AISSMS
INSTITUTE OF INFORMATION TECHNOLOGY
(IOIT)

ADDING VALUE TO ENGINEERING

An Autonomous Institute Affiliated to Savitribai Phule Pune University.
Approved by AICTE, New Delhi and Recognised by Govt. of Maharashtra
Accredited by NAAC with "A+" Grade | NBA - 5 UG Programmes

ACADEMIC COURSE STRUCTURE

AND

DETAILED SYLLABUS OF

DEPARTMENT OF ENGINEERING SCIENCES
(FY B-TECH)

(Applicable for the batches admitted from 2023-2024)

AISSMS INSTITUTE OF INFORMATION TECHNOLOGY
Kennedy Road, Near RTO,
Pune – 411 001, Maharashtra State, India
Email: principal@aissmsioit.org, Website:
https://www.aissmsioit.org

Chairman Board of Studies
AISSMS, IOIT, Pune-1
Department of Engg. Sciences (F.Y. B.Tech)

Institute Vision & Mission

Vision

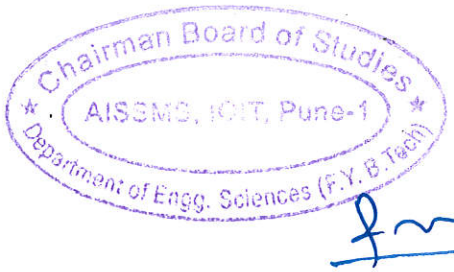
To be recognized amongst top 10 private engineering colleges in Maharashtra by the year 2026 by rendering value added education through academic excellence, research, entrepreneurial attitude, and global exposure.

Mission

- To enable placement of 150 plus students in the 7 lacs plus category & ensure 100% placement of all final year students.
- To connect with 10 plus international universities, professional bodies, and organizations to provide global exposure students.
- To create conducive environment for career growth, prosperity, and happiness of 100% staff.
- To be amongst top 5 private colleges in Pune in terms of admission cut off.

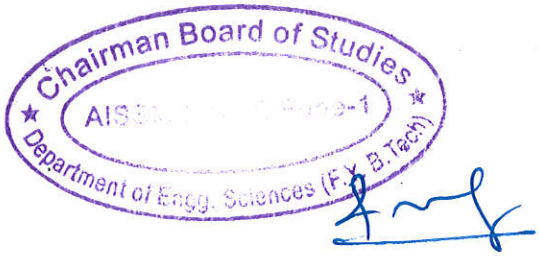
Quality Policy

We commit ourselves to provide quality education & enhance our students quality through continuous improvement in our teaching and learning processes.



Program Outcomes (POs)

1. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. [Engineering knowledge]
2. Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. [Problem analysis]
3. Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. [Design/development of solutions]
4. Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. [Conduct investigations of complex problems]
5. Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations. [Modern tool usage]
6. Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice. [The engineer and society]
7. Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. [Environment and sustainability]
8. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. [Ethics]
9. Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. [Individual and team work]
10. Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. [Communication]
11. Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. [Project management and finance]
12. Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. [Life-long learning]



Program- FY BTech for all Programs
DEPARTMENT of ENGINEERING SCIENCES

(Autonomous Curriculum Structure 2023-24)

A. Definition of Credit:

1 Hr. Lecture (L) per week	1 credit
1 Hr. Tutorial (T) per week	1 credit
1 Hr. Practical (P) per week 2 Hours Practical (Lab)/week	0.5 credits 1 credit

B. Range of credits –

A range of credits from 160 to 176 for a student to be eligible to get Undergraduate degree in Engineering. A student

will be eligible to get Undergraduate degree with Honors 20 credits and/or Minors 14 credits, if he/she completes additional credits.

C. Credit for Undergraduate Degree in Information Technology

Sr. No.	Year	Semester	Credits
1	First Year	I	19
2		II	21
3	Second Year	III	
4		IV	
5	Third Year	V	
6		VI	
7	Final Year	VII	
8		VIII	
Total Credits			

D. Structure of Undergraduate Engineering program

Sr. no.	Domains	Code	Credits	NEP Suggested
1	Basic Science courses	BSC		14-18
2	Engineering Science courses	ESC		16-12
3	Programme Core Courses	PCC		44-56
4	Programme Elective courses	PEC		20
5	Open Elective other than particular Programme	OEC		08
6	Vocational and Skill Enhancement Course	VSE		08
7	Humanities Social Science and Management	HSM		14
8	Experiential Learning Courses	ELC		22
9	Liberal Learning Courses	LLC		04
Total				**160-176**

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Department of Engg. Sciences (F.Y. B.Tech)

E. Domain wise credits Distribution

Sr. no.	Code	Credits									
		Semesters								Total	NEP
		I	II	III	IV	V	VI	VII	VIII		
1	BSC	08	08								
2	ESC	09	07								
3	PCC										
4	PEC										
5	OEC										
6	VSE	01	01								
7	HSM										
8	ELC	03	03								
9	LLC										
Total Credits		21	19								
Exam Total		**650**	**650**								
Total Working Hours per Week (Including Audit courses)		**30**	**28**								

F. Honors Structure: Cyber Security

Sr. No.	Courses Name	Semester	Hours per week			Credit	Examination Scheme					Total
			Lecture	Tutorial	Practical		ISE	ESE	TW	PR	OR	
Total												

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Department of Engg. Sciences (F.Y. B.Tech)

