D. Y. Patil Education Society, Kolhapur

(Deemed to be University)

School of Engineering, Technology & Management, Kolhapur

Kasaba Bawada, Kolhapur

D. Y. PATIL
EDUCATION SOCIETY
(DEEMED TO BE UNIVERSITY)
KOLHAPUR

F.Y. B. Tech.

Structure and Curriculum

(Common To All Programs)

Department of First Year Engineering

w. e. f. A.Y. 2023-24

D. Y. Patil Education Society, Kolhapur
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School of Engineering, Technology & Management
Kasaba Bawada, Kolhapur
Department of First Year Engineering

F. Y. B. Tech. Scheme of Teaching and Evaluation w. e. f .A. Y. 2023-2024

(As Per National Education Policy 2020)

Semester-I (Physics Cycle)

Sr. No	Course Code	Course Type	Name of the Course	Teaching Scheme Per Week			Credits	Total Marks	Evaluation Scheme			
				L	T	P			Type	Max. Marks	Minimum Marks For Passing	
Students Induction Program As Per AICTE Guidelines												
1	230FYL101	BSC	Linear Algebra and Calculus	03	01	--	04	100	ISE MSE ESE	20 30 50	20 20	40
2	230FYL102	BSC	Applied Physics	03	--	--	03	100	ISE MSE ESE	20 30 50	20 20	40
3	230FYL103	ESC	Computer Programming and Problem Solving	03	--	--	03	100	ISE MSE ESE	20 30 50	20 20	40
4	230FYL104	ESC	Elements of Civil Engineering and Mechanics	03	--	--	03	100	ISE MSE ESE	20 30 50	20 20	40
5	230FYL105	ESC	Design Thinking Through Innovation	02	--	--	02	50	ISE MSE	20 30	20	20
6	230FYP106	BSC	Applied Physics Laboratory	--	--	02	01	25	ISE	25	10	10
7	230FYP107	ESC	Computer Programming and Problem Solving Laboratory	--	--	02	01	50	ISE	50	20	20
8	230FYP108	ESC	Elements of Civil Engineering and Mechanics Laboratory	--	--	02	01	25	ISE	25	10	10
9	230FYP109	ESC	Design Thinking Through Innovation Laboratory	--	--	02	01	50	ISE	50	20	20
			Total	**14**	**01**	**08**	**19**	**600**	--	--	--	--
Mandatory Courses												
1	230FYM119	MC	Rural/Social Internship	--	--	--	--	50	ISE	Grade	--	--
2	230FYM120	MC	Fundamentals of Aptitude and Technical-I	03	--	--	--	50	ISE	Grade	--	--

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(As Per National Education Policy 2020)

Semester -II (Physics Cycle)

Sr. No	Course Cod0e	Course Type	Name of the Course	Teaching Scheme Per Week			Credits	Total Marks	Evaluation Scheme			
				L	T	P			Type	Max. Marks	Minimum Marks For Passing	
1	230FYL110	BSC	Differential Equations and Numerical Techniques	03	01	--	04	100	ISE	20	20	40
									MSE	30		
									ESE	50	20	
2	230FYL111	BSC	Applied Chemistry	03	--	--	03	100	ISE	20	20	40
									MSE	30		
									ESE	50	20	
3	230FYL112	ESC	Elements of Electrical and Electronics Engineering	03	--	--	03	100	ISE	20	20	40
									MSE	30		
									ESE	50	20	
4	230FYL113	ESC	Computer Aided Engineering Graphics	03	--	--	03	100	ISE	20	20	40
									MSE	30		
									ESE	50	20	
5	230FYL114	HSMC	Technical Communication	02	--	--	02	50	ISE	20	20	20
									MSE	30		
6	230FYP115	BSC	Applied Chemistry Laboratory	--	--	02	01	25	ISE	25	10	10
7	230FYP116	ESC	Elements of Electrical and Electronics Engineering Laboratory	--	--	02	01	25	ISE	25	10	10
8	230FYP117	ESC	Computer Aided Engineering Graphics Laboratory	--	--	02	01	50	ISE	50	20	20
9	230FYP118	HSMC	Technical Communication Laboratory	--	--	02	01	50	ISE	50	20	20
Total				**14**	**01**	**08**	**19**	**600**	--	--	--	--
Mandatory Courses												
1	230FYM121	MC	Capstone Project	--	--	--	--	50	ISE	Grade	--	--
2	230FYM122	MC	Fundamentals of Aptitude and Technical-II	03	--	--	--	50	ISE	Grade	--	--

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Semester -I (Chemistry Cycle)

Sr. No	Course Code	Course Type	Name of the Course	Teaching Scheme Per Week			Credits	Total Marks	Evaluation Scheme			
				L	T	P			Type	Max. Marks	Minimum Marks For Passing	
1	230FYL101	BSC	Linear Algebra and Calculus	03	01	--	04	100	ISE	20	20	40
									MSE	30		
									ESE	50	20	
2	230FYL111	BSC	Applied Chemistry	03	--	--	03	100	ISE	20	20	40
									MSE	30		
									ESE	50	20	
3	230FYL112	ESC	Elements of Electrical and Electronics Engineering	03	--	--	03	100	ISE	20	20	40
									MSE	30		
									ESE	50	20	
4	230FYL113	ESC	Computer Aided Engineering Graphics	03	--	--	03	100	ISE	20	20	40
									MSE	30		
									ESE	50	20	
5	230FYL114	HSMC	Technical Communication	02	--	--	02	50	ISE	20	20	20
									MSE	30		
6	230FYP115	BSC	Applied Chemistry Laboratory	--	--	02	01	25	ISE	25	10	10
7	230FYP116	ESC	Basic Electrical and Electronics Engineering Laboratory	--	--	02	01	25	ISE	25	10	10
8	230FYP117	ESC	Computer Aided Engineering Graphics Laboratory	--	--	02	01	50	ISE	50	20	20
9	230FYP118	HSMC	Technical Communication Laboratory	--	--	02	01	50	ISE	50	20	20
Total				**14**	**01**	**08**	**19**	**600**	--	--	--	--
Mandatory Courses												
1	230FYM119	MC	Rural/Social Internship	--	--	--	--	50	ISE	Grade	--	--
2	230FYM120	MC	Fundamentals of Aptitude and Technical-I	03	--	--	--	50	ISE	Grade	--	--

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(As Per National Education Policy 2020)

Semester-II (Chemistry Cycle)

Sr. No	Course Code	Course Type	Name of the Course	Teaching Scheme Per Week			Credits	Total Marks	Evaluation Scheme			
				L	T	P			Type	Max. Marks	Minimum Marks For Passing	
Students Induction Program As Per AICTE Guidelines												
1	230FYL110	BSC	Differential Equations and Numerical Techniques	03	01	--	04	100	ISE MSE ESE	20 30 50	20 20	40
2	230FYL102	BSC	Applied Physics	03	--	--	03	100	ISE MSE ESE	20 30 50	20 20	40
3	230FYL103	ESC	Computer Programming and Problem Solving	03	--	--	03	100	ISE MSE ESE	20 30 50	20 20	40
4	230FYL104	ESC	Elements of Civil Engineering and Mechanics	03	--	--	03	100	ISE MSE ESE	20 30 50	20 20	40
5	230FYL105	ESC	Design Thinking Through Innovation	02	--	--	02	50	ISE MSE	20 30	20 	20
6	230FYP106	BSC	Applied Physics Laboratory	--	--	02	01	25	ISE	25	10	10
7	230FYP107	ESC	Computer Programming and Problem Solving Laboratory	--	--	02	01	50	ISE	50	20	20
8	230FYP108	ESC	Elements of Civil Engineering and Mechanics Laboratory	--	--	02	01	25	ISE	25	10	10
9	230FYP109	ESC	Design Thinking Through Innovation Laboratory	--	--	02	01	50	ISE	50	20	20
			Total	**14**	**01**	**08**	**19**	**600**	--	--	--	--
Mandatory Courses												
1	230FYM121	MC	Capstone Project	--	--	--	--	50	ISE	Grade	--	--
2	230FYM122	MC	Fundamentals of Aptitude and Technical-II	03	--	--	--	50	ISE	Grade	--	--

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Course Title: Linear Algebra and Calculus	
Course Code :230FYL101	**Semester:** I/II
Teaching Scheme L-T-P :3-1-0	**Credits:**4
Evaluation Scheme ISE-I,MSE,ISE-II:10/30/10	**ESE Marks:** 50

Prior Knowledge of:	Matrices, Derivatives.

Course Objectives:

1.	To teach mathematical methodology.
2.	To develop mathematical skills and enhance logical thinking power of students.
3.	To provide students with skills in Linear Algebra and Calculus.
4	To imbibe graduates with mathematical knowledge, computational skills and the ability to deploy these skills effectively in solution of engineering problems.

Curriculum Details

Course Contents	Duration
Unit-I Linear Algebra –I • Introduction to matrices, types of matrices. • Rank of matrix by normal form and echelon form. • Solution of simultaneous linear Non-homogenous equations. • Solution of simultaneous linear homogenous equations. • System of linear equations with application in Electrical circuits.	**06 Hrs**
Unit-II Linear Algebra –II • Definition of linear combination of vectors. • Dependence and independence of vectors. • Eigen values and its properties. • Eigen vectors and its properties. • Cayley-Hamilton theorem.	**06 Hrs**
Unit-III Numerical Solutions of Linear Equations • Introduction • Gauss–Elimination method. • Gauss –Jordan method. • Gauss –Seidel method. • Jacobi's iterative method.	**06 Hrs**

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Course Contents	Duration
Unit-IV Differential Calculus –I • Introduction. • Taylor's theorem, expansions and approximate value of functions. • Standard expansion by Maclaurin's theorem. • Expansion of $\sin^{-1} x$, $\cos^{-1} x$, $\tan^{-1} x$ and related expansions. • Indeterminate forms and L' Hospital's rule.	**06 Hrs**
Unit-V Differential Calculus –II • Introduction. • Partial derivatives. • Total derivatives. • Euler's theorem on homogeneous functions. • Jacobian and its properties.	**06 Hrs**
Unit-VI Integral Calculus • Introduction of improper integral. • Gamma function and its properties. • Beta function and its properties. • Error Function and its properties.	**06 Hrs**

Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
101.1	Reduce matrices to echelon form and **apply** the concept of rank of matrices to solve system of linear equations
101.2	**Identify** eigen values & **make use of** it for finding eigen vectors.
101.3	**Solve** linear equations by numerical methods.
101.4	**Apply** Taylor theorem to find the expansion of functions and identify the indeterminate forms
101.5	**Apply** the knowledge of partial differentiation.
101.6	**Use** special functions and their properties during their higher learning.

