours	e Name	Perio	ds / Wee	ek P	Credit	Maxii CA	mum M	arks TM
MF005	Fleme	ents of Project Management	2	0	0	् २	40	60	100
Prerequisite:	Lieme		<u> </u>	•	•				100
	CO1	At the end of the course the project	e student	will be	able	to Iden	tify key co	ompone	nts of a
6	CO2	Describe the stages of a proje		w each s	stage (can be er	rectively m	ianageo	
Course	CO3	Outline some of the tools and	techniqu	es that d	can be	neiptui	when plant	ning a pi	oject
Outcome	CO4	techniques for identifying and	manageme I managin	g risks	iveneva		ojects, and	descrit	e some
	CO5	doing this	iluating th	e errect	ivenes	s or a pr	oject and t	lescribe	ways or
UNIT-I							Periods:	9	
Indian project	manage	ement scenario, Projects - Proje	ct ideas a	nd preli	minar	y screen	ing. Develc	pments	-
Project plannir	ng to Pr	oject completion - Pre-investm	nent phas	e, Inves	tment	t phase,	operationa	al phase	⁻ CO1
Governmental	Regulat	tory framework. Capital Budget	ing: Capita	al cost-t	ime-v	alue (CT\	/) system, ı	managir	g
project resourd	ces flow			1					
UNIT-II			•-			-	Periods:	9	
Stages - Oppo	rtunity	studies - General opportunity	studies, s	pecific o	opport	tunity stu	idies, pre-	feasibilit	:y
studies, function	onal stu	idies or support studies, feasil	bility stuc	ly expai	nsion	projects,	data for t	feasibilit	y ,
study. Market	: and	Technical Appraisal: Market	and Dem	nand ar	naiysis	, Marke	t Survey,	Deman	a CO2
forecasting. Te	inoru a	analysis- Materials and inputs,	choice o	riechno	ology,	Product	mix, Plant	locatio	١,
	intery a	na equipment.					Doriodau	0	
Approical proc		contrand Tachniquae Cast an	d Popofit	from Ei	nanci	al anglo	Perious:	9 ciploc fr	\r
measuring cost	ess, cui ts and h	enefits components of cash flo	W Times	nom ri value of	mone	al aligie -	nt and fut	icipies it	וע
Annraisal crite	ria - Ilr	gency Payback period Rate o	of return	Deht se	nvice	coverage	ratio Ne	t nreser	., CO3
value Benefit (nost rati	io Internal rate of return Annu	al canital	charge	Invest	ment an	nraisal in n	ractice	
UNIT-IV			ui capitai				Periods:	9	
Cost of capital	- Cost o	of different sources of finance.	Cost of de	ebt. pret	ferenc	e capital	. and Equit	v capita	l.
Weighted aver	age Co	st of capital, Marginal cost of	capital. R	lisk ana	lvsis-	Measure	s of risk, S	Sensitivi	.v
analysis, and [Decisior	n tree analysis. Social cost ben	, efits anal	ysis (SC	, BA) -	Rational	e for SCBA	A, UNID	, 0 CO4
approach. Cost	t of Cap	pital. Means of financing, Term	Loans, Fi	nancial	Institu	utions. P	rofitability	- Cost o	of
Production, Bro	eak-eve	n analysis. Assessing the tax bu	rden and	financia	l proje	ections.			
UNIT-V							Periods:	9	
Forms of Proje	ect Orga	anization, Project Planning, Imp	olementat	ion, and	d Con	trol - Ne	twork con	structio	n,
CPM, PERT, De	evelopn	nent of Project schedule, Cras	hing of Pi	roject N	letwor	rk, Sched	luling base	d on th	e
availability of	Resour	ces (Manpower and Release	of Funds). Intro	ductio	on to Fo	reign colla	aboratio	n CO5
projects - Gov	rnmer	ntal policy framework, Need f	or foreigr	n techn	ology,	Royalty	payments	, Foreig	n
investments ar	nd proce	edural aspects.							
