



Yashoda Shikshan Prasarak Mandal's
YASHODA TECHNICAL CAMPUS, SATARA
 An Autonomous Institute
FACULTY OF ENGINEERING
Department of Mechanical Engineering

S.Y. B.Tech SEMESTER III (Regular)

Course Code	Course Domain	Course Name	Teaching Scheme					Evaluation Scheme					TOTAL
			L	T	P	SL	Credit	Scheme	Theory		Practical		
									Max.	Min. Passing	Max.	Min. Passing	
0UMEPC301	F	Engineering Mathematics- III	3	1	0	5	4	ISE	20	40*	-	-	100
								MSE	20				
								ESE	60				
0UMEPC302	F	Analysis of Mechanical Elements	3	0	0	4	3	ISE	20	40*	-	-	100
								MSE	20				
								ESE	60				
0UMEPC303	F	Applied Thermodynamics	3	0	0	4	3	ISE	20	40*	-	-	100
								MSE	20				
								ESE	60				
0UMEPC304	F	Material Science and Metallurgy	3	0	0	4	3	ISE	20	40*	-	-	100
								MSE	20				
								ESE	60				
0UMEPC305	F	Machine Drawing	3	0	0	4	3	ISE	20	40*	-	-	100
								MSE	20				
								ESE	60				
0UMEVE306	F	Environmental Studies	2	0	0	1	2	ISE	50	20*	-	-	50
0UMEHM307	F,E	Engineering Economics	2	0	0	1	2	ISE	50	20*	-	-	50
0UMEPC308	F,E	Applied Thermodynamics Lab	0	0	2	1	1	ISE	-	-	25	25**	50
								ESE			25		
0UMEPC309	F	Material Science and Metallurgy Lab	0	0	2	1	1	ISE	-	-	25	25**	50
								ESE			25		
0UMEPC310	F	Analysis of Mechanical Elements Lab	0	0	2	1	1	ISE	-	-	25	25**	50
								ESE			25		
0UMEVS311	F	CAD Lab	0	0	2	1	1	ISE	-	-	50	25**	50
TOTAL			19	1	08								
Total Contact Hours Per Week			28			27	24	TOTAL MARKS					800

Course Category	Program Core Course	Program Elective Course	Open Elective Course	Multi Disciplinary Minor Course	Value Education	Vocational and Skill Enhancement Course	Ability Enhancement Course	Humanities and Management Course	Internship	Project	Co-curricular Courses	Total
Credit	19	-	-	-	2	1	-	2	-	-	-	24

ISE:-In semester evaluation, MSE:- Mid Semester Examination, ESE:- End Semester Examination

Note1- *- Scoring 40% in ESE is essential and combining ISE+MSE+ESE =40% for Theory Course

** - ISE-40%, ESE-50% Combined together needs to be 50% for Laboratory courses for passing

Chairman-BOS

Member Secretary- AC

Chairperson-AC

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Yashoda Shikshan Prasarak Mandal's
YASHODA TECHNICAL CAMPUS, SATARA
 An Autonomous Institute
FACULTY OF ENGINEERING
 Department of Mechanical Engineering
S.Y. B.Tech SEMESTER IV (Regular)

Course Code	Course Domain	Course Name	Teaching Scheme					Evaluation Scheme					Total
			L	T	P	SL	Credit	Scheme	Theory		Practical		
									Max.	Min. Passing	Max.	Min. Passing	
0UMEPC401	F	Fluid Mechanics	3	-	-	4	3	ISE	20	40*	-	-	100
								MSE	20				
								ESE	60				
0UMEPC402	F	Production Processes	3	0	0	4	3	ISE	20	40*	-	-	100
								MSE	20				
								ESE	60				
0UMEPC403	F	Energy Conservation and Management	3	0	0	4	3	ISE	20	40*	-	-	100
								MSE	20				
								ESE	60				
0UMEPC404	F	Theory of Machines	3	0	0	4	3	ISE	20	40*	-	-	100
								MSE	20				
								ESE	60				
0UMEMD405	F	MDM I	3	0	0	4	3	ISE	20	40*	-	-	100
								MSE	20				
								ESE	60				
0UMEVE406	F,E	Universal Human Values	2	0	0	3	2	ISE	50	20*	-	-	50
0UMEHM407	F	Entrepreneurship Development	2	0	0	3	2	ISE	50	20*	-	-	50
0UMEPC408	F	Fluid Mechanics Lab	0	0	2	1	1	ISE	-	-	25	25**	50
								ESE			25		
0UMEPC409	F	Theory of Machines Lab	0	0	2	1	1	ISE	-	-	25	25**	50
								ESE			25		
0UMEAE410	F	Ability Enhancement Lab	0	0	2	1	1	ISE	-	-	50	25**	50
0UMEIR411	F,E	Internship-I	0	0	4	2	2	ISE	-	-	50	25**	50
TOTAL			19	0	10	31	24	TOTAL MARKS					800
Total Contact Hours Per Week			29										

Course Category	Programme Core Course	Programme Elective Course	Open Elective Course	Multi Disciplinary Minor Course	Value Education	Vocational and Skill Enhancement Course	Ability Enhancement Course	Humanities and Management Course	Internship	Project	Co-curricular Courses	Total
	PC	PE	OE	MD	VE	VS	AE	HM	IR	PR	CC	
Credit	14	-	-	3	2	-	1	2	-	2	-	24

ISE:- In semester evaluation, MSE: - Mid Semester Examination, ESE: - End Semester Examination

Note1- * - Scoring 40% in ESE is essential and combining ISE+MSE+ESE =40% for Theory Course

** - ISE-40%, ESE-50% Combined together needs to be 50% for Laboratory courses for passing

Note 2- Internship I: Students are expected to complete minimum 60 hours of internship after the third semester, and its evaluation will be conducted in the fourth semester.

Total Credits in SY

SEM-I	SEM-II	SEM-III	SEM-IV	TOTAL
22	22	24	24	92

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Yashoda Shikshan Prasarak Mandal's
YASHODA TECHNICAL CAMPUS, SATARA
 An Autonomous Institute
FACULTY OF ENGINEERING
Department of Mechanical Engineering
T.Y. B.Tech SEMESTER V (Regular)

Course Code	Course Domain	Course Name	Teaching Scheme					Evaluation Scheme					TOTAL
			L	T	P	SL	Credit	Scheme	Theory		Practical		
									Max.	Min. Passing	Max.	Min. Passing	
0UMEPC501	F	Heat & Mass Transfer	3	0	0	4	3	ISE	20	40*	-	-	100
								MSE	20				
								ESE	60				
0UMEPC502	F	Machine Design I	3	0	0	4	3	ISE	20	40*	-	-	100
								MSE	20				
								ESE	60				
0UMEPE503	F	Programme Elective Course (PEC) I	3	0	0	4	3	ISE	20	40*	-	-	100
								MSE	20				
								ESE	60				
0UMEOE504	F	Open Elective (OE) I (MOOC)	3	0	0	4	3	ISE	20	40*	-	-	100
								MSE	20				
								ESE	60				
0UMEMD505	F	MDM II	3	0	0	4	3	ISE	20	40*	-	-	100
								MSE	20				
								ESE	60				
0UMEVE506	F	Constitution of India	2	0	0	1	2	ISE	50	20*			50
0UMEPC507	F,E	Heat Transfer Lab	0	0	2	1	1	ISE	-	-	25	25**	50
								ESE			25		
0UMEPC508	F	Machine Design I Lab	0	0	2	1	1	ISE	-	-	25	25**	50
								ESE			25		
0UMEVS509	F	Vocational and Skill Enhancement Lab	0	0	2	1	1	ISE	-	-	50	25**	50
0UMEAE510	F	Ability Enhancement Course	2	0	0	3	2	ISE	50	20*	-	-	50
0UMEPR511	F,E	Mini Project	0	0	2	1	1	ISE	-	-	25	25**	50
								ESE	-	-	25		
0UMECC512	F	Co –curricular Courses	0	0	2	1	1	ISE	-	-	50	25**	50
TOTAL			17	0	10								
Total Contact Hours Per Week			27			28	24	TOTAL MARKS					850

Course Category	Programme Core Course	Programme Elective Course	Open Elective Course	Multi Disciplinary Minor Course	Value Education	Vocational and Skill Enhancement Course	Ability Enhancement Course	Humanities and Management Course	Internship	Project	Co-curricular Courses	Total
Credit	PC	PE	OE	MD	VE	VS	AE	HM	IR	PR	CC	
	8	3	3	3	2	1	2	-	-	1	1	24

ISE:-In semester evaluation, MSE: - Mid Semester Examination, ESE: - End Semester Examination

Note1- * - Scoring 40% in ESE is essential and combining ISE+MSE+ESE =40% for Theory Course

** - ISE-40%, ESE-50% Combined together needs to be 50% for Laboratory courses for passing

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 An Autonomous Institute
FACULTY OF ENGINEERING
Department of Mechanical Engineering

Programme Elective Course (PEC): I

Course Code	Course Name	Domain
0UMEPE503A	Product Design and Development	Design
0UMEPE503B	Additive Manufacturing	
0UMEPE503C	Internal Combustion Engines	Thermal
0UMEPE503D	Energy Conservation Management	
0UMEPE503E	Welding & Joining Technology	Manufacturing
0UMEPE503F	Manufacturing and Automation	

Open Elective (OE): I

Course Code	Course Name	Domain
0UMEOE504A	Machine Tool Design	Design
0UMEOE504B	Industrial Design	
0UMEOE504C	Renewable Energy Sources	Thermal
0UMEOE504D	Alternative Fuels	
0UMEOE504E	Computer Integrated Manufacturing CIM	Manufacturing
0UMEOE504F	Introduction to Robotics	
0UMEOE504G	Python Programming for Mechanical Engineers	AI in Mechanical Engineering

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 An Autonomous Institute
FACULTY OF ENGINEERING
Department of Mechanical Engineering
T.Y. B.Tech SEMESTER VI (Regular)