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Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs / COs	BTL	1	2	3	4	5	6	7	8	9	10	11	12
101.1	2, 3	3	2	--	--	1	---	--	--	--	--	--	1
101.2	2, 3	3	2	--	--	1	--	--	--	--	--	--	1
101.3	3	3	2	--	--	1	--	--	--	--	--	--	1
101.4	2, 3	3	2	--	--	1	--	--	--	--	--	--	1
101.5	3	3	2	--	--	1	--	--	--	--	--	--	1
101.6	3	3	2	--	--	1	--	--	--	--	--	--	1

Suggested Learning Resources:

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Advanced Engineering Mathematics	7th	Peter V.O'Neil	Cengage Learning	2012
2	Advanced Engineering Mathematics	1st	H. K. Dass	S. Chand Publications, New Delhi	2011
3	A Text Book of Applied Mathematics	7th	P.N.Wartikar, J.N.Wartikar	Vidyarthi Griha Prakashan, Pune.	2006
4	Higher Engineering Mathematics	36th	B.S. Grewal	Khanna Publishers	2001

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Advanced Engineering Mathematics	5th	Erwin Kreyszig	India Pvt, Ltd.	2014
2	Higher Engineering Mathematics	6th	B.V.Ramana	Tata M/c Graw-Hill Publication	2010
3	Numerical Methods for Scientific and Engineering Computation	5th	M.K.Jain	New Age International Pvt. Ltd New Delhi	2007

Useful Link /Web Resources:

1. DELNET- http://www.delnet.in
2. NDL-http://ndl.iitkgp.ac.in
3. N-LIST- http://www.nlist.inflib.ac.in
4. https://www.youtube.com/results?search_query=Dr+Navneet+Sangle

List of Tutorials

Tut. No	Title of Tutorial	Duration
01	Linear Algebra –I	01Hr
02	Linear Algebra –II	01Hr
03	Numerical Solutions of Linear Equations-I	01Hr
04	Numerical Solutions of Linear Equations-II	01Hr
05	Differential Calculus –I	01Hr
06	Differential Calculus –II	01Hr
07	Integral Calculus-I	01Hr
08	Integral Calculus-II	01Hr

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Course Title: Applied Physics	
Course Code: 230FYL102	**Semester:** I/II
Teaching Scheme: L-T-P :3-0-0	**Credits:** 03
Evaluation Scheme ISE-I/MSE/ISE-II:10/30/10	**ESE Marks:** 50

Prior Knowledge of:	Fundamentals of optics, semiconductors, resonance, nature of radiation.

Course Objectives:

1	To provide basic concept of modern optics
2	To expose electronic properties of materials for semiconductors from quantum mechanical point of view
3	To perceive the concepts of ultrasonic and nanomaterials for their applications in engineering fields
4	To make the students grasp the working principles of LASER and its applications

Curriculum Details

Course Contents	Duration
Unit 1. Modern Optics • Introduction: interference, diffraction, review of geometric path, optical path • Theory of plane diffraction grating and grating equation • Resolving power of plane diffraction grating • Newtons ring: Experimental arrangement • Diameter of bright and dark ring • Determination of wavelength of monochromatic light using Newtons ring • Applications of interference in anti-reflecting coatings	**06 Hrs**
Unit 2. Ultrasonics and Oscillations • Ultrasonic: properties of ultrasonic waves • Ultrasonic production method-magnetostriction and piezoelectric method • Determination of depth of the sea using SONAR method • Free oscillations, Forced oscillations, Resonance • Damped harmonic oscillator: differential wave equation and its solution	**06 Hrs**

Course Contents	Duration
Unit 3. Solid State Physics • Energy band theory of solids • Fermi Dirac distribution, Fermi energy and Fermi level in intrinsic and extrinsic semiconductors • Dependence of Fermi energy on temperature • Hall effect: equation for Hall voltage and Hall coefficient and relation between them	**06 Hrs**
Unit 4. Quantum Physics • Introduction to quantum Physics • De Broglie wavelength of matter waves and its different forms • Physical significance wave function • Wave function of particle in quantum physics • Schrodinger's time independent & dependent wave equation (1-D) • Energy of particle in 1-D potential well	**06 Hrs**
Unit 5. LASER and its applications • Einstein's coefficients • Absorption, Spontaneous emission, Stimulated emission, Population inversion • Properties of LASER • Types of LASERS - Ruby LASER, He-Ne LASER • Applications of LASER: Industrial, Medical	**06 Hrs**
Unit 6. Nano Technology • Introduction to nanotechnology, nanoscience, nanomaterials • Synthesis method-Top-down Process: Ball milling method • Synthesis method-Bottom-up Approach: Colloidal method • Properties of nanoparticles • Applications of nanomaterials	**06 Hrs**

Self-learning topics: NDT of materials, Acoustic design of good hall, Optical fibre as sensors, CO_2 LASER.

Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
102.1	**Apply** the principle of interference and relate concepts in various engineering applications
102.2	**Determine** the frequency of ultrasonics & explain the solution of damped wave equation in applied physics
102.3	**Illustrate** the electronic properties of semiconductors
102.4	**Solve** 1-D potential well problems using principles of quantum mechanical phenomenon
102.5	**Describe** the working mechanism and applications of LASER
102.6	**Explain** the need of nanomaterials in science and technology

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs / Cos	BTL	1	2	3	4	5	6	7	8	9	10	11	12
103.1	3	3	2	-	-	-	-	-	-	-	-	-	1
103.2	3	3	2	-	-	-	-	-	-	-	-	-	1
103.3	3	3	2	-	-	-	-	-	-	-	-	-	1
103.4	3	3	2	-	-	-	-	-	-	-	-	-	1
103.5	2	3	-	-	-	-	-	-	-	1	-	-	1
103.6	2	3	-	-	-	-	-	-	-	1	-	-	1

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Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Engineering Physics	1st	H. K. Malik	Tata McGraw Hill Education	2019
2	A Text Book of Engineering Physics	Revised	M. N. Avadhanulu, P. G. Kshirasagar	S. Chand Publications	2018
3	Engineering Physics	Revised	L.N. Singh	Synergy Knowledge Ware	2016
4	Engineering Physics	Revised	V. Rajendran	Tata McGraw Hill Education	2010
5	Engineering Physics	1st	R.K. Gaur, S.L. Gupta	Dhanpat Rai Publications	1993

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Fundamentals of Physics	Revised	J. Walker, D. Halliday, R. Resnick	Wiley Publications	2018
2	Engineering Physics	1st	B.K. Pandey and Chaturvedi	Cengage learning Publications	2017
3	Nanotechnology- Principles & Practices	3rd	Sulabha K. Kulkarni	Capital Publication Co. New Delhi	2014
4	Introduction to Solid State Physics	8th	Charles Kittel	John Willey and Sons Inc.	2009
5	Solid State Physics	6th	S.O.Pillai	New edge Internationals	2009

Useful Link /Web Resources:

1. **http://hyperphysics.phy-astr.gsu.edu/hbase/index.html**
2. **https://en.wikipedia.org/wiki/Wave_interference**
3. **https://en.wikipedia.org/wiki/Introduction_to_quantum_mechanics**

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Course Title: Applied Physics Laboratory	
Course Code :230FYP106	**Semester:** I / II
Teaching Scheme: L-T-P: 0-0-2	**Credit :** 01
Evaluation Scheme: ISE: 25	**ESE Marks: -**

Prior Knowledge of:	Optics, magnetic materials, semiconductor basics, graph plotting, slope calculation

Course Objectives:

1	To make the students understand the concept of physics for the effective application in the field of engineering and technology.
2	To use the knowledge of electron transport in semiconductors.
3	To summarize the factors affecting the speed of ultrasound through liquids.

List of Experiments-

Exp. No	Title of Experiments	Duration
01	To compute diameter of cylindrical obstacle using LASER	02Hrs
02	To determine divergence of LASER beam	02Hrs
03	To decide band gap energy of P-N junction diode	02Hrs
04	To determine wavelength of LASER using diffraction grating	02Hrs
05	To determine the velocity of the ultrasonic wave in water using ultrasonic Interferometer	02Hrs
06	To calculate radius of curvature of Plano convex lens using Newton's ring	02Hrs
07	To recognize carrier concentration of semiconductor using Hall effect	02Hrs
08	To determine Resolving power of diffraction grating	02Hrs
09	To calculate the Resolving power of telescope	02Hrs

- ❖ Minimum 08 Experiments should be conducted from above list.
- **Self-learning Experiment:** To calculate energy loss of ferromagnetic materials using B-H curve

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Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
107.1	**Interpret** knowledge related to optics to use for suitable purposes in applied physics
107.2	**Identify** theory of semiconductor in terms of band gap energy and carrier concentration
107.3	**Explain** ultrasonic interferometer to study velocity of ultrasound in given Liquid
107.4	**Interpret** knowledge related to LASER for suitable purposes in applied physics

Course Articulation Matrix: Mapping of Course Outcomes (Cos) with Program Outcomes (PO's)

PO's / Cos	BTL	1	`2	3	4	5	6	7	8	9	10	11	12
107.1	2	3	-	-	-	1	-	-	-	-	-	-	1
107.2	2	3	-	-	-	1	-	-	-	-	-	-	1
107.3	2	3	-	-	-	1	-	-	-	-	-	-	1
107.4	2	3	-	-	-	1	-	-	-	-	-	-	1

Suggested Learning Resources: --
Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Engineering Physics	1st	H.K. Malik	Tata McGraw Hill Education	2019
2	A Text Book of Engineering Physics	Revised	M. N. Avadhanulu, P. G. Kshirasagar	S. Chand Publications	2018
3	Engineering Physics	Revised	L. N. Singh	Synergy Knowledge Ware	2016
4	Engineering Physics	Revised	V. Rajendran	Tata McGraw Hill Education	2010
5	Engineering Physics	1st	R.K. Gaur, S.L. Gupta	Dhanpat Rai Publications	1993

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Fundamentals of Physics	Revised	J.Walker, D.Halliday, R.Resnick	Wiley Publication	2018
2	Engineering Physics	1st	B.K. Pandey and Chaturvedi	Cengage Learning Publications	2017
3	Nanotechnology- Principles & Practices	3rd	Sulabha K. Kulkarni	Capital Publication Co. New Delhi	2014
4	Introduction to Solid State Physics	8th	C.Kittel	John Willey and Sons Inc.	2009
5	Solid State Physics	6th	S.O.Pillai	New edge Internationals,	2009

Useful Link /Web Resources:

1. https://vlab.amrita.edu/?sub=1
2. http://vlabs.iitb.ac.in/vlab/labsps.html

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Course Title : Computer Programming and Problem Solving	
Course Code : 230FYL103	**Semester :** I / II
Teaching Scheme L-T-P : 3-0-0	**Credits :** 3
Evaluation Scheme ISE-I,MSE,ISE-II:10/30/10	**ESE Marks :**50

Prior Knowledge of:	Basic knowledge of computers.