G. BSC/ESC Courses

Sr. No.	Courses Name	Semester	Hours per week			Credit	Examination Scheme					Total
			Lecture	Tutorial	Practical		ISE	ESE	TW	PR	OR	
1	Engineering Mathematics-I	I	03	--	--	03	40	60*	--	--	--	100
2	Engineering Physics / Industrial Chemistry	I	03	--	--	03	40	60*	--	--	--	100
3	Engineering Mathematics-I (Lab)	I	--	--	02	01	--	--	--	25	--	25
4	Engineering Physics / Industrial Chemistry (Lab)	I	--	--	02	01	--	--	--	25	--	25
5	Basic Electrical Engineering /Basic Electronics Engineering	I	03	--	--	03	40	60*	--	--	--	100
6	Engineering Graphics and Introduction to CAD	I	01	--	02	02	--	--	25	25	--	50
7	Engineering Mechanics	I	02	--	02	03	40	60*	--	--	--	100
8	Basic Electrical Engineering /Basic Electronics Engineering (Lab)	I	--	--	02	01	--	--	--	25	--	25
9	Engineering Mathematics-II	II	03	--	--	03	40	60*	--	--	--	100
10	Engineering Physics / Industrial Chemistry	II	03	--	--	03	40	60*	--	--	--	100
11	Engineering Mathematics-I (Lab)	II	--	--	02	01	--	--	--	25	--	25
12	Engineering Physics / Industrial Chemistry (Lab)	II	--	--	02	01	--	--	--	25	--	25
13	Basics in Mechanical Engineering	II	01	--	02	02	40	60*	--	--	--	100
14	Environmental Informatics	II	--	--	02	01	--	--	25	25	--	50
15	Basic Electrical Engineering /Basic Electronics Engineering	II	03	--	--	03	40	60*	--	--	--	100
16	Basic Electrical Engineering /Basic Electronics Engineering Lab	II	--	--	2	01	--	--	--	25	--	25

H. Major Courses

Sr. No.	Courses Name	Semester	Hours per week			Credit	Examination Scheme					Total
			Lecture	Tutorial	Practical		ISE	ESE	TW	PR	OR	
1												
2												

I. Minor Courses

Sr. No.	Courses Name	Semester	Hours per week			Credit	Examination Scheme					Total
			Lecture	Tutorial	Practical		ISE	ESE	TW	PR	OR	
1												
2												

J. Open Elective Courses

Sr. No.	Courses Name	Semester	Hours per week			Credit	Examination Scheme					Total
			Lecture	Tutorial	Practical		ISE	ESE	TW	PR	OR	
1												
2												

K. Vocational and Skill Enhancement Courses

Sr. No.	Courses Name	Semester	Hours per week			Credit	Examination Scheme					Total
			Lecture	Tutorial	Practical		ISE	ESE	TW	PR	OR	
1	Project Based Learning Management I	I	-	-	02	01	--	--	--	--	25	25
2	Project Based Learning Management II	II	-	-	02	01	--	--	--	--	25	25

L. Humanities Social Science and Management Courses

Sr. No.	Courses Name	Semester	Hours per week			Credit	Examination Scheme					Total
			Lecture	Tutorial	Practical		ISE	ESE	TW	PR	OR	
1												
2												

M. Experiential Learning Courses

Sr. No.	Courses Name	Semester	Hours per week			Credit	Examination Scheme					Total
			Lecture	Tutorial	Practical		ISE	ESE	TW	PR	OR	
1	Problem Solving and Programming I	I	02	--	02	03	40	60**	--	--	--	100
2	Problem Solving and Programming II	II	02	--	02	03	40	60**	--	--	--	100

N. Liberal Learning Courses

Sr. No.	Courses Name	Semester	Hours per week			Credit	Examination Scheme					Total
			Lecture	Tutorial	Practical		ISE	ESE	TW	PR	OR	
1												
2												

O. Exit Courses

Sr. No.	Exit Point	Courses Name	Code	Hours per week			Credit	Examination Scheme					Total
1	Exit course after F.Y												
2	Exit course after S.Y.												
3	Exit course after T.Y.												

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Department of Engg. Sciences (F.Y. B.Tech)

SEMESTER WISE STRUCTURES

First Year Course Structure Semester I

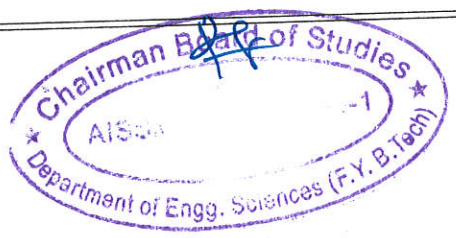
Sr No.	Course Code	Course Title	Teaching Scheme (Hours/Week)			Examination Scheme and Marks						
			Theory	Tutorial	Practical	Credits	ISE	ESE	TW	PR	OR	Total
1	FEBSC101	Engineering Mathematics-I	03	--	--	03	40	60*	--	--	--	100
2	FEBSC102 /FEBSC103	Engineering Physics / Industrial Chemistry	03	--	--	03	40	60*	--	--	--	100
3	FEESC104	Engineering Graphics and Introduction to CAD	01	--	--	01	--	--	25	25	--	50
4	FEESC105	Engineering Mechanics	02	--	02	03	40	60*	--	--	--	100
5	FEESC106 /FEESC107	Basic Electrical Engineering /Basic Electronics Engineering	03	--	--	03	40	60*	--	--	--	100
6	FEVSE108	Project Based Learning Management I	--	--	02	01	--	--	--	--	25	25
7	FEELC109	Problem Solving and Programming I	02	--	02	03	40	60**	--	--	--	100
8	FEBSC110	Engineering Mathematics-I (Lab)	--	--	02	01	--	--	--	25	--	25
9	FEBSC111 /FEBSC112	Engineering Physics / Industrial Chemistry (Lab)	--	--	02	01	--	--	--	25	--	25
10	FEESC113 /FEESC114	Basic Electrical Engineering /Basic Electronics Engineering (Lab)	--	--	02	01	--	--	--	25	--	25
	Total		14	00	14	21	200	300	25	100	25	650
11	FEMC115	Audit Course 1	02		a. UHV- I (1Hr/ week) b. Sports I (1Hr/ week)							

