# SWVSM'S

# Tatyasaheb Kore Institute of Engineering and Technology, Warananagar

(An Autonomous Institute)



# **Structure and Curriculum**

# For

# **First Year B.Tech**

(Common to All Branches)

w.e.f AY 2020-2021

# SWVSM'S

# Tatyasaheb Kore Institute of Engineering and Technology, Warananagar

# **Abbreviations**

Sr. No.	Acronym	Definition
1	BSC	<b>Basic Sciences Courses</b>
2	ESC	<b>Engineering Science Courses</b>
3	HSC	Humanities and Social Science Courses
4	ISE	<b>In-Semester Examination</b>
5	ISE-I	In-Semester Examination-I
6	ISE-II	In-Semester Examination-II
7	ESE	<b>End Semester Examination</b>
8	L	Lecture
9	Р	Practical
10	0	Oral
11	PE	Practical Exam
12	POE	Practical and Oral Exam
13	Т	Tutorial
14	СН	Contact Hours
15	С	Credit
16	ISA	In-semester Assessment
17	ESA	End Semester Assessment

# Tatyasaheb Kore Institute of Engineering and Technology, Warananagar (An Autonomous Institute) First Year B.Tech (Sem-I)

**Physics Group** (Common to All Branches)

Course			<b>Teaching and Credit</b>					Examination & Evaluation Scheme			
Course	<b>Course Title</b>	Category		S	che	me		Component	Monka	Min for	Max
Coue			L	P	Τ	СН	С	Component	WIARKS	Passing	Marks
	Fngineering							ISE-I	30	12	30
ASH101	Physics	BSC	3			3	3	ISE-II	30	12	50
								ESE	70	28	70
A GI1107	Engineering	DOG	2			2	2	ISE-I	30	12	30
ASH105	Mathematics-I	BSC	3			3	3	ISE-II ESE	30	28	70
	Basic Electrical							ISE-I	30	20	70
ASH113	and Electronics	ESC	3			3	3	ISE-II	30	12	30
	Engineering					_		ESE	70	28	70
	Pagia Civil							ISE-I	30	12	20
ASH117	Easic Civil Engineering	ESC	3			3	3	ISE-II	30	12	50
	Lingineering							ESE	70	28	70
A GI I 1 0 1	Computer Aided	FRO	2					ISE-I	30	12	30
ASH121	Engineering	ESC	2			2	2	ISE-II	30	20	70
	Professional							ESE	70	20	70
ASH109	Communication	HSC	1			1	1				
	Engineering							ISA-I	25		
ASH102	Physics Lab	BSC		1		2	1	ISA-II	25	10	25
	5							ESA	25		
	Engineering	200						ISA-I	25	10	
A5H106	Mathematics-I	BSC			1	1	1	ISA-II	25	10	25
	Tutoriai							ESA	25		
A GIULI 1 4	Basic Electrical	FGG		1			1	ISA-I	25		25
ASH114	and Electronics Engineering Lab	ESC		1		2	1	ISA-II	25	10	25
								ESA	25		
	Basic Civil							ISA-I	25	1.0	
ASH118	Engineering Lab	ESC		1		2	1	ISA-II	25	10	25
								ESA	25		
								ISA-I	25		
	Computer Aided	799						ISA-II	25	10	25
ASH122	Engineering Drawing Lab	ESC		1		2	1	ESA	25	1	
	C							POE	25	10	25
								ISA-I	50		
4.011110	Professional	und		1			1	ISA-II	50	20	50
ASH110	Communication	HSC		1		2	1	ESA	50		
	Lau							POE	50	20	50
	XX7 1 1							ISA-I	50		
ASH125	Workshop Practice Lab	ESC		1		2	1	ISA-II	50	20	50
	Fractice Lab							ESA	50		
Mandator	y Audit Course-I:							105	<b>7</b> 03	<b>0</b> 0:t	<b>5</b> 0.1
Democra	cy, Elections and							ISE	50*	20*	50*
0000		 r	15	(	1	20	22				000
1	ΙΟΙΑ	L	12	0		28	<i>11</i>				<b>ð</b> UU

# Tatyasaheb Kore Institute of Engineering and Technology, Warananagar (An Autonomous Institute) First Year B.Tech (Sem-I)

Chemistry Group (Common to All Branches)

			Teaching and Credit				edit	Examination & Evaluation Scheme			heme
Course	Course Title	Catagony		S	che	me				Min	Mar
Code	Course Thie	Category	т	D	Т	CII	C	Component	Marks	for	Marka
			L	P	L	Сн	C			Passing	IVIALKS
	Engineering							ISE-I	30	12	30
ASH103	Chemistry	BSC	3			3	3	ISE-II	30	12	30
	Chemistry							ESE	70	28	70
	Engineering							ISE-I	30	12	30
ASH105	Mathematics-I	BSC	3			3	3	ISE-II	30	12	50
	Wathematics-1							ESE	70	28	70
	Computer							ISE-I	30	12	30
ASH115	Programming in C	ESC	2			2	2	ISE-II	30	12	50
	r togramming m e							ESE	70	28	70
	Applied							ISE-I	30	12	30
ASH119	Mechanics	ESC	3			3	3	ISE-II	30	12	50
	Wieenames							ESE	70	28	70
	<b>Basic Mechanical</b>							ISE-I	30	12	30
ASH123	Engineering	ESC	3			3	3	ISE-II	30	12	50
	Lingineering							ESE	70	28	70
A CI 100	Professional	UCC	1			1	1				
ASH109	Communication	HSC	1			1	1				
								ISA-I	25		
	Due is at Dara d							ISA-II	25	10	25
ASH126	Project Based	ESC		1		2	1	ESA	25	10	20
	Learning							Dragontation	25	10	25
								Fresentation	23	10	
4.01110.4	Engineering	DCC		ISA-I	25	10	25				
ASH104	Chemistry Lab	BSC		1		2	1	ISA-II	25	10	25
	•							ESA	25		+
	Engineering							ISA-I	25		
ASH106	Mathematics-I	BSC			1	1	1	ISA-II	25	10	25
	Tutorial							ESA	25		
								ISA-I	25		
	Computer							ISA-II	25	10	25
ASH116	Programming in C	ESC		1		2	1	ESA	25		
	Lab							POE	25	10	25
									25	10	20
A ST1120	Applied	ESC		1		2	1	ISA-I	25	10	25
ASH120	Mechanics Lab	ESC		1		Z	1	ISA-II	25	10	23
								ESA ISA I	25		
A SU124	<b>Basic Mechanical</b>	ESC		1		2	1		25	10	25
ASH124	Engineering Lab	ESC		1		Z	1		25	10	23
									<u> </u>		
	Professional								50	20	50
ASH110	Communication	HSC		1		2	1		50	20	50
1.011110	Lab	110 0		-		_	-	ESA	50	• •	
								POE	50	20	50
Mandato	ry Audit Course-I:										
Democr	acy, Elections and							ISE	50*	20*	50*
Goo	d Governance										
	TOTAL	,	15	6	1	28	22				800

# Tatyasaheb Kore Institute of Engineering and Technology, Warananagar (An Autonomous Institute)

# First Year B.Tech (Sem-II)

Chemistry Group

(Common to All Branches)

G			Teaching and Credit				edit	Examination & Evaluation Scheme			heme
Course	<b>Course Title</b>	Category		S	chei	me				Min for	Max
Code			L	Р	Т	СН	С	Component	Marks	Passing	Marks
				-	-	011	Ū	ISE-I	30	_	
ASH103	Engineering	BSC	3			3	3	ISE I	30	12	30
1011105	Chemistry	DBC	5			5	5	ESE	70	28	70
								ISE-I	30	20	70
ASU107	Engineering	PSC	2			2	2		30	12	30
ASIII07	Mathematics-II	DSC	5			5	5	ISE-II ESE	70	28	70
									30	20	70
A CI I 1 1 5	Computer	ESC	2			2	2		30	12	30
ASHIIS	Programming in C	LSC				2	2		70	20	70
									20	28	/0
ACU110	Applied	ESC	2			2	2	ISE-I	20	12	30
ASHI19	Mechanics	ESC	3			3	3	ISE-II	30 70	20	70
								ESE	70	28	/0
A G11102	Basic Mechanical	FGC	2			2	2	ISE-I	20	12	30
ASH123	Engineering	ESC	3			3	3	ISE-II	30	20	70
								ESE	/0	28	70
A CI I 1 1		USC	1			1	1				
АЗНІП	Soft Skills	пъс				1	1				
								ISAI	25		
	H126 Project Based							ISA-II	25	10	25
ASH126		ESC		1		2	1	ESA	25	10	23
	Learning							Dresentation	25	10	25
								Tresentation	23	10	23
4 011104	Engineering	DOG		1			1	ISA-I	25	10	25
ASH104	Chemistry Lab	BSC		1		2	1	ISA-II	25	10	25
								ESA	25		
	Engineering							ISA-I	25		
ASH108	Mathematics-II	BSC			1	1	1	ISA-II	25	10	25
	Tutorial							ESA	25		
								ISAI	25		
	Computer								25	10	25
ASH116	Programming in C	ESC		1		2	1		25	10	23
	Lab							LSA	23	10	
								POE	25	10	25
	Applied					_		ISA-I	25		
ASH120	Mechanics Lab	ESC		1		2	1	ISA-II	25	10	25
								ESA	25		
A SU124	Basic Mechanical	ESC		1		2	1	ISA-I	25	10	25
ASH124	Engineering Lab	LSC		1		2	1	ISA-II ESA	25	10	23
								ISA-I	50		
								ISA-II	50	20	50
ASH112	Soft Skills Lab	HSC		1		2	1	ESA	50		
								DOE	50	20	50
								FUE	50	20	50
Mandato	ry Audit Course-II:							ISE	50*	20*	50*
Wate	er Management									-	-
	TOTAL	,	15	6	1	28	22				800