Course Code	Course Domain	Course Name	Teaching Scheme					Evaluation Scheme					Total
			L	T	P	SL	Credit	Scheme	Max.	Min. Passing	Max.	Min. Passing	
0UMEPC601	F	Machine Design II	3	0	-	4	3	ISE	20	40*	-	-	100
								MSE	20				
								ESE	60				
0UMEPC602	F	Mechanical Measurement and Control System	3	0	0	4	3	ISE	20	40*	-	-	100
								MSE	20				
								ESE	60				
0UMEPE603	F	Program Elective Course (PEC) II	3	0	0	4	3	ISE	20	40*	-	-	100
								MSE	20				
								ESE	60				
0UMEPE604	F	Program Elective Course (PEC) III	3	0	0	4	3	ISE	20	40*	-	-	100
								MSE	20				
								ESE	60				
0UMEOE605	F	Open Elective (OE) II	3	0	0	4	3	ISE	20	40*	-	-	100
								MSE	20				
								ESE	60				
0UMEMD606	F	MDM III	2	0	0	3	2	ISE	20	40*	-	-	100
								MSE	20				
								ESE	60				
0UMEVS607	F,E	Vocational and Skill Enhancement Lab	0	0	2	1	1	ISE	-	-	50	25**	50
0UMEPC608	F	Machine Design II Lab	0	0	2	1	1	ISE	-	-	25	25**	50
								ESE	-	-	25		
0UMEPC609	F	Mechanical Measurement and Control System Lab	0	0	2	1	1	ISE	-	-	25	25**	50
								ESE	-	-	25		
0UMEPR610	F,E	Project Phase- I	0	0	4	3	2	ISE	-	-	25	25**	50
								ESE	-	-	25		
0UMEIR611	E	Internship-II	0	0	4	3	2	ISE	-	-	50	25**	50
TOTAL			17	0	14								
Total Contact Hours Per Week			31			32	24	TOTAL MARKS					850

Course Category	Programme Core Course	Programme Elective Course	Open Elective Course	Multi Disciplinary Minor Course	Value Education	Vocational and Skill Enhancement Course	Ability Enhancement Course	Humanities and Management Course	Internship	Project	Co-curricular Courses	Total
	PC	PE	OE	MD	VE	VS	AE	HM	IR	PR	CC	
Credit	8	6	3	2	-	1	-	-	-	2	2	24

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Note1- * - Scoring 40% in ESE is essential and combining ISE+MSE+ESE =40% for Theory Course

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Note 2- Internship II: Students are expected to complete minimum 60 hours of internship after the fifth semester, and its evaluation will be conducted in the sixth semester.

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FACULTY OF ENGINEERING
Department of Mechanical Engineering

Total Credits in TY

SEM-I	SEM-II	SEM-III	SEM-IV	SEM-V	SEM-VI	TOTAL
22	22	24	24	24	24	140

Program Elective Course (PEC) II:

Course Code	Course Name	Domain
0UMEPE603A	Innovation and Prototype	Design
0UMEPE603B	Fundamentals of Robotics	
0UMEPE603C	Automobile Engineering	Thermal
0UMEPE603D	Solar Technology	
0UMEPE603E	Composite Materials & Structures	Manufacturing
0UMEPE603F	Non Destructive Techniques	

Program Elective Course (PEC) III:

Course Code	Course Name	Domain
0UMEPE604A	Tribology	Design
0UMEPE604B	Reverse Engineering	
0UMEPE604C	Industrial Hydraulics and Pneumatics	Thermal
0UMEPE604D	Power Plant Engineering	
0UMEPE604E	Advanced Manufacturing Processes	Manufacturing
0UMEPE604F	Micro-Electrical Mechanical System	

Open Elective (OE) II:

Course Code	Course Name
0UMEOE605A	Industrial Engineering
0UMEOE605B	Human Resource Management
0UMEOE605C	Production Planning & Control
0UMEOE605D	Materials Management
0UMEOE605E	Artificial Intelligence in Mechanical Engineering

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Yashoda Shikshan Prasarak Mandal's
YASHODA TECHNICAL CAMPUS, SATARA
 An Autonomous Institute
FACULTY OF ENGINEERING
Department of Mechanical Engineering
B.Tech SEMESTER VII (Regular)

Course Code	Course Domain	Course Name	Teaching Scheme					Evaluation Scheme					TOTAL
			L	T	P	S L	Credit	Scheme	Theory		Practical		
									Max.	Min. Passing	Max.	Min. Passing	
0UMEPC701	F	Computer Integrated Manufacturing (CIM)	3	0	0	4	3	ISE	20	40*	-	-	100
								MSE	20				
								ESE	60				
0UMEPC702	F	Refrigeration & Air Conditioning	3	0	0	4	3	ISE	20	40*	-	-	100
								MSE	20				
								ESE	60				
0UMEPE703	F	Professional Elective Course (PEC)- IV	3	0	0	4	3	ISE	20	40*	-	-	100
								MSE	20				
								ESE	60				
0UMEPE704	F	Professional Elective Course (PEC)- V	3	0	0	4	3	ISE	20	40*	-	-	100
								MSE	20				
								ESE	60				
0UMEMD705	F	Multi Disciplinary Minor Course (MDM)- IV	3	0	0	4	3	ISE	20	40*	-	-	100
								MSE	20				
								ESE	60				
0UMEPC706	F,E	Computer Integrated Manufacturing (CIM) Lab	0	0	2	1	1	ISE	-	-	25	25**	50
								ESE	-	-	25		
0UMEPC707	F,E	Refrigeration & Air Conditioning Lab	0	0	2	1	1	ISE	-	-	25	25**	50
								ESE	-	-	25		
0UMEPR708	F	Project Phase- II	0	0	8	6	4	ISE	-	-	50	25**	100
								ESE			50		
0UMECC709	F,E	Co –curricular Courses	0	0	2	1	1	ISE	-	-	50	25**	50
TOTAL			15	0	14	29	22	TOTAL MARKS					750
Total Contact Hours Per Week			29				22						

Course Category	Programme Core Course	Programme Elective Course	Open Elective Course	Multi Disciplinary Minor Course	Value Education	Vocational and Skill Enhancement Course	Ability Enhancement Course	Humanities and Management Course	Internship	Project	Co-curricular Courses	Total
Credit	PC	PE	OE	MD	VE	VS	AE	HM	IR	PR	CC	
	8	6	-	3	-	-	-	-	-	4	1	22

ISE:-In semester evaluation, MSE: - Mid Semester Examination, ESE: - End Semester Examination

Note1- * - Scoring 40% in ESE is essential and combining ISE+MSE+ESE =40% for Theory Course

** - ISE-40%, ESE-50% Combined together needs to be 50% for Laboratory courses for passing

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Department of Mechanical Engineering

Program Elective Course (PEC) IV:

Course Code	Course Name	Domain
0UMEPE703A	Noise & Vibration	Design
0UMEPE703B	Finite Element Analysis	
0UMEPE703C	Power Plant Engineering	
0UMEPE703D	Wind Energy Systems	Thermal
0UMEPE703E	Artificial Intelligence in Manufacturing	Manufacturing
0UMEPE703F	Smart Manufacturing	

Program Elective Course (PEC) V:

Course Code	Course Name	Domain
0UMEPE704A	Advanced Machine Tool Design	Design
0UMEPE704B	Mechanical System Design	
0UMEPE704C	Cogeneration & Waste Heat Management	Thermal
0UMEPE704D	Heat Exchangers	
0UMEPE704E	Powder Metallurgy	Manufacturing
0UMEPE704F	Advanced Manufacturing Processes	

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Yashoda Shikshan Prasarak Mandal's
YASHODA TECHNICAL CAMPUS, SATARA
 An Autonomous Institute
FACULTY OF ENGINEERING
 Department of Mechanical Engineering
B.Tech SEMESTER VIII (Regular)

Course Code	Course Domain	Course Name	Teaching Scheme					Evaluation Scheme					Total
			L	T	P	SL	Credit	Scheme	Theory		Practical		
									Max.	Min. Passing	Max.	Min. Passing	
0UMEPE801	F	Program Elective Course (PEC) VI (MOOC)	2	-	-	4	3	ISE	20	40*	-	-	100
								MSE	20				
								ESE	60				
0UMEIR802	F,E	Internship- III	-	-	2	25	8	ISE	-	-	100	100**	200
								ESE	-	-	100		
TOTAL			2	0	2	29	11	TOTAL MARKS					300
Total Contact Hours Per Week			4										

Course Category	Programme Core Course	Programme Elective Course	Open Elective Course	Multi-Disciplinary Minor Course	Value Education	Vocational and Skill Enhancement Course	Ability Enhancement Course	Humanities and Management Course	Internship	Project	Co-curricular Courses	Total
	PC	PE	OE	MD	VE	VS	AE	HM	IR	PR	CC	
Credit	-	3	-	-	-	-	-	-	8	-	-	11

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Note1- * - Scoring 40% in ESE is essential and combining ISE+MSE+ESE =40% for Theory Course

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Note 2- Internship III: Students are expected to complete minimum 240 hours of internship in the same semester.