*** End Semester Examination (ESE) based on subjective questions.**

**** Practical or Activity based Evaluation.**

 # In Semester Evaluation based on Presentation/Group Discussion/Laboratory Work/Course Project/Home Assignment/Comprehensive Viva Voce/Blog Writing/Case Study/Survey/Multiple-Choice Question (MCQ) examination

Note- Students are required to undergo internship of 1 week under UNNAT Bharat Abhiyan after 1st semester and submit the report at the beginning of next semester.



First Year Course Structure Semester II

Sr No.	Course Code	Course Name	Teaching Scheme (Hours/Week)		Examination Scheme and Marks							
			Theory	Tutorial	Practical	Credits	ISE	ESE	TW	PR	OR	Total
1	FEBSC201A	Engineering Mathematics-II (Comp, IT, AIDS)	03	--	--	03	40	60*	--	--	--	100
	FEBSC201B	Engineering Mathematics-II (Electrical, Instru, E&Tc)										
2	FEBSC202 /FEBSC203	Engineering Physics / Industrial Chemistry	03	--	--	03	40	60*	--	--	--	100
3	FEESC204	Basics in Mechanical Engineering	01	--	02	02	40	60*	--	--	--	100
4	FEESC205	Environmental Informatics	--	--	02	01	--	--	25	25	--	50
5	FEESC206 /FEESC207	Basic Electrical Engineering /Basic Electronics Engineering	03	--	--	03	40	60*	--	--	--	100
6	FEVSE208	Project Based Learning Management II	--	--	02	01	--	--	--	--	25	25
7	FEELC209	Problem Solving and Programming II	02	--	02	03	40	60**	--	--	--	100
8	FEBSC210	Engineering Mathematics-II (Lab)	--	--	02	01	--	--	--	25	--	25
9	FEBSC211 /FEBSC212	Engineering Physics / Industrial Chemistry (Lab)	--	--	02	01	--	--	--	25	--	25
10	FEESC213 /FEESC214	Basic Electrical Engineering /Basic Electronics Engineering (Lab)	--	--	02	01	--	--	--	25	--	25
	Total		12	00	14	19	200	300	25	100	25	650
11	FEMC215	Audit Course 2	02		a. UHV- II (1Hr/ week) b. Sports II (1Hr/ week)							
12	FEHSM216	Social Internship	00		Internship of 1 week under UNNAT Bharat Abhiyan after 1st semester							

*** End Semester Examination (ESE) based on subjective questions.**

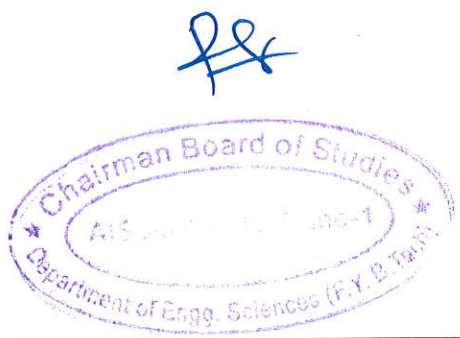
**** Practical or Activity based Evaluation.**

 # In Semester Evaluation based on Presentation/Group Discussion/Laboratory Work/Course Project/Home Assignment/Comprehensive Viva Voce/Blog Writing/Case Study/Survey/Multiple-Choice Question (MCQ) examination

Note- Students are required to undergo internship of 1 week under UNNAT Bharat Abhiyan after 1st semester and submit the report at the beginning of next semester.

Chairman Board of Studies
Department of Engg. Sciences (F.Y. B.Tech)

Semester – I


Chairman Board of Studies
Department of Engg. Sciences (F.Y. B.Tech)

Engineering Mathematics I

Course Title: Engineering Mathematics I (FEBSC 101)
(For Computer, IT and AIDS branch)

Contact Hours:	**3 Hrs./week (L)**	Type of Course:	**Lecture**
Examination Scheme	**In Sem Exam: 40 Marks**	**End Sem Exam: 60 Marks**	**Practical: -**
Course Credit	**03**		

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1.	In Sem Exam	Internal	40
2.	End Sem Exam	External	60
		Total	100

Pre-requisites: Sound knowledge about Differentiation, Integration and Matrices.

Course Objectives:

1	To develop the understanding of system of linear equations using matrices.
2	To explain the concepts of Eigen values and Eigen vectors.
3	To impart the knowledge of expansion of functions, mean value theorem and Indeterminate forms.
4	To enable the students to understand the concept of derivatives of functions of several variables.
5	To present the sound knowledge of Jacobians, error & approximation, and extreme values of the function of two variables.

Course Outcomes:

After successfully completing the course students will be able to

1	Solve a system of linear equations using matrices and apply it to study the process of steganography and cryptography.
2	Find Eigen values and Eigen vectors of square matrix and use it for principal component analysis in machine learning and quantum computing.
3	Explain Mean value theorems & Successive differentiation and use in mechanics to study velocity time graphs with non-linear acceleration.
4	Express Taylor's and Maclaurin's series for functions of various types and to use it in approximation theory in computer graphics.
5	Find the derivative of functions of several variables that are essential to study neural network in machine learning.
6	Explain the Jacobian and its applications for partial derivative of function of several variables.