# Tatyasaheb Kore Institute of Engineering and Technology, Warananagar (An Autonomous Institute) First Year B.Tech (Sem-II)

# **Physics Group** (Common to All Branches)

				Tea	chir	ng and	l	Examination & Evaluation Scheme			
Course	<b>Course Title</b>	Category		Cree	dit S	chem	e	<i>a</i> .		Min for	Max
Code			L	P	Т	СН	С	Component	Marks	Passing	Marks
	<b></b> .							ISE-I	30	10	20
ASH101	Physics	BSC	3			3	3	ISE-II	30	12	30
	ritysics							ESE	70	28	70
	Enclassing							ISE-I	30	12	30
ASH107	Mathematics-II	BSC	3			3	3	ISE-II	30	12	30
	Wathematics II							ESE	70	28	70
	Basic Electrical							ISE-I	30	12	30
ASH113	and Electronics	ESC	3			3	3	ISE-II	30	12	50
	Engineering							ESE	70	28	70
	Basic Civil							ISE-I	30	12	30
ASH117	Engineering	ESC	3			3	3	ISE-II	30	12	50
	8							ESE	70	28	70
	Computer Aided							ISE-I	30	12	30
ASH121	Engineering	ESC	2			2 2	2	ISE-II	30	12	20
	Drawing							ESE	70	28	70
A CI 111	Soft Shills	USC	1			1	1				
АЗПІТІ	Soft Skills	пъс	1			1	1				
	Engineering							ISA-I	25		
ASH102	Physics Lab	BSC		1		2	1	ISA-II	25	10	25
	T Hysics Lab							ESA	25		
	Engineering							ISA-I	25		
ASH108	Mathematics-II	BSC			1	1	1	ISA-II	25	10	25
	Tutorial							ESA	25	-	
						ISA-I	25				
ASH114	and Electronics	ESC		1		2	1	ISA-II	25	10	25
	Engineering Lab							ESA	25	-	23
								ISA-I	25		
ASH118	Basic Civil	ESC		1		2	1	ISA-II	25	10	25
11011110	Engineering Lab	2.5 0		-		_	-	ESA	25		
			<u> </u>					ISA-I	25		
A G11100	Computer Aided	FRG						ISA-II	25	10	25
ASH122	Engineering	ESC		1		2	1	ESA	25		
	Drawing Lab							POE	25	10	25
								ISA-I	50		
								ISA-II	50	20	50
ASH112	Soft Skills Lab	HSC		1		2	1	ESA	50		
								POE	50	20	50
	Warlah							ISA-I	50		
ASH125	WORKShop Practice Lab	ESC		1		2	1	ISA-II	50	20	50
								ESA	50		
Mandator Water	ry Audit Course-II r Management							ISE	50*	20*	50*
	TOTAL	L	15	6	1	28	22				800

Course Code		Course Title							
ASH101		Engineering Physics							
Teaching Scheme	Theory	Practical	Tutorial	Т	'otal				
(Hrs)(Per week)	3		-		3				

3

	Marks								
Examination Scheme	ISE	ESE	ISA	0	Р	POE	Total		
	30	70					100		
Duration	ISE: One	Hour			ESE: Two Hours and Thirty min.				

Course Objectives: The objective of the course is to

3

- To provide the useful fundamental concepts of Physics to all Engineering disciplines.
- To make the student aware of new techniques in Physics applicable to engineering practices.

Course (	Course Outcomes:								
Cos	At the end of successful completion of the course the student will be able to	Blooms							
		Taxonomy							
CO1	Apply the knowledge of basic quantum mechanics to understand wave particle	Understand							
	dualism								
CO2	Analyze the different crystal structure by understanding crystallography	Analyze							
CO3	Utilize nanophysics theory and phenomenon to produce Nanomaterials	Apply							
CO4	Understand the basic requirements of Architectural Acoustics	Understand							
CO5	Explain the different phenomenon of light.	Remember							
CO6	Discuss concepts and applications of LASER and techniques and modern	Understand							
	engineering tools necessary for nuclear power plant.								

### **Description:**

**Credit Assigned** 

Engineering Physics course is offered as the basic science course. This course contains crystal structures and their properties, Nanomaterial and Nanotechnology, Architectural acoustics, light phenomenon's, wave –particle dualism and nuclear energy that are useful fundamental concepts of Physics to all Engineering disciplines and to make the student aware of new techniques in Physics applicable to engineering practices.

Duonograficitoge	1:	Fundamentals of quantum mechanics and Crystal structure
Prerequisites:	Different phenomenon of light and sound	
	3:	Essentials of Nanomaterials and Nuclear energy

	Tatyasaheb Kore Institute of Engineering and Technology,							
	Warananagar							
	COURSE CONTENT							
nit		TT	00					

	COURSE CONTENT		
Unit No	Course Description	Hours	COs
	Section-I		
	Wave Mechanics		
	Introduction, Wave-particle dualism (De-Broglie's Hypothesis -light and		
	matter)		
	De-Broglie's wavelength in terms of Kinetic Energy, Potential Difference	06	CO1
1	and Temperature		
	Properties of matter waves, Heisenberg's uncertainty principle for		
	position and momentum		
	Compton Effect (statement, explanation and formula)		
	Photoelectric Effect		
	Numerical.		

	Crystallography		
2	Introduction, Basics of crystal structure -Space Lattice, Basis, crystalline		
	solid and Unit cell (geometry and types)		
	Bravais lattice, Seven crystal system,		
	Properties of unit cell for SC, BCC and FCC (number of atoms per unit		
	cell, coordination number, atomic radius and packing density)	08	CO2
	Relation between density and lattice constant		
	Symmetry elements of cubic crystal		
	Miller indices (procedure, features and sketches for planes)		
	Bragg's law, Bragg's x-ray spectrometer		
	Numerical.		

	Nanoscience and Nanotechnology		
	Introduction, Nanomaterials, Nanoscience and Nanotechnology		
	Top down and bottom up approaches		
	Production techniques - Ball milling and Colloidal		
3	Types of nanomaterial, Properties of material at nanoscale (Surface to	07	CO3
5	Volume ratio and Quantum confinement effect)	07	005
	Applications of nanomaterials		
	Characterizations - Scanning Tunneling Microscope and Atomic Force		
	Microscope		
	Carbon Nanotube - Structure and types of CNT.		

	Section-II					
	Architectural Acoustics					
	Introduction, Reverberation, Reverberation time, Absorption coefficient					
4	Average absorption coefficient, Sabine's formula for reverberation time					
	(no derivation)	06	CO4			
	Factors affecting architectural acoustics and their remedy					
	Conditions for good acoustics					
	Numerical					

	vvarananagar		
5	Wave Optics         Introduction, Theories of light         Interference of light and types, Diffraction of light and types         Construction of diffraction grating, Theory of fraunhofer diffraction by         double slit         Rayleigh criterion for limit of resolution, Resolving power of plane         transmission grating         Polarisation of light, double refraction, Huygens' theory of double         refraction         Optical Activity, Specific Rotation, Quarter wave plate and half wave         plate         Laurent's half shade polarimeter         Numerical.	08	CO5

	LASER and Nuclear Physics		
	LASER: Introduction, Absorption, spontaneous emission and stimulated		
	emission of radiations		
	Population inversion, Pumping energy, Characteristics of laser beams,		
	Engineering (Industrial) and medical applications, Ruby laser		
6	Nuclear Energy: Introduction, Nuclear Fission	07	CO6
	Energy released by 1 Kg of U235		
	Chain reaction and critical size, Nuclear fission reactor		
	Nuclear fusion, Thermonuclear reactions (proton-proton chain and		
	Carbon Nitrogen cycle)		
	Numerical		

Course Code		Course Title					
ASH102		Engineering Physics Lab					
Teaching Scheme	Theory	Practical	Tutorial	Т	'otal		
(Hrs)(Per week)	-	2	-		2		
Credit Assigned	-	1	-		1		

				Mar	ks		
Examination Scheme	ISE	ESE	ISA	0	Р	POE	Total
			25				25
Duration	ISA:						

### **Suggested List of Experiments**

Minimum 08 experiments should be performed from the following list.