Lecture Period	s: 45	Tutorial Periods:	Practica	Period	s:		Total Per	iods: 45	
Reference Books:									
 Prasanna Publishin 	a Chand Ig Comp	ra, Projects - Preparation, App bany Ltd., New Delhi, 1980.	raisal, Bu	dgeting	and I	mplemer	ntation, Ta	ta McGi	aw Hill
2. P.Gopala	krishna	n and V.E.Rama Moorthy - Proje	ect Manag	gement,	Macn	nillan Ind	lia Ltd., Ne	w Delhi,	1993.
3. R.C.Mish 2005	ra and [•]	Tarun Soota - Modern Project	Managen	nent, Ne	ew Ag	e Interna	ational (P)	Ltd, Ne	w Delhi,
4. Goel. B.B	Proie	ct Management - Principles and	Techniau	es. Dee	p & D	eepPubli	cations. Ne	w Delhi	. 1986.
5. UNIDO S	eries or	n Project Management		, = 00		-1			

Department : I	ment : Mechanical Engineering Programme : B.Tech.											
Semester : 1	hird to	Seventh	Course Category Code: OEC Semester Exam Type: T									
Course Code	Cours	o Namo	Perio	ds / Week		Credit	N	laximum Mar	ks			
Course coue	Cours		L	Т	Ρ	С	CA	SE	TM			
MEO06	Introc and N	luction to Nano Science Jano Technology	3	0	0	3	40	60	100			
Prerequisite:												
	CO1	Get a broad view about na	noscience	concepts a	and	basics						
Course	CO2	Expose to Supramolecular	nanostruc	tures and b	oiolo	ogical mat	terials					
Outcome	CO3	Know Nanostructures and	its applica	tions								
Outcome	CO4	Familiarize with Emerging t	technolog	ies for envi	ron	mental re	mediati	on				
	CO5	Explore the concepts of Ser	miconduc	tor nanopa	rticl	es – appl	ications					
UNIT-I					Pe	riods: 9						
Evolution of Na	ano scie	ence: Introduction, length sc	ale of diff	erent struc	cture	es, definit	ion of N	lano science				
and nanotechr	nology -	Electronic structure of varie	ous nanos	tructures -	- Dis	covery o	f fullere	nes and the	CO1			
evolution of I	Nano s	cience, Size dependent pro	operties,	size deper	nder	nt absorp	otion -	Phonons in	001			
nanostructures	5.											
UNIT-II					Pe	riods: 9						
Supramolecula	r nanos	structures and biological ma	aterials: S	upramolec	ular	structur	es, tran	sition metal				
mediated type	, dendr	itic molecules, and supramo	lecular de	ndrimers.	Soli	d disorde	red nan	ostructures:	CO3			
Metal Nano cl	uster c	omposite glasses. biological	nanostru	ictures, po	lype	eptide na	nowire	and protein	02			
nanoparticles,	nucleic	acids, and protein synthesis	, example	s of biologi	ical	nanostruo	ctures.					
UNIT-III					Pe	riods: 9						
Nanostructure	s and	its applications: Classificat	tions of	nanomater	rials	- Zero	dimens	sional, one-				
dimensional ar	nd two	dimensional nanostructures-	Kinetics i	n nanostru	ictui	red mate	rials- mu	ultilayer thin	CO3			
films and supe	r lattice	- clusters of metals, semicon	ductors a	nd nanocor	про	sites.						
Application of	Nano m	aterials in Electronics, Medic	cine, Milit	ary, Defens	se, to	extiles etc	2.					
					Pe	riods: 9	~					
Emerging tech	nologie	es for environmental reme	ediation:	Use of n	ano	particles	for en	vironmental				
remediation ar	nd wate	er treatment- Role of Dendri	mer- singl	e enzyme-i	nano	oparticle	and me	talloprotein.	CO4			
Case studies an	na kegu	liatory Needs.										