Total Credits in BTech

SEM-I	SEM-II	SEM-III	SEM-IV	SEM-V	SEM-VI	SEM-VII	SEM-VIII	TOTAL
22	22	24	24	24	24	22	11	173

Program Elective Course (PEC) VI:

Advanced NPTEL Course (TBD)

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YASHODA TECHNICAL CAMPUS, SATARA
An Autonomous Institute
FACULTY OF ENGINEERING
Department of Mechanical Engineering

Department of Mechanical Engineering

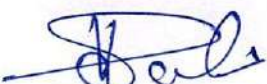
Multidisciplinary Minor Courses (Regular)

Sr. No.	Semester	MDM	Course Code	Course Name	Credit
1	IV	MDM-I	0UMEMD405	Mechanical Systems and Manufacturing	3
2	V	MDM-II	0UMEMD505	Product Life-Cycle Management	3
3	VI	MDM-III	0UMEMD606	Energy Engineering	3
4	VII	MDM-IV	0UMEMD705	Smart Manufacturing	3


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FACULTY OF ENGINEERING
Department of Mechanical Engineering

S.Y. B.Tech SEMESTER III (Working Professional)

Course Code	Course Domain	Course Name	Teaching Scheme					Evaluation Scheme					TOTAL
			L	T	P	SL	Credit	Scheme	Max.	Min. Passing	Max.	Min. Passing	
0UMWPC301	F	Mathematics for Mechanical Engineering	3	1	0	5	4	ISE	20	40*	-	-	100
								MSE	20				
								ESE	60				
0UMWPC302	F	Analysis of Mechanical Elements	3	0	0	4	3	ISE	20	40*	-	-	100
								MSE	20				
								ESE	60				
0UMWPC303	F	Applied Thermodynamics	3	0	0	4	3	ISE	20	40*	-	-	100
								MSE	20				
								ESE	60				
0UMWPC304	F	Material Science and Metallurgy	3	0	0	4	3	ISE	20	40*	-	-	100
								MSE	20				
								ESE	60				
0UMWPC305	F	Machine Drawing	3	0	0	4	3	ISE	20	40*	-	-	100
								MSE	20				
								ESE	60				
0UMWVE306	F	Environmental Studies	2	0	0	1	2	ISE	50	20*	-	-	50
0UMWHM307	F,E	Engineering Economics	2	0	0	1	2	ISE	50	20*	-	-	50
0UMWPC308	F,E	Applied Thermodynamics Lab	0	0	2	1	1	ISE	-	-	25	25**	50
								ESE			25		
0UMWPC309	F	Material Science and Metallurgy Lab	0	0	2	1	1	ISE	-	-	25	25**	50
								ESE			25		
0UMWPC310	F	Analysis of Mechanical Elements Lab	0	0	2	1	1	ISE	-	-	25	25**	50
								ESE			25		
0UMWVS311	F	CAD Lab	0	0	2	1	1	ISE	-	-	50	25**	50
TOTAL			19	1	08								
Total Contact Hours Per Week			28				27	24	TOTAL MARKS				800

Course Category	Program Core Course	Program Elective Course	Open Elective Course	Multi Disciplinary Minor Course	Value Education	Vocational and Skill Enhancement Course	Ability Enhancement Course	Humanities and Management Course	Internship	Project	Co-curricular Courses	Total
	PC	PE	OE	MD	VE	VS	AE	HM	IR	PR	CC	
Credit	19	-	-	-	2	1	-	2	-	-	-	24

ISE:- In semester evaluation, MSE:- Mid Semester Examination, ESE:- End Semester Examination

Note1- * - Scoring 40% in ESE is essential and combining ISE+MSE+ESE =40% for Theory Course

** - ISE-40%, ESE-50% Combined together needs to be 50% for Laboratory courses for passing

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 An Autonomous Institute
FACULTY OF ENGINEERING
Department of Mechanical Engineering

S.Y. B.Tech SEMESTER IV (Working Professional)

Course Code	Course Domain	Course Name	Teaching Scheme					Evaluation Scheme					Total
			L	T	P	SL	Credit	Scheme	Theory		Practical		
									Max.	Min. Passing	Max.	Min. Passing	
0UMWPC401	F	Fluid Mechanics	3	-	-	4	3	ISE	20	40*	-	-	100
								MSE	20				
								ESE	60				
0UMWPC402	F	Production Processes	3	0	0	4	3	ISE	20	40*	-	-	100
								MSE	20				
								ESE	60				
0UMWPC403	F	Energy Conservation and Management	3	0	0	4	3	ISE	20	40*	-	-	100
								MSE	20				
								ESE	60				
0UMWPC404	F	Theory of Machines	3	0	0	4	3	ISE	20	40*	-	-	100
								MSE	20				
								ESE	60				
0UMWMD405	F	MDM I	3	0	0	4	3	ISE	20	40*	-	-	100
								MSE	20				
								ESE	60				
0UMWVE406	F,E	Universal Human Values	2	0	0	3	2	ISE	50	20*	-	-	50
0UMWHM407	F	Entrepreneurship Development	2	0	0	3	2	ISE	50	20*	-	-	50
0UMWPC408	F	Fluid Mechanics Lab	0	0	2	1	1	ISE	-	-	25	25**	50
								ESE			25		
0UMWPC409	F	Theory of Machines Lab	0	0	2	1	1	ISE	-	-	25	25**	50
								ESE			25		
0UMWAE410	F	Ability Enhancement Lab	0	0	2	1	1	ISE	-	-	50	25**	50
0UMWIR411	F,E	Internship-I	0	0	4	2	2	ISE	-	-	50	25**	50
TOTAL			19	0	10	31	24	TOTAL MARKS					800
Total Contact Hours Per Week			29										

Course Category	Programme Core Course	Programme Elective Course	Open Elective Course	Multi Disciplinary Minor Course	Value Education	Vocational and Skill Enhancement Course	Ability Enhancement Course	Humanities and Management Course	Internship	Project	Co-curricular Courses	Total
	PC	PE	OE	MD	VE	VS	AE	HM	IR	PR	CC	
Credit	14	-	-	3	2	-	1	2	-	2	-	24

ISE:-In semester evaluation, MSE: - Mid Semester Examination, ESE: - End Semester Examination

Note1- * - Scoring 40% in ESE is essential and combining ISE+MSE+ESE =40% for Theory Course

** - ISE-40%, ESE-50% Combined together needs to be 50% for Laboratory courses for passing

Note 2- Internship I: Students are expected to complete minimum 60 hours of internship after the third semester, and its evaluation will be conducted in the fourth semester.

Total Credit in SY

SEM-I	SEM-II	SEM-III	SEM-IV	TOTAL
22	22	24	24	92

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T.Y. B.Tech SEMESTER V (Working Professional)

Course Code	Course Domain	Course Name	Teaching Scheme					Evaluation Scheme					TOTAL	
			L	T	P	SL	Credit	Scheme	Theory		Practical			
									Max.	Min. Passing	Max.	Min. Passing		
0UMWPC501	F	Heat & Mass Transfer	3	0	0	4	3	ISE	20	40*	-	-	100	
								MSE	20					
								ESE	60					
0UMWPC502	F	Machine Design I	3	0	0	4	3	ISE	20	40*	-	-	100	
								MSE	20					
								ESE	60					
0UMWPE503	F	Programme Elective Course (PEC) I	3	0	0	4	3	ISE	20	40*	-	-	100	
								MSE	20					
								ESE	60					
0UMWOE504	F	Open Elective (OE) I (MOOC)	3	0	0	4	3	ISE	20	40*	-	-	100	
								MSE	20					
								ESE	60					
0UMWMD505	F	MDM II	3	0	0	4	3	ISE	20	40*	-	-	100	
								MSE	20					
								ESE	60					
0UMWVE506	E	Constitution of India	2	0	0	3	2	ISE	50	20*			50	
0UMWPC507	F,E	Heat Transfer Lab	0	0	2	1	1	ISE	-	-	25	25**	50	
								ESE			25			
0UMWPC508	F	Machine Design I Lab	0	0	2	1	1	ISE	-	-	25	25**	50	
								ESE			25			
0UMWVS509	F	Vocational and Skill Enhancement Lab	0	0	2	1	1	ISE	-	-	50	25**	50	
0UMWAE510	F	Ability Enhancement Course	2	0	0	3	2	ISE	50	20*	-	-	50	
0UMWPR511	F,E	Mini Project	0	0	2	1	1	ISE	-	-	25	25**	50	
								ESE	-	-	25			
0UMWCC512	F	Co –curricular Courses	0	0	2	1	1	ISE	-	-	50	25**	50	
TOTAL			17	0	10		28	22	TOTAL MARKS					850
Total Contact Hours Per Week			27											

Course Category	Programme Core Course	Programme Elective Course	Open Elective Course	Multi Disciplinary Minor Course	Value Education	Vocational and Skill Enhancement Course	Ability Enhancement Course	Humanities and Management Course	Internship	Project	Co-curricular Courses	Total
	PC	PE	OE	MD	VE	VS	AE	HM	IR	PR	CC	
Credit	8	3	3	3	2	1	2	-	-	1	1	24

ISE:-In semester evaluation, MSE: - Mid Semester Examination, ESE: - End Semester Examination

Note1- * - Scoring 40% in ESE is essential and combining ISE+MSE+ESE =40% for Theory Course

** - ISE-40%, ESE-50% Combined together needs to be 50% for Laboratory courses for passing

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Programme Elective Course (PEC): I

Course Code	Course Name	Domain
0UMWPE503A	Product Design and Development	Design
0UMWPE503B	Additive Manufacturing	
0UMWPE503C	Internal Combustion Engines	Thermal
0UMWPE503D	Energy Conservation & Management	
0UMWPE503E	Welding & Joining Technology	Manufacturing
0UMWPE503F	Manufacturing and Automation	

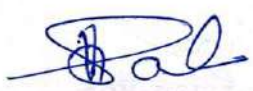
Open Elective (OE): I (MOOC):

Advanced NPTEL Course (TBD)


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T.Y. B.Tech SEMESTER VI (Working Professional)

Course Code	Course Domain	Course Name	Teaching Scheme					Evaluation Scheme					Total				
			L	T	P	SL	Credit	Scheme	Theory		Practical						
									Max.	Min. Passing	Max.	Min. Passing					
0UMWPC601	F	Machine Design II	3	0	-	4	3	ISE	20	40*	-	-	100				
0UMWPC602	F	Mechanical Measurement and Control System	3	0	0	4	3	MSE	20								
								ESE	60								
								ISE	20	40*	-	-	100				
0UMWPE603	F	Program Elective Course (PEC) II	3	0	0	4	3	MSE	20								
								ESE	60								
								ISE	20	40*	-	-	100				
0UMWPE604	F	Program Elective Course (PEC) III	3	0	0	4	3	MSE	20								
								ESE	60								
								ISE	20	40*	-	-	100				
0UMWOE605	F	Open Elective (OE) II (MOOC)	3	0	0	4	3	MSE	20								
								ESE	60								
								ISE	20	40*	-	-	100				
0UMWMD606	F	MDM III	2	0	0	3	2	MSE	20								
								ESE	60								
								ISE	20	40*	-	-	100				
0UMWVS607	F,E	Vocational and Skill Enhancement Lab	0	0	2	1	1	ISE	-					-	50	25**	50
0UMWPC608	F	PCC Lab VIII	0	0	2	1	1	ISE	-					-	25	25**	50
0UMWPC609	F	PCC Lab IX	0	0	2	1	1	ESE			25						
								ISE	-	-	25	25**	50				
0UMWPR610	F,E	Project Phase-I	0	0	4	3	2	ISE	-	-	25			25**	50		
0UMWIR611		Internship-II	0	0	4	3	2	ESE	-	-	25						
								ISE	-	-	50	25**	50				
TOTAL			17	0	14												
Total Contact Hours Per Week			31			32	24	TOTAL MARKS					850				

Course Category	Programme Core Course	Programme Elective Course	Open Elective Course	Multi Disciplinary Minor Course	Value Education	Vocational and Skill Enhancement Course	Ability Enhancement Course	Humanities and Management Course	Internship	Project	Co-curricular Courses	Total
	PC	PE	OE	MD	VE	VS	AE	HM	IR	PR	CC	
Credit	8	6	3	2	-	1	-	-	-	2	2	24

Note1- * - Scoring 40% in ESE is essential and combining ISE+MSE+ESE =40% for Theory Course

** - ISE-50%, ESE-50% Combined together needs to be 50% for Laboratory courses for passing

Note 2- Internship II: Students are expected to complete minimum 60 hours of internship after the fifth semester, and its evaluation will be conducted in the sixth semester.