Number	Practical/ Experiment/Tutorial Topic	Hrs.	Cognitive levels of attainment as per Bloom's
1	Measurements in Physics	02	Knowledge
2	2 Resistor and Capacitor Code		Knowledge
3	3 Divergence of LASER Beam		Knowledge
4	4 Wavelength of different spectral lines of mercury using grating.		Knowledge
5 Specific rotation by Polarimeter		02	Knowledge
6	6 Resolving power of Telescope		Knowledge
7	7 Measurement of Band Gap Energy		Knowledge
8	8 Study of seven Crystal Structure, Bravais Lattice and Properties of unit cell		Knowledge
9	Study of Symmetry Elements of Cubic Crystal	02	Knowledge
10	Determination of Interplaner distance using XRD pattern	02	Knowledge
11	Miller Indices	02	Knowledge
12	Determination of e/m of an electron	02	Knowledge
13	Resolving power of diffraction grating	02	Knowledge
14	Grating constant of diffraction grating	02	Knowledge
15	Determination of wavelength of LASER using diffraction grating.	02	Knowledge

Ref	erence Books
1	R. K. Gaur & Gupta S. L, Engineering Physics – Dhanapat Rai Publication
2	B. L. Theraja -Modern Physics - S. Chand & Company Ltd., Delhi
3	Subramanyam & BrijLal, A Text Book of Optics -S. Chand & Company (P.) Ltd.
4	M. N. Avadhanulu & P. G. Kshirsagar - A Text Book of Engineering Physics -S. Chand Publication.
5	B. K. Pandey and S. Chaturvedi- Engineering Physics, Cengage Learning
6	S. O. Pillai, Solid State Physics: Structure & Electron Related Properties, Eastern Ltd., New Age
	International Ltd.
7	Charles Kittle, Introduction to Solid State Physics - Wiley India Pvt. Ltd.
8	V. Rajendran – Engineering Physics- Mc. Graw Hills
9	Alan Giambattista and others- Fundamentals of physics, Tata Mc. Graw Hills
10	Vijay Kumari- Engineering Physics, Vikas Publications
11	Resnick Halliday, Physics Volume-I, Krane -John Wiley & Sons Pub.
12	Resnick Halliday, Physics Volume-II, Krane -John Wiley & Sons Pub.
13	Hitendra K. Malik, A. K. Singh – Engineering Physics - Tata Mc. Graw Hills Education Private Ltd.
14	A. Beiser – Concepts of Modern Physics - Tata Mc. Graw Hills
15	L. J. Schiff – Quantum Mechanics - Tata Mc. Graw Hills

(An Autonomous Institute Affiliated to Shivaji University, Kolhapur)

Course Code		Course Title				
ASH105	Engineering Mat	ngineering Mathematics-I				
Teaching Scheme	Theory	Practical	Tutorial	Т	'otal	
(Hrs)(Per week)	3	-			3	
Credit Assigned	3	-			3	

				Marks			
Examination	ISE	ESE	ISA	0	Р	POE	Total
Scheme	30	70		-	-	-	100
Duration	ISE: One	Hour		ESE: Two	o Hours an	d Thirty 1	nin.

Cours	e Objec	tives: The objective of the course is				
•	• To provide detailed of matrices which is applied for solving system of linear equations and useful in various fields of technology					
•	• This course enables the students to learn the concept of imaginary numbers and gives awareness					
	about	algebra of complex numbers which helps in understanding of engineering sul	bjects like			
	electri	cal circuits, Electromagnetic wave theory, and complex analysis etc.				
•	To bu equati	ild ability to solve numerically system of linear equations, algebraic and trans ons. To provide an overview of the experimental aspect of applied mathemati	scendental ics.			
•	This c	ourse enables to provide an overview of partial derivatives and its application	ns which is			
	used f	or solving optimization problems and concepts is needed in study of wave, he	eat equation of			
	variou	s orders and also in calculation of errors in various engineering subjects.				
Course	e Outco	omes:				
Cos		At the end of successful completion of the course the student will be	Blooms			
		able to	Taxonomy			
CO1		Find rank of matrix and solve system of linear equation.	Knowledge,			
			Application			
CO2		Find eigen values and eigen vectors and verifies cayley Hamilton's	Application Understanding,			
CO2		Find eigen values and eigen vectors and verifies cayley Hamilton's theorem	Application Understanding, Evaluation			
CO2 CO3		Find eigen values and eigen vectors and verifies cayley Hamilton's theorem Apply De Moivre's Theorem to find roots of complex numbers, expand	Application Understanding, Evaluation Understanding,			
CO2 CO3		Find eigen values and eigen vectors and verifies cayley Hamilton's theorem Apply De Moivre's Theorem to find roots of complex numbers, expand powers of sinnθ and cosnθ	Application Understanding, Evaluation Understanding, Apply			
CO2 CO3 CO4		Find eigen values and eigen vectors and verifies cayley Hamilton's theorem         Apply De Moivre's Theorem to find roots of complex numbers, expand powers of sinnθ and cosnθ         Solve system of liner equations numerically.	Application Understanding, Evaluation Understanding, Apply Understanding,			
CO2 CO3 CO4		Find eigen values and eigen vectors and verifies cayley Hamilton's theorem         Apply De Moivre's Theorem to find roots of complex numbers, expand powers of sinnθ and cosnθ         Solve system of liner equations numerically.	Application Understanding, Evaluation Understanding, Apply Understanding, Apply			
CO2 CO3 CO4 CO5		Find eigen values and eigen vectors and verifies cayley Hamilton's theorem         Apply De Moivre's Theorem to find roots of complex numbers, expand powers of sinnθ and cosnθ         Solve system of liner equations numerically.         Compute forward and backward difference, Apply Newton's & Lagranges	Application Understanding, Evaluation Understanding, Apply Understanding, Apply Remember,			
CO2 CO3 CO4 CO5		Find eigen values and eigen vectors and verifies cayley Hamilton's theorem         Apply De Moivre's Theorem to find roots of complex numbers, expand powers of sinnθ and cosnθ         Solve system of liner equations numerically.         Compute forward and backward difference, Apply Newton's & Lagranges interpolation Formulae.	Application Understanding, Evaluation Understanding, Apply Understanding, Apply Remember, Application			
CO2 CO3 CO4 CO5 CO6		Find eigen values and eigen vectors and verifies cayley Hamilton's theoremApply De Moivre's Theorem to find roots of complex numbers, expand powers of sinnθ and cosnθSolve system of liner equations numerically.Compute forward and backward difference, Apply Newton's & Lagranges interpolation Formulae.Find partial derivative and apply it to find maxima & Minima of function	Application Understanding, Evaluation Understanding, Apply Understanding, Apply Remember, Application Knowledge,			
CO2 CO3 CO4 CO5 CO6		Find eigen values and eigen vectors and verifies cayley Hamilton's theoremApply De Moivre's Theorem to find roots of complex numbers, expand powers of sinnθ and cosnθSolve system of liner equations numerically.Compute forward and backward difference, Apply Newton's & Lagranges interpolation Formulae.Find partial derivative and apply it to find maxima & Minima of function of two variable	Application Understanding, Evaluation Understanding, Apply Understanding, Apply Remember, Application Knowledge, Understanding,			

### **Description:**

Engineering Mathematics-I course is offered as the basic science course. This course contains Mathematical methods and techniques that are typically used in engineering to solve complex engineering problems. This course has six units namely i) Matrices and Solution of Linear System Equations ii) Eigen Values and Eigen vectors, iii) Complex Numbers, iv) Numerical Solution of linear simultaneous equations, v) Finite Differences, vi) Partial Differentiation and its Application

Duono guigitogo	1:	Determinant, Matrix algebra
Prerequisites:	2:	Basic knowledge of complex numbers
	3:	Differentiation and integration formulae.

	COURSE CONTENT		
Unit No	Course Description	Hours	COs
	Section-I		
1	Matrices and Solution of Linear System Equations		
	• Rank of matrix: Definition,		CO1
	• Normal form and echelon form		
	<ul> <li>System of linear homogeneous equations</li> </ul>		
	<ul> <li>System of linear Non-homogeneous equations</li> </ul>		
2	Eigen Values and Eigen vectors		
	• Eigen Values	07	CO2
	<ul> <li>Properties of Eigen Values</li> </ul>		
	• Eigen vectors		
	<ul> <li>Properties of Eigen vectors</li> </ul>		
	• Cayley-Hamilton's theorem (Without proof)		

3	Complex Numbers		
	• De Moivre's Theorem (Without proof)	07	CO3
	• Roots of complex numbers by using De Moivre's Theorem		
	• Expansion of sinn $\theta$ and cosn $\theta$ in powers of sin $\theta$ and /or cos $\theta$ .		
	• Circular functions of a complex variable		
	• Hyperbolic and Inverse Hyperbolic Functions- definitions .		

	Section-II		
4	Numerical Solution of linear simultaneous equations		
	Gauss elimination method	07	CO4
	• Gauss-Jordan method		
	• Jacobi's iteration method		
	• Gauss-Seidel iteration method		

5	Finite Differences		
	• Forward & Backward difference operator,	06	CO5
	• Shift operator,		
	<ul> <li>Interpolation &amp; Extrapolation Methods</li> </ul>		
	• Newton's formulae (Equal intervals)		
	• Lagrange's formulae (Unequal intervals).		