Course Objectives:

1.	To provide basic knowledge of Computer and C Programming language.
2.	To learn the fundamental programming concepts and methodologies which are essential to building C programs.
3.	To introduce the concepts of new trends in IT.

Curriculum Details

Course Contents	Duration
Unit-I Introduction to Computer and Programming • Basics of computer, Components of Computer Hardware. • Computer Memory: Memory Representation, Memory Hierarchy • Number System: Decimal, Binary, Octal, Hexadecimal and Conversions. • Software: Types of software • Program Development Life Cycle Steps: Program Design: Algorithm, Flowchart, And Pseudo Code.	**06 Hrs**
Unit-II Overview of C • Structure of C program • Constants, Variables and Data types in C. • Operators in C, Precedence of operators and associativity • Managing Input and Output operations. • Decision making statements- Branching and Looping.	**06 Hrs**
Unit-III Arrays • Introduction to Arrays, Types of Array. • Declaration and Initialization of an Array. • Character Arrays and Strings: Declaration and Initialization. • Reading string from terminal and writing strings to screen. • String handling Functions.	**06 Hrs**

Unit-IV Functions • Introduction to functions and Need. • Types of Function: User defined functions and Pre Defined Functions. • Elements of Function: Function Declaration, Function Call and Function Definition. • Categories of Function.	**06 Hrs**
Unit-V Structure and Unions • Introduction to Structures. • Defining a Structures. • Declaration and Initialization of Structures. • Array of Structures. • Array within structures. • Unions.	**06 Hrs**
Unit-VI Recent Trends in IT • Introduction to Artificial Intelligence. • Machine Learning and Deep Learning. • Augmented Reality and Virtual Reality. • Artificial Neural Network.	**07 Hrs**

Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
101.1	**Understand** the components of computer system and program development problems for problem solving
101.2	**Describe** the basic structure of C program and use of different data type
101.3	**Explain** the concept of arrays and strings to store homogeneous data
101.4	**Use** functions to break programs in to small module
101.5	**Explain** concept of structures and union
101.6	**Understand** the recent trends in Information technology.

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Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes

POs / Cos	BTL	1	2	3	4	5	6	7	8	9	10	11	12
101.1	2	2	2	-	-	3	-	-	-	2	-	-	1
101.2	2	2	2	-	-	3	-	-	-	2	-	-	1
101.3	2	2	2	-	-	3	-	-	-	2	-	-	1
101.4	2	2	2	-	-	3	-	-	-	2	-	-	1
101.5	2	2	2	-	-	3	-	-	-	2	-	-	1
101.6	2	2	2	-	-	3	-	-	-	2	-	-	1

Suggested Learning Resources:

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Computer Fundamentals	1st	Anita Goel	Pearson Publications.	2013
2	Programming in ANSI C	3rd	E Balagurusamy	McGraw Hill publications	2018
3	Programming in C	1st	Anita Seth	Cenage Learning	2011
4	Let Us C	16th	Yashwant Kanetkar	BPB Publication	2017

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	How to solve it by computer	-	R. G. Dromey	Prentice-Hall	2007
2	Programming with ANSI and Turbo C	-	Ashok Kamthane	Pearson Education	2002
3	Programming in C	2nd	J.B Dixit	Firewal Media	2011

Useful Link /Web Resources:

1.https://nptel.ac.in/courses/106104128

2.https://www.simplilearn.com/top-technology-trends-and-jobs-article

3.https://www.forbes.com/sites/bernardmarr/2020/04/20/these-25-technology-trends-will-define-the-next-decade/?sh=2d1c8d9629e3

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Course Title : Computer Programming and Problem Solving Laboratory	
Course Code : 230FYP107	**Semester** : I / II
Teaching Scheme L-T-P : 0-0-2	**Credit :** 1
Evaluation Scheme ISE Marks - 50	**ESE:--**

Prior Knowledge of:	Basic computer knowledge

Course Objective:

1.	To Develops the ability to analyze a problem, develop an algorithm to solve it
2.	To Understand the concept of a program in a high-level language how it is being translated by a compiler into machine language and then executed
3.	To impart concept like looping, array, functions, structure and unions

List of Experiments

Exp. No	Title of Experiments	Duration
01	Write C Program/s to explore data types, constants and variables.	02Hrs
02	Program/s to provide insight to formatted and unformatted input and output in C.	02Hrs
03	Program/s to perform arithmetic, logical and relational operators	02Hrs
04	Program using simple control statements: If-else, Do-while.	02Hrs
05	Program using loops and switch statement.	02Hrs
06	Program using arrays: Declare and initialization of arrays.	02Hrs
07	Generation of Fibonacci sequence calculating factorials,	02Hrs
08	Write program to demonstrate a) Accessing the union members b) Difference between structures and unions.	02Hrs

Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
101.1	**Understand** the logic for given problem and provide the solution.
101.2	**Explain** syntax and construction of C programming.
101.3	**Describe** the methods of iteration or looping and branching.
101.4	**Make use of** different data structures like Arrays, Structures, and Unions.

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Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs / Cos	BTL	1	`2	3	4	5	6	7	8	9	10	11	12
101.1	2	2	2	-	-	3	-	-	-	2	-	-	1
101.2	2	2	2	-	-	3	-	-	-	2	-	-	1
101.3	2	2	2	-	-	3	-	-	-	2	-	-	1
101.4	2	2	2	-	-	3	-	-	-	2	-	-	1

Suggested Learning Resources:
Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Programming in ANSI C	3rd	E Balagurusamy	McGraw Hill publications	2018
2	Programming in C	1st	Anita Seth	Cenage Learning	2011
3	Let Us C	16th	Yashwant Kanetkar	BPB Publication	2017

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	How to solve it by computer	-	R. G. Dromey	Prentice-Hall	2007
2	Programming with ANSI and Turbo C	-	Ashok Kamthane	Pearson Education	2002
3	Programming in C	2nd	J.B Dixit	Firewal Media	2011

Useful Link /Web Resources:

1. https://www.cprogramming.com/
2. https://www.programiz.com/c-programming/examples

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Course Title : Elements of Civil Engineering and Mechanics	
Course Code : 230FYL104	**Semester :** I / II
Teaching Scheme L-T-P : 3-0-0	**Credit :** 3
Evaluation Scheme ISE-I,MSE,ISE-II:10/30/10	**ESE Marks :** 50

Prior Knowledge of:	Knowledge of forces, Newton's Laws of Motion, Moment

Course Objectives:

1.	Use basic Civil Engineering knowledge of surveying and construction material in real life.
2.	Apply concepts of static and dynamics in engineering problems.

Curriculum Details

Course Contents	Duration
Unit-I Elements of Civil Engineering ● Importance of Civil engineering in society ● Basic Units used in Civil industry and its conversion (for example -acre- guntha , square meter – square foot etc.) ● Branches of Civil Engineering ● Types of Building – Load Bearing and Framed Structure ● Detailed cross section of building – showing components of sub-structure and super-structure and their functions	**06 Hrs**
Unit-II Engineering Survey ● Introduction to Surveying-Types, Principles. Applications. ● Introduction to levelling- HI, Rise and Fall method. ● Introduction to modern equipment's used in surveying- EDM, Total Station, GIS, GPS, Remote sensing.	**06Hrs**
Unit-III Construction Material and Construction Equipment's ● Materials- Cement, Bricks, Sand-natural and artificial, Steel- Mild, Tor and	**06Hrs**

Course Contents	Duration
High Tensile, Concrete- PCC, RCC, RM Pre-stressed and Precast. Introduction to RMC Plant ● Construction Equipment-Introduction to Excavator, Paver Machine, Tower crane.	
Unit-IV Statics and Equilibrium ● Basic Concepts and Fundamental Laws ● Force, Moment and Couple, System of Forces, Resultant, ● Varignon's Theorem, Law of Moments, Free Body Diagram, ● Beams: Types of Loads, Types of supports, Equilibrium conditions ● Analysis of Simple beams based on UDL and Point load	**06Hrs**
Unit-V Collision and Impact ● Impact: Types of Impact, Direct, Coefficient of restitutions. ● Law of conservation of momentum. ● Numerical based on direct impact.	**06 Hrs**
Unit-VI Centroid and Moment of Inertia ● Centroid and centre of gravity ● Moment of Inertia of Standard shapes from first principle ● Parallel and perpendicular axis theorem ● Radius of gyration. ● Numerical on moment of inertia of plain and composite figures	**06 Hrs**

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Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
104.1	**Describe** the importance of various branches of Civil Engineering.
104.2	**Explain** the importance of surveying and levelling.
104.3	**Interpret** the use of various Construction Material and Construction Equipments.
104.4	**Apply** conditions of equilibrium to find the resultant**.**
104.5	**Solve** numerical on collision and impact.
104.6	**Identify** centroid and moment of inertia of figures.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs COs	BTL	1	2	3	4	5	6	7	8	9	10	11	12
104.1	2	3	2	-	-	-	-	-	-	-	-	-	-
104.2	2	3	-	-	-	-	-	-	-	-	-	-	-
104.3	3	3	3	-	-	-	-	-	-	-	-	-	2
104.4	3	3	3	-	-	-	-	-	-	-	-	-	2
104.5	3	3	3	-	-	-	-	-	-	-	-	-	2
104.6	3	3	3	-	-	-	-	-	-	-	-	-	2