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Total Credits in TY

SEM-I	SEM-II	SEM-III	SEM-IV	SEM-V	SEM-VI	TOTAL
22	22	24	24	24	24	138

Program Elective Course (PEC) II:

Course Code	Course Name	Domain
0UMWPE603A	Innovation and Prototype	Design
0UMWPE603B	Fundamentals of Robotics	
0UMWPE603C	Automobile Engineering	Thermal
0UMWPE603D	Solar Technology	
0UMWPE603E	Composite Materials & Structures	Manufacturing
0UMWPE603F	Non Destructive Techniques	

Program Elective Course (PEC) III:

Course Code	Course Name	Domain
0UMWPE604A	Tribology	Design
0UMWPE604B	Reverse Engineering	
0UMWPE604C	Industrial Hydraulics and Pneumatics	Thermal
0UMWPE604D	Power Plant Engineering	
0UMWPE604E	Advanced Manufacturing Processes	Manufacturing
0UMWPE604F	Micro-Electrical Mechanical System	

Open Elective (OE): II (MOOC):

Advanced NPTEL Course (TBD)


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B.Tech SEMESTER VII (Working Professional)

Course Code	Course Domain	Course Name	Teaching Scheme					Evaluation Scheme					TOTAL
			L	T	P	SL	Credit	Scheme	Theory		Practical		
									Max.	Min. Passing	Max.	Min. Passing	
0UMWPC701	F	Computer Integrated Manufacturing System (CIMS)	3	0	0	4	3	ISE	20	40*	-	-	100
								MSE	20				
								ESE	60				
0UMWPC702	F	Mechatronics	3	0	0	4	3	ISE	20	40*	-	-	100
								MSE	20				
								ESE	60				
0UMWPE703	F	Professional Elective Course (PEC)- IV	3	0	0	4	3	ISE	20	40*	-	-	100
								MSE	20				
								ESE	60				
0UMWPE704	F	Professional Elective Course (PEC)- V	3	0	0	4	3	ISE	20	40*	-	-	100
								MSE	20				
								ESE	60				
0UMWMD705	F	Multi Disciplinary Minor Course (MDM)- IV	3	0	0	4	3	ISE	20	40*	-	-	100
								MSE	20				
								ESE	60				
0UMWPC706	F,E	Computer Integrated Manufacturing System (CIMS) Lab Mechatronics Lab	0	0	2	1	1	ISE	-	-	25	25**	50
								ESE	-	-	25		
0UMWPC707	F,E	Mechatronics Lab	0	0	2	1	1	ISE	-	-	25	25**	50
								ESE	-	-	25		
0UMWPR708	F	Project Phase- II	0	0	8	6	4	ISE	-	-	50	25**	100
								ESE			50	25**	
0UMWCC709	F,E	Co –curricular Courses	0	0	2	1	1	ISE	-	-	50	25**	50
TOTAL			15	0	14	29	22	TOTAL MARKS					750
Total Contact Hours Per Week			29										

Course Category	Programme Core Course	Programme Elective Course	Open Elective Course	Multi Disciplinary Minor Course	Value Education	Vocational and Skill Enhancement Course	Ability Enhancement Course	Humanities and Management Course	Internship	Project	Co-curricular Courses	Total
	PC	PE	OE	MD	VE	VS	AE	HM	IR	PR	CC	
Credit	8	6	-	3	-	-	-	-	-	4	1	22

ISE:-In semester evaluation, MSE: - Mid Semester Examination, ESE: - End Semester Examination

Note1- * - Scoring 40% in ESE is essential and combining ISE+MSE+ESE =40% for Theory Course

** - ISE-40%, ESE-50% Combined together needs to be 50% for Laboratory courses for passing

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Program Elective Course (PEC) IV:

Course Code	Course Name	Domain
0UMEPE703A	Noise & Vibration	Design
0UMEPE703B	Finite Element Analysis	
0UMEPE703C	Mechanical System Design	
0UMWPE703D	Cogeneration & Waste Heat Management	Thermal
0UMWPE703E	Alternative Fuels	
0UMWPE703F	Renewable Energy Sources	
0UMWPE703G	Powder Metallurgy	Manufacturing
0UMWPE703H	Smart Manufacturing	
0UMWPE703I	Artificial Intelligence in Manufacturing	

Program Elective Course (PEC) V:

Advanced NPTEL Course (TBD)


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B.Tech SEMESTER VIII (Working Professional)

Course Code	Course Domain	Course Name	Teaching Scheme					Evaluation Scheme					Total
			L	T	P	SL	Credit	Scheme	Theory		Practical		
									Max.	Min. Passing	Max.	Min. Passing	
0UMWPE801	F	Program Elective Course (PEC) VI (MOOC)	2	-	-	4	3	ISE	20	40*	-	-	100
								MSE	20				
								ESE	60				
0UMWIR802	F,E	Internship- III	-	-	2	25	8	ISE	-	-	100	100**	200
								ESE	-	-	100		
TOTAL			2	0	2	29	11	TOTAL MARKS					300
Total Contact Hours Per Week			4										

Course Category	Programme Core Course	Programme Elective Course	Open Elective Course	Multi Disciplinary Minor Course	Value Education	Vocational and Skill Enhancement Course	Ability Enhancement Course	Humanities and Management Course	Internship	Project	Co – curricular Courses	Total
	PC	PE	OE	MD	VE	VS	AE	HM	IR	PR	CC	
Credit	-	3	-	-	-	-	-	-	8	-	-	11

ISE:-In semester evaluation, MSE: - Mid Semester Examination, ESE: - End Semester Examination

Note1- * - Scoring 40% in ESE is essential and combining ISE+MSE+ESE =40% for Theory Course

** - ISE-40%, ESE-50% Combined together needs to be 50% for Laboratory courses for passing

Note 2- Internship III: Students are expected to complete minimum 240 hours of internship in the same semester.

Total Credits in BTech

SEM-III	SEM-IV	SEM-V	SEM-VI	SEM-VII	SEM-VIII	TOTAL
24	24	24	24	22	11	129

Program Elective Course (PEC) VI:

Advanced NPTEL Course (TBD)

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Multidisciplinary Minor Courses (Working Professional)

Sr. No.	Semester	MDM	Course Code	Course Name	Credit
1	IV	MDM-I	0UMEMD405	Mechanical Systems and Manufacturing	3
2	V	MDM-II	0UMEMD505	Product Life-Cycle Management	3
3	VI	MDM-III	0UMEMD606	Energy Engineering	3
4	VII	MDM-IV	0UMEMD705	Smart Manufacturing	3


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S.Y. B.Tech SEMESTER III (Working Professional)

Course Structure:

Class	S.Y.B. Tech. Sem. –III
Course Code and Course Title	0UMWPC301 Mathematics for Mechanical Engineering
Prerequisite/s	Differentiation and Integration
Teaching Scheme: Lecture/Tutorial/Practical	03/01/00
Credits	04
Evaluation Scheme: ISE / MSE / ESE	20/20/60

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:		Bloom's Level
0UMWPC301_1	Apply Laplace Transform techniques to solve ordinary differential equations	L3
0UMWPC301_2	Apply Fourier Series and Fourier Transform techniques to represent and analyze periodic engineering functions..	L3
0UMWPC301_3	Implement numerical methods to obtain approximate solutions of engineering problems.	L3
0UMWPC301_4	Analyze partial differential equations arising in heat conduction and vibration problems.	L4

Course Contents :		
Unit 1	Laplace Transform : Definition – conditions for existence ; Transforms of elementary functions; Properties of Laplace transforms - Linearity property, first shifting property, second shifting property, transforms of functions multiplied by t^n , change of scale property, transforms of functions divided by t , transforms of integral of functions, transforms of derivatives ; Evaluation of integrals by using Laplace transform.	7Hrs.
Unit 2	Inverse Laplace Transform : Introductory remarks; Inverse transforms of some elementary functions; General methods of finding inverse transforms; Partial fraction method and Convolution Theorem for finding inverse Laplace transforms; Applications to find the solutions of linear differential equation and simultaneous linear differential equations with constant coefficients.	7Hrs.


