PAAVAI ENGINEERNG COLLEGE (Autonomous)

M.E. - ENGINEERING DESIGN

REGULATIONS 2023

(CHOICE BASED CREDIT SYSTEM) CURRICULUM

S.No.	Category	Course Code	Course Title	L	Т	P	C
Theory	7						
1	PC	PED23101	Advanced Engineering Materials	3	0	0	3
2	PC	PED23102	Concepts of Engineering Design	3	0	0	3
3	PC	PED23103	Computer Applications in Design	3	0	0	3
4	PC	PED23104	Vibration Analysis and Control	3	1	0	4
5	MC	PEN23101	Research Methodology and IPR	3	0	0	3
6	PE	PED23***	Professional Elective I	3	0	0	3
7	AC	PAC23101	English for Research Paper Writing (Audit Course I)	2	0	0	0
Practic	cal						
1	PC	PED23105	Computer Aided Design Laboratory	0	0	4	2
		TO	OTAL	20	1	4	21

SEMESTER – II

S.No.	Category	Course Code	Course Title	${f L}$	T	P	C
Theor	y	1					
1	PC	PED23201	Finite Element Methods in Mechanical Design	3	1	0	4
2	PC	PED23202	Integrated Product Development	3	0	0	3
3	PC	PED23203	Mechanical Behavior of Materials	3	0	0	3
4	PC	PED23204	Advanced Mechanics of Materials	3	1	0	4
5	PE	PED23***	Professional Elective II	3	0	0	3
6	PE	PED23***	Professional Elective III	3	0	0	3
7	AC	PAC23201	Pedagogy Studies (Audit Course II)	2	0	0	0
Practi	ical						•
1	PC	PED23205	Simulation and Analysis Laboratory	0	0	4	2
			Simulation and Analysis Laboratory TOTAL	20	2	4	22

SEMESTER - III

S.No.	Category	Course Code	Course Title	L	T	P	C
Theory	7						
1	PC	PED23301	Engineering Fracture Mechanics	3	0	0	3
2	PE	PED23***	Professional Elective IV	3	0	0	3
3	PE	PED23***	Professional Elective V	3	0	0	3
4	OE	PED23***	Open Elective	3	0	0	3
Practic	al						
1	EE	PED23302	Project Work (Phase I)	0	0	12	6
			TOTAL	12	0	12	18

SEMESTER – IV

S.No.	Category	Course Code	Course Title	L	Т	P	C
Practic	al						
1	EE	PED23401	Project Work (Phase II)	0	0	24	12
			TOTAL	0	0	24	12

TOTAL CREDITS: 21+22+18+12=73

PROFESSIONAL ELECTIVE COURSES

S.No.	Category	Course Code	Course Title	L	T	P	C
1.	PE	PED23151	Design for Sustainability	3	0	0	3
2.	PE	PED23152	Mechanics of Composite Materials	3	0	0	3
3.	PE	PED23153	Design of Hydraulic and Pneumatic Systems	3	0	0	3
4.	PE	PED23154	Tribology in Design	3	0	0	3
5.	PE	PED23155	Advanced Mechanisms in Design	3	0	0	3
6.	PE	PED23156	Product Lifecycle Management	3	0	0	3
7.	PE	PED23157	Surface Engineering	3	0	0	3
8.	PE	PED23158	Optimization Techniques in Design	3	0	0	3
9.	PE	PED23159	Mechanical Measurements and Analysis	3	0	0	3
10.	PE	PED23160	Design for X	3	0	0	3
11.	PE	PED23161	Vehicle Dynamics Approved Appr	3	0	0	3

S.No	Category	Course Code	Course Title	L	T	P	C
12.	PE	PED23163	Solid Freeform Manufacturing	3	0	0	3
13.	PE	PED23165	Advanced Finite Element Analysis	3	0	0	3
14.	PE	PED23166	Design of Hybrid and Electric Vehicles	3	0	0	3
15.	PE	PED23168	Material Handling Systems and Design	3	0	0	3
16.	PE	PED23169	Artificial Intelligence and Machine Learning	3	0	0	3
17.	PE	PED23170	Industrial Internet of Things	3	0	0	3
18.	PE	PED23171	Materials Characterization Techniques	3	0	0	3
19.	PE	PED23172	Composite Materials and Testing	3	0	0	3
20.	PE	PED23173	Soft Computing	3	0	0	3