6	Partial Differentiation and its Application		
	• Partial derivatives: Introduction	08	CO6
	• Total derivatives		
	• Differentiation of implicit function		

(An Autonomous Institute Affiliated to Shivaji University, Kolhapur)				
• Euler's theorem on homogeneous function of two variables				
• Jacobian and its Properties				
• Maxima and Minima of functions of two variables				

(An Autonomous Institute Affiliated to Shivaji University, Kolhapur)

Course Code	Course Title	
ASH106	Engineering Mathematics-I Tutorial	Ι

Teaching Scheme	Theory	Practical	Tutorial	Total
(Hrs)(Per week)	-	-	1	1
Credit Assigned	-	-	1	1

Examination				Marks			
Examination	ISE	ESE	ISA	0	Р	POE	Total
Scheme			25	-	-	-	25
Duration	ISA:						

### List of Practical/ Experiments/Tutorials

Number	Practical/ Experiment/Tutorial Topic	Hrs.	Cognitive levels of attainment as per Bloom's
1	Rank by Normal form & Echelon form	1	Knowledge
2	Solution of system of linear equation	1	Knowledge, Application
3	Eigen values & Eigen Vectors	1	Understanding
4	Cayley Hamilton's Theorem	1	Knowledge
5	De Moivre's Theorem & Roots of complex number	1	Application
6	Gauss elimination method & Gauss Jordon method	1	Application
7	Jacobi Iteration & Gauss Seidel Iteration Method	1	Application
8	Newton's & Lagrange's Interpolation	1	Knowledge
9	Partial Derivative, Euler's Theorem	1	Knowledge
10	Jacobian, Maxima & minima	1	Application

Tex	t Books:
1	A text book of Engineering Mathematics by N. P. Bali, Iyengar, Laxmi Publications (P) Ltd., New
	Delhi.
2	Higher Engineering Mathematics by Dr. B. S. Grewal, Khanna Publishers, Delhi.
3	Engineering Mathematics I, G. V. Kumbhojkar, H. V. Kumbhojkar, C. Jamnadas & Co.
Ref	erence Books
1)	A text book of Applied Mathematics, Vol.I, Vol. II, Vol. III by P. N. Wartikar& J. N. Wartikar,
	Pune Vidyarthi Griha Prakashan, Pune.
2)	Numerical methods by Dr. B. S. Grewal, Khanna Publishers, Delhi.
3)	Advanced Engineering Mathematics by Erwin Kreyszig, Wiley India Pvt. Ltd.
4)	Advanced Engineering Mathematics by H. K. Dass, S. Chand, New Delhi.
5)	A text book of Engineering Mathematics Volume I by Peter V. O'Neil and Santosh K.Sengar,
	Cengage Learning.

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

Course Code	Course Title	
ASH113	Basic Electrical and Electronics Engineering	I & II

Teaching Scheme	Theory	Practical	Tutorial	Total
(Hrs)(Per week)	3	-	-	3
Credit Assigned	3	-	-	3

<b>E</b>	Marks						
Examination	ISE	ESE	ISA	0	Р	POE	Total
Scheme	30	70	25	-	-	-	125
Duration	ISE: One	Hour		ESE: Two	o Hours an	d Thirty 1	nin.

**Course Objectives:** The objective of the course is to Provide the students with an introductory and broad treatment of the field of electrical and Electronics engineering.

<b>Course Outc</b>	omes:	
Cos	At the end of successful completion of the course the student will be	Blooms
	able to	Taxonomy
CO1	Apply the basic knowledge of Ohm's law and Kirchhoff's laws for	Knowledge,
	electrical circuit	Application
CO2	Distinguish between electric and magnetic circuit	Analysis
CO3	Understand the basic phenomenon of electromagnetism & Calculate the	Analysis
	various parameters of series circuit.	
CO4	Understand the concept of three phase AC supply generation,	Knowledge,
	transmission & distribution	Analysis
CO5	Understand the concept of construction, working principle and various	Knowledge
	types of single phase transformer.	
CO6	Understand the concept of Basic Electronics components.	Knowledge

### **Description:**

Basic Electrical Engineering course is offered as the engineering science course. This course contains basic knowledge of electrical engineering and its advantages, applications. This course has six units namely i) Analysis of D.C.Circuits, ii) Magnetic circuits, iii) Single phase AC circuits, iv) Three phase AC circuits, v) Single phase Transformer and vi). Fundamentals of electronics

	1:	Battery, Potential difference and current flow concept.
Prerequisites:         2:         Few basic electrical components identification		Few basic electrical components identification
	3:	Difference between AC & DC circuits
	4:	Few basic electronics components identification

	COURSE CONTENT		
Unit No	Course Description	Hours	COs
	Section-I		
1	Analysis of D.C. Circuits	06	CO1
	• Concept of emf, Potential difference ,current, Power, Energy	00	COI
	• Resistance, Ohms law,		
	• Kirchhoff's laws		
	• Mesh & Node analysis		
	<ul> <li>Numerical on Mesh &amp; Node analysis of two loops</li> </ul>		
2	Magnetic circuits		
	• Concept of mmf, reluctance, magnetic flux	07	CO2
	• Magnetic flux density, magnetic field strength,		
	• BH curve ,magnetic leakage, fringing		
	<ul> <li>Comparison of Electric &amp; magnetic circuit</li> </ul>		
	• Series magnetic circuits		
	• Numericals on series magnetic circuit		
3	Single phase A C Circuits		

3	Single phase A.C.Circuits		
	• Fundamentals of alternating quantities, Faradays laws	08	CO3
	• Types of induced emf, generation of sinusoidal voltage		
	<ul> <li>concept of RMS &amp; Average value</li> </ul>		
	• Form factor, peak factor		
	<ul> <li>Analysis of pure Resistive, Inductive, Capacitive circuits</li> </ul>		
	• Analysis of series R-L,R-C, R-L-C circuits		
	• Powers, significance of power factor		
	• Numerical treatment on series R-L, R-C, R-L-C circuits		

	Section-II		
4	Three phase A.C. Circuits		
	• Advantages of three phase system	06	CO4
	• Generation of three phase AC supply, phase sequence		
	• Balanced three phase load & supply		
	• Relation between line & phase quantities for star connected circuit		
	<ul> <li>Relation between line &amp; phase quantities for Delta connected circuit</li> </ul>		
	• Three phase power		

5	Single phase Transformer		
	• Construction, operating principle, types	08	CO5
	• Emf Equation, Ratios of voltage & current		

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	*	
• Operation on No load & with load		
• Open & Short circuit test of single phase transformer		
• Power losses, Efficiency		
<ul> <li>Voltage Regulation, Applications</li> </ul>		
• Numerical treatment on Emf equations, transformer losses &		
efficiency		

6	Fundamentals of Electronics		
	Introduction of Diode, Rectifier configuration		CO6
	• Analysis of Half wave Rectifier & Full wave Rectifier		
	• Analysis of Bridge Rectifier		
	• Introduction of Transistor, study of CE,CB and CC configuration		
	• Study of Zener diode and SCR		

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Course Code	Course Title	Sem
ASH114	Basic Electrical and Electronics Engineering Lab	I & II
ASH114	Basic Electrical and Electronics Engineering Lab	1&

Teaching Scheme	Theory	Practical	Tutorial	Total
(Hrs)(Per week)	-	2	-	3
Credit Assigned	-	1	-	3

Examination	Marks							
	ISE	ESE	ISA	0	Р	POE	Total	
Scheme			25	-	-	-	25	
Duration	ISA:							

### List of Practical/ Experiments/Tutorials

Number	Practical/ Experiment/Tutorial Topic	Hrs.	Cognitive levels of attainment as per Bloom's
1	Laboratory sessions covering, general introduction to electrical engineering laboratory, experimental setups, Instruments etc. Electrical symbols	2	Knowledge
2	Electric shocks & precautions against shocks	2	Knowledge
3	Study of Ohm's law	2	Knowledge, Application
4	Verification of Kirchhoff's Voltage law & Kirchhoff's 2		Knowledge, Analysis
5	B-H Curve for magnetic material	2	Knowledge
6	Determination of Reactance's for series R-L-C circuit	2	Analysis
7	Demonstration of Power factor Improvement by static capacitor	2	Analysis
8	Polarity & Ratio test for Single phase Transformer	2	Knowledge, Evaluation
9	Pre- determination of efficiency & regulation by open circuit & short circuit tests on single phase transformer	2	Knowledge, Analysis
10	Study of Basic method of Earthing, Use of Fuse & MCB	2	Knowledge, Application
11	Study of different luminaries including Mercury Vapour lamp, fluorescent tube, CFL & LED lamp	2	Knowledge, Evaluation
12	Study of Half wave Rectifier	2	Knowledge
13	Study of Full wave Rectifier	2	Knowledge
14	Study of Zener Regulator	2	Knowledge

Tex	t Books:
1)	P.V.Prasad and S.Shivan Raju – Electrical engineering concepts and applications – cenagage
	learning.
2)	B.H.Deshmukh, Electrical engineering concepts and applications
3)	Robert L.Boysted and Louis Nashelsky, Electronics devices and circuit theory – Pearson education
Ref	erence Books
1)	B.L.Theraja – Electrical Technology Vol.1 S.Chand
2)	Nagarath I.J. and D.P.Kothari – Basic Electrical Engineering (2001) – Tata McGraw Hill.
3)	Bharati Dwivedi and Anurasg Tripathi – Fundamentals of Electrical engineering – Willey Precise.

Course Code	Course Title	Sem
ASH117	Basic Civil Engineering	I/II

Teaching Scheme	Theory	Practical	Tutorial	Total
(Hrs)(Per week)	3			3
Credit Assigned	3			3

Examination	Marks							
	ISE	ESE	ISA	0	Р	POE	Total	
Scheme	30	70					100	
Duration	ISE: One Hour			ESE: Two Hours and Thirty min.				