UNII-V		ortiolog opplications Orti			ר אר אין אר אין אין אר אין אר אר אין אר א	rioas: 9	o from	direct based				
Semiconductor	nanop	articles – applications: Option		escence and	a til II no	Jorescen	ce from	direct band				
gap semiconor	actor na	Inoparticles, surface-trap pas	loctrolum	in core-snei	li fia	hopartici	es, carri	er injection,	CO5			
polymer-nanor	article,	, LED and Solar Cells, e	lectrolum	inescence,	пg	nt emis	sion in	om mairect				
Locture Period	Lecture Periods: A5 Tutorial Periods: - Practical Periods: - Total Periods: 45											
Reference Roo	3. 4J kc·		FIALLILD	renous			TULAT	ciluus. 45				
	no. Ir Erar	ak I Owens and Charles Intr	oduction	o Nanotoc	hno			and sons 200	2			
2. G. Cao	and Y.	Wang, Nanostructures and	nanomate	erials: synth	nesi	s, propert	ties and	applications,	World			
Scienti	fic, 2nd	edition, 2011										
3. H.S. Na	alwa, En	ncyclopedia of nanoscience a	nd nanote	chnology,	Ame	erican Sci	entific P	ublishers, 200)7			
4. S.Yang	and P.S	Shen: "Physics and Chemistry	of Nanos	tructured N	Mate	erials". Ta	avlor & F	rancis. 2000.				

J. Twidell and T. Weir, Renewable Energy Resources, E & F N Spon Ltd, London, 1986.

Department : Mechanical Engineering Programme : B.Tech.									
Semester : T	hird to	Seventh	Course C	ategory Co	de:	OEC	Semes	ster Exam Type:	ΤY
Course Code	Cours	o Namo	Perio	ds / Week		Credit	N	Aaximum Marks	5
Course Code	Course	e Name	L	Т	Ρ	С	CA	SE	ΤM
MEO07	Indust	trial Automation	3	0	0	3	40	60	100
Prerequisite:									
	CO1	Students understand the va	arious aut	omation pr	oce	esses			
Courso	CO2	Students understand the va	arious aut	omation te	chn	iques in	manufa	cturing process	es
Outcome	CO3	Students understand the va	arious aut	omations ir	n m	achining	process	es	
Outcome	CO4	Students understand the va	arious aut	omations ir	n ro	botics			
	CO5	Students understand the va	arious plai	nning and	imp	lementat	tion pro	cesses	
UNIT-I					Ре	riods: 9			
Hardness Auto	mation	 I: Introduction to Automa 	ation in M	anufacturir	ng –	Types o	f Auton	nation – Study	CO1
of the principle	the principles of working of automates – Applications.								
UNIT-II					Ре	riods: 9			
Hardness Auto	mation	- II: Automated flow line	s – Types	. Transfer	ma	- achines	- types,	mechanisms,	
applications, T	ransfer,	Handling, Location, Orienta	ation and I	Parts Feedi	ng	devices –	- Types	and principles	CO2
of working or	ly. Buf	fer storage. NC machines	– Introdu	uction, Typ	bes,	Econom	nics, Ad	vantages and	
Applications. C	NC, DN	C (Direct and Distributed), ar	nd Adaptiv	e Control.					
UNIT-III					Pe	riods: 9			
Turning and Ma	achinin	g Centres – Description and t	types of A ⁻	FC, Applica	tion	IS.		_	
NC Part Progra	mming	– Types – Introduction to pro	ogrammin	g language	s, A	PT Progra	amming	, Examples on	CO3
CNC Turning,	Milling	& Drilling operations. P	reliminary	study or	n si	mulation	of CA	AD based NC	
programming.					D -				
UNIT-IV		Configuration Mark Malu	a Find a	.ff	Pe	rioas: 9		tool oo ood	
RODOT anatom	y and	Configuration, work volum	ne, End e	mectors –	Тy	pes of g	rippers	, tool as end	
Pohot Sonsors	Extor	nal and Internal Types De	cition con	arc Valac	i+., ,	concore .	Tactilo	Drovimity and	CO 4
	– Exter Machin	e vision – Applications	SILION SEN	sors, veloc	ity :	sensors,	ractile,	FIOXITILY and	04
Automated Ma	torial H	andling and Storage System	s – Tynes	Design and	d In	terfacing	Prelimi	naries	
			13 Types,	Design and	Pe	rinds 9	TTCIIII	nancs	
Group Technol	ogv: Pai	rt Families – Parts Classificat	ion and Co	oling Fyar	nnl	es Annlic	ations		
Flexible Manuf	acturing	Systems: Types Componer	nts Planni	ng and Imn	lem	entation			CO5
Introduction to	Lean a	nd Agile Manufacturing System	ems - Con	nparison	i ci i		155465.		