OPEN ELECTIVE COURSES

S. No	Category	Course Code	Course Title	L	Т	P	C
1	OE	PED23901	Industrial Safety	3	0	0	3
2	OE	PSE23901	Climate change and Adaptation	3	0	0	3
3	OE	PPS23901	Alternate Energy Sources	3	0	0	3
4	OE	PCS23901	Design of Digital Elements	3	0	0	3
5	OE	PCE23901	Big Data Analytics	3	0	0	3



PE	D2330	1		EN	GINEE	ERING	FRACT	TURE I	MECHA	NICS			3	0	0
CO	URSE	OB	JECTIVES	3											
То	enable	the	students to						-						
1.	get fa	milia	ar with the i	nechanis	sms of fr	fracture	and crac	ick grow	th.						
2.	know	abo	ut the elasti	c crack-ti	ip stress	s field a	and crack	k tip pla	stic zone	e.					
3.	under	stan	d the energ	y princip	ole invol	lving cr	rack grov	wth and	crack- r	esistano	e.				
4.	gain k	cnow	ledge on e	lastic cra	ck-tip st	stress fi	ield and o	crack tip	plastic	zone.					
5.	learn	the n	nechanism (of fatigu	ie crack	c propag	gation.								
UN	ITI	M	IECHANIS	MS OF	FRAC	CTURE	AND C	CRACK	GROW	TH					
anal	lysis.		leavage fra											rvice	e fa
	IT II		LASTIC C												
			s function-C								he effect	t of fini	te siz	ze-Tl	he I
			rrection-The				ne shape	of the p	lastic zo	ne.					
	III TI	T	HE ENER	GY PRI	NCIPLI	.F.									
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			ease rate-Th				owth-Th	he crack	resistan	ce (R cı	ırve)-Co	mpliano	e-Tl	ne J i	inte
Tea	ring mo	odulı	us-Stability.		on for cr	crack gr		he crack	resistan	ce (R cı	irve)-Co	mpliano	ce-Tl	ne J i	inte
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UNI Frac Exp	ring mo IT IV cture b erimen	E) eyon tal	us-Stability. LASTIC-P nd general places	LASTIC yield-The	on for cr C FRAC e crack	CTURE c tip op	E pening d ers affect	displacer	nent-The	e possil	ole use o	of the	СТО	DD ci	riter
Team UNI Frac Exp yield	ring mo IT IV cture b erimen d-Use o	Ell eyon tal do f the	us-Stability. LASTIC-P nd general ge	LASTIC yield-Tho n of CT Limitatio	on for cr C FRAC e crack TOD-Par ons of th	CTURE c tip op	E pening d ers affect tegral-M	displacer	nent-The	e possil	ole use o	of the	СТО	DD ci	riter
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- 2. Prashant Kumar, "Elements of Fracture Mechanics", Tata McGraw-Hill Publishing Company Ltd, 2009
- 3. Tribikram Kundu, "Fundamentals of Fracture Mechanics", Ane Books Pvt. Ltd. New Delhi/ CRC Press, 1st Indian Reprint, 2012
- 4. Ted L. Anderson, "Fracture Mechanics: Fundamentals and Applications", CRC Taylor and Francis, 4th Edition, 2017.
- 5. John M.Barson and Stanely T.Rolfe, "Fatigue and fracture control in structures", Butterworth-Heinemann; 3rd edition. 2010.

CO - PO MAPPING

Mapping of Course Outcomes with Programme Outcomes: (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

CO	, , , , ,		Programme (Outcomes(POs)								
COs	PO1	PO2	PO3	PO4	PO5	PO6						
C01	3	3	2	2	2	-						
CO2	3	3		s -	2	2						
CO3	3	-	2	E	2	2						
CO4	3	3	2	2	2	-						
CO5	2	2	2	2	3	-						