Cours	Course Objectives:					
1.	1. To learn the brief introduction of all aspects under civil engineering					
2.	To understand basic concepts of Surveying, Transportation Engineering					
Cours	se Outcomes:					
Cos	At the end of successful completion of the course the student will be able	Blooms				
	to	Taxonomy				
COL	Demonstrate basic knowledge in different fields of Civil Engineering	Knowledge,				
COI	Demonstrate basic knowledge in different fields of Civil Engineering	Synthesis				
CO2	CO2 Analy arianial of algoring huilding Produces					
002	Appry principles of plaining, building Bye laws	Application				
	Explain various uses and properties of building materials and also types of	Knowledge,				
CO3	loads acting on building	Comprehension,				
		Synthesis				
		Knowledge,				
CO4	Illustrate linear and angular measurements by considering principles and	Application,				
04	significance of Surveying	Analysis,				
		Evaluation				
		Knowledge,				
CO5	Identify nature of ground by using methods of leveling	Analysis,				
		Evaluation				
COG	List components of pavements, railway track and water supply scheme	Knowledge,				
00	List components of pavements, ranway track and water supply scheme	Comprehension				

<b>Description:</b>							
This course include	This course include principles of building planning, building components and their functions, building						
materials, surveyin	ig an	d its principles, leveling transportation engineering, irrigation					
	1:	To know basics of Civil Engineering in day to day life					
D	2:	Implementation and assessment of Engineering work related with Civil					
Prerequisites:		Engineering					
	3:	Scope of Civil Engineering					
	1:	To know basics of Civil Engineering in day to day life					

	COURSE CONTENT		
Unit No	Course Description	Hours	COs
	Section-I		
1	Introduction to Civil Engineering and Building Planning	7	CO1, CO2
	Introduction, branches of civil engineering		
	• Relevance of civil engineering in the overall development of the country		
	Principles of planning		
	• Introduction to Bye-Laws regarding building line, height of building, open space requirements, F.S.I., setbacks,		
	• Ventilation, sanitation as per municipal corporation area requirement.		
	• Land Documents, property purchase and sale procedure, Property selection criteria and marketability of property transaction		
	1		I
2	Components of Building	7	CO1
	A) Sub-structure:		
	• Types of soil and rocks as foundation strata, concept of bearing capacity		
	• Types of foundations i.e. shallow and deep and their suitability		
	• Shallow foundation such as wall foundation, isolated foundation		
	• Deep foundation such as pile foundation		
	B) Super-structure:		
	• Elements of super-structures and their		
	• Functions of elements		
	1		
3	Unit-III Building Materials and Design	7	CO1, CO3
	Building Materials- cement blocks- properties and specification		
	Cement-Types, grades, properties and uses in brief		
	• Concrete-Plain and reinforced cement concrete and ready mix concrete and their grades		
	• Use and properties of bricks, steel, timber,		
	• Use and properties of roofing materials etc.		
	• Introduction to types of structures- load bearing and framed structures, types of loads,		
	• Introduction to building finance		

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Unit No	Course Description	Hours	COs
110	Section-II		
4	Linear and Angular Measurements	8	CO1, CO4
	Principles of surveying, Classification of surveys		
	• Linear measurements- Chain Surveying, Instruments used- Metric chain		
	• errors in chaining, Ranging(Direct only)-Instruments Used, nominal scale and R.F.,		
	• chaining, offsetting & numerical		
	• Angular Measurements- Compass survey, Meridian, bearing and its types		
	• system of bearing, Types of compass: prismatic and surveyor's compass		
	• Calculation of included angles, correction for local attraction		
	Numerical		
5	х 1 <sup>,</sup>	7	001 005
5		/	01,005
	• Terms used in leveling, use of Dumpy level and Auto Level		
	• Temporary adjustments. Methods of reduction of levels		
	• types of leveling		
	• numerical		
	Modern Surveying Instruments- EDM, Total Station, GPS     (Introduction and use)		
	• Measurement of area by planimeter – mechanical and digital		
	• numerical		
		Г	1
6	Unit-VI Introduction to Transportation Environmental and	6	CO1 CO6

6	Unit-VI Introduction to Transportation, Environmental and	6	CO1, CO6
	Irrigation Engineering		
	Components of rigid and flexible pavement		
	Cross section of road in cutting and embankment		
	components of railway track (Broad Gauge)		
	Water Treatment Plant- Components with Flow Diagram		

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Course Code	Course Title	Sem
ASH118	Basic Civil Engineering Lab	I/II

Teaching Scheme	Theory	Practical	Tutorial	Total
(Hrs)(Per week)	-	2		2
Credit Assigned	-	1		1

<b>.</b> :	Marks								
Examination	ISE	ESE	ISA	0	Р	POE	Total		
Scheme			25				25		
Duration	ISA:								

### List of Practical/ Experiments/Tutorials

Sr. No	Practical/ Experiment/Tutorial Topic	Hrs.	Cognitive levels of attainment as per Bloom's
1	Measurement of Distances	2	Knowledge, Application
2	Plotting the outlines of buildings by chaining, ranging and offsetting	2	Knowledge, Application
3	Traversing by Compass	2	Knowledge, Application
4	Reduction of levels by Collimation Plane Method	2	Knowledge, Application, Analysis
5	Finding out gradient of line by Rise & fall method	2	Knowledge, Application, Analysis
6	Measurement of area by mechanical and digital planimeter	2	Knowledge, Application, Analysis
7	Study of total station for measurements	2	Knowledge, Application
8	Site visit for study of various construction processes and building planning	2	Knowledge, Application
9	Drawing a line plan of residential building by applying principles of planning	2	Knowledge, Application
10	Drawing sheet showing various building components	2	Knowledge, Application

Tex	t Books:
1)	Basic Civil Engineeringby G. K. Hiraskar, DhanpatRai Publication
2)	Basic Civil Engineering by S. S. Bhavikatti, New Age International Publications
3)	Building Construction by S P Arora & S P Bindra, DhanpatRai Publications
1)	Basic Civil Engineeringby G. K. Hiraskar, DhanpatRai Publication
Ref	erence Books
1)	Surveying by N. Basak, Tata Mc-Graw Hill Publication
2)	Surveying Vol.I, Vol.II, Vol.III by B.C. Punmia, Laxmi Publication
3)	Civil Engineering Materials - Technical Teacher's Training Institute, Chandigarh
4)	Irrigation Engineering by B. C. Punmia, DhanpatRai Publications

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Course Code	Course Title	Sem
ASH109	Professional Communication	Ι

Teaching Scheme	Theory	Practical	Tutorial	Total	
(Hrs)(Per week)	1	2		3	
Credit Assigned	1	1		2	

Eveningtion	Marks							
Examination	ISE	ESE	ISA	0	Р	POE	Total	
Scheme								
Duration	ISE: NA			ESE: NA				

Course Obje	ctives:				
To acquai	nt students with basic English Grammar and help students in improving lang	guage skills			
• To familia	arize students with concept, various types, barriers and filters of communicat	tion			
To assist	students in developing Vocabulary				
• To aid the	em in understanding corporate meetings				
• To train the	he students to compose and write the business letters effectively				
<b>Course Outc</b>	omes:				
Cos	At the end of successful completion of the course the student will be	Blooms			
	able to	Taxonomy			
CO1	To formulate grammatical sentences correctly	Understanding			
CO2	Use various communicative techniques to participate in several activities	Applying			
CO3	Understand and use vocabulary effectively	Understanding			
	& Applying				
CO4	Use interpersonal skills with precision and competence in different	Applying			
C05	Scenario.	Creating			
005	Display standard writing skins while composing dusiness letters	Creating			

### **Description:**

In the era of globalization, the most commonly used medium to express oneself is English language, especially in the industry, where almost all the service manuals, installation and commissioning manuals of the various equipment are in English and the technologist has to interpret them correctly. English is the dire need, not only for the Indian industry, but also worldwide, where the Engineering Graduates have the opportunity to take up jobs. Therefore, the basic English reading and writing skills have become almost mandatory for employment in the industry. Hence, English language has become quite a necessity for engineering students. This course is therefore designed to help the students to learn the correct grammatical structures and use the relevant vocabulary while reading and writing. Also introduce the communication theory, report writing & business correspondence to them.

	1:	Basic Knowledge of English Grammar
Prerequisites:	2:	Reading and Listening Comprehension
	3:	Basic knowledge of Writing Skills

	COURSE CONTENT		
Unit No	Course Description	Hours	COs
	Section-I		
1	Rapid Review of English Grammar		
	• Parts of Speech,	02	CO1
	• Types of Sentences, Tenses / Verbal forms	02	COI
	Common Errors & Rectifications		
2	Introduction to Communication		
	Nature, Importance and Process of Communication		
	Basic Types: Verbal- Non- verbal Communication		
	Barriers & Filters to Communication	02	CO2

3	Organizational Communication	02	CO2
	Nature of CommunicationFormal & Informal		
	• Directions of Communication: Upward, Downward, Horizontal,		
	Internal, External		
	Levels of Communication		

4	Vocabulary Building	02	CO3
	Synonyms & Antonyms, Prefixes and Suffixes		
	Words often Confused: Homonym & Homophone		
	Idioms and Phrases		

5	Corporate Meetings	02	CO4
	• Significance and Types of Meeting	1	
	Strategies of Conducting and Attending Meeting Effectively	l	
	Record Keeping: Notice, Agenda and Minutes	1	

6	Business Correspondence	04	CO5
	Importance of Correspondence & Elements of Letter Writing		
	• Structure or Layouts (American & British)		
	• Letter Writing: Simple application letters (Applications for various occasions etc.),		
	• Letters: Inquiry, Order Placement, Complaint and its Adjustment, Invitation Letter		