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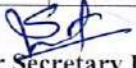
Unit 3	Fourier Series : Introductory remarks- Euler's formulae; Conditions for Fourier series expansion – Dirichlet's conditions; Even and odd functions, Change of interval; Half-range Fourier sine series, Half-range Fourier cosine series, Parseval's identity.	7Hrs
Unit 4	Fourier Transform : Definitions – integral transforms; Fourier integral theorem (without proof); Fourier sine and cosine integrals ; Complex form of Fourier integrals ; Fourier sine and cosine transforms ; Properties of Fourier transforms; Parseval's identity for Fourier Transforms.	7Hrs
Unit 5	Numerical Methods for Ordinary Differential Equations : Euler's method, Euler's modified method, Runge-Kutta method of second order; Runge-Kutta method of fourth order.	7Hrs
Unit 6	Partial Differential Equations and their Applications : Formation of Partial differential equations by eliminating arbitrary constants and functions; solution of PDE; Equations solvable by direct integration; Linear equations of first order (Lagrange's linear equations); Method of separation of variables – applications to find solutions of one dimensional heat flow equation and one dimensional wave equation.	7Hrs

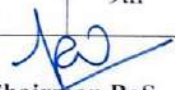
Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Higher Engineering Mathematics	B. S. Grewal	Khanna Publisher	44 th Edition	2021
2	Advanced Engineering Mathematics	H. K. Dass	S. Chand & Company Limited	22nd	2019
3	A textbook of Engineering Mathematics	N.P.Bali & Dr.Manish Goyal	Laxmi Publication	8 th Edition	2011

Reference Books :

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Advanced Engineering Mathematics	Erwin Kreyszig	John Wiley & Sons, New York.	9th	2011


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2	A Text Book of Applied Mathematics (Vol I & II)	P. N. Wartikar and J. N. Wartikar	Pune Vidyarthi Griha Prakashan, Pune.		
3	Higher Engineering Mathematics	B. V. Ramana	Tata McGraw-Hill Publications, New Delhi.		2022
4	Introductory Methods of Numerical Methods	S. S. Sastri	Prentice Hall of India, New Delhi	5th	2012

E- Learning Resources :

Sr. No	Title	Course Instructor	Platform	Web link
1	Introduction to Methods of Applied Mathematics	Prof. Mani Mehra, Prof. Vivek K. Aggarwal	NPTEL	https://onlinecourses.nptel.ac.in/e-learning/preview/noc26_ma108
2	Numerical Analysis	Prof. R. Usha	NPTEL	https://nptel.ac.in/courses/111106101
3	Laplace Transform & Inverse Laplace Transform	Prof. Indrava Roy	NPTEL	https://nptel.ac.in/courses/111106139

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Course Structure:

Class	S.Y- Sem. III
Course Code and Course Title	0UMWPC302, Analysis of Mechanical Elements
Prerequisite/s	-
Teaching Scheme: Lecture/Tutorial/Practical	03/00/00
Credits	03
Evaluation Scheme: ISE / MSE / ESE	20/20/60

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:		Bloom's Level
0UMWPC302_1	Apply stress-strain concepts to determinate and indeterminate members.	L3
0UMWPC302_2	Draw shear force and bending moment diagrams for beams under various loading and support conditions.	L3
0UMWPC302_3	Differentiate bending and shear stress distributions in beam cross-sections.	L4
0UMWPC302_4	Calculate torsional and buckling parameters of shafts and columns using torsion and Euler's theories.	L4
0UMWPC302_5	Evaluate principal stresses and combined stresses using analytical methods and Mohr's circle.	L5
0UMWPC302_6	Determine the stresses on a two-dimensional element by using the theory of failure.	L5

Course Contents:

Unit 1	Simple Stresses & Strains- Introduction to types of loads (Static, Dynamic & Impact Loading) and various types of stresses with applications, Hooke's law, Poisson's ratio, Modulus of Elasticity, Modulus of Rigidity, Bulk Modulus. Interrelation between elastic constants, Stress-strain diagram for ductile and brittle materials, factor of safety, Stresses and strains in determinate and indeterminate beam, homogeneous and composite bars under concentrated loads.	7 Hrs.
Unit 2	Shear Force & Bending Moment Diagrams- Introduction to SFD, BMD with application, SFD & BMD for statically determinate beam due to concentrated load, uniformly distributed load, uniformly varying load, couple and combined loading, Relationship between rate of loading, shear force and bending moment, Concept of zero shear force, Maximum bending moment, point of contra-flexure.	7 Hrs.
Unit 3	Bending stresses and Shearing Stresses- Bending Stress on a Beam: Introduction to bending stress on a beam with application, Theory of Simple bending, assumptions in pure bending, derivation of flexural formula, Moment of inertia of common cross section	7 Hrs.

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	(Circular, Hollow circular, Rectangular, I & T), Bending stress distribution along the same cross-section Shear Stress on a Beam: Introduction to transverse shear stress on a beam with application, shear stress distribution diagram along the Circular, Hollow circular, Rectangular, I & T cross-section.	
Unit 4	Torsion and Buckling- Torsion of circular shafts: Introduction to torsion on a shaft with application, Basic torsion formulae and assumption in torsion theory, Torsion in stepped and composite shafts, Torque transmission on strength and rigidity basis, Torsional Resilience Buckling of columns: Introduction to buckling of column with its application, Different column conditions and critical, safe load determination by Euler's theory. Limitations of Euler's Theory.	8 Hrs.
Unit 5	Principal Stresses- Principal Stresses: Introduction to principal stresses with application, Transformation of Plane Stress, Principal Stresses and planes (Analytical method and Mohr's Circle), Stresses due to combined Normal and Shear stresses.	7 Hrs.
Unit 6	Theories of Elastic failure Introduction to theories of failure with application, Maximum principal stress theory, Maximum shear stress theory, Maximum distortion energy theory, Maximum principal strain theory, Maximum strain energy theory.	6 Hrs.

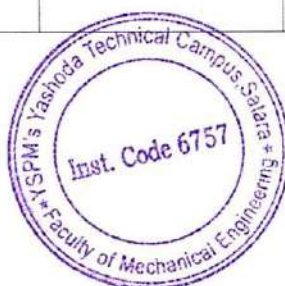
Text Books:

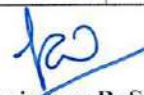
Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Strength of Materials	S. S. Rattan	Tata McGraw Hill Education	3 rd Edition	2016
2	Strength of Materials	S. Ramamrutham	Dhanpat Rai Publishing Company	15 th Edition	2016
3	Strength of Materials	B. K. Sarkar	McGraw Hill Education, New Delhi	3 rd Edition	2010
4	A Textbook of Strength of Materials	R. K. Bansal	Laxmi Publications	6 th Edition	2022

Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Strength of Materials	S. Ramamrutham and R. Narayanan	Dhanpat Rai Publishing Company	17 th Edition	2017
2	Strength of Materials	U. C. Jindal	Pearson Education	2 nd Edition	2016


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3	Advanced Mechanics of Materials	Arthur P. Boresi and Richard J. Schmidt	Wiley	6th Edition	2003
4	Mechanics of Materials	Ferdinand P. Beer, E. Russell Johnston, John T. DeWolf, David F. Mazurek	McGraw Hill Education	9th Edition	2020

E- Learning Resources:

Sr. No.	Title	Course Instructor	Platform	Web Link
1	Strength of Materials	Prof. K. Ramesh, Prof. Tarkes Dora Pallicity	NPTEL	nptel.ac.in/courses/112106319
2	Mechanics of Solids	Prof. B. N. Rao, IIT Madras	NPTEL	nptel.ac.in/courses/112106141


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Course Structure:

Class	S.Y- Sem. –III
Course Code and Course Title	0UMWPC303 Applied Thermodynamics
Prerequisite/s	Basic Engineering Sciences.
Teaching Scheme: Lecture/Tutorial/Practical	03/00/00
Credits	03
Evaluation Scheme: ISE / MSE / ESE	20/20/60

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:		Bloom's Level
0UMWPC303_1	Apply the basic principles of thermodynamics to engineering problems.	L3
0UMWPC303_2	Analyze the second law of thermodynamics and steam properties.	L4
0UMWPC303_3	Analyze fuels, combustion, and steam generation systems.	L4
0UMWPC303_4	Apply thermodynamic principles to steam power plants and refrigeration systems.	L3
0UMWPC303_5	Evaluate the performance of thermal systems for energy conservation.	L5
0UMWPC303_6	Evaluate sustainable thermal engineering practices in industrial applications.	L5

Course Contents:

Unit 1	Fundamentals of Thermodynamics: Introduction to Thermodynamics and its engineering applications. Thermodynamic system, surroundings and boundary. Types of thermodynamic systems (closed, open and isolated systems). Thermodynamic properties: intensive and extensive properties. State, path, process and cycle. Thermodynamic equilibrium. Forms of energy. Heat and work interactions. Zeroth Law of Thermodynamics. First Law of Thermodynamics. Internal energy, enthalpy and specific heats (C_p and C_v). Energy equation for closed systems and steady flow systems. Introduction to Steady Flow Energy Equation (SFEE). Simple numerical problems.	7 Hrs.
Unit 2	Second Law of Thermodynamics and Steam Properties: Limitations of the First Law of Thermodynamics. Heat engines, refrigerators and heat pumps. Kelvin–Planck and Clausius statements of the Second Law of Thermodynamics. Carnot cycle and Carnot theorem. Thermal efficiency and Coefficient of Performance (COP). Entropy and entropy change for simple processes. Pure substances and phase change process. Formation of steam. Thermodynamic properties of steam. Dryness fraction. Use of steam tables. Introduction to the Mollier chart and its engineering applications. Simple numerical problems.	7 Hrs.
Unit 3	Fuels, Combustion and Steam Generators: Classification and properties of solid, liquid and gaseous fuels. Calorific	7 Hrs.


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Department of Mechanical Engineering

	value of fuels. Higher and Lower Calorific Value (HCV and LCV). Combustion of hydrocarbon fuels. Stoichiometric air-fuel ratio. Excess air and its significance. Classification of boilers. Cochran boiler and Babcock & Wilcox boiler. Boiler mountings and accessories. Boiler efficiency. Equivalent evaporation (concept only). Boiler draught: Natural and Artificial draught (concept only). Introduction to Indian Boiler Regulations (IBR).	
Unit 4	Steam Power Plants and Vapour Power Cycles: Layout and working of a steam power plant. Rankine cycle and its processes. Representation of the Rankine cycle on P-V, T-S and h-s diagrams. Effect of boiler pressure, condenser pressure and superheating on Rankine cycle performance. Introduction to reheat and regenerative cycles (concept only). Steam condensers: functions, advantages and classification. Cooling towers: functions and types. Simple numerical problems on the Rankine cycle.	7 Hrs.
Unit 5	Refrigeration and Air Conditioning Fundamentals: Introduction to refrigeration and its applications. Reversed Carnot cycle. Unit of refrigeration. Coefficient of Performance (COP). Vapour Compression Refrigeration (VCR) system. Working principle and components: compressor, condenser, expansion device and evaporator. Refrigerants: desirable properties and classification. Basic concepts of comfort air conditioning and its applications. Environmental aspects: Ozone Depletion Potential (ODP) and Global Warming Potential (GWP). Simple numerical problems on refrigeration.	7 Hrs.
Unit 6	Energy Conservation and Sustainable Thermal Systems: Introduction to energy conservation and energy efficiency. Conventional and renewable energy resources (overview). Waste heat recovery (basic concepts). Thermal insulation and its importance. Cogeneration (concept only). Industrial applications of boilers, steam power plants and refrigeration systems. Introduction to energy auditing. Case studies on energy conservation in thermal engineering applications.	7 Hrs.

Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year
1	Engineering Thermodynamics	P. K. Nag	McGraw Hill Education (India)	7th	2021
2	Basic and Applied Thermodynamics	P. K. Nag	McGraw Hill Education (India)	3rd	2020
3	Thermal Engineering	R. S. Khurmi & J. K. Gupta	S. Chand Publishing	14th	2019
4	Refrigeration and Air Conditioning	C. P. Arora	McGraw Hill Education (India)	3rd	2017


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Department of Mechanical Engineering

Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year
1	Thermodynamics: An Engineering Approach	Yunus A. Çengel & Michael A. Boles	McGraw Hill Education	9th	2019
2	Fundamentals of Engineering Thermodynamics	Michael J. Moran, Howard N. Shapiro, Daisie D. Boettner & Margaret B. Bailey	Wiley	9th	2018
3	Applied Thermodynamics for Engineering Technologists	T. D. Eastop & A. McConkey	Pearson Education	5th	2014
4	Power Plant Engineering	P. K. Nag	McGraw Hill Education (India)	4th	2014

E- Learning Resources:

Sr.	Title	Instructor	Platform	Web Link
1	Engineering Thermodynamics	Prof. V. Raghavan	NPTEL	https://nptel.ac.in/courses/112106320
2	Applied Thermodynamics	Prof. Niranjan Sahoo, Prof. Pranab K. Mondal	NPTEL	https://nptel.ac.in/courses/112106419
3	Refrigeration and Air Conditioning	Prof. Ravi Kumar	NPTEL	https://nptel.ac.in/courses/112107208
4	Thermodynamics	Prof. Anand T. N. C	NPTEL	https://www.nptel.ac.in/courses/127106135
5	Thermodynamics	Various Faculty	MIT OpenCourse Ware	https://ocw.mit.edu/search/?q=thermodynamics

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Department of Mechanical Engineering

Course Structure:

Class	S.Y Sem. -III
Course Code and Course Title	0UMWPC304, Material Science and Metallurgy
Prerequisite/s	Basic Mechanical Engineering
Teaching Scheme: Lecture/Tutorial/Practical	03/00/00
Credits	03
Evaluation Scheme: ISE/ MSE / ESE	20/20/60

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:		Bloom's Level
0UMWPC304_1	Analyze the crystal structures of materials.	L4
0UMWPC304_2	Illustrate different imperfections in the crystal.	L3
0UMWPC304_3	Interpret the mechanism of plastic deformation	L3
0UMWPC304_4	Compare various tests for mechanical properties	L4
0UMWPC304_5	Compare various non-destructive tests	L4
0UMWPC304_6	Demonstrate the use of various macroscopic and microscopic techniques	L4

Course Contents:

Unit 1	Crystal Structures Atomic arrangement: crystalline vs. amorphous materials; unit cell, space lattice, 14 Bravais lattices, lattice parameters, 7 crystal systems; BCC, FCC, and HCP structures: Basic Characteristics: average number of atoms per unit cell, Coordination number, atomic packing factor; Indexing of lattice planes: finding Miller indices of a given plane, drawing a plane with given Miller indices, inter-planar spacing for cubic systems, angle between planes; Indexing of lattice directions, importance, procedure, finding Miller indices of a given direction, drawing a direction with given Miller indices, angle between directions.	08 Hrs.
Unit 2	Crystal Imperfections Importance, Classification: Point defects: vacancy, interstitials, impurities, Frenkel, Schottky defects, Line defects: definition, types, edge, screw, mixed dislocations, characteristics of each type, planar defects: external surfaces, grain boundaries: high and low angle, tilt and twist boundaries; twin boundaries, stacking faults: intrinsic, extrinsic; Volume defects: examples.	07 Hrs.
Unit 3	Mechanism of Plastic Deformation Slip: slip direction, slip plane, slip systems for cubic structures, Mechanism of slip: movement of dislocations; Twinning: twin direction and plane; types:	10 Hrs.

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Department of Mechanical Engineering

	deformation and annealing twinning; slip vs twinning; Deformation of single crystal by slip: Schmid's law, calculation of critical resolved shear stress, sliding and rotation of slip planes; Strain hardening: mechanism, Frank-Read source; Plastic deformation of polycrystalline materials: piling up of dislocations.	
Unit 4	Mechanical Properties and their Testing Tension test, Engineering stress-strain curves, True stress-strain curves, true strain, relationship between engineering and true stress – strain, Evaluation of properties: proportional stress, elastic limit, ultimate tensile strength, breaking or fracture stress, yield stress, proof stress, resilience, toughness, stiffness, ductility, Compression test: Introduction, types of fracture, Poisson's ratio, Formability: Importance, Erichsen test; Hardness testing, different hardness tests: Brinell, Rockwell and Vickers tests; Impact tests: Charpy and Izod.	8 Hrs.
Unit 5	Non-destructive testing: Introduction, dye penetrant test, magnetic particle inspection, ultrasonic test, and eddy current test.	8 Hrs.
Unit 6	Metallography Introduction: Definition, importance; Microscopy: Specimen preparation: Procedure, Metallographic polishing abrasives, Metallographic polishing clothes; Mounting of specimens; Etching: procedure and reagents; Optical metallurgical microscope: Principle of working, construction, and important terms. Macroscopy: Procedure and methods; Macro tests: Sulphur printing, flow lines observation, Examination of fractures: fatigue, tensile, fibrous; Spark test.	8 Hrs.

Text Books

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1.	Material Science and Metallurgy for Engineers	V. D. Kodgire, S.V. Kodgire	Everest Publishing House, Pune,	24th edition	2025
2.	Materials Science and Engineering: An Introduction	W. D. Callister	John Wiley and Sons	5th Edition	2021
3	Introduction to Physical Metallurgy	S. Avner	Tata McGraw Hills Publishers	2nd Revised Edition	2019

Reference Books

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1.	Introduction to Engineering Materials	V. B. John	ELBS	6th Edition	2025

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2.	Materials Science and Engineering	G. F. Carter, D. E. Paul	ASM International	3rd edition	2019
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E- Learning Resources

Sr. No	Title	Course Instructor	Platform	Web link
1.	Materials Science	Prof. Naresh Varma Datla, Prof. S. R. Kale IIT Delhi	NPTEL	nptel.ac.in/courses/112102304
2.	Engineering Materials	Prof. Deepak Mujumdar, IIT Kharagpur	NPTEL	nptel.ac.in/courses/112105294

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Faculty OF ENGINEERING
Department of Mechanical Engineering

Course Structure:

Class	S.Y Sem. –III
Course Code and Course Title	0UMWPC305, Machine Drawing
Prerequisite/s	Engineering Graphics
Teaching Scheme: Lecture/Tutorial/Practical	02/00/00
Credits	02
Evaluation Scheme: ISE/ MSE / ESE	20/20/60

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:		Bloom's Level
0UMWPC305_1	Analyze engineering drawings to identify standards, fits, tolerances, and manufacturing requirements of machine components.	L4
0UMWPC305_2	Interpret surface finish requirements and machining symbols for preparation of production drawings.	L3
0UMWPC305_3	Prepare accurate sectional representations of machine components using conventional drawing practices.	L3
0UMWPC305_4	Evaluate geometric intersections of machine components for developing accurate manufacturing drawings.	L4

Course Contents:		
Unit 1	Introduction to Machine Drawing Types of Drawings, Standardization, Production Drawing, Assembly and part drawings, Blueprint reading, Study, and preparation of bill of materials. Design considerations – Limits, fits, and standardization; Friction and lubrication, Tolerances ISO system of tolerance, Tolerance charts, Hole - base and shaft -base system of tolerance, Types of fits, symbols and applications, values related to various manufacturing processes	08 Hrs.
Unit 2	Surface Roughness & Production Drawing Surface Textures, Roughness values and Roughness Grades, Machining symbols Conventional Representation on part drawings.	07 Hrs.
Unit 3	Sectional Views- Full section, half section, partial section, off-set section, revolved sections, removed sections, auxiliary section, guidelines for hatching, examples on all above types of sections of machine elements.	10 Hrs.
Unit 4	Interpenetration of Surfaces (Emphasis on Applied Cases)- Line or curve of intersection of two penetrating cylinders, Cone and cylinder, prism and a cylinder, cone and prism, Forged ends, etc.	10 Hrs.

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Department of Mechanical Engineering

Text Books

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1.	Engineering Drawing	N. D. Bhatt	Charotar Publishing House, Anand, India.	55 th Edition	2025
2.	Machine Drawing	K. L. Narayana, P. Kannaiah, K. Venkata Reddy	New Age International Publishers	4 th Edition	2021
3	Fundamentals of Machine Drawing	Sadhu Singh	Khanna Publishers	3 rd Edition	2019
4	A Textbook of Machine Drawing	Laxmi Narayana, M. L. Mathur	Jain Brothers, New Delhi	2nd Revised Edition	2022

Reference Books

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1.	Machine Drawing	N. D. Bhatt, V. M. Panchal	Charotar Publishing House Pvt. Ltd., Anand	51 st Edition	2025
2.	Machine Drawing	R. K. Dhawan	S. Chand Publishing	2 nd Edition	2019
3.	Machine Drawing with AutoCAD	Goutam Pohit, Goutam Ghosh	Pearson Education India	2 nd Edition	2018
4.	Machine Drawing	P. S. Gill	S. K. Kataria & Sons	2 nd Edition	2020

E- Learning Resources

Sr. No	Title	Course Instructor	Platform	Web link
1.	Engineering Graphics and Design	Prof. Naresh Varma Datla, Prof. S. R. Kale IIT Delhi	NPTEL	nptel.ac.in/courses/112102304
2.	Engineering Drawing and Computer Graphics	By Prof. Rajaram Lakkaraju, IIT Kharagpur	NPTEL	nptel.ac.in/courses/112105294


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Department of Mechanical Engineering

Course Structure:

Class	S.Y.B. Tech. Sem. –III
Course Code and Course Title	0UMWVE306_Environmental Studies
Prerequisite/s	Nil
Teaching Scheme: Lecture/Tutorial/Practical	02/00/00
Credits	02
Evaluation Scheme: ISE	50