Lecture Period	s: 45	Tutorial Periods: Nil	Practical	Periods: N	lil		Total	Periods: 45	
Reference Boo	ks:		1				1		
1. Mikel P.C	Grover,	Automation, Production Sys	tems and	Computer	Inte	grated N	lanufac	turing, PHI Ltd.,	New
Delhi, 2003.									
2. P. Radha	krishnai	n, NC Machine Tools, Dhanpa	at Rai & So	ons, New D	elhi	,2000			
3. G. Booth	royd et	al, Automatic assembly, Mar	rcel Dekke	r Inc., New	Yo	rk, 1993.			
4. P.N. Rao	et al, Co	omputer Aided Manufacturir	ng, Tata M	cGraw Hill	Pub	lishers, 1	.993.		
5. P. Radha	krishna	n and S. Subramanian – CAD,	/CAM/CIN	1/, Wiley Ea	aste	rn Ltd., 2	000.		

Department : Mechanical Engineering Programme : B.Tech.									
Semester :	Third to Sev	venth	Course C	ategor	y Cod	e:OEC	Semeste	er Exam T	ype: TY
	N		Period	ls / We	ek	Credit	Max	kimum M	arks
Course Code	Course Na	ame	L	Т	Р	С	CA	SE	TM
MEO08	Quantitat	ive Techniques for Engineers	3	0	0	3	40	60	100
Prerequisite:									
	CO1	At the end of the course the s	student is a	able to	unde	stand Q	uantitativ	e Technic	lues
Course	CO2	Understanding the concepts	of operatic	on rese	arch				
Outcome	CO3	To get knowledge about vario	ous operati	ion tec	hniqu	es			
outcome	CO4	Explain about Queuing Theor	у						
	CO5	Understanding of financial m	anagemen	t					
UNIT-I					Perio	ods: 9			
Introduction, Phases of Ope Operations R Operations Re	Historical E erations Res esearch Te esearch	Background, Scope of Operati search, Types of Operations Re schniques and Tools , Struct	ons Resea search Mo ure of th	orch , odels, C e Mat	Featur Operat thema	es of O ions Res tical Mo	perations earch Me odel, Lim	Researc thodolog itations	h, y, of CO1
UNIT-II					Perio	ods: 9			
Linear Progra Transportation	imming – n and Assigi	Graphical and Simplex Meth nment Problems	nods, Dua	lity ar	nd Po	st – Op	otimality	Analysis	⁻ co2
UNIT-III					Perio	ods: 9			
Inventory Cor Simulation Mo	ntrol - EOQ odels – Qua	- Quantity Discounts - Safety lity Control.	v Stock – I	Replace	ement	Theory	– PERT a	and CPM	– соз
UNIT-IV					Perio	ods: 9			i
Mathematical Properties of Channels, Erla Queuing Theo	Analysis Queuing ang Family ry	of Queuing Theory: Introduct System, Notations, Service S of Distribution of Service Time	ion, Math ystem, Sir es, Applica	emationgle Cations	cal An hanne of Qu	alysis o I Model euing Th	f Queuin Is, Multip eory, Lim	g Proces ble Servio iitations (s, ce of CO4
UNIT-V	·				Perio	ods: 9			
FINANCIAL M	ANAGEMEI	NT: Working Capital Manage	ement – (Compo	und I	nterest	and Pres	sent Valu	^{ie} CO 5
Lecture Derio	lounieu. Ca	Tutorial Periods: Nil	Dractical	Dorio	le. Nil		Total De	riods· 15	
Reference Ro	13. 4J nke:	Tutorial Ferious. Nil	Flaculdi	Feno	12. INII		i Utai Pe	110us. 45	
	$v \wedge Taba \cap$	norations Doscorate An Introd.	uction Dray	atical	<u>- 11 - 20</u>	10			