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Course Code	Course Title	Sem
ASH110	Professional Communication Lab	Ι

Teaching Scheme	Theory	Practical	Tutorial	Total
(Hrs)(Per week)		2		2
Credit Assigned		1		1

Examination				Marks			
Examination	ISE	ESE	ISA	0	Р	POE	Total
Scheme			50			50	100
Duration	ISE: NA			ESE: NA			

### List of Practical/ Experiments/Tutorials

Number	Practical/ Experiment/Tutorial Topic	Hrs.	Cognitive levels of attainment as per Bloom's
01	Star of Life: Introducing Yourself	02	III
02	Vocabulary Building Exercises	02	Ι
03	Lab Module on Phonetics Drill	02	II
04	Lab Session on Intonation & Pronunciation drill	02	II
05	Grammar Activities – Irregular verb list	02	II
06	Conducting & Attending Meeting	04	III
07	Practice on writing General Applications	02	III
08	Practice on Business Correspondence	02	III

English Language Lab Software: ORELL

Rec	ommended Books
01	Communication Skills by Meenakshi Raman and Sangeeta Sharma, Oxford University
01	Press 2016 1st Edition.
02	Communication Skills for Engineers by S. Mishra & C. Muralikrishna (Pearson)
02	Basic Communication Skills for Technology by Rutherford, Andrea J. (2002) Delhi: Pearson
05	Education Asia
04	Mastering Communication by Nicky Stanton, Palgrave Master Series
05	Comfort, Jeremy, et al. (2011) Speaking Effectively: Developing Speaking Skills for Business English.
05	Cambridge: Cambridge University Press. (Reprint)
	Sharma, R. C. and Krishna Mohan, Basic Correspondence and Report Writing: A Practical Approach
06	to Business and Technical Communication, Tata McGraw-Hill Publishing Company Limited, India
	,5th Edition, 2017
07	Written Communication in English by Saran Freeman (Orient Longman)
00	Seely, J. The Oxford Guide to Writing and Speaking, Oxford University Press, India 3rd Edition,
08	2013
09	High School English Grammar and Composition by Wren and Martin, Blackie, 2000
10	Essential English Grammar (Elementary & Intermediate) Raymond Murphy (CUP)

	(An Autonomous Institute Affiliated to Shivaji University, Kolhapur)
11	Sethi, J. and Dhamija P.V. A Course in Phonetics and Spoken English Prentice-Hall of India 2nd Edition, 2006
12	English Language Laboratories, by Nira Konar, PHI Learning, 2014
13	Perspective of Communication and Communicative Competence, M.V. Rodriques, Concept Publishing Company, New Delhi-10059
	www.buisnesscommunicationskills.com
	www.kcitraing.com
	www.mindtools.com

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Course Code	Course Title	Sem
FYBSC102	Engineering Chemistry	I&II

Teaching Scheme	Theory	Practical	Tutorial	Total
(Hrs)(Per week)	3			3
Credit Assigned	3			3

<b>E</b>	Marks						
Examination	ISE	ESE	ISA	0	Р	POE	Total
Scheme	30	70	25				125
Duration	ISE: One Hour			ESE: Two	o Hours an	d Thirty 1	nin.

### **Course Objectives:**

• To develop confidence among students about the chemistry applications in engineering field.

• To develop an interest among students regarding applied and engineering chemistry.

• To analyze quality parameters of water and metallic materials.

• To train students to effectively use knowledge of instrumental techniques.

• To understand the concept of chemistry related to various branches of engineering.

### **Course Outcomes:** At the end of successful completion of the course the student will be able Cos **Blooms** Taxonomv CO1 Recall the terms, basic properties of water analyze water sample for pollution control. Remembering CO2 Utilize the knowledge of instrumentation for chemical analysis. Analyzing CO3 Apply Knowledge of engineering materials in various technical fields and in Applying construction. CO4 Select proper fuels for domestic, and industrial applications. Applying CO5 Analyze engineering problems related to corrosion and metal finishing in achieving a Analyzing practical solution. apply the significance of corrosion in industries CO6 in chemical equilibrium using various terms ( Phase , Components & Degree of Understanding freedom

### **Description:**

This course aims to impart fundamental knowledge of engineering materials (composite, polymer Cement), and applied knowledge of water purification methods, analysis of chemical compounds using instruments, energy storage devices, prevention techniques of corrosion. Students will be expected to communicate knowledge to society and industry.

<b>D</b>	1:	Students should have knowledge about basic chemistry related to electrochemistry and occurrence of metals,
Prerequisites:	2:	periodic table physical and chemical properties of elements
	3:	applications of fuel ,different macromolecules
	4:	parameters of water etc.

	COURSE CONTENT		
Unit No	Course Description	Hours	COs
	Section-I		
1	Water Technology	6	CO1
	• Introduction, impurities in natural water, water quality parameters.		
	• Hardness of water, types of hardness, units of hardness.		
	• ill effects of hard water in steam generation in boilers , scale & sludge formation.		
	• Numericals on hardness, treatment of hard water (ion exchange and reverse osmosis).		
	• Green Chemistry :Definition, Twelve principles of green chemistry, Industrial applications.		
2	Instrumental Methods Of Chemical Analysis	6	CO2
	• Introduction, advantages and disadvantages of instrumental methods		
	• <b>Spectrometry</b> : Introduction, Laws of spectrometry (Lamberts and Beer- Lambert's law),Single beam spectrophotometer (schematic working and applications).		
	• Chromatography: Introduction, types, gas-liquid chromatography (GLC),		

3	Engineering materials	6	CO3
	• Macromolecules : Polymers : Introduction, Addition and condensation polymers examples ; plasticsindustrially important plastics( PF, UF & Epoxy resin) Conducting polymers and Biopolymers, Molecular Weight of polymers.		
	• <b>Composite materials</b> Introduction, Composition, properties and uses of fiber reinforced plastics (FRP) example glass reinforced plastic(GRP)		

	Section-II		
4	Energy Engineering	6	CO4
	• Introduction, Definition ,classification, properties of fuels.		
	• Characteristics of good fuels, comparison between solid, liquid and gaseous		
	fuels, Calorific value (higher and lower),		
	Bomb calorimeter and Boy's calorimeter.		
	• Numerical on Bomb and Boy's calorimeter.		
	• Fuel Cells: Defination, classification of fuel cells, working of Solid		
	oxide fuel cell (SOFC), limitations and applications of fuel cells.		
5	Corrosion and it's Prevention	6	CO5
	• Introduction, Concept of electrode potential, Nernst Theory , causes,		
	classification,		
	• Factors affecting rate of corrosion.		
	• corrosion monitoring and protection from corrosion prevention methods		
	.such as Proper design and material selection, cathodic protection,		
	• Prevention methods and protective coatings- Metallic and Non metallic		
	coatings, such as Hot dipping (galvanizing and tinning,), electroplating,		
	Metal cladding ,Metal Spraying ,.		

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6	Chemical Equilibrium	6	CO6
	• Introduction, Heterogeneous equilibrium, mathematical statement of phase		
	rule		
	• Terminology, , Phase diagram , One component system example Water		
	system. applications and limitations of phase rule.		

Course Code	Course Title	Sem
FYBSC103	Engineering Chemistry Lab	I&II

Teaching Scheme	Theory	Practical	Tutorial	Total
(Hrs)(Per week)		2		2
Credit Assigned		1		1

Number	Practical/ Experiment/Tutorial Topic	Cognitive levels of attainment as per Bloom's	
1	Determination of acidity of water.	2	Knowledge
2	Determination of total alkalinity of water sample.	2	Knowledge
3	Determination of chloride content of water by Mohr's method.	2	Knowledge
4	Determination of temporary and permanent hardness of water sample by EDTA method.	2	Knowledge
5	Determination of moisture, volatile and ash content in a given coal sample by proximate analysis	2	Knowledge
6	Preparation of urea-formaldehyde resin	2	Knowledge ,Application Application
7	Preparation of phenol-formaldehyde resin	2	Knowledge
8	Determination of percentage of copper in brass by iodometry.	2	Knowledge
9	Estimation of zinc in brass solution	2	Knowledge
10	Determination of rate of corrosion of aluminium by weight loss method in acidic and basic medium	2	Knowledge
11	Demonstration of concentration of given inorganic samples by spectrophotometer.	2	Knowledge
12	Demonstration of paper chromatography	2	Knowledge

Tex	t Books:
1	Textbook of Engineering Chemistry by S.S. Dara and S.S.Umare, S. Chand and Company Lit., New Delhi.
2	Textbook of Engineering Chemistry by Shashi Chawla, Dhanpat Rai & Co.( Pvt.) Lit, Delhi
3	Textbook of Engineering Chemistry by Dr. Mrs. Jayshree Parikh, Tech-Max Publication Pune.
Ref	erence Books
1	Engineering Chemistry by Jain and Jain, DhanpatRai Publishing Company Ltd., New Delhi.
2	A Textbook of Engineering Chemistry by C. P. Murthy, C. V. Agarwal and A. Naidu, BS Publications,
	Hyderabad
3	ChatwalandAnand,InstrumentalMethodsofChemicalAnalysis,HimalayaPublishingHouse,New Delhi
4	A text Book of Engineering Chemistry by ShashiChawla, DhanpatRai& Co. (Pvt.) Ltd, Delhi
5	Engineering Chemistry by Renu Bapna and Renu Gupta, MacMillan Publishers (India) Ltd, Delhi.