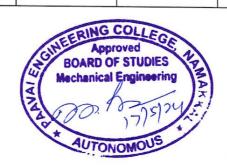
PEI	023302		PR	ROJECT WORK	(PHASE I)		0	0	12	6
CO	URSE OBJ	ECTIV	ES							
То	enable the s	tudents t	0							
1.	enhance su	ıfficient	hands-on learning	experience relate	d to the design, de	evelopment a	and analys	sis o	f suit	able
	product / p	rocess								
2.	develop the	e technic	al skill sets in the	chosen field and a	lso to accustom to	research orie	entation.			
3.	develop the	e method	lology to solve the	identified problem	n.					
4.	train the st	udents in	preparing project	reports and to face	e reviews and viva	-voce exami	nation.			
SYL	LABUS									
The	student ind	ividually	works on a spec	ific topic approved	d by the head of the	ne division u	nder the	guid	ance	of a
facu	lty member	who is f	amiliar in this area	of interest. The st	udent can select ar	y topic whic	h is releva	int t	o the a	area
				eoretical or case s						
the v	work done	should b	e submitted which	n contains clear de	efinition of the ide	entified prob	lem, deta	led	literat	ture
revie	w related t	o the ar	ea of work and m	ethodology for ca	arrying out the wo	ork. The stud	lents will	be o	evalua	ated
throu	ıgh a viva-v	oce exa	mination by a pane	el of examiners inc	cluding one extern	al examiner.				
						TOTAL	PERIOD	S:	18	0
COI	JRSE OUT	COME	S			T	BT MAP	PE)	
At th	e end of the	e course,	the students will I	be able to			(Highest	Leve	el)	
COI	confron	t challen	ging practical prol	olem and explore s	solution by proper	procedure	Understa	ndin	g (K2)
	using th	e technic	al knowledge and	professional appro	oach.					
CO2	conduct	experim	ents / Design and	Analysis / solution	iterations and doc	cument the	Applying	(K3	()	
CO3			m of technical rep	ort / presentation. formulation and so	lution		A 1	(IV 2		
CO4				nplex problems ut			Applying			
	PO MAP		ing solutions to col	inplex problems ut	msing a systems a	pproach	Applying	(K3)	
	TOWNE	1110	Manning of Co	urse Outcomes wi	th Dragramma Ou					
		(1/2		gth of correlation			ak			
		-			outcomes(POs)	, ~ , / 0				
COs										
	PC)1	PO2	PO3	PO4	PO5		F	06	
COs	PC 2		PO2 2 2	PO3 3	PO4 2	PO5 2		F	2	