Useful Link /Web Resources:

1. https://www.pdfdrive.com/basic-civil-engineering-e40136136.html
2. https://www.pdfdrive.com/applied-mechanics-books.html

Suggested Learning Resources:

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Elements of Civil Engineering and Mechanics	1st	N. Balasubramanya	Cengage Learning India Private Limited	2018
2	Elements of civil engineering and engineering mechanics	3rd	M. N. Sheshaprakash, Gganesh B. Mogaveer	PHI Learning Pvt. Ltd.	2014
3	Basic Civil Engineering	1st	Dr. B. C. Punmia, Ashok Jain	Laxmi Publications	2013
4	Elements Of Civil Engineering	1st	Dr. S SBhavikatti,	New Age International (P) Ltd., Publishers	2012
5	Basic Civil Engineering	19th	G. K. Hiraskar	DhanpatRai Publication	2008
6	Engineering Mechanics and Dynamics	3rd	S. Rajshekaran, G. Subramaniam	Vikas Publishing House Pvt. Ltd	2005
7	Applied Mechanics	16th	S. S. Junnarkar. Dr. H. J. Shah	Chaotar Publishing House	2001

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Basic Civil Engineering	40th	SatheeshGopi	Dorling Kindersley Pvt Ltd	2010
2	Basic Civil Engineering	2nd	Rakesh Beohar	Uni. Science press	2010
3	Engineering Mechanics	10th	Ferdinand Leon Singer	Harper & Row Publication, London.	2010
4	Engineering Mechanics	3rd	S. S. Bhavikatti, K. G. Rajashekarappa	New Age International (P) Ltd.	2010

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Course Title : Elements of Civil Engineering and Mechanics Laboratory	
Course Code : 230FYL108	**Semester :** I / II
Teaching Scheme L-T-P : 0-0-2	**Credit :**1
Evaluation Scheme : ISE Marks : 25	**ESE: --**

Prior Knowledge of:	Knowledge of forces, Newton's Laws of Motion, Moment

Course Objective:

1.	Handle surveying instruments for field measurements.
2.	Apply knowledge of static and dynamic force system.

List of Experiments:

Exp. No	Title of Experiments	Duration
01	Study of building component on site.	02Hrs
02	Sketch cross section of Super structure and substructure (Drawings Sheet)	02Hrs
03	Calculate RL(Reduced levels) by HI Method and Rise Fall Method.	04Hrs
04	Measurement of area by using surveying equipment.	04Hrs
05	Determine resultant of force system by graphical method. (Drawings Sheet)	04Hrs
06	Verify law of polygon of forces.	02Hrs
07	Calculate support reactions of beam by graphical method. (Drawings Sheet)	04Hrs
08	Identify support reactions of Beam by digital beam apparatus.	02Hrs

Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
108.1	**Sketch** the cross section of Super structure and substructure.
108.2	**Explain** the use of surveying instruments for Horizontal and Vertical Measurement.
108.3	**Calculate** forces experimentally and graphically.
108.4	**Identify** the Beam Reaction experimentally.

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Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs COs	BTL	1	`2	3	4	5	6	7	8	9	10	11	12
108.1	3	3	2	-	-	-	-	-	-	-	1	-	-
108.2	3	3	2	-	-	2	-	-	-	-	-	-	1
108.3	3	3	2	-	-	-	-	-	-	-	1	-	1
108.4	3	3	2	-	-	-	-	-	-	-	-	-	1

Suggested Learning Resources:

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Basic Civil Engineering	1st	Dr. B. C. Punmia, Ashok Jain	Laxmi Publications	2013
2	Basic Civil Engineering	19th	G. K. Hiraskar	DhanpatRai Publication	2008
3	Applied Mechanics	16th	S. S. Junnarkar. Dr. H. J. Shah	Chaotar publishing house	2001
4	Engineering Mechanics and Dynamics	3rd	S. Rajshekaran, G.Subramaniam	Vikas Publishing House Pvt. Ltd	2005

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Basic Civil Engineering	40th	SatheeshGopi	Dorling Kindersley Pvt Ltd	2010
2	Basic Civil Engineering	2nd	Rakesh Beohar	Uni. Science press	2010
3	Engineering Mechanics	10th	Singer	Harper & Row Publication, London.	2010
4	Engineering Mechanics	3rd	S. S. Bhavikatti, K. G. Rajashekarappa	New Age International (P) Ltd.	2010

Useful Link /Web Resources:

1. Virtual Lab by IITR- http://sl-iitr.vlabs.ac.in/List%20of%20experiments.html

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Course Title : Design Thinking Through Innovation	
Course Code : 230FYL105	**Semester :** I / II
Teaching Scheme L-T-P : 2-0-0	**Credits :** 2
Evaluation Scheme: ISE-I/MSE/ISE-II: 10/30/10	**ESE Marks :--**

Course Objectives:

1.	To familiarize product design process
2.	To explain the fundamental concept of Problem Identification and Problem Solving
3.	To discuss the fundamentals of Project Management, Engineering Ethics, Sustainability
4.	To introduce the basics of design thinking
5.	To bring awareness on idea generation
6.	To discuss the fundamentals of Entrepreneurial Mindset.

Curriculum Details:

Course Contents	Duration
Unit I: Engineering Design & Creativity • Introduction to engineering design process • Product development process • Characteristics of successful product development • What is creativity? Creativity is not a magic and can be learned • Creativity v/s Innovation.	**04**
Unit II: Problem Identification and Problem Solving: **Problem Identification**: • Identify unexplored areas • Identify customer needs and pain areas • Define the problem **Problem Solving**: • Identify philosophy • Problem Solving tools • Solve the Problem • Criteria for selection of solution & feasibility of solution	**06**

Course Contents	Duration
Unit III: Project Management, Engineering Ethics, Sustainability • Introduction to Project Management • Project Management tools • Introduction to Ethics, moral values • Significance of professional ethics, code of conduct for engineers • Teamwork • Sustainability	**05**
Unit IV: Design Thinking • Introduction • Principles, Origin, Importance of design thinking • The process and benefits of design thinking • Design thinking and innovation • Case studies.	**04**
Unit V: Idea generation: • Introduction to idea generation • Idea generation techniques • Brainstorming • Select ideas from ideation methods • Case studies.	**04**
Unit VI: Entrepreneurial Mindset: • Mental attitude or inclination toward entrepreneurship • What does it mean to be entrepreneur? • Creation of value, embracing uncertainty, putting it all together.	**02**

Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
105.1	**Learn** structured approach of engineering design & creativity, problem identification & problem solving
105.2	**Apply Design Thinking** approach to identify **Innovation** opportunities and develop solutions
105.3	**Identify and define** specific innovation opportunities through **Idea generation**
105.4	**Develop** mindset of a successful Entrepreneur

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs / COs	BTL	1	2	3	4	5	6	7	8	9	10	11	12
105.1	1	2	-	-	-	-	-	-	-	-	-	-	1
105.2	2	2	1	-	-	-	-	-	-	-	-	-	1
105.3	2	2	-	-	-	-	-	1	1	-	-	2	1
105.4	2	2	-	-	-	-	-	-	1	-	-	-	1

Suggested Learning Resources:

Text Books:

Sr. No	Title	Author(s)	Publisher	Year
1.	"The Design of Business: Why Design Thinking is the Next Competitive Advantage"	Roger Martin	Harvard Business Press	2009
2.	"Design Thinking: Understand – Improve– Apply"	Hasso Plattner, Christoph Meine etc.al	Springer	2011
3.	"Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School"	Idris Mootee	John Wiley & Sons	2013
4.	The Design Thinking Playbook	Michael Lewrick	Wiley	2019

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1.	"Engineering Design Process"	2nd	Yousef Haik and Tamer M.Shahin	CengageLearning	2011
2.	Solving Problems with Design Thinking - Ten Stories of What Works	1st	Jeanne Liedtka, Andrew King, Kevin Bennett	Columbia Business School Publishing	2013

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Course Title: Design Thinking Through Innovation Laboratory	
Course Code :230FYP109	**Semester:** I / II
Teaching Scheme: L-T-P: 0-0-1	**Credit :** 01
Evaluation Scheme: ISE: 50	**ESE Marks: --**

Course Objectives:

1.	To explain the concept of design thinking for product and service development
2.	To explain the fundamental concept of innovation and design thinking
3.	To discuss the methods of implementing design thinking in the real world.
4.	To discuss the methods of Design Thinking
5.	To explain the fundamental concept of Outcome driven innovation using JBTD
6.	To discuss the fundamentals of Entrepreneurial Mindset.

List of Experiments-

Exp. No.	Title of Experiments	Duration
01	Idea Generation by Brain Storming.	02Hrs
02	Introduction to Design Thinning Through Innovation	02Hrs
03	Design Thinning Methodology	02Hrs
04	Design Thinking Workshop	02Hrs
05	Apply creativity to identify a problem from a selected domain and provide innovative solution for it	02 Hrs
06	Visit to Industries & Interaction with successful Entrepreneur	02Hrs
07	Prepare presentation and report on new venture opportunity based on above workshop.	02Hrs
08	Prepare presentation and report on new venture opportunity based on above workshop.	02 Hrs

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Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
109.1	**Learn** structured approach to creativity, problem identification and problem solving
109.2	**Apply** design thinking approach to identify innovation opportunities and develop solutions
109.3	**Develop** mind-set of a successful Entrepreneur

Course Articulation Matrix: Mapping of Course Outcomes (Cos) with Program Outcomes (PO's)

POs / COs	BTL	1	2	3	4	5	6	7	8	9	10	11	12
109.1	1	2	-	-	-	-	-	-	-	-	-	-	1
109.2	2	2	1	-	-	-	-	-	-	-	-	-	1
109.3	2	2	-	-	-	-	-	-	1	-	-	2	1

Suggested Learning Resources: --

Reference Books:

Sr. no.	Name of Book	Author	Year
1.	Design Thinking: Understand-Improve-Apply	S. G. Blank	2007
2.	Design Thinking for innovation research and Practice	Walter Brenner, Falk Uebernickel, Springer	2016
3.	Business Design Thinking and Doing: Frameworks, Strategies and Techniques for Sustainable Innovation	Angele M. Beausoleil	2022

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Course Title : Differential Equations and Numerical Techniques	
Course Code: 230FYL110	**Semester:** II
Teaching Scheme L-T-P : 3-1-0	**Credits :** 4
Evaluation Scheme ISE-I, MSE, ISE-II:10/30/10	**ESE Marks :**50

Prior Knowledge of:	Formulae of Derivatives and Integration, Differential Equation

Course Objectives:

1.	To teach mathematical methodology
2.	To develop mathematical skills and enhance logical thinking power of students.
3.	To provide students with skills in differential equations and numerical techniques.
4	To imbibe graduates with mathematical knowledge, computational skills and the ability to deploy these skills effectively in solution of engineering problems.