2. Kuma	y A. rana, O r, A.C.S, Ope	erations Research, Yes Dee Pub	lishing Pvt	Ltd, 20	an, 20 015.	10.			
 Levin, R.I, Rubin, D.S., and Stinson J., Quantitative Approaches to Management, McGraw Hill College, 1993. Vohra, Nd., Quantitative Techniques in Management, Third Edition, Tata McGraw-Hill Company Ltd, 2007. 									

Department : Mechanical Engineering			Programme : B.Tech.							
Semester : Third to Seventh			Course Category Code: OEC Semester Exam Ty						m Type:	TY
Course Code	Course Name		Periods / Week			Credit	Maximum Mark			5
Course Coue			L	Т	Ρ	С	CA	SE	TN	Λ
MEO09	Finite Element Analysis		3	0	0	3	40	60	10	0
Prerequisite:										
Course	CO1 CO2	 At the end of the course the student is able to Understand the fundamentals of finite element method. Apply finite element method for bar and truss applications. Apply finite element method light Transfer Problems. 								
Outcome		COA Apply finite element method Solid Mechanics Problems								
	CO4	Apply mille element method using ANSVS software								
	Deriode: Q									
INTRODUCTION- Historical Background - Basic Concents - comparison of FEM and Exact Solutions -										
General Procedure - Evamples Einite Element formulation from Coverning differential equations										CO1
UNIT II										
UNIT-II PERIODS: 9										
general weighted residual statement – weak formulation of the weighted residual methods – comparisons – piecewise continuous trial functions-example of a bar finite element –functional and differential forms – principle of stationary total potential – Rayleigh Ritz method – piecewise continuous trial functions – finite element method – application to bar element. Coordinate system types-global, local and natural, shape function of 1D bar element – problems in 2D truss.										CO2
ONE DIMENSIONAL FINITE ELEMENT ANALYSIS - General form of total potential for 1-D applications – generic form of finite element equations – linear bar element – quadratic element –nodal approximation – development of shape functions – element matrices and vectors – example problems – extension to plane truss– development of element equations – assembly – element connectivity – global equations – solution methods –beam element – nodal approximation – shape functions – element matrices and vectors – assembly – solution – example problems										CO3
UNIT-IV Periods: 9										
TWO DIMENSIONAL FINITE ELEMENT ANALYSIS- Introduction – approximation of geometry and field variable – 3 node triangular elements – four node rectangular elements. Equations of elasticity – Plane stress, plane strain and axisymmetric problems – Body forces and temperature effects – Stress calculations - Plate and shell elements.										
UNIT-V	Periods: 9									
APPLICATIONS OF FEM — Simple Problems in Solid Mechanics – Heat Transfer – Fluid Mechanics Introduction to software – ANSYS.									nanics.	CO5
Lecture Periods: 45Tutorial Periods: NilPractical Periods: NilTotal Periods: 45										
Reference Books:										
 Seshu.P, Textbook of Finite Element Analysis, PHI Learning Private Limited, Delhi- 110092, 2014 David V. Hutton, Fundamentals of Finite Element Analysis, Tata McGraw Hill PublishingCompany Pvt. Ltd., New Delhi, 2005. Logan, D.L., "A first course in Finite Element Method", Thomson Asia Pvt. Ltd., 2002 S. S. Rao, Finite Element Method in Engineering, Elsevier India, 2005. Robert D. Cook, s. David, Malkucs Michael E. Plesha, Concepts and Applications of Finite 										
7. S. S. Bha	ivikati, F	inite Element Analysis, New	/ Age Inte	rnational	Publis	shers, 201	15.			

7. S. S. Bhavikati, Finite Element Analysis, New Age International Publishers, 2015.