CO3

CO4

	23401		DJECT WORK (I	PHASE II)		0	0	24	12
COL	JRSE OBJECTIV	ES							
To e	nable the students t	0							
1.	the project work sh	all be based on the	e knowledge acqu	ired by the stud	lent during the	course a	nd p	referal	bly it
	should meet and co	ntribute towards th	ne needs of the soo	ciety					
2.	the project aims to	provide an opportu	unity of designing	and building co	mplete system	or subsy	sten	ns base	ed on
;	area where the stud	ents like the acqui	re specialized skil	ls.					
3.	solve the identified	problem based on	the formulated me	ethodology.		**			
4.	develop skills to an	alyze and discuss t	the test results, and	d make conclus	ions.				
SYL	LABUS								
The s	student should cont	inue the phase I w	ork on the selecte	ed topic as per	the formulated	methodo	ology	unde	r the
same	supervisor. At the	end of the semes	ter, after completi	ing the work to	the satisfactio	n of the	supe	ervisor	r and
revie	w committee, a deta	ailed report should	l be prepared and	submitted to the	e head of the de	epartmer	nt. Tl	he stud	dents
will t	be evaluated based	on the report subn	nitted and the viva	-voce examina	tion by a panel	of exam	iner	s inclu	ıding
one e	xternal examiner.								
					TOTAL	PEDIOI	19.	36	50
				N.		LIMOI	ا ۱۰۰	30	00
COU	RSE OUTCOME	S				BT MA	-1300 90		
	RSE OUTCOME e end of the course,		be able to				APPI	ED	
At th	e end of the course,	the students will be project work, th	e students will be		o take up any	BT MA	APPI st Le	E D vel)	
At the	completion of the challenging pra	the students will be project work, the ctical problems	e students will be and find solution	on by formul	o take up any ating proper	BT MA	APPI st Le	E D vel)	
At the	completion of the challenging pra methodology apply engineering	the students will be project work, the ctical problems	e students will be and find solution	on by formul	o take up any ating proper handling of	BT MA	APPI st Le	E D vel) ing (K	
At the	completion of the challenging pra methodology apply engineering project have a clean	the students will be project work, the ctical problems and managemear idea of his/her	e students will be and find solution	on by formul	o take up any ating proper handling of	BT MA (Highes	APPI st Le	E D vel) ing (K	
	completion of the challenging pra methodology apply engineerin project have a clout the work in a	the students will be project work, the ctical problems and managemear idea of his/her	e students will be and find solution ent principles the area of work and t	on by formul	take up any ating proper handling of sition to carry	BT MA (Highes Unders	APPI st Le tandi	ED vel) ing (K	
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At the	completion of the challenging pra methodology apply engineering project have a clout the work in a design engineering demonstrate the up any challenging complete the contract of the contract	the students will be project work, the ctical problems and management idea of his/her a systemic waying solutions to conknowledge, skills and practical problems	e students will be and find solution ent principles the area of work and the mplex problems ut	on by formul rough efficient they are in a postilising a system professional en	take up any ating proper handling of sition to carry as approach gineer to take	BT MA (Highes Unders Applyin	APPI st Le tandi	ED vel) ing (K	
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At the CO1 CO2 CO3 CO4	completion of the challenging pra methodology apply engineering project have a clout the work in a design engineering demonstrate the up any challenging complete the contract of the contract	the students will be project work, the ctical problems and management idea of his/her a systemic way and solutions to conknowledge, skills and practical problems it.	e students will be and find solution ent principles the area of work and to applex problems ut and attitudes of a period of	rough efficient they are in a pos- cilising a system professional eng- engineering de	b take up any ating proper handling of sition to carry as approach gineer to take sign and find	BT MA (Highes Unders Applyin	APPI st Le tandi	ED vel) ing (K	
CO2 CO3 CO4	completion of the challenging pramethodology apply engineering project have a cleout the work in a design engineering demonstrate the up any challenging better solutions to the complete solution to the complete	the students will be project work, the ctical problems and management idea of his/her a systemic way and solutions to conknowledge, skills and practical problems it.	e students will be and find solution ent principles the area of work and the mplex problems ut and attitudes of a permit in the field of ourse Outcomes with and students of the problems with the students of	rough efficient they are in a postilising a system professional engineering de	b take up any ating proper handling of sition to carry as approach gineer to take sign and find	BT MA (Highes Unders Applyin Applyin	APPI st Le tandi	ED vel) ing (K	
CO2 CO3 CO4	completion of the challenging pramethodology apply engineering project have a cleout the work in a design engineering demonstrate the up any challenging better solutions to the complete solution to the complete	the students will be project work, the ctical problems and management idea of his/her a systemic waying solutions to conknowledge, skills and practical problems it.	e students will be and find solution ent principles the area of work and to a mplex problems ut and attitudes of a gem in the field of ourse Outcomes with of correlation	rough efficient they are in a postilising a system professional engineering de	b take up any ating proper handling of sition to carry as approach gineer to take sign and find	BT MA (Highes Unders Applyin Applyin	APPI st Le tandi	ED vel) ing (K	
CO2 CO3 CO4	completion of the challenging praymethodology apply engineering project have a clayout the work in a design engineering demonstrate the up any challenging better solutions to the project have a clayout the work in a design engineering demonstrate the up any challenging better solutions to the project have a clayout the work in a design engineering the project have a clayout the work in a design engineering the project have a clayout the work in a design engineering the project have a clayout the work in a design engineering the project have a clayout the work in a design engineering the project have a clayout the work in a design engineering the project have a clayout the work in a design engineering the project have a clayout the work in a design engineering the project have a clayout the work in a design engineering the project have a clayout the work in a design engineering the project have a clayout the work in a design engineering the project have a clayout the work in a design engineering the project have a clayout the work in a design engineering the project have a clayout the work in a design engineering the project have a clayout the work in a design engineering the project have a clayout the work in a design engineering the project have a clayout the work in a design engineering the project have a clayout the pro	the students will be project work, the ctical problems and management idea of his/her a systemic waying solutions to conknowledge, skills and practical problems it. Mapping of Cooks indicates streng	e students will be and find solution ent principles the area of work and to a mplex problems ut and attitudes of a gem in the field of ourse Outcomes with of correlation	rough efficient they are in a postilising a system professional engineering de (th Programme) 3-Strong, 2-N	b take up any ating proper handling of sition to carry as approach gineer to take sign and find	BT MA (Highes Unders Applyin Applyin	APPI st Le tandi	ED vel) ing (K	
CO2 CO3 CO4 CO - COs CO1	completion of the challenging pramethodology apply engineering project have a clout the work in a design engineering demonstrate the up any challenging better solutions to the polymer. PO MAPPING (1/2/PO) PO1 2	the students will be project work, the ctical problems and management idea of his/her a systemic way ng solutions to correct knowledge, skills and practical problem it. Mapping of Co it. PO2 3	e students will be and find solution ent principles the area of work and to a mplex problems ut and attitudes of a period of the correlation area of correlation and correlation area of correlation and correlation area of correlation area of correlation area of correlation and correlation area of correlation area of correlation area of correlation and correlation area of correlation area of correlation and correlation area of correlation and correlation area of correlation area of correlation area of correlation and correlation area of correlation area.	rough efficient they are in a postilising a system professional engineering de (th Programme) 3-Strong, 2-Noutcomes(POs)	take up any ating proper handling of sition to carry as approach gineer to take sign and find Outcomes: Medium, 1-We	BT MA (Highes Unders Applyin Applyin	APPI st Le tandi	ED vel) ing (K	
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CO4