Curriculum Details

Course Contents	Duration
Unit-I Ordinary Differential Equations of First Order and First Degree • Definition of differential equation, order and degree of differential equation. • Exact differential equations. • Non - exact differential equations. • Linear differential equations. • Bernoulli's differential equations.	**06 Hrs**
Unit-II Applications of Ordinary Differential Equations of First Order and First Degree • Introduction of variable separable form. • Orthogonal trajectories. (Cartesian form) • Applications to simple electrical circuits. • Newton's law of cooling. • Rate of decay and growth	**06 Hrs**
Unit-III Numerical methods to solve Ordinary Differential Equations of First Order and First Degree • Introduction	**06 Hrs**

Course Contents	Duration
• Picard's method. • Taylor's series method. • Euler's method. • Runge - Kutta's method.(Fourth order)	
Unit-IV Numerical Solutions of Algebraic & Transcendental equations • Introduction of Algebraic and Transcendental equations • Bisection method. • Newton-Raphson method. • Regula-Falsi method. • Secant method.	**06 Hrs**
Unit-V Numerical Differentiation • Introduction • Newton's forward difference formula. • Newton's backward difference formula. • Stirling's central difference formula. • Lagrange's interpolation formula.	**06 Hrs**
Unit-VI Partial Differential Equations • Definition of partial differential equation. • Formation of partial differential equation. • Lagrange's method to solve first order linear partial differential equations • Standard method to solve first order non-linear partial differential equations of the Form I f(p, q)=0 • Standard method to solve first order non-linear partial differential equations of the Form II f(z,p,q)=0 • Standard method to solve first order non-linear partial differential equations of the Form III f(x, p)=g(y, q)	**06 Hrs**

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Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
110.1	**Solve** ordinary differential equations of first order and first degree.
110.2	**Apply** the knowledge of ordinary differential equation of first order and first degree.
110.3	**Solve**partial differential equations with different methods.
110.4	**Use**thenumerical methods to solve ordinary differential equations.
110.5	**Calculate** the derivative using interpolation formulae.
110.6	**Apply** the numerical techniques to solve algebraic &transcendental equations.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs / COs	BTL	1	2	3	4	5	6	7	8	9	10	11	12
110.1	2, 3	3	2	-	-	1	-	-	-	-	-	-	1
110.2	3	3	2	-	-	1	-	-	-	-	-	-	1
110.3	2, 3	3	2	-	-	1	-	-	-	-	-	-	1
110.4	3	3	2	-	-	1	-	-	-	-	-	-	1
110.5	3	3	2	-	-	1	-	-	-	-	-	-	1
110.6	2, 3	3	2	-	-	1	-	-	-	-	-	-	1

Suggested Learning Resources:

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Advanced Engineering Mathematics	7^{th}	Peter V.O'Neil	Cengage Learning	2012
2	Advanced Engineering Mathematics	1^{st}	H.K.Dass	S. Chand Publications, New Delhi	2011

Sr. No	Title	Edition	Author(s)	Publisher	Year
3	A Text Book of Applied Mathematics	7th	P.N.Wartikar, J.N.Wartikar	Vidyarthi Griha Prakashan, Pune.	2006
4	Higher Engineering Mathematics	36th	B.S. Grewal	Khanna Publishers	2001

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Advanced Engineering Mathematics	5th	Erwin Kreyszig	India Pvt, Ltd.	2014
2	Higher Engineering Mathematics	6th	B.V.Ramana	Tata M/c Graw-Hill Publication	2010
3	Numerical Methods for Scientific and Engineering Computation	5th	M.K.Jain	New Age International Pvt. Ltd New Delhi	2007
4	A Textbook of Engineering Mathematics	6th	N.P.Bali, Iyengar	Laxmi Publication	2004

Useful Link /Web Resources:

1. DELNET- http://www.delnet.in
2. NDL-http://ndl.iitkgp.ac.in
3. N-LIST- http://www.nlist.inflib.ac.in
4. https://www.youtube.com/results?search_query=Dr+Navneet+Sangle

List of Tutorials

Tut. No	Title of Tutorials	Duration
01	Exact and non-exact differential equations.	01Hr
02	Linear and non-linear differential equations.	01Hr
03	Applications of ODE of first order and first degree.	01Hr
04	Partial differential equations	01Hr
05	Numerical solutions of ODE of first order and first degree.	01Hr
06	Numerical differentiation-I	01Hr
07	Numerical differentiation-II	01Hr
08	Numerical solutions of algebraic &transcendental equations.	01Hr

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Course Title : Applied Chemistry	
Course Code : 230FYL111	**Semester :**I / II
Teaching Scheme L-T-P : 3-0-0	**Credits :** 3
Evaluation Scheme ISE-I/MSE/ISE-II:10/30/10	**ESE Marks :** 50

Prior Knowledge of:	Periodic properties of elements, Basics of organic, inorganic, physical and analytical chemistry

Course Objectives:

1.	To study the different water-based concepts and its importance.
2.	To impart the basic concepts of instrumental techniques.
3.	To give the basic knowledge of fuel and some advanced materials.
4.	To explain battery technology, engineering materials and green chemistry.

Curriculum Details

Course Contents	Duration
Unit-I Water Chemistry Introduction, impurities in natural water, • Water quality parameters total solids, acidity, alkalinity and chlorides, (definition, causes, significance) • Hardness of water, types of hardness, units of hardness, numerical on hardness, ill effects of hard water in steam generation in boilers (scale & sludge formation). • Treatment of hard water (Ion exchange and reverse osmosis process).	**06 Hrs**
Unit-II Instrumental methods of chemical analysis Introduction, advantages and disadvantages of instrumental methods • p^HMetry: Introduction, p^H measurement using glass electrode and its applications • Spectrometry: Introduction, Laws of spectrometry (Lamberts and Beer-Lambert's law), UV-visible spectrophotometry(schematic, working and applications). • Chromatography: Introduction, types, gas-liquid chromatography (GLC),	**06 Hrs**

Course Contents	Duration
Basic principle, instrumentation and applications..	
Unit-III Advanced materials • Polymers: Introduction, plastics, thermos-softening and thermosetting plastics • Industrially important plastics like phenol formaldehyde, ureaformaldehydeandepoxyresins • Conducting polymers and Biopolymers (Introduction, examples and applications.) • Composite materials: Introduction, Composition, properties and uses of fibrere in forced plastics (FRP) and glass rein forced plastic(GRP)	**06 Hrs**
Unit-IV Fuels & Green Chemistry • Introduction, classification, calorific value, definition, units (calorie, kcal, joules, kilojoules), characteristics of good fuels, Boy's Calorimeter and their numerical. • Green Chemistry: Definition, Twelve principles of Green Chemistry.	**06 Hrs**
Unit-V Nanomaterials • Introduction to nanomaterials, Types &synthesis approaches of nanomaterials • Characteristics and Applications of Fullerenes, Characteristics and Applications of Carbon Nanotubes, Characteristics and Applications of Nanowires, Characteristics and Applications of Graphite	**06 Hrs**
Unit-VI Battery Technology& Fuel Cells • Introduction to basic principles of electrochemistry • Battery & battery technology: Introduction, primary call (carbon zinc cell, lithium cell), secondary cell (rechargeable alkaline storage battery- Ni-Cd Battery, rechargeable lithium ion batteries) • Fuelcells:Introduction,theoreticalprinciple,advantages,disadvantages,types of Fuel Cells, H_2-O_2 fuel cells (Construction, Working and Applications)	**06 Hrs**

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Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
111.1	**Interpret** hardness, acidity, alkalinity and chloride content of water and methods For waters of tening.
111.2	**Enumerate** importance, principles of chemical analysis by instrumental techniques.
111.3	I**llustrate** general synthesis and mechanisms of some advanced polymeric materials
111.4	**Discuss** fuels and concept of green chemistry with its applications.
111.5	**Summarize** synthesis, properties and applications of nanomaterials
111.6	**Correlate** basics of battery technology and fuel cells with their types, properties and applications.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs / COs	BTL	1	2	3	4	5	6	7	8	9	10	11	12
111.1	3	3	2	–	–	–	–	–	–	–	–	–	1
111.2	2	3	_	–	–	–	–	–	–	–	–	–	1
111.3	2	3	_	–	–	–	–	–	–	–	–	–	1
111.4	3	3	2	–	–	–	–	–	–	–	–	–	1
111.5	2	3	_	–	–	–	–	–	–	–	–	–	1
111.6	2	3	_	–	–	–	–	–	–	–	–	–	1

Suggested Learning Resources:

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	A Textbook of Engineering Chemistry	12th	S. S. Dara, S. S. Umare	S. Chand & Company Ltd., New Delhi.	2011
2	A Textbook of Engineering Chemistry	1st	C. P. Murthy, C. V. Agarwal, A. Naidu	BS Publications, Hyderabad,	2012
3	A text Book of Engineering Chemistry	1st	S. Chawla	Dhanpat Rai & Co. (Pvt.) Ltd, Delhi	2011
4	Engineering Chemistry	15th	P.C.Jain	Dhanpat Rai & Co. (Pvt.) Ltd,Delhi	2015

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Chemistry of Engineering Materials	3rd	R. P. Mani,K. N. Mishra	Cengage Learning	2015
2	Engineering Chemistry	3rd	B.Chinnappan, S. Baskar, R.Dhillon	Wiley India	2015
3	Engineering Chemistry	1st	PALANNA O.G.	TataMc-Graw Hill Publishing Limited	2012
4	Instrumental Methods Of Chemical Analysis : Analytical Chemistry	6th	Chatwal, Anand	Himalaya Pub. House, Mumbai	2010

Useful Link /Web Resources:

1. https://archive.nptel.ac.in/courses/122/106/122106028/#
2. https://nptel.ac.in/courses/118104008

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Course Title : Applied Chemistry Laboratory	
Course Code : 230FYP115	**Semester :**I / II
Teaching Scheme L-T-P :0-0-2	**Credits :**1
Evaluation Scheme ISE : 25	**ESE:--**

Prior Knowledge of:	Experiments based on titration, Handling of Glassware's & Chemicals

Course Objective:

1.	To test water quality parameters using various titration analysis methods
2.	To synthesize simple advanced materials and estimate concentration of elements in material's.
3.	To know handling of glassware's and simple equipment's for chemical analysis.