Course Code	Course Title			Sem		
FYESC107		Computer Programming in C				
Teaching Scheme	Theory	Practical	Tutorial	Т	'otal	
(Hrs)(Per week)	2	2			4	
Credit Assigned	2	1			3	

	Marks						
Examination Scheme	ISE	ESE	ISA	Р	0	POE	Total
Selicine	30	70	25			25	150
Duration	ISE: 1 ho	our				ESE: 1.30 hour	S

### **Course Objectives:**

To understand the basics of problem solving techniques

To provide an insight into structured programming constructs in C

To give details of modular programming

**Importance of Course:** 

Course	e Outcomes:	
Cos	At the end of successful completion of the course the student will be able to	Bloom's Taxonomy
CO1	Define the various terminologies in Programming	Remember
CO2	Understand the concept to implement structured programming for various problem definitions	Understand
CO3	Understand devising algorithm, flowchart and implementing program in C- languages in Basic problems	Understand
CO4	Analyze the problem statement and Select the most suitable constructs and data structures for writing well structured programs.	Analyze
CO5	Use modular programming concepts to design and develop solutions to complex problems.	Design/Develop
CO6	Design/Develop a computer program to solve real world problems of different requirements.	Design/Develop

Description:						
This Course is de	This Course is designed to build programming skills in First year B.Tech students. The programming					
skills will be help	skills will be helpful to all branches of Engineering.					
Prerequisites: 1: Basic knowledge of Computers						
	2:	Computational Mathematics				

	COURSE CONTENT			
Unit No	Course Description	Hours	COs	
	Section-I			
1	Unit-I : Basics of C programming	4	CO-01	
	<b>Basics of programming</b> : Program development steps, Algorithms		CO-02	
	/ Pseudo code, flowchart, Structure of C- Program, A simple C		CO-03	
	program identifier, basic data types and sizes, constants variables.			
2	Unit-II : Operators and Expressions in C	4	CO-02	
	Assignment Operators, Increment and Decrement Operators, Conditional		CO-03	
	Operator, Bitwise Operators, Special Operators, Arithmetic Expressions,			
	Evaluation of Expressions, Precedence of Arithmetic Operators, Some			
	Computational Problems.			

3	Unit-III : Decision Making Statements	4	CO 02
	<b>Decision Making and Branching :</b> Decision Making with IF Statement,		CO03
	Simple if, ifelse, Nested ifelse statements, elseif ladder, Switch		CO-04
	statement,		
	The ?: Operator, The goto statement. Example programs		

	Section-II		
4	Unit-IV: Decision Making and Looping	4	CO-03
	Introduction, while statement, do statement, for statement, jumps in		CO-04
	loops, break and continue. Example programs		

5	Unit-V: User Defined Function	4	C0-05
	Need for User-defined functions, Elements of User-defined functions,		CO-06
	Definition of Functions, Return Values and their types, Function Calls,		
	Function Declaration, Passing arguments to functions. Example		
	programs.		

6	Unit-VI : Arrays	4	C0-05
	1-Dimensional, 2-Dimensional, Programs on Array operations, basic		CO-06
	operations on matrices.		

Course Code	Course Title				Sem
FYESC108	(	Computer Programming in C Lab			I/II
Teaching Scheme	Theory	Practical	Tutorial	Т	otal
(Hrs)(Per week)		2			2
Credit Assigned		1			1

(Hrs)(Per week)	 2	
Credit Assigned	 1	

### **List of Practicals**

Number	Practical/ Experiment/Tutorial Topic	Hrs.	Cognitive levels of attainment as per Bloom's
1.	<ul> <li>Write a Program to Demonstrate how to read and display the value in all Basic data type variables.</li> <li>Example:</li> <li>WAP to display the details of Student Like: <ol> <li>Roll_No of Student</li> <li>Division of Student</li> <li>Height and Weight of Student.</li> </ol> </li> </ul>	2	Remember
2.	Write a C Program to demonstrate the working of a simple calculator using arithmetic operators in C.	2	Understand
3.	<ul> <li>Write a C Program to do the following using relational operators and branching statement:</li> <li>a. Read two integers and check they are equal or not.</li> <li>b. Print the greatest of three numbers.</li> </ul>	2	
4.	Write a C program to read variables and perform the bitwise operation $(\&,  , ^, >>, <<)$ on the variables and check the output.	2	Understand
5.	Write a C Program to demonstrate Switch Statement and Constant Variable by finding the area of Circle, Rectangle, Square and Triangle considering each as a different case.	2	Understand
6.	<ul> <li>Write a C Program to demonstrate looping statements.</li> <li>a. Find the Factorial of a Number.</li> <li>b. Count total number of digits for a given integer number.</li> <li>c. Find the Sum of Digits in a given Number.</li> <li>d. Reverse the given integer number and display the same on the output screen.</li> </ul>	2	Analyze
7.	Write a C program to read N numbers in an integer array and print it in reverse order.	2	Develop
8.	Write a C program to read N numbers in an integer array and display the sum of array elements.	2	Develop

9.	Write a C Program to swap two numbers using call by reference.	2	Develop
10.	Write a program to read two matrices and store the addition of two matrices in the third matrix.	2	Develop

Tex	tbooks:
1)	C the Complete Reference by Herbert Schild (Tata McGraw Hill) 4th Edition.
2)	The C Programming Language- Brian W. Kernighan, Dennis Ritchie 2nd Edition.
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### **Reference and Recommended Books**

1)	E. Balaguruswamy, "Programming in ANSI C", Tata McGraw Hill, 5th edition, 2010.
2)	Let Us C By Yashavant P. Kanetkar, 5th Edition.

(An Autonomous Institute Affiliated to Shivaji University, Kolhapur)

Course Code	Course Title	Sem
ASH119	Applied Mechanics	I/II

Teaching Scheme	Theory	Practical	Tutorial	Total
(Hrs)(Per week)	3	2	-	5
Credit Assigned	3	1	-	4

Enomination	Marks						
Examination	ISE	ESE	ISA	0	Р	POE	Total
Scheme	30	70	25				125
Duration	ISE: One Hour			ESE: Two	o Hours an	d Thirty 1	nin.

Course Obje	ctives:			
1. To u	nderstand and visualize the various force systems on static bodies.			
2. To u	nderstand the concept of equilibrium and its imaginary existence.			
3. To u	nderstand geometric properties of plain laminae.			
4. To u	nderstand dynamics of rigid bodies.			
Course Outc	omes:			
Cos	At the end of successful completion of the course the student will be	Blooms		
	able to	Taxonomy		
CO1	Explain and apply the theory and principles of applied mechanics.	Knowledge,		
		Application		
CO2	Determine the resultant force and moment for a given system of forces	Knowledge,		
		Evaluation		
CO3	Check the stability of various force systems.	Knowledge,		
		Comprehensi		
		on		
CO4	Analyse Newton laws, force systems and apply them to practical	Knowledge,		
	engineering system with design and development	Application,		
		Analysis,		
		Evaluation		
CO5	Deploy applied mechanics knowledge to solve the practical engineering	Knowledge,		
problems Analysis,				
CO6	Find the centroid and centre of gravity of various components in	Knowledge,		
	engineering systems.	Evaluation		

Description:

This course is designed to provide basic understanding about the different types of forces, moments and their effects on structural elements, which will analyze different structural systems.

	1)	Calculation of sectional properties of different sections used as engineering needs
Prerequisites:	2:	Learning and analysis of different loading and supporting conditions applicable for engineering applications

COURSE CONTENT		
Course Description	Hours	COs
Section-I		
Fundamentals of Statics	7	CO1, CO2
Basic Concepts and Fundamental Laws, Force, System of Forces,		
Resultant, Equilibriant		
Resolution and Composition of Forces		
Moment and Couple,		
Varignon's Theorem, Law of Moments.		
Equilibrium	7	CO1, CO3
Equilibrium of Forces Equilibrium conditions,		
Lamis' Theorem, Free Body Diagram, Friction		
Beams: Types of Loads, Types of supports		
Analysis of Simple beams, Support reactions.		
	COURSE CONTENTCourse DescriptionSection-IFundamentals of StaticsBasic Concepts and Fundamental Laws, Force, System of Forces,Resultant, EquilibriantResolution and Composition of ForcesMoment and Couple,Varignon's Theorem, Law of Moments.EquilibriumEquilibrium of Forces Equilibrium conditions,Lamis' Theorem, Free Body Diagram, FrictionBeams: Types of Loads, Types of supportsAnalysis of Simple beams, Support reactions.	COURSE CONTENTHoursCourse DescriptionHoursSection-IFundamentals of Statics7Basic Concepts and Fundamental Laws, Force, System of Forces, Resultant, Equilibriant7Resolution and Composition of ForcesMoment and Couple, Varignon's Theorem, Law of Moments.7Equilibrium Lamis' Theorem, Free Body Diagram, Friction Beams: Types of Loads, Types of supports Analysis of Simple beams, Support reactions.7

3	Centroid and Moment of Inertia	7	CO1, CO6
	Centroid and Center of Gravity,		
	Moment of Inertia of Standard shapes from first principle		
	Parallel and perpendicular axis theorem,		
	Moment of Inertia of plain and composite figures, Radius of Gyration.		