PE	D23901	INDUSTRIAL SAFETY	3	0	0	3
CC	OURSE (DBJECTIVES				
To	enable t	he students to				
1.	give ex	posure to various industrial safety equipment's and methods.				
2.	unders	and tools used for maintenance cost and services life of equipment.				
3.	analyz	e the types, causes, effects of wear reduction methods.				
4.		e awareness of fault tracing concept and maintenance and types of faults in machi- causes.	ne to	ools a	and	their
5.	develo	o rudimentary ability on periodic inspection concept and needs of various mechanical tent's.	l and	elec	trica	al
UN	ITI	INDUSTRIAL SAFETY				9
Acc	cident, c	auses, types, results and control, mechanical and electrical hazards, types, cause	es an	d pr	eve	ntive
step	os/proced	lure, describe salient points of factories act 1948 for health and safety, wash room	ıs, dı	inkir	ng v	vater
layo	outs, ligh	t, cleanliness, fire, guarding, pressure vessels, etc., Safety color codes. Fire preventio	n and	l fire	figh	ting,
equ	ipment a	and methods.				
UN	IT II	FUNDAMENTALS OF MAINTENANCE ENGINEERING				9
Def	finition a	nd aim of maintenance engineering, Primary and secondary functions and responsibili	ty of	mair	nten	ance
		Types of maintenance, Types and applications of tools used for maintenance, Main	tenan	ice co	ost d	& its
rela	tion witl	replacement economy, Service life of equipment.				
UN	II III	WEAR AND CORROSION AND THEIR PREVENTION	. 1			9
		s, causes, effects, wear reduction methods, lubricants-types and applications, Lub				0.50
gen	eral sket	ch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. S	plasl	h lub	rica	tion,
iv. (Gravity 1	ubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, De	finiti	ion, p	orino	ciple
and	factors	affecting the corrosion. Types of corrosion, corrosion prevention methods.				
UN	IT IV	FAULT TRACING				9
Fau	lt tracin	g-concept and importance, decision tree concept, need and applications, sequence	e of	fault	-fin	ding
acti	vities, s	now as decision tree, draw decision tree for problems in machine tools, hydr	aulic	, pne	eum	atic,
auto	omotive,	thermal and electrical equipment's like, i. Any one machine tool, ii. Pump iii. Ai	r coi	npre	ssor	, iv.
Inte		abustion engine, v. Boiler, vi. Electrical motors, Types of faults in machine tools	and	their	gen	eral
	IT V	PERIODIC AND PREVENTIVE MAINTENANCE		-		9
		pection-concept and need, degreasing, cleaning and repairing schemes, overhauling	ng of	f me	char	
		overhauling of electrical motor, common troubles and remedies of electric motor, re				
1	•	1 7 1.1	pall	comp	JICX	ities

and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: I. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets,

Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance.

		TOTAL PER	HODS:	45
COU	RSE OUTCOMES	BT	MAPPEI)
At the	end of the course, the students will be able to	(Hig	hest Leve	el)
CO1	differentiate the types of accident causes and preventive steps of inc	ustrial safety. Und	erstandin	g (K2)
CO2	assess the various types and applications of tools used for mainterelation with economy.	nance and its Und	erstandin	g (K2)
CO3	analyze the factors affect the corrosion and its prevention methods.	Und	erstandin	g (K2)
CO4	identify the types of faults in machine tools and their general causes	s. App	lying (K3	3)
CO5	analyze the various preventive maintenance of mechanical and elected equipment's and repair cycle concepts.	trical App	lying (K3	3)

REFERENCES

- 1. Foundation Engineering Handbook, Hans F.Winterkorn, Hsai-yang fang, Chapman & Hall publishers London 2010.
- 2. Pump-hydraulic Compressors, Audels, Tata MC Graw hill Publication 2003.
- 3. Industrial Maintenance, H. P. Garg, S. Chand Ltd., Reprint 2010.
- 4. Maintenance Engineering Handbook, Higgins & Morrow, Tata MC Graw hill 2012.
- Principles of Industrial Safety Management Understanding the Ws of Safety at Work, "Das Akhil Kumar", January 2020.

CO - PO MAPPING

Mapping of Course Outcomes with Programme Outcomes:

(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs _			Programme C	Outcomes(POs)		
	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	-	2	-	-	3
CO2	3	2	2	3	- 1	2
CO3	3 .	3	2	3	3	3
CO4	3	3	2	3	- 1	3
CO5	3	-	2	3	3	3