List of Experiments

Exp. No	Title of Experiments	Duration
01	Determination of total hardness and of water sample by EDTA method (Complexometric Titration).	02Hrs
02	Determination of chloride content and acidity of water samples.	02Hrs
03	Determination of alkalinity of given water sample using acid-base titration.	02Hrs
04	Estimation of zinc inbrasssolution.	02Hrs
05	Preparation of urea-formaldehyderesin.	02Hrs
06	Estimation of Calcium inlimestone.	02Hrs
07	Estimation of Nickel by colorimetric method.	02Hrs
08	Determination of p^H of given sample using p^H Meter.	02Hrs

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Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
115.1	**Analyze** hardness, acidity, alkalinity and chloride content of water and percentage of elements in some alloys.
115.2	**Produce** various advanced materials and analyze aqueous solutions using instruments.
115.3	**Perform** various experiments by following written instructions.
115.4	**Express** involvement by understanding concepts in applied chemistry.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs / COs	BTL	1	`2	3	4	5	6	7	8	9	10	11	12
115.1	3	3	-	-	-	-	-	-	-	1	-	-	1
115.2	3	3	-	-	-	1	-	-	-	1	-	-	1
115.3	3	3	-	-	-	-	-	-	-	1	-	-	1
115.4	3	3	-	-	-	-	-	-	-	1	-	-	1

Suggested Learning Resources:
Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Laboratory manual on engineering chemistry	1st	S. K. Bashin, Dr.Sudha Rani	Dhanpat Rai Publishingcompany Ltd.,New Delhi	2012
2	Engineering Chemistry	15th	P. C. Jain,	Dhanpat Rai Publishing Company Ltd., New Delhi	2014

Useful Link /Web Resources:

1. https://www.vlab.co.in/broad-area-chemical-sciences

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Course Title : Elements of Electrical and Electronics Engineering	
Course Code :230FYL112	**Semester :**I / II
Teaching Scheme L-T-P : 3-0-0	**Credits :**3
Evaluation Scheme ISE-I,MSE,ISE II:10/30/10	**ESE Marks :**50

Prior Knowledge of:	Ohms law, Magnetism, Semiconductor theory

Course Objectives:

1.	To learn basic knowledge of electrical and magnetic circuits.
2.	To understand concept of single phase and Three phase AC circuits.
3.	To impart basic knowledge for understanding of AC machines.
4.	To introduce fundamental concepts of Analog electronics.
5	To introduce fundamental concepts of Digital electronics.
6.	To expose the students about different types of transducers

Curriculum Details

Course Contents	Duration
Unit-I: Electric and Magnetic Circuits • **Electric Circuit:** Basic concepts- Voltage,Current, Power, Resistance, Inductance, Capacitance, E.M.F. • Simplification of networks using series and parallel combinations(R,L,C) • Kirchhoff's laws . • **Magnetic Circuit:** Flux, flux density, reluctance, MMF, permeability and field strength, their units. • Magnetic leakage, fringing, Faraday's law of Electromagnetic induction.	**06 Hrs**
Unit-II: Single Phase AC Circuits and Three Phase AC Circuits • Generation of single phase sinusoidal voltage • Generation of 3 phase supply and its necessity. • Average value, root mean square value, form factor and peak factor of sinusoidal varying quantities. • Single phase ac circuit analysis (R-L-C series)	**06 Hrs**
Unit-III: Single phase AC Machines • **Single Phase Transformer:** Construction, operating principle • Types of Transformer	**06 Hrs**

Course Contents	Duration
• E.M.F equation • Turns ratio, voltage ratio • Power losses • **AC Motors:** Construction and working of single phase induction motor.	
Unit-IV: Analog Electronics • Introduction to semiconductor. • Construction, symbol, working, characteristics, applications of 1. P-N Junction 2. Zener Diode • Rectifiers:(HWR, FWR, Bridge) • Filter(C) • Features of IC regulators 78XX, 79XX, LM317 • Transistor: construction, types, operation; transistor configuration.	**06 Hrs**
Unit-V: Digital Electronics • Introduction to Logic Gates • Universal gates • **Combinational Logic Circui**t: Reduction of digital expressions by Boolean algebra and De Morgan's Theorem.	**06 Hrs**
Unit-VI: Transducers • Classification of transducers • Temperature transducers • Speed transducers • Displacement transducers • Photo transducers	**06 Hrs**

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Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
112.1	Explain the basic concept of electric and magnetic circuits.
112.2	Understand concept of single phase and Three phase AC circuits.
112.3	Interpret the knowledge of single Phase AC machine.
112.4	Identify type of diodes, transistor configurations.
112.5	Apply De Morgan's theorem and Boolean algebra to reduce digital expressions.
112.6	Classify different types of transducers.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs / COs	BTL	1	2	3	4	5	6	7	8	9	10	11	12
112.1	L1,2,3	3	2	-	-	-	-	-	-	-	-	-	1
112.2	L1,2,3	3	2	-	-	-	-	-	-	-	-	-	1
112.3	L1,2,3	3	-	-	-	-	-	-	-	-	-	-	1
112.4	L1,2	3	2	-	-	-	-	-	-	-	-	-	1
112.5	L1,2	3	2	-	-	-	-	-	-	-	-	-	1
112.6	L1,2	3	-	-	-	-	-	-	-	-	-	-	1

Suggested Learning Resources:

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Theory and problems of Basic Electrical Engineering	Eastern Economy Edition.	I. J. Nagrath and Kothari	PHI learning 2. Pvt .Ltd	2009
2	Fundamentals of Electrical Engineering	4th Edition.	Ashfaq Husain	Dhanpat Rai &Co.	2013
3	Basic Electrical Engineering	2nd Edition.	V. N. Mittal and Arvind	Tata Mc Graw Hill	2007

Sr. No	Title	Edition	Author(s)	Publisher	Year
			Mittal		
4	Basic Electrical Engineering	1st Revised Edition	V.K. Mehta,	S. Chand & Co. Pvt . Ltd. New Delhi)	2008
5	Electronics Devices	9th Edition	Thomas. L. Floyd	Pearson	2008
6	Modern Digital Electronics	4th Edition	R.P. Jain	Tata Mc Graw Hill	2010

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Basic Electrical Engineering	1st Edition	D. C. Kulshreshta	Tata McGraw hill	2008
2	A textbook of Electrical Technology Vol I	1st Edition.	B. L. Theraja and A. K. Theraja	Chand & Co. Pvt. Ltd. New Delhi	2008
3	A textbook of Electrical Technology Vol II	1st Edition.	B. L. Theraja and A. K. Theraja	Chand & Co. Pvt. Ltd. New Delhi	2008
4	Electrical Technology	10th Edition	Edward Hughes,	Pearson	2008
5	Digital Fundamentals	10th Edition	Thomas L Floyd	Pearson	1982
6	Digital design	3rd Edition	M. Morris Mano	Pearson	1996
7	Fundamentals of digital circuits	2nd Edition	Anand Kumar	Prentice Hall of India	2008

Useful Link /Web Resources:

NPTL: https://www.youtube.com/watch?v=0SnfR13p6Mc&t=12s

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Course Title : Elements of Electrical and Electronics Engineering Laboratory	
Course Code : 230FYP116	**Semester :**I / II
Teaching Scheme L-T-P :0-0-2	**Credits :**1
Evaluation Scheme: ISE Marks 25	**ESE: --**

Prior Knowledge of:	Identify electrical and electronic component

Course Objective:

117.1	To make the students learn working principal of different Electrical & Electronic Circuits
117.2	To impart the skills to identify types of transformers and the their losses
117.3	To make the students use of transducers.
117.4	To expose the students to working of analog and digital circuits

List of Experiments

Exp. No	Title of Experiments	Duration
01	Introduction to Electrical Engineering laboratory.	02Hrs
02	Verification of Kirchhoff's Current Law/ Kirchhoff's Voltage Law	02Hrs
03	Determination of reactance for Series R-L- C Circuit.	02Hrs
04	Polarity and Ratio Test for single Phase Transformer	02Hrs
05	Testing of Electronic components using multi-meter &CRO	02Hrs
06	Experiment on Half wave rectifiers.	02Hrs
07	Experiment on Full wave rectifiers.	02Hrs
08	Measurement of Displacement using LVDT/strain Gauge.	02Hrs
09	Experiment and use of IC (78XX, LM317) as Voltage regulators.	02Hrs
10	Implementation of logic gate by using universal gate.	02Hrs

Minimum eight experiments should be conducted covering all units.