Syllabus

Course: Engineering Mathematics I

Unit I: Linear Algebra-I- Matrices, System of linear Equations (6 Hrs)
Rank of a Matrix, System of Linear Equation, Linear Dependence and Independence, Applications to steganography and cryptography.

Unit II: Linear Algebra-II- Eigen Values and Eigen Vectors, Diagonalization (6 Hrs)
Eigen values and Eigen vectors, Caley Hamilton Theorem, Diagonalization of a matrix, Reduction of

quadratic forms to Canonical form by Linear and Orthogonal transformations. Applications to Machine Learning, Deep learning and Artificial Intelligence.

Unit III: Differential Calculus-I (6 Hrs)
Rolle's theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Successive differentiation, Leibnitz theorem, Applications of Mean value Theorems to Mechanics.

Unit IV: Differential Calculus-II (6 Hrs)
Taylor's and Maclaurin's series, Expansion of functions using standard expansions, Indeterminate forms, L'Hospital rule, Evaluation and applications of Series in computer graphics.

Unit V: Partial Differentiation (6 Hrs)
Introduction to functions of several variables, Partial Derivatives, Euler's Theorem on Homogeneous Functions, Composite Functions, Total Derivatives, Applications of Partial derivatives to Machine Learning.

Unit VI: Applications of Partial Differentiation (6 Hrs)
Jacobian and its applications, Error and Approximations, Maxima and Minima of Functions of two variables, Lagrange's method of undetermined multipliers, Applications to Machine Learning.

Textbooks

1. B. V. Ramana, Higher Engineering Mathematics, Tata McGraw Hill.
2. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley Eastern Ltd.
3. B.S. Grewal, 'Higher engineering Mathematics', *Khanna publishers, Delhi (*40th edition),(2008).

Reference Books

1. P. V. O'Niel, Advanced Engineering Mathematics, Thomson Learning.
2. M. D. Greenberg, Advanced Engineering Mathematics, Pearson Education.
3. P. N. Wartikar, J. N. Wartikar, Applied Mathematics (Vol I&II), P. V. G. Prakashan.

Following topics are important for Competitive Examination from this course.

Rank of Matrix, Eigen values and Eigen vectors, Maxima and Minima
Linear and Orthogonal transformation (Approximately 8-10 Marks)

Engineering Mathematics I

Course Title: Engineering Mathematics I (FEBSC 110)
(For Computer, IT and AIDS branch)

Contact Hours:	**2 Hrs/week (P)**	Type of Course:	**Practical**
Examination Scheme	**In Sem Exam:** -	**End Sem Exam:** -	**Practical: 25 Marks**
Course Credit	**01**		

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1.	Practical	External	25
		Total	25

Course Objectives:

1 To develop the capabilities of students to perform experiments based on theory of Linear Algebra, Differential Calculus and Partial Derivative of Function of Several Variables.

2 To expose student to Mathematical software MATLAB/MAPLE and perform simulations and calculation based on theory of Linear Algebra, Differential Calculus and Partial Derivative of Function of Several Variables.

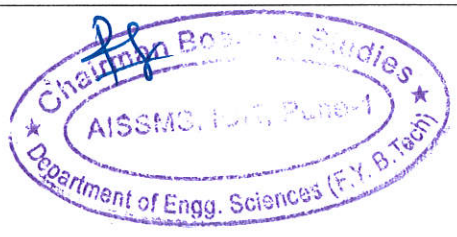
Course Outcomes:

After successfully completing the course students will be able to

1 Solve a system of linear equations using matrices and apply it to linear and orthogonal transformation.
2 Find Eigen values and Eigen vectors of square matrix and use it for reduction of quadratic to canonical form.
3 Explain the concept of Mean value theorem and Successive differentiation
4 Find Taylor's and Maclaurin's series for functions of various types and find value of Indeterminate form.
5 Find the derivative of functions of several variables that are essential in various branches of Engineering.
6 Explain the Jacobian and its applications for partial derivative of function of several variables.

List of Practical's (any 8)

1.	To determine rank of matrix and use it to solve system of linear equations using MATLAB/MAPLE
2.	To verify the linear dependence and independence of vectors.
3.	To find Eigenvalues and Eigenvectors of a matrix and problems on Cayley Hamilton theorem using MATLAB/MAPLE
4.	To find the canonical form of a matrix and reduction of quadratic forms.
5.	To verify applicability of mean value theorems, to find the successive derivative of functions and use of Leibnitz's theorem
6.	To find the Taylor's and Maclaurin's series expansion using MATLAB/MAPLE.
7.	To find the partial derivative of functions of several variable and to study and apply Euler theorem for homogenous functions.
8.	To find the partial derivative of composite functions and problems on variable treated as constant.
9.	To study application of partial derivatives to find Jacobians and Maxima and Minima of Functions of two variables using MATLAB/MAPLE
10.	To study Mathematical Modeling on one of the following topics.



1) System of Equation 2)Taylors and Maclaurins series 3) Partial Differentiation

Textbooks

1. B. V. Ramana, Higher Engineering Mathematics, Tata McGraw Hill.
2. B.S. Grewal, 'Higher engineering Mathematics', *Khanna publishers, Delhi (*40th edition),(2008).
3. Peter Issa Kattan, MATLAB for Beginners: A Gentle Approach, Petra Books, 2008.