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:		Bloom's Level
0UMWVE306_1	Demonstrate the concepts of natural resources, ecosystems, and biodiversity in addressing environmental issues across disciplines.	L3
0UMWVE306_2	Implement knowledge of causes, effects, and control measures of pollution to develop suitable mitigation strategies.	L3
0UMWVE306_3	Examine environmental ethics and their role in resolving societal and ecological challenges.	L4
0UMWVE306_4	Assess environmental laws and regulations for their effectiveness in societal and industrial contexts.	L4

Course Contents :		
Unit 1	Fundamentals of Environmental Studies: 1.1 Environmental Studies Basics: Definition, scope, and importance, Multidisciplinary nature. 1.2 Ecosystem: Concept, structure, and functions; Producers, consumers, decomposers; Energy flow in ecosystem; Ecological succession. 1.3 Ecological Interactions: Food chains, food webs, Ecological pyramids. 1.4 Types of Ecosystems (Overview): Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, rivers, oceans, estuaries).	7 Hrs.
Unit 2	Natural Resources and Energy Systems: 2.1 Natural Resources: Forest resources: use, over-exploitation, deforestation; Water resources: use, overutilization, floods, drought, dams; Mineral resources: extraction, environmental impacts; Food resources: agriculture, modern practices, impacts. 2.2 Energy Resources: Growing energy needs, Renewable vs non-renewable energy. 2.3 Alternate Energy Sources: Solar energy, Wind energy, Biomass energy, nuclear energy. 2.4 Land Resources: Land as a resource, Land degradation, Soil erosion and desertification, Landslides.	8 Hrs.
Unit 3	Biodiversity and Environmental Pollution: 3.1 Biodiversity: Definition: genetic, species, ecosystem diversity; Biogeographical classification of India, Values of biodiversity - Consumptive, Productive, Social, ethical, aesthetic. 3.2 Biodiversity Issues: India as a mega-diversity nation, Hotspots of	8 Hrs



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FACULTY OF ENGINEERING
Department of Mechanical Engineering

	biodiversity; Threats: habitat loss, poaching, conflicts; Endangered and endemic species. 3.3 Conservation of Biodiversity: In-situ conservation, Ex-situ conservation. 3.4 Environmental Pollution: Definition, causes, effects, and control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, nuclear hazards. 3.5 Waste Management: Solid waste management, Urban and industrial waste control.	
Unit 4	Social Issues, Environmental Ethics & Protection Laws: 4.1 Social Issues and Environment: Sustainable development, Urban environmental problems, Water conservation, rainwater harvesting, Watershed management, Resettlement and rehabilitation issues. 4.2 Global Environmental Issues: Climate change and global warming, Acid rain, Ozone layer depletion, nuclear accidents and holocaust. 4.3 Environmental Ethics: Role of ethics in environmental protection; Case-based understanding. 4.4 Environmental Legislation: Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act. 4.5 Human Population and Environment: Population growth and its impacts, Human rights and environment.	7 Hrs

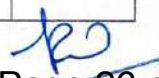
Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Environmental Studies	Erach Bharucha	Universities Press	2nd	2013
2	Environmental Studies	Anubha Kaushik & C. P. Kaushik	New Age International	5th	2018
3	Textbook of Environmental Studies	Deeshita Dave & P. Udaya Bhaskar	Cengage Learning	2nd	2017
4	Environmental Science	Daniel B. Botkin & Edward A. Keller	Wiley India	9th	2014
5	Environmental Studies: From Crisis to Cure	R. Rajagopalan	Oxford University Press	3rd	2016

Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Principles of Environmental Science and Engineering	P. Venugopala Rao	Prentice Hall India	2nd	2006


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Department of Mechanical Engineering

2	Environmental Science	G. Tyler Miller & Scott Spoolman	Cengage Learning	15th	2014
3	Introduction to Environmental Engineering and Science	Gilbert M. Masters & Wendell P. Ela	Pearson	3rd	2008
4	Environmental Pollution Control Engineering	C. S. Rao	New Age International	2nd	2006
5	Environmental Chemistry	A. K. De	New Age International	7th	2010

E- Learning Resources:

Sr. No.	Title	Course Instructor	Platform	Web link
1	Environmental Studies	Prof. T. R. Sreekrishnan	NPTEL/Swayam	https://nptel.ac.in/courses/120108004
2	Environmental Engineering and Science	Prof. B. Sengupta	NPTEL/Swayam	https://nptel.ac.in/courses/105105160
3	Ecology and Environment	Prof. A. K. Sharma	NPTEL/Swayam	https://onlinecourses.swayam2.ac.in/ugc20_ge11
4	Introduction to Environmental Science	Various Instructors	NPTEL/Swayam	https://www.coursera.org/learn/environmental-science
5	Environmental Studies	Dr. Suresh Kumar	NPTEL/Swayam	https://onlinecourses.swayam2.ac.in/ugc20_ge11
6	Global Environmental Management	Technical University of Denmark (DTU)	Coursera	https://www.coursera.org/learn/global-environmental-management
7	Environmental Pollution	Prof. Mukesh Khare	NPTEL/Swayam	https://nptel.ac.in/courses/105102089
8	Climate Change Science and Negotiations	Prof. Anand Patwardhan	NPTEL/Swayam	https://nptel.ac.in/courses/120108002



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Page 27 of 30



Yashoda Shikshan Prasarak Mandal's
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An Autonomous Institute
Faculty OF ENGINEERING
Department of Mechanical Engineering

Course Structure:

Class	S.Y- Sem. -I
Course Code and Course Title	0UMWHM307_Engineering Economics
Prerequisite/s	-
Teaching Scheme: Lecture/Tutorial/Practical	02/00/00
Credits	02
Evaluation Scheme: ISE / MSE / ESE	50/00/00

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:		Bloom's Level
0UMWHM307_1	Analyze macroeconomic policies and economic problems using market dynamics and IS/LM models.	L4
0UMWHM307_2	Examine the impact of market failures, financial systems, and banking policies on inflation.	L4
0UMWHM307_3	Calculate business forecasts and resource allocations using budgets, cost metrics, and linear models.	L3
0UMWHM307_4	Deconstruct patterns of regional, gender, and social exclusion using growth and employment data.	L4

Course Contents:		
Unit 1	Basic Principles and Methodology of Economics Demand/Supply – elasticity –Government Policies and Application. Theory of the Firm and Market Structure. Basic Macroeconomic Concepts (including GDP/GNP/NI/Disposable Income) and Identities for both closed and open economies. Aggregate demand and Supply (IS/LM). Price Indices (WPI/CPI), Interest rates, Direct and Indirect Taxes.	7 Hrs.
Unit 2	Public Sector Economics Welfare, Externalities, Labour Market. Components of Monetary and Financial System, Central Bank –Monetary Aggregates; Commercial Banks & their functions; Capital and Debt Markets. Monetary and Fiscal Policy Tools & their impact on the economy – Inflation and Phillips Curve.	7 Hrs.
Unit 3	Elements of Business/Managerial Economics and forms of organizations Cost & Cost Control –Techniques, Types of Costs, Budgets, Break even Analysis, Capital Budgeting, Application of Linear Programming. Investment Analysis – NPV, ROI, IRR, Payback Period, Depreciation, Time value of money. Business Forecasting – Elementary techniques. Statements – Cash flow, Financial. Case Study Method.(Simple Numerical Expected)	7 Hrs.
Unit 4	Indian economy Brief overview of post independence period – plans. Post reform Growth, Structure of productive activity. Issues of Inclusion – Sectors, States/Regions, Groups of people (M/F), Urbanization. Employment– Informal, Organized, Unorganized, Public, Private. Challenges and Policy Debates in Monetary, Fiscal, Social, External sectors.	7 Hrs.

Text Books:


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Yashoda Shikshan Prasarak Mandal's
YASHODA TECHNICAL CAMPUS, SATARA
 An Autonomous Institute
FACULTY OF ENGINEERING
Department of Mechanical Engineering

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Fundamentals of Engineering Economics	Pravin Kumar	Wiley Precise Text book Series	First	2015
2	Principles of Economics	Mankiw Gregory N	Thompson Asia	Second	2002
3	Managerial Economics	V. Mote, S. Paul, G. Gupta	Tata McGraw Hill	First	2004
4	Engineering Economics	James L. Riggs	McGraw-Hill Education	Fourth	2004

Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Indian Economy	Misra, S.K. and Puri	Himalaya	First	2009
2	Textbook of Business Economics	Pareek Saroj	Sunrise Publishers	First	2003
3	Cost Accounting Principles and Practice	S. P. Jain and K. L. Narang	Kalyani Publishers	Twenty Sixth	2019
4	Macroeconomics	N. Gregory Mankiw	Worth Publishers	Tenth	2019

E- Learning Resources:

Sr. No.	Title	Course Instructor	Platform	Web Link
1	Engineering Economic Analysis	Prof. Pradeep Kumar Jha IIT Roorkee	NPTEL/Swayam	https://onlinecourses.nptel.ac.in/e-learning/preview/noc25_me98

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Yashoda Shikshan Prasarak Mandal's
YASHODA TECHNICAL CAMPUS, SATARA
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FACULTY OF ENGINEERING
Department of Mechanical Engineering

Course Structure:

Class	S.Y. Sem. –III
Lab Code and Lab Title	0UMWPC308, Applied Thermodynamics Lab
Prerequisite/s	Basic Mechanical Engineering
Teaching Scheme: Lecture/Tutorial/Practical	0/0/2
Credits	01
Evaluation Scheme: ESE	50

Course Outcomes (COs)	Bloom's Level
Upon successful completion of this Lab, the student will be able to:	
0UMWPC308_1 Calculate fuel and steam properties by running tests on lab setups and virtual simulators.	L3
0UMWPC308_2 Explain how boilers, refrigeration units, and safety valves work by studying cut-section models.	L2
0UMWPC308_3 Evaluate cooling capacity, COP, and heat transfer rates by conducting trials on refrigeration and heat exchanger test rigs.	L4
0UMWPC308_4 Study real-world power and cooling plants by writing technical reports on industrial field visits.	L4

List of Experiments:

Expt. No.	Title of Experiment
1	Determination of dryness fraction of steam using a Separating and Throttling Calorimeter.
2	Study and structural comparison of Cochran and Babcock & Wilcox boilers using cut-section models.
3	Study and working demonstration of Boiler Mountings (Safety Valve, Water Level Indicator, Pressure Gauge) and Accessories (Economizer, Superheater).
4	Study and demonstration of natural and artificial boiler draught mechanisms using cut-section models.
5	Determination of calorific value of solid/liquid fuel using a Bomb Calorimeter. (Physical setup / Virtual Simulator)
6	Mapping and performance analysis of Rankine Cycle processes on P-V, T-S, and Mollier (h-s) diagrams using steam tables.
7	Performance trial on a Heat Exchanger setup to determine overall heat transfer coefficient and effectiveness.
8	Performance trial on a Vapour Compression Refrigeration (VCR) Test Rig to evaluate COP and refrigeration capacity.
9	Performance trial on a Reciprocating Air Conditioning Test Rig
10	Performance trial on a Mechanical Heat Pump.
11	Performance evaluation and working demonstration of a Vapour Absorption Test Rig.
12	Study, dismantling, and reassembly demonstration of domestic refrigerator and window air conditioner units.
13	Study of refrigeration system components and safety controls (Compressors, Expansion Valves, Filter Drier, HP-LP Cutout, Thermostat) using cut-section models.
14	Determination of thermal conductivity and heat loss through insulating materials (Lagged Pipe / Insulating Powder apparatus).
15	Technical report writing based on a field visit to a local sugar factory boiler house, cold storage plant, or steam power unit.