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Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
116.1	Understand the working principal of different Electrical & Electronic Circuits
116.2	Illustrate differences between the types of transformers and the their losses
116.3	Use analog and digital circuits.
116.4	Use measuring devices and transducers

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs / COs	BTL	1	`2	3	4	5	6	7	8	9	10	11	12
116.1	3	3	3	-	-	-	-	-	-	-	-	-	1
116.2	3	3	-	-	-	-	-	-	-	-	-	-	1
116.3	3	3	3	-	-	-	-	-	-	-	-	-	1
116.4	3	3	-	-	-	-	-	-	-	-	-	-	1

Suggested Learning Resources:

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Theory and problems of Basic Electrical Engineering	Eastern Economy Edition.	I. J. Nagrath and Kothari	PHI learning 2. Pvt .Ltd	2009
2	Fundamentals of Electrical Engineering	4th Edition.	Ashfaq Husain	Dhanpat Rai &Co.	2013
3	Basic Electrical Engineering	2nd Edition.	V. N. Mittal and Arvind Mittal	Tata Mc Graw Hill	2007
4	Electronics Devices	9th Edition	Thomas. L. Floyd	Pearson	2008
5	Modern Digital Electronics	4th Edition	R.P. Jain	Tata Mc Graw Hill	2010

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Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Basic Electrical Engineering	1st Edition	D. C. Kulshreshta	Tata McGraw hill	2008
2	A textbook of Electrical Technology Vol I	1st Edition.	B. L. Theraja and A. K. Theraja	Chand & Co. Pvt. Ltd. New Delhi	2008
3	A textbook of Electrical Technology Vol II	1st Edition.	B. L. Theraja and A. K. Theraja	Chand & Co. Pvt. Ltd. New Delhi	2008
4	Digital Fundamentals	10th Edition	Thomas L Floyd	Pearson	1982
5	Digital design	3rd Edition	M. Morris Mano	Pearson	1996
6	Fundamentals of digital circuits	2nd Edition	Anand Kumar	Prentice Hall of India	2008

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Course Title: Computer Aided Engineering Graphics	
Course Code: 230FYL113	**Semester:** I / II
Teaching Scheme L-T-P: 3 – 0 – 0	**Credits:** 3
Evaluation Scheme: ISE-I, MSE, ISE-II: 10 /30/10	**ESE Marks :**50

Prior Knowledge of:	Fundamentals of drawings

Course Objectives:

1.	Enable them to use computer aided drafting tools to prepare drawings.
2.	Bring awareness that engineering drawing is the language of engineers.
3.	Impart basic knowledge and skills required to prepare engineering drawings.
4.	visualize and present the orthographic and isometric views with proper dimension and scale.

Curriculum Details

Content	Duration
Unit-I: Introduction to Computer Aided Sketching ▪ Introduction to CAD software ▪ Graphical User interface of CAD software ▪ Selection of Drawing size and scale ▪ Standard Toolbars, Menus, Tabs, navigational tools ▪ Basic Commands to draw 2D objects ▪ Co-ordinate system and planes ▪ Viewing Commands	**07 Hrs**
Unit-II: Customization and Annotations ▪ Edit & Modify Commands ▪ Dimensions ▪ Lettering ▪ Annotations as per BIS conventions ▪ Changing length through modifying existing line ▪ Plotting	**07 Hrs**

Content	Duration
Unit-III: Projections of Solids ▪ Projection of solid ▪ when axis is perpendicular to one of the reference planes ▪ when axis is inclined to one and parallel to other reference plane ▪ when axis is inclined to both the reference planes ▪ Projection of Prisms, Pyramids, right circular cylinder, right circular cone	**07 Hrs**
Unit-IV: Orthographic Views ▪ Principles of Orthographic Projections ▪ Types of orthographic projections–First angle and third angle projections ▪ Obtaining orthographic projections of given pictorial views by using first angle projection method along with sectional views, dimensioning and sections	**08 Hrs**
Unit-V: Isometric Projections ▪ Introduction to Isometric ▪ Isometric scale ▪ Isometric projections and Isometric views / drawings ▪ Circles in isometric view ▪ Isometric views of simple solids and objects	**08 Hrs**

Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
113.1	Understand modern engineering tools used for engineering drawing.
113.2	Prepare 2-D drawings with appropriate dimensional and geometrical constraints.
113.3	Prepare drawing for projection of solid.
113.4	Prepare drawing for orthographic & sectional views.
113.5	Prepare drawing for isometric projection.

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Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

(POs) (COs)	1	2	3	4	5	6	7	8	9	10	11	12
113.1	3	2	-	-	3	-	-	-	-	-	-	-
113.2	3	2	-	-	3	-	-	-	-	-	-	-
113.3	3	2	-	-	3	-	-	-	-	-	-	-
113.4	3	2	-	-	3	-	-	-	-	-	-	-
113.5	3	2	-	-	3	-	-	-	-	-	-	-

Suggested Learning Resources:

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Engineering Graphics with Auto CAD	13th	D. M. Kulkarni A. P. Rastogi	(PHI) Publisher	2010
2	Computer Aided Engineering Drawing	3rd	S. Trymbaka Murthy	I.K. International Publishing House	2013
3	Engineering Drawing	53rd	N. D. Bhatt	Charotor Publication House, Bombay	2014
4	Machine Drawing	46rd	N. D. Bhatt	Charotor Publication House, Bombay	2016

Reference Books:

Sr. No	Title	Author(s)	Publisher
1	Graphic Science	French and Vierck	Mc-Graw Hill International
2	Working with AutoCAD 2000	Ajeet Sing	Tata McGraw Hill
3	Machine Drawing	K. L. Narayana	New Age Publication
4	Engineering Drawing and Graphics	K. Venugopal	New Age Publication
5	A text book of Engineering Drawing	R. K. Dhawan	S. Chand and Co.
6	Fundamentals of Engineering Drawing	W. J. Luzadder	Prentice Hall of India
7	Engineering Drawing	N. B. Shaha and B. C. Rana	Pearson Education

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Course Title: Computer Aided Engineering Graphics Laboratory	
Course Code: 230FYP117	**Semester:** I & II
Teaching Scheme L-T-P: 0 – 0 – 2	**Credits:** 1
Evaluation Scheme: ISE - 50	**ESE :--**

Prior Knowledge of:	Fundamentals of drawings

Course Objectives:

1.	Enable them to use computer aided drafting tools to prepare drawings.
2.	Bring awareness that engineering drawing is the language of engineers.
3.	Impart basic knowledge and skills required to prepare engineering drawings.
4.	Visualize and present the orthographic and isometric views with proper dimension and scale.

Curriculum Details

Content		
Exp. No	**Details**	**Hrs.**
1	Introduction of basic CAD software commands	2.00
2	Use and practice of Customization & Annotations	2.00
3	Draw Basic Drawings (Minimum two problems)	4.00
4	Draw problems on Projections of Solid (Minimum two problems)	4.00
5	Draw problems on Orthographic views (Minimum two problems)	4.00
6	Draw problems on Sectional Orthographic views (Minimum two problems)	4.00
7	Draw problems based on Isometric projections (Minimum two problems)	4.00

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Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
117.1	Understand modern engineering tools used for engineering drawing.
117.2	Prepare 2-D drawings with appropriate dimensional and geometrical constraints.
117.3	Prepare drawing for projection of solid.
117.4	Prepare drawing for orthographic & sectional views.
117.5	Prepare drawing for isometric projection.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

(POs) / (COs)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
117.1	**3**	**2**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
117.2	**3**	**2**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
117.3	**3**	**2**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
117.4	**3**	**2**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
117.5	**3**	**2**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
117.1	**3**	**2**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

Suggested Learning Resources:

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Engineering Drawing	53rd	N. D. Bhatt	Charotor Publication House, Bombay	2014
2	Machine Drawing	46rd	N. D. Bhatt	Charotor Publication House, Bombay	2016
3	Engineering Graphics with Auto CAD	13th	D. M. Kulkarni A. P. Rastogi	(PHI) Publisher	2010
4	Computer Aided Engineering Drawing	3rd	S. Trymbaka Murthy	I.K. International Publishing House	2014

Reference Books:

Sr. No	Title	Author(s)	Publisher
1	Graphic Science	French and Vierck	Mc-Graw Hill International
2	Working with AutoCAD 2000	Ajeet Sing	Tata McGraw Hill
3	Machine Drawing	K. L. Narayana	New Age Publication
4	Engineering Drawing and Graphics	K. Venugopal	New Age Publication
5	A text book of Engineering Drawing	R. K. Dhawan	S. Chand and Co.
6	Fundamentals of Engineering Drawing	W. J. Luzadder	Prentice Hall of India
7	Engineering Drawing	N. B. Shaha and B. C. Rana	Pearson Education

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Course Title : Technical Communication	
Course Code : 230FYL114	**Semester :** I / II
Teaching Scheme L-T-P : 2-0-0	**Credits :** 02
Evaluation Scheme: - ISE/MSE: 10/30/10	**ESE: --**

Prior knowledge of:	Basic English grammar, Basics of communication

Course Objectives:

1.	To **make** students learn important communicative situations, basics of communication and its significance in corporate sector
2.	To **enhance** their basic knowledge of grammar to communicate correctly
3.	To **sharpen** their listening, speaking and reading skills
4.	To **facilitate** them to draft office documents effectively
5.	To **make** holistic development of students

Curriculum Details

Course Contents	Duration
Unit 1 Language and Communication • Need for effective communication • The process and levels of communication • Technical communication • Communication networks/ flows • Forms and methods (verbal and non-verbal) of communication • Barriers to communication and solutions	**05 Hrs**
Unit 2 Remedial English • Parts of speech, Sentence pattern • Modal auxiliaries • Tenses • Change the voice • Direct indirect speech/Reported speech • Common Errors: Subject-verb agreement, Noun-pronoun agreement, Misplaced modifiers, Articles, Prepositions • Vocabulary building: TOEFL, GRE, IELTS	**04 Hrs**

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Course Contents	Duration
Unit 3 Introduction to LSRW • **Listening Skills:** Hearing and listening, Listening as an active skill; Types of Listening; Barriers to effective listening skills. • **Speaking Skills**: Importance, Various oral business contexts/situations, Group communication, Preparing effective public speeches (Impromptu and prepared) • **Reading Skills**: Benefits of effective reading, Types of reading (Skimming; Scanning, Intensive reading, Extensive reading) Overcoming common obstacles, Reading comprehension. • **Writing Skills:** Importance, Paragraph writing techniques	**04 Hrs**
Unit 4 Technical Writing • **Official correspondence** Principles, structure (elements) Layout (complete block, modified block, semi-block), Types (enquiry and reply, claim and adjustment) • **Office drafting** Writing notice, agenda and minutes of the meeting • **Email writing** Advantages and limitations Style, structure and content Email etiquette • **Report writing** Formal and informal reports Structure and style Types of reports Survey reports Investigation reports	**06 Hrs**
Unit 5 Behavioral Skills • Introduction to behavioral skills • Understanding Self (SWOC), SMART goal setting • Team building skills • Corporate etiquettes and ethics	**05 Hrs**
Unit6 Career Skills • Writing resume and cover letter • Interview skills	**04 Hrs**