Engineering Mathematics I

Course Title: Engineering Mathematics I (FEBSC 101)
(For E&TC, Electrical and Instrumentation branch)

Contact Hours:	**3 Hrs/week (T)**	Type of Course:	**Lecture**
Examination Scheme	**In Sem Exam: 40 Marks**	**End Sem Exam: 60 Marks**	**Practical: -**
Course Credit	**03**		

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1.	In Sem Exam	Internal	40
2.	End Sem Exam	External	60
		Total	100

Pre-requisites: Sound knowledge about Differentiation, Integration and Matrices.

Course Objectives:

1	To develop the understanding of system of linear equations using matrices.
2	To explain the concepts of Eigen values and Eigen vectors.
3	To impart the knowledge of expansion of functions, mean value theorem and Indeterminate forms.
4	To enable the students to understand the concept of derivatives of functions of several variables.
5	To present the sound knowledge of Jacobians, error & approximation and find extreme values of the function of two variables.

Course Outcomes:

After successfully completing the course students will be able to

1	Solve a system of linear equations using matrices and apply it to study image processing and super resolution.
2	Find Eigen values and Eigen vectors of square matrix and use it in study of wavelets and communication engineering.
3	Explain the concept of Mean value theorem & Successive differentiation and use in Mechanics to study velocity time graphs with non-linear acceleration.
4	Find Taylor's and Maclaurin's series for functions of various types and find value of Indeterminate form to use in approximation theory in computer graphics.
5	Find the derivative of functions of several variables that are essential to study its application in electrical circuits.
6	Explain the Jacobian and its applications for partial derivative of function of several variables.

Syllabus

Course: Engineering Mathematics I

Unit I: Linear Algebra-I- Matrices, System of linear Equations (6 hr)
Rank of a Matrix, System of Linear Equation, Linear Dependence and Independence, Applications of Matrices to Engineering (Image Processing, Super Resolution, CBIR)

Unit II: Linear Algebra-II- Eigen Values and Eigen Vectors, Diagonalization (6 hr)
Eigen values and Eigen vectors, Caley Hamilton Theorem, Diagonalization of a matrix, Linear and Orthogonal transformations. Applications to Eigen values and Eigen vectors to Engineering field (Wavelets, Communication Engineering)

Unit III: Differential Calculus-I (6hr)
Rolle's theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Successive differentiation, Leibnitz theorem, Applications of Mean value Theorems in electrical circuits.

Unit IV: Differential Calculus-II (6hr)
Taylor's and Maclaurin's series, Expansion of functions using standard expansions, Indeterminate forms. L'Hospital rule and applications of Series in Engineering.

Unit V: Partial Differentiation (6hr)
Introduction to functions of several variables, Partial Derivatives, Euler's Theorem on Homogeneous Functions, Composite Functions, Applications of Partial derivatives in electrical circuits.

Unit VI: Applications of Partial Differentiation (6hr)
Jacobian and its applications, Error and Approximations, Maxima and Minima of Functions of two variables.

Text Books

1. B. V. Ramana, Higher Engineering Mathematics, Tata McGraw Hill.
2. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley Eastern Ltd.
3. B.S. Grewal, 'Higher engineering Mathematics', *Khanna publishers, Delhi (*40th edition),(2008).

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2. M. D. Greenberg, Advanced Engineering Mathematics, Pearson Education.
3. P. N. Wartikar, J. N. Wartikar, Applied Mathematics (Vol I & II), P. V. G. Prakashan.

Following topics are important for Competitive Examination from this course.

Rank of Matrix, Eigen values and Eigen vectors, Maxima and Minima
Linear and Orthogonal transformation (Approximately 8-10 Marks)

Chairman Board of Studies ★ ★ (F.Y. B.Tech)

Engineering Mathematics I

Course Title: Engineering Mathematics I (FEBSC 110)
(For E&TC, Electrical and Instrumentation branch)

Contact Hours:	**2 Hrs/week (P)**	Type of Course:	**Practical**
Examination Scheme	**In Sem Exam:** -	**End Sem Exam:** -	**Practical: 25 Marks**
Course Credit	**01**		

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1.	Practical	External	25
		Total	25

Course Objectives:

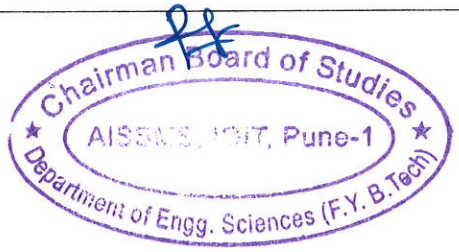
1	To develop the capabilities of students to perform experiments based on theory of Linear Algebra Differential Calculus and Partial Derivative of Function of Several Variables.
2	To expose student to Mathematical software MATLAB/MAPLE and perform simulations and calculation based on theory of Linear Algebra Differential Calculus and Partial Derivative of Function of Several Variables.

Course Outcomes:
After successfully completing the course students will be able to

1	Solve a system of linear equations using matrices and apply it to linear and orthogonal transformation.
2	Find Eigen values and Eigen vectors of square matrix and use it for reduction of quadratic to canonical form.
3	Explain the concept of Mean value theorem and Successive differentiation
4	Find Taylor's and Maclaurin's series for functions of various types and find value of Indeterminate form.
5	Find the derivative of functions of several variables that are essential in various branches of Engineering
6	Explain the Jacobian and its applications for partial derivative of function of several variables.