	Section-II		
4	Kinetics of Linear Motion	7	CO1, CO5,
	Introduction to Kinematics of Linear motion		CO6
	Kinetics of linear motion, Newton's Laws, D'Alembert's Principle,		
	Work- Energy Principle,		
	Impulse Momentum Principal		

5	Kinetics of Circular motion	7	CO1, CO5,
	Introduction to Kinematics of Circular motion		CO6
	Rotation with constant and variable angular acceleration,		
	Centripetal and centrifugal force,		
	Condition of skidding and overturning.		

6	Impact and Collision of elastic bodies	7	CO1, CO5,
	Impact, Types of Impact		CO6
	Law of conservation of Momentum, Coefficient of Restitution,		
	Numerical on Direct central Impact,		
	Impact on fixed plane		

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Course Code	Course Title	Sem
ASH120	Applied Mechanics Lab	I/II

Teaching Scheme	Theory	Practical	Tutorial	Total
(Hrs)(Per week)		2	-	2
Credit Assigned		1	-	1

### List of Practical/ Experiments/Tutorials

Sr. No	Practical/ Experiment/Tutorial Topic	Hrs.	Cognitive levels of attainment as per Bloom's
1	Law of polygon of forces	2	Knowledge, Application, Evaluation
2	Jib crane	2	Knowledge, Application, Evaluation
3	Bell crank lever	2	Knowledge, Application, Evaluation
4	Support Reactions of Beam	2	Knowledge, Application, Evaluation
5	To find Resultant by Graphical Method	2	Knowledge, Application, Evaluation
6	To find Support Reactions by Graphical Method	2	Knowledge, Application, Evaluation
7	Assignments	2	Knowledge, Analysis
8	Assignments	2	Knowledge, Analysis
9	Assignments	2	Knowledge, Analysis
10	Assignments	2	Knowledge, Analysis
11	Assignments	2	Knowledge, Analysis
12	Assignments	2	Knowledge, Analysis

Tex	t Books:		
1)	Engineering Mechanics by R. S. Khurmi, S. Chand Publications.		
2)	Engineering Mechanics by R. K. Bansal and Sanjay Bansal		
3)	Engineering Mechanics by S. S. Bhavikatti, New Age International Pvt. Ltd		
4)	Engineering Mechanics by D.P.Sharma, Pearson Education		
Reference Books			
1)	Engineering Mechanics by Manoj K Harbola, Cengage Learning		
$\mathbf{a}$			

3) Engineering Mechanics by K. I. Kumar, Tata Mc -Graw Hill Publication

4) Engineering Mechanics by Irving H. Shames, Prentice Hall of India, New Delhi.

5)	Fundamentals of Engineering Mechanics by S. Rajasekaran, G. Sankarasubramanian, Vikas
	Publishing House.

(An Autonomous Institute Affiliated to Shivaji University, Kolhapur)

Course Code	Course Title			Se	
					m
ASH123	Basic Mechanical Engineering			I/II	
Teaching Scheme	Theory	Practical	Tutorial	Т	'otal
(Hrs)(Dor wook)	3				3

8			
(Hrs)(Per week)	3	-	 3
Credit Assigned	3	-	 3

	Marks						
Examination	ISE	ESE	ISA	0	Р	POE	Total
Scheme	30	70		-	-	-	100
Duration ISE: One Hour			ESE: Two	o Hours an	d Thirty 1	nin.	

Course Objectives: The objective of the course is to

1. Acquire basic knowledge of mechanical engineering

2. Impart knowledge of basic concepts of thermodynamics applied to industrial application

- 3. Understand principle of energy conversion system and power plants
- 4. Understand and identify power transmission devices with their functions

Course Outco	Course Outcomes:					
Cos	At the end of successful completion of the course the student will be	Blooms				
	able to	Taxonomy				
CO1	To demonstrate the knowledge of basic concepts and derivations in	Knowledge,				
	thermodynamics.	Application				
CO2	To demonstrate working of I C Engine	Knowledge				
CO3	To Explain working of VARA &VCRA	Knowledge				
CO4	To explain the principles, construction and working of various power	Knowledge				
	plants.	-				
CO5	To summarize the working of energy converting and power transmission	Knowledge				
	devices.	_				
CO6	To illustrate the understanding of basic manufacturing processes.	Knowledge				
		Application				

### **Description:**

Basic Mechanical Engineering course is offered as the basic science course. This course describes the scope of mechanical engineering in multidisciplinary industries and important phenomenon to run the world. This course describes the applications of Mechanical Engineering in many relative fields.

Prerequisites:	1:	Basics of Thermodynamics
Prerequisites:	2:	Basics of energy sources
1	3:	Basics of Thermodynamics

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	(An Autonomous Institute Affiliated to Shivaji University, Kolha	pur)	
	COURSE CONTENT		
Unit No	Course Description	Hours	COs
	Section-I		
1	Thermodynamic		
	• Thermodynamic State, Process, Cycle,	07	CO1
	• Thermodynamic System, Heat, work, Internal Energy,		
	• First Law of Thermodynamics, Application of First Law to steady		
	Flow processes,		
	• Limitations of First Law (Numerical Treatment)		
	<ul> <li>Statements of Second Law of Thermodynamics.</li> </ul>		
2	Introduction to I C Engine		
	• Carnot Engine, Construction and Working of C.I. and S.I.	07	CO2
	• Two stroke, Four Stroke Cycles		
	Air standard cycles- Carnot Cycle		
	Joule Cycle		
	• Otto Cycle, Air Standard efficiency (Descriptive Treatment only)		

3	Introduction to Refrigeration and Air Conditioning		
	<ul> <li>Carnot refrigerator, Refrigerant types and properties</li> </ul>	06	CO3
	Vapour compression system		
	<ul> <li>vapour absorption system</li> </ul>		
	• solar refrigeration, Window Air Conditioning,		
	• Psychometric properties of moist air, Applications of		
	Refrigeration & air conditioning (Descriptive Treatment only).		

	Section-II		
4	Energy Sources and power plants		
	• Renewable and nonrenewable, Solar-flat plate collector,	07	CO4
	concentric collector-Parabolic & cylindrical, Photovoltaic cell		
	• Wind Power plant, Tidal Power plant		
	• Hydropower plant		
	• Steam Power plant		
	• Bio-gas, Bio-Diesel (Descriptive Treatment only).		

5	Mechanical Power Transmission and Energy conversion		
	devices	07	CO5
	• Type of Belt and belt drives, chain drive, ,		
	• Types of gears and gear Trains, (Numerical Treatment on belt drive),		
	Construction, working and applications of centrifugal Pump		
	<ul> <li>Construction, working and applications of Reciprocating compressor and Pelton wheel Turbine.</li> </ul>		
	Mechanical Power Transmission and Energy conversion		
	devices		

	(An Autonomous Institute Affiliated to Shivaji University, Kolhaj	pur)	
6	Manufacturing Processes		
	• Introduction to manufacturing processes - Casting Process, Steps	06	CO6
	involved in casting processes, and their applications,		
	• Metal removing processes (Lathe, milling & drilling operations)		
	• Metal Joining Processes – Arc welding, soldering and brazing and		
	their applications.		

(An Autonomous Institute Affiliated to Shivaji University, Kolhapur)

Course Code	Course Title				Se	
					m	
ASH124	E	Basic Mechanical Engineering Lab				
Teaching Scheme	Theory	Practical	Tutorial	Т	'otal	
(Hrs)(Per week)	-	2			3	

Eveningtion	Marks						
Examination	ISE	ESE	ISA	0	Р	POE	Total
Scheme			25	-	-	-	25
Duration	ISA						

-

Credit Assigned

Suggested List of Practical/ Experiments/Tutorials

1

3

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Number	Practical/ Experiment/Tutorial Topic		Cognitive levels of attainment as per Bloom's
1	Demonstration of I.C. engine	2	Knowledge
2	Demonstration of Two stroke and four stroke engine	2	Knowledge, Application
3	Demonstration of vapour compression refrigeration system and window air conditioner.	2	Knowledge
4	Demonstration of Solar water heating system.	2	Knowledge
5	Demonstration of Wind or Biogas or Hydroelectric Power Plant	2	Knowledge
6	Demonstration of types of Gears and gear trains	2	Knowledge
7	Demonstration of pumps and compressor.	2	Knowledge
8	Demonstration of metal joining processes	2	Knowledge, Application
9	Demonstration of metal removal processes	2	Knowledge
10	Demonstration of Steam Power Plant	2	Knowledge

Tex	xt Books:		
1)	Thermal Engineering by R.K. Rajput, Laxmi Publication, Delhi, ISBN-13-978-8131808047,		
	9 <sup>th</sup> edition.		
2)	Engineering Thermodynamics by R.Joel, The English Language Book Society.		
3)	Elements of Heat Engine Vol.I,II,III by Patel and Karamchandani, Acharya Book Depot.		
Reference Books			
1)	Solar Energy by Dr.S.P. Sukathame, Tata Mc-Graw Hill Publication, 4 <sup>th</sup> edition.		
2)	Power Plant Engineering by Arora and Domkunwar, Dhanpat Rai and Sons		
3)	Elements of Workshop Technology, Vol.I and II by Hajara Choudhari, Media Promoters		
4)	Energy Technology by S. Rao and Dr.B.B. Parulekar, Khanna Publication.		
5)	Basic Mechanical Engineering by Basant Agrawal & C. M. Agrwal, Wiley India Pvt. Ltd.		