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Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
114.1	**Implement** verbal and non-verbal codes for effective communication
114.2	**Prepare** grammatically correct and meaningful sentences
114.3	**Demonstrate** language learning skills-LSRW (Listening, Speaking, Reading, and Writing)
114.4	**Draft** business documents efficiently
114.5	**Exhibit** behavioral skills in personal and professional contexts
114.6	**Demonstrate** career skills effectively

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs / COs	BTL	1	2	3	4	5	6	7	8	9	10	11	12
114.1	3	-	-	-	-	-	-	-	-	3	3	-	1
114.2	3	-	-	-	-	-	-	-	-	-	3	-	1
114.3	3	-	-	-	-	-	-	-	3	3	3	-	1
114.4	3	-	-	-	-	-	-	-	-	-	2	-	1
114.5	3	-	-	-	-	-	-	-	3	3	3	-	1
114.6	3	-	-	-	-	-	-	-	3	3	3	-	1

Suggested Learning Resources:

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Technical Communication: Principles and Practice	4th	Meenakshi Raman & Sangita Sharma	Oxford University Press	2022
2	Personality Development and Soft- Skills	2nd	Barun K. Mitra	Oxford University Press	2016
3	Communication Skills	2nd	Sanjay Kumar & Pushp Lata	Oxford University Press	2015
4	Communication Skills	3rd	Meenakshi Raman & Sangeeta Sharma	Oxford University Press	2013

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Business Communication	2nd	Urmila Rai and S.M. Rai	Himalaya Publishing House Pvt. Ltd.	2014
2	A University Grammar of English	1st	Randolph Quirk and S Greenbaum	Pearson	2007
3	Effective Technical Communication	2nd	B. K.Mitra	Oxford University Press	2006
4	Effective Technical Communication	2nd	M.Ashraf Rizvi	McGraw Hill Education	2005

Useful Links/Web Resources:

1. **https://www.skillsyouneed.com**
2. **https://www.psychologytoday.com**
3. **https://www.britishcouncil.in**
4. **https://www.udemy.com**
5. **https://www.englishclub.com**

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Course Title : Technical Communication Laboratory	
Course Code : 230FYP118	**Semester :** I / II
Teaching Scheme L-T-P : 0-0-2	**Credit :**01
Evaluation Scheme: ISE Marks : 50	**ESE Marks : --**

Prior knowledge of:	Basic language learning and behavioral skills

Course Objectives:

1.	To **familiarize** students with English phonology and improve their pronunciation
2.	To **improve** language learning skills (LSRW) by providing ample practice
3.	To **develop** students verbal and non-verbal communication
4.	To **cultivate** behavioral skills among them

List of Lab Sessions

Session No	Title of Activities	Duration
01	**Icebreaking: Introducing self and others** Different ways of introducing self and others: demonstration	02Hrs
02	**Phonetics** Introduction to phonetics - consonants, vowels and diphthongs, stress, intonation in English with video samples	02Hrs
03	**Listening Practice** Listening comprehension, strategies for effective listening with audio/video samples	02Hrs
04	**Writing Practice** Paragraph writing, writing notices, agenda minutes of the meeting, report writing	02Hrs
05	**Public Speaking** Practicing extempore and prepared speeches	02Hrs
06	**Technical Presentation** Practicing technical presentation	02Hrs
07	**Group discussion and debate** Group discussions on current topics	02Hrs
08	**Mock Interviews** Interview skills and techniques	02Hrs

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Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
118.1	**Demonstrate** effective LSRW skills
118.2	**Comprehend** grammar rules and sound patterns for better technical communication
118.3	**Deliver** speeches and presentations effectively
118.4	**Execute** the soft skills effectively for better career opportunities

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs / COs	BTL	1	`2	3	4	5	6	7	8	9	10	11	12
118.1	3	-	-	-	-	-	-	-	-	3	3	-	1
118.2	3	-	-	-	-	-	-	-	-	-	3	-	1
118.3	3	-	-	-	-	-	-	-	3	3	3	-	1
118.4	3	-	-	-	-	-	-	-	3	3	3	-	1

Suggested Learning Resources:

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	A Practical Course in Spoken English	1st	J.K. Gangaj	PHI Learning Pvt. Ltd	2014
2	English Language Laboratories	2nd	Nira Konar	PHI Learning Pvt. Ltd	2014
3	Better English Pronunciation	2nd	J.D.O Connor	Cambridge University Press,	1980

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Communication Skills	2nd	Sanjay Kumar & Pushp Lata	Oxford University Press	2015
2	Technical Communication: Principles and Practice	2nd	Meenakshi Raman & Sangita Sharma	Oxford University Press	2011

Useful Links /Web Resources:

1. https://www.indiabix.com
2. https://www.skillsyouneed.com
3. https://interviewbuddy.in
4. https://learnenglish.britishcouncil.org
5. https://www.fluentu.com

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Course Title: Rural/Social Internship	
Course Code: 230FYM119	**Semester:** I
Teaching Scheme: L-T-P :0-0-0	**Credits:** Grade (Mandatory Course)
Evaluation Scheme ISE: 50	**ESE Marks:** --

Course Objectives:

1	To provide possible opportunities to learn, understand and sharpen the real time technical / managerial skills required at the job.
2	To exposure to the current technological developments relevant to the subject area of training.
3	To expose students to the engineer's responsibilities and ethics.
4	To understand the social, economic and administrative considerations that influence the working environment of industrial organizations
5	To gain experience in writing technical reports/projects.
6	To understand the social, economic and administrative considerations that influence the working environment of industrial organizations

Curriculum Details

As per the approved structure of curriculum, students will be allowed to do internship during first semester of B. Tech. program. During internship students are required to be visit village/ward/small industry/organization etc

Internship Period: Two Weeks

For following activities

1. Prepare and implement plan to create local job opportunities.
2. Prepare and implement plan to improve education quality in village.
3. Preparing an actionable DPR for Doubling the village Income.
4. Developing Sustainable Water Management system.
5. Prepare and Improve a plan to improve health parameters of villagers.
6. Developing and implementing of Low Cost Sanitation facilities
7. Prepare and implement plan to promote Local Tourism through Innovative Approaches
8. Implement/Develop Technology solutions which will improve quality of life.

9. Prepare and implement solution for energy conservation.
10. Prepare and implement plan to Skill village youth and provide employment.
11. Develop localized techniques for Reduction in construction Cost.
12. Prepare and implement plan of sustainable growth of village.
13. Setting of Information imparting club for women leading to contribution in social and economic issues.
14. Developing and managing Efficient garbage disposable system.
15. Contribution to any national level initiative of Government of India. For eg. Digital India/ Skill India/ Swachh Bharat Internship etc

Every student is required to prepare a file containing documentary proofs of the activities done by him. The evaluation will be done by expert committee constituted by HoD/Departmental Internship In-charge/ faculty mentor.

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Course Title: Capstone Project	
Course Code: 230FYM121	**Semester:** II
Teaching Scheme: L-T-P :0-0-0	**Credits:** Grade (Mandatory Course)
Evaluation Scheme ISE: 50	**ESE Marks:** --

Course Objectives:

1	To inculcate independent learning by problem solving with social context.
2	To engages students in rich and authentic learning experiences.
3	To emphasizes learning activities that are long-term, interdisciplinary and student-centric.
4	To provide every student the opportunity to get involved either individually or as a group so as to develop team skills and learn professionalism.

Curriculum Details

As per the approved structure of curriculum, students will be allowed to do capstone project during second semester of B. Tech. program.

Topics:

Capstone Project may be a theoretical analysis, modeling & simulation, experimentation & analysis, prototype design, fabrication of new equipment, correlation and analysis of data, software development, etc. or a combination of these.

Group Structure:

Working in supervisor/mentor monitored groups; the students plan, manage, and complete a task/project/activity which addresses the stated problem.

1. There should be team/group of 4 -5 students
2. A supervisor/mentor teacher assigned to individual groups

Selection of Project:

The project demo model for learning is recommended. The model begins with the identifying of a problem, often growing out of a question or “wondering”. This formulated problem then stands as the starting point for learning. Students design and analyze the problem within an

articulated interdisciplinary or subject frame or based on Rural/Social internship.

A problem can be theoretical, practical, social, technical, symbolic, cultural, and/or scientific and grows out of students' wondering within different disciplines and professional environments. A chosen problem has to be exemplary. The problem may involve an interdisciplinary approach in both the analysis and solving phases.

By exemplarity, a problem needs to refer back to a particular practical, scientific, social and/or technical domain. The problem should stand as one specific example or manifestation of more general learning outcomes related to knowledge and/or modes of inquiry.

There are no commonly shared criteria for what constitutes an acceptable project. Projects vary greatly in the depth of the questions explored, the clarity of the learning goals, the content, and structure of the activity.

1. A few hands-on activities that may or may not be multidisciplinary.
2. Use of technology in meaningful ways to help them investigate, collaborate, analyze, synthesize, and present their learning.
3. Activities may include- Solving real life problem, investigation, /study and Writing reports of in-depth study, fieldwork.

Recommended Guidelines and phases:

Capstone project is learning through activity. One of the teachers can be appointed as guide for capstone project group. Following are the recommended guidelines that will work as an initiator and facilitator in process of completion of Capstone project.

1. In first week of commencement of 2nd semester, let the guide create awareness about capstone project (what, why, and how) among the students. Convey students expected outcomes, assessment process and evaluation criteria.
2. Get groups of students registered preferably 4-5 students per group.
3. Assign guide to each group.
4. Provide guidelines for title identification (Problem can be some real-life situation that needs technology solutions. This situation can be identified by rural/social internship, by meeting people around, visiting various industries, society, and institutes. The solution can be prototype, model, convertible solutions, survey and analysis, simulation, and similar).

5. Let students submit the problem identified in prescribed format (Problem Statement, Initial Survey for topic finalization, Abstract, Software, Hardware required, Title)
6. Guide can approve the problem statements based on feasibility and learning outcomes expected for first year engineering students
7. Guide is to monitor progress of the task during phases of project work. Broadly phases may include- requirements gathering, preparing a solution, technology design for the solution.
8. Weekly monitoring and continuous assessment record are to be maintained by guide.
9. Get the report submitted at the end of semester.

Student is required to prepare a capstone project and file containing documentary proofs of the activities done by him. The evaluation will be done by expert committee constituted by HoD/Departmental capstone project In-charge/ faculty mentor.