List of Practical's (any 8)

1.	To determine rank of matrix and use it to solve system of linear equations using SCILAB/MATLAB
2.	To verify the linear dependence and independence of vectors.
3.	To find Eigenvalues and Eigenvectors of a matrix and problems on Cayley Hamilton theorem using SCILAB/MATLAB
4.	To verify applicability of mean value theorems, to find the successive derivative of functions and use of Leibnitz's theorem
5.	To find the Taylor's and Maclaurin's series expansion using SCILAB/MATLAB.
6.	To find the partial derivative of functions of several variable and to study and apply Euler theorem for homogenous functions.
7.	To find the partial derivative of composite functions and problems on variable treated as constant.
8.	To study application of partial derivatives to find Jacobians
9.	To study the application of partial derivatives in errors and to find Maxima and Minima of Functions of two variables.
10.	To determine rank of matrix and use it to solve system of linear equations using SCILAB/MATLAB



Textbooks

1. B. V. Ramana, Higher Engineering Mathematics, Tata McGraw Hill.
2. B.S. Grewal, 'Higher engineering Mathematics', *Khanna publishers, Delhi (*40th edition),(2008).
3. Peter Issa Kattan, MATLAB for Beginners: A Gentle Approach, Petra Books, 2008.

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AISSMS IOIT, Pune-1
Department of Engg. Sciences (F.Y. B.Tech)

Engineering Physics

Course Title: Engineering Physics (FEBSC102)
(For E&TC, Electrical and Instrumentation branch)

Contact Hours:	**3 Hrs./week (L)**	Type of Course:	**Lecture**
Examination Scheme	**In Sem Exam: 40 Marks**	**End Sem Exam: 60 Marks**	
Course Credit	**03**		

Sr. No.	Course assessment methods/tools	External/Internal	Marks
1.	In Sem Exam	Internal	40
2.	End Sem Exam	External	60
		Total	100

Course Objectives:

1. To explain the principles of Physics required for Engineering.
2. To describe applications of optics and sound required for Engineering.
3. To identify advance technical applications of Quantum Mechanics, Nanophysics and Superconductivity.
4. To explain importance of Semiconductor physics in Engineering.

Course Outcomes:

The student will be able to:

1. Explain basics of wave optics and use them in engineering applications.
2. Describe the fundamentals of Polarization, Lasers and Fiber optics with applications.
3. Explain basics of Sounds and Ultrasound along with applications.
4. Reproduce the basics of Quantum Physics and Nano Physics along with applications.
5. Explain basics of Semiconductor Physics and use them in understanding applications.
6. Describe basics of Magnetism and Superconductivity along with applications.

Syllabus
Course: Engineering Physics

Unit I: Wave Optics (7 HRs)

EM spectra, (Self study: Properties and propagation of EM waves, Basics of satellite communication.)

Interference

Temporal coherence for division of amplitude, concept of thin film, interference due to thin film, applications: thickness measurement and anti-reflection coating and optical flatness (Self-study: Interference due to wedge shaped film qualitative discussion, fringe width). Numericals.

Diffraction

Definition, Types, Single slit conditions for maxima and minima, Rayleigh's criterion for resolution of 2 point objects, resolving power of Telescope. (Self-study: Diffraction grating, Conditions for Principal Maxima, minima, intensity pattern), Numerical.

Unit II: Polarization and Lasers (6 HRs)

Polarization of light. Double refraction. Geometry of Calcite Crystal, Applications.
Understanding working of laser (Self-study: Typical lasers like Ruby, He-Ne). Properties, Applications of Lasers.

Unit III: Sound and Ultrasound (6 HRs)

Sound

Definitions of Intensity, Loudness, pitch and timbre of sound, reflection of sound, echo, intensity level, reverberation, absorption of sound, (Self-study : absorption coefficient of materials, Sabine's formula), Factors affecting the acoustics of auditorium and remedies, Numerical.

Ultrasound

Piezo-electric materials, generation of ultrasound (schematic electronic circuit) by Piezo-electric oscillator, velocity of ultrasound in different materials, Materials for sensors and transducers, Applications and Numerical

Unit IV: Quantum mechanics and Nanophysics (6 HRs)

De Broglie hypothesis, De Broglie wavelength in terms of kinetic energy. (Self-study: Heisenberg's uncertainty principle, wave function). Schrodinger time independent equation, Applications and Numerical

Nanophysics

Introduction, Quantum wire, Quantum Dot, Properties and Applications

Unit V: Physics of Semiconductors (6 HRs)

Energy Band theory of solids, Fermi-Dirac distribution function, position of Fermi energy,
(Self-study: Effective density of states, Carrier density in extrinsic semiconductor), position of Fermi energy, Band structure of diode. (Self-study: Hall effect. Solar Cell), Materials for photo diode, numerical.

Unit VI: Magnetism and Superconductivity (5 HRs)

Classification of magnetic materials, magnetic hysteresis loop, (Self-study : magneto-resistance, giant magneto-resistance GMR) application.

Superconductivity: Properties zero resistance, Meissner effect, isotope effect, BCS theory, type I and II superconductors,
(Self-study: low Tc and high Tc superconductors, Josephson effect), applications.