***Note- Minimum 10 experiments compulsory**

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YASHODA TECHNICAL CAMPUS, SATARA
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Department of Mechanical Engineering

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Engineering Thermodynamics	P. K. Nag	McGraw Hill Education	7th	2021
2	Thermal Engineering	R. S. Khurmi & J. K. Gupta	S. Chand Publishing	15th	2020
3	Refrigeration and Air Conditioning	C. P. Arora	McGraw Hill Education	4th	2020
4	A Course in Thermal Engineering	R. K. Rajput	Laxmi Publications	6th	2018

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Thermodynamics: An Engineering Approach	Y. A. Çengel & M. A. Boles	McGraw Hill Education	9th	2019
2	Applied Thermodynamics for Engineering Technologists	T. D. Eastop & A. McConkey	Pearson Education	5th	2014
3	Fundamentals of Engineering Thermodynamics	M. J. Moran & H. N. Shapiro	John Wiley & Sons	8th	2015
4	Basic and Applied Thermodynamics	P. K. Nag	McGraw Hill Education	2nd	2017

E- Learning Resources:

Sr. No.	Title	Course Instructor	Platform	Web link
1	Applied Thermodynamics	Prof. Niranjana Sahoo / Prof. Pranab K. Mondal	NPTEL (IIT Guwahati)	nptel.ac.in/courses/112106419
2	Virtual Thermal Labs	Ministry of Education Initiative	Virtual Labs	vlab.co.in
3	Refrigeration and Air Conditioning	Prof. Ravi Kumar	NPTEL (IIT Roorkee)	nptel.ac.in/courses/112107208




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Yashoda Shikshan Prasarak Mandal's
YASHODA TECHNICAL CAMPUS, SATARA
An Autonomous Institute
FACULTY OF ENGINEERING
Department of Mechanical Engineering

Course Structure:

Class	S.Y. Sem. –III
Lab Code and Lab Title	0UMWVS309, Material Science and Metallurgy Lab
Prerequisite/s	-
Teaching Scheme: Lecture/Tutorial/Practical	0/0/2
Credits	01
Evaluation Scheme: ESE	50

Course Outcomes (COs)		Bloom's Level
Upon successful completion of this Lab, the student will be able to:		
0UMWVS309_1	Apply suitable material testing methods and analyze the test results.	L3
0UMWVS309_2	Examine and interpret the microstructures of ferrous and non-ferrous materials.	L4
0UMWVS309_3	Analyze materials using non-destructive testing and material identification methods.	L4
0UMWVS309_4	Correlate material microstructures and test results with their properties and applications.	L4

List of Experiments:

Expt. No.	Title of Experiment
1	Brinell Hardness Test
2	Rockwell Hardness Test
3	Impact Test
4	Study of Optical Metallurgical Microscope
5	Specimen Preparation for Microscopy
6	Spark Test
7	Study and drawing of microstructures of plain carbon steels
8	Study and drawing of microstructures of heat-treated steels
9	Dye Penetrant Test
10	Study and drawing of microstructures of non-ferrous materials
11	Erichssen Cupping Test
12	Ultrasonic Test

***Note- Minimum 10 experiments compulsory**

E- Learning Resources

Sr. No	Title	Course Instructor	Platform	Web link
1.	Metallurgical Engineering	Prof. B.S. Murthy IIT Hyderabad	NPTEL	https://nptel.ac.in/courses/113106031


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Course Structure:

Class	S.Y. Sem. –III
Lab Code and Lab Title	0UMWPC310, Analysis of Mechanical Elements Lab
Prerequisite/s	-
Teaching Scheme: Lecture/Tutorial/Practical	0/0/2
Credits	01
Evaluation Scheme: ESE	50

Course Outcomes (COs)		Bloom's Level
Upon successful completion of this Lab, the student will be able to:		
0UMWPC310_1	Perform tensile, compression, torsion, and impact tests on engineering materials to determine their mechanical properties and compare their behavior under different loading conditions.	L3
0UMWPC310_2	Analyze the experimental results obtained from material testing to evaluate stress-strain characteristics, strength, toughness, and ductility of engineering materials.	L4
0UMWPC310_3	Evaluate strain distribution in structural members using strain gauges and strain rosettes to determine the state of stress under loading conditions.	L5
0UMWPC310_4	Conduct virtual laboratory experiments on direct shear, compression, and hardness testing to interpret material behavior using simulation-based learning tools.	L3
0UMWPC310_5	Interpret experimental observations and prepare technical laboratory reports by comparing theoretical and experimental results using standard engineering practices.	L4

List of Experiments:

Expt. No.	Title of Experiment
1	Tension test on ductile material specimen.
2	Tension test on brittle material specimen.
3	Compression test on concrete/ wood specimen.
4	Shear test on mild steel/ aluminum (single and double shear tests).
5	Charpy Impact Test on given specimen.
6	Izod Impact Test on given specimen.
7	Deflection test on mild steel/wooden beam specimen.
8	Determination of Young's modulus using simply supported beam set-up.
9	Strain measurement involving strain gauges/ rosettes.
10	V-Lab- Direct Shear Test on Mild Steel Plate
11	V-Lab- Compression Test on Mild Steel rod.
12	V-Lab-Rockwell Hardness Test

***Note- Minimum 10 experiments compulsory**



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Text Books

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Engineering AutoCAD	A. P. Gautam	Khanna Publishing House	1 st Edition	2026
2	Up and Running with AutoCAD: 2D and 3D Drawing, Design and Modeling	Robert C. Kaebisch & Elliot J. Gindis	Elsevier	1 st Edition	2025
3	Engineering Graphics with AutoCAD	S. N. Lal	Cengage Learning India	1 st Edition	2018
4	Textbook of Engineering Drawing with AutoCAD	K. Venkata Reddy	BS Publications	4 th Edition	2016

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	AutoCAD 2024 Tutorial: First Level 2D Fundamentals	Randy H. Shih	SDC Publications	1 st Edition	2023
2	CAD/CAM: Computer-Aided Design and Manufacturing	M. P. Groover	Pearson Education	1 st Edition	2003
3	Machine Drawing with AutoCAD	Ajeet singh	Tata McGraw Hill	2 nd Edition	2012
4	Engineering Drawing and Design	David A. Madsen & David P. Madsen	Cengage Learning	6 th Edition	2017

E- Learning Resources

Sr. No	Title	Course Instructor	Platform	Web link
1.	Computer Aided Design and Manufacturing	Prof. Anup Chawla, Prof. P.V. Madhusudan Rao IIT Delhi	NPTEL	nptel.ac.in/courses/112102101




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Department of Mechanical Engineering

Course Structure:

Class	S.Y. Sem. -III
Lab Code and Lab Title	0UMWVS311, Computer-Aided Design (CAD) Lab
Prerequisite/s	-
Teaching Scheme: Lecture/Tutorial/Practical	0/0/2
Credits	01
Evaluation Scheme: ESE	50

Course Outcomes (COs)		Bloom's Level
Upon successful completion of this Lab, the student will be able to:		
0UMWVS311_1	Describe the fundamental elements and principles of engineering drawing for graphical representation.	L3
0UMWVS311_2	Construct 2D engineering drawings using AutoCAD commands and drafting tools	L3
0UMWVS311_3	Generate 3D models of mechanical components using AutoCAD modeling techniques.	L3

List of Experiments:

Expt. No.	Title of Experiment
1	Introduction to elements of drawing
2	To develop the given model by using auto cad 2D commands and to specify its Dimension.
3	To develop the given model by using auto cad 2D commands and to specify its Dimension
4	To develop the given model by using auto cad 2D commands and to specify its Dimension
5	To create a 2D view of the given simple machine component using Auto CAD
6	To create a 2D view of the given simple machine component using Auto CAD
7	To create a 2D view of the given simple machine component using Auto CAD
8	To create a 2D view of the given simple machine component using Auto CAD
9	To draw 3-D model of one simple machine component using AutoCAD
10	To draw 3-D model of one simple machine component using AutoCAD
11	To draw 3-D model of one simple machine component using AutoCAD

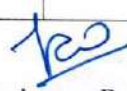
***Note- Minimum 10 experiments compulsory**

Text Books

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Engineering AutoCAD	A. P. Gautam	Khanna Publishing House	1 st Edition	2026
2	Up and Running with AutoCAD: 2D and 3D Drawing, Design and Modeling	Robert C. Kachiseth & Elliot J. Gindis	Elsevier	1 st Edition	2025


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3	Engineering Graphics with AutoCAD	S. N. Lal	Cengage Learning India	1 st Edition	2018
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E- Learning Resources

Sr. No	Title	Course Instructor	Platform	Web link
1.	Computer Aided Design and Manufacturing	Prof. Anup Chawla, Prof. P.V. Madhusudan Rao IIT Delhi	NPTEL	nptel.ac.in/courses/112102101



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