Textbooks

1. A textbook of Engineering Physics – M N Avadhanulu and P G Kshirsagar, S Chand & Co. Ltd.
2. A Textbook of Optics – N Subrahmanyam and BrijLal, S Chand Publications

Reference Books

1. Fundamentals of Physics – Halliday, Resnick and Walker, Wiley Publications
2. Acoustics – Heinrich Kuttruff, CRC Press
3. Optics – Ajay Ghatak, Tata McGrawHill
4. Concepts of Modern Physics – Arthur Bieser, Tata McGrawHill
5. Introduction to Solid State Physics - C. Kittel, Wiley Publications
6. Solar Energy –S P Sukhatme, McGrawHill

Engineering Physics

Course Title: Engineering Physics (FEBSC111)
(For E&TC, Electrical and Instrumentation branch)

Contact Hours:	**2 Hrs./Week (P)**	Type of Course:	**Practical**
Examination Scheme	**Practical: 25 Marks**		
Course Credit	**01**		

Sr. No.	Course assessment methods/tools	External/Internal	Marks
1.	Practical	External	25
		Total	25

Course Objectives:

1. To study and verify laws of Physics.
2. To compute different physical parameters by experimental means.

Course Outcomes:

Students will be able to

1	Explain basics of experimentations in optics.
2	Demonstrate the experimental aspects in semiconductor physics.
3	Illustrate techniques in Sound.

Laboratory Work
List of experiments (8 out of the following experiments)
Group A: Optics (Any three)

1	To determine radius of curvature of plano-convex lens by Newton's rings method.
2	To determine the wavelength of light using diffraction grating.
3	To determine the concentration of sugar in solution using a Polarimeter.
4	To verify Law of Malus.
5	To determine the characteristics of laser beam.
6	To record and render 3D image using polarization.
7	To determine R. P. of telescope.
8	To determine R. P. of diffraction Grating

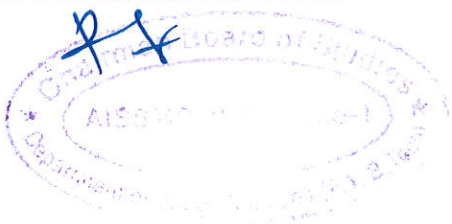
Group B: Semiconductor Physics (Any two)

1	To determine band gap in semiconductor.
2	To determine the Hall coefficient
3	To determine the I-V characteristics and parameters of a Solar cell

Group C: Sound (Anyone)

1	To determine sound absorption coefficient of materials
2	To determine sound pressure level.
3	To determine the ultrasonic velocity in a liquid using Ultrasonic interferometer.

Group D: Experiment beyond syllabus (Any two)



1	Ultrasonic Distance Meter
2	Study of Spectrometer
3	Study of Basic Sound Notes
4	Experiment based on Gravity
5	Study of Resonance
6	Study of LASER Printer / LASER Mouse

Reference Books

1. Fundamentals of Physics – Halliday, Resnick and Walker, Wiley Publications
2. Concepts of Modern Physics – Arthur Bieser, Tata McGrawHill
3. A course on Experiments with He-Ne Laser – R S Sirohi, New Age International Publishers
4. Introduction to Solid State Physics - C. Kittel, Wiley Publications
5. Solar Energy –S P Sukhatme, McGrawHill

Industrial Chemistry - Theory			
Course Title: Industrial Chemistry (FEBSC 103) (For Computer, IT and AIDS branch)			**Industrial Chemistry (Required)**
Contact Hours:	**3 Hrs./week (L)**	Type of Course:	**Lecture**
Examination Scheme	**In Sem Exam: 40 Marks**	**End Sem Exam: 60 Marks**	
Course Credit	**03**		

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1.	Unit Tests	Internal	40
2.	End Sem Exam	External	60
		Total	100

Pre-requisites: Basic Chemistry at 12th Standard or equivalent level

Course Objectives:

1	To prepare students in analysis of water as commodity and corrosion as industrial problem
2	To emphasize the need of technological advancement for utility of nanomaterials and fuels with reference to analytical tools
3	To introduce students to basic terminologies in statistics and analytical chemistry

Course Outcome:

CO	After completion of the course the student should be able to
1	Apply suitable methods for water analysis and various treatment methods
2	Relate the technological developments with the enhanced understanding of materials further
3	Classify different kinds of fuels on the basis of calorific value and can define need for alternative energy sources
4	Explain working principle of spectrophotometer
5	Identify control measures of corrosion
6	Infer knowledge of basic terminologies from statistics and analytical chemistry

Syllabus
Course: Industrial Chemistry

Unit I: Water Technology: (6 Hrs)

Impurities in water, hardness of water: Types, Hardness units and numericals. Determination of hardness by EDTA method (using molarity concept) and alkalinity, numericals. Ill effects of hard water in boiler - priming and foaming, boiler corrosion, scale and sludge.

Water treatment: i) Zeolite method and numerical

Unit II: Engineering Materials (6 Hrs)

[A] Materials for Engineers: Introduction, Classification, Structure Property Relationship, Periodicity of properties

[B] Nano technology and computational development: Introduction, (Categories of Nano Computing, Benefits of nanotechnology for computer science, Role of nanotechnology in computer science,) Nanotechnology and transistor building, Nanotechnology and quantum computers processor building, Nanotechnology and memory building, Optical nano technology.

[C] Role of computer science in nanotechnology Image enhancement with digital signal processing Artificial intelligence (AI) in nanotechnology, DNA computing

Unit III: Fuels and Energy (6 Hrs)

Introduction, definition, classification of fuels, Calorific value (CV): Higher calorific value (HCV) and Lower calorific value (LCV)

Challenges in Nonconventional Energy Harvesting: Solar Energy, Hydrogen, Wind, Tidal, Nuclear, Geothermal, Biomass

Unit IV: Spectroscopic Techniques (6 Hrs)

[A]UV-Visible Spectroscopy:

Introduction, interaction of electromagnetic radiation with matter, statement of Beer's law and Lamber's law, absorption of UV radiation by organic molecule leading to different electronic transitions, Instrumentation and applications of UV-visible spectroscopy.

[B] Infrared Spectroscopy:

Introduction, Principle of IR Spectroscopy, types of vibrations: Stretching and bending conditions of absorption of IR radiations, vibration of diatomic and polyatomic molecules. Fundamental group region, fingerprint region, applications of IR spectroscopy.

Unit V: Corrosion Science (6 Hrs)

Introduction, Types of corrosion – Dry and Wet corrosion, mechanism of dry corrosion, nature of oxide films and Pilling-Bedworth's rule, wet corrosion – mechanism: hydrogen evolution and oxygen absorption, Factors influencing rate of corrosion. Methods of corrosion control and prevention: cathodic and anodic protection.

Unit VI: Statistical analysis of data and probability-in analytical chemistry (6 Hrs)

Mean, Mode, median, deviation, linear regression, variance, errors, uncertainty and residuals, Instrumental analysis and calibration.

Methods of Data Collection, Revision of data analysis, measures of asymmetry (skewness & kurtosis), correlation & regression. Association of attributes.

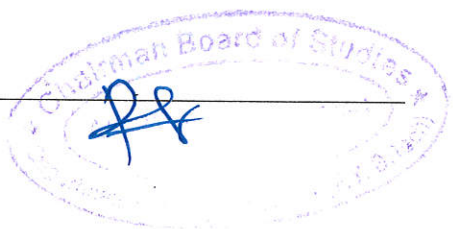
Textbooks

1. A Textbook of Engineering Chemistry by Dr. S.S. Dara, Dr. S.S. Umare, S Chand & Company Ltd. (2018).
2. B.R. Puri and L.R. Sharma, "Principles of Physical Chemistry", 45th Edition, Vishal Publishing Co. 2012.
3. Chemometrics - Statistics and Computer Application In Analytical Chemistry 2E by Otto, John Wiley And Sons March 2007
4. Solar Energy 4Th Edition 2017 by S P Sukhatme and J K Nayak, McGraw Hill

Reference Books

1. Engineering Chemistry by O.G. Palanna; Tata McGraw-Hill Publishing Co. Ltd
2. Basic Concepts of Analytical Chemistry by S. M. Khopkar; New age International Publishers
3. Instrumental Methods of Analysis by Willard, Merrit, Dean, Settle
4. Polymer Science, V. R. Gowarikar, N. V. Viswanathan, Jayadev Sreedhar, Wiley Eastern Ltd
5. Inorganic Chemistry, 5 ed by Shriver and Atkins, Oxford University Press
6. Textbook of Engineering Chemistry by Dr. Sunita Rattan, S. K. Kataria& Sons Publisher
7. Analytical Chemistry (Sixth Edition) written by Gary D. Christian, University of Washington in pdf published by John Wiley and Sons Inc. in 2004.

8. Status and Future Challenges for Non-conventional Energy Sources Volume 2, Editors: Sanket J. Joshi, Ramkrishna Sen, Atul Sharma, P. Abdul Salam, Springer, 2022 ISBN :978-981-16-4508-2
9. Non-Conventional Energy Sources, G.D.Rai, 5th edition, 2018, ISBN : 9788174090737 Jain Book Agency



Industrial Chemistry - Practical			
Course Title: Industrial Chemistry (FEBSC 112)		**Industrial Chemistry** (Required)	
Contact Hours:	**2 Hrs./week (P)**	Type of Course:	Practical
Examination Scheme	Practical 25 Marks		
Course Credit	01		

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1	Practical	External	**25**
		Total	**25**

Pre-requisites: Basic Chemistry at 12th Standard or equivalent level

Course Objectives:	
1	To prepare students in analysis of water as commodity and corrosion as industrial problem
2	To emphasize the need of technological advancement for utility of nanomaterials and fuels with reference to analytical tools
3.	To introduce students to basic terminologies in statistics and analytical chemistry

Course Outcome:	
CO	**After completion of the course the student should be able to**
1	Apply suitable methods for water analysis and various treatment methods
2	Relate the technological developments with the enhanced understanding of materials further
3	Classify different kinds of fuels on the basis of calorific value and can define need for alternative energy sources
4	Explain working principle of spectrophotometer
5	Identify control measures of corrosion
6	Infer knowledge of basic terminologies from statistics and analytical chemistry

Use of simulating software related to respective units through virtual lab

List of Experiments:

Minimum 8 experiments are to be performed from the following list:

Sr No.	Title
1	To determine hardness of water by EDTA method
2	To determine alkalinity of water
3	To determine maximum wavelength of absorption of $CuSO_4$/$FeSO_4$/ $KMnO_4$, verify Beer's law and find unknown concentration of given sample.
4	To determine % fixed carbon of coal
5	To coat copper and zinc on iron plate using electroplating.
6	To preparation biodiesel from waste/nonedible oil
7	To study basic terms in analytical chemistry and statistics
8	To process statistical data generated during Chemical Oxygen Demand (COD) of sewage water experiment

Text books

1. Laboratory manual of Engineering Chemistry by Dr Sudharani, Dhanpatrai Publishing House. 2012 ed, Reprint 2015

2. A textbook on experiments and calculations in Engineering Chemistry by S S Dara, S Chand Publication. 9th Revised edition (November 1, 2003)
3. Basic Concepts of Analytical Chemistry by S. M. Khopkar; New age International Publishers (1 January 2008)
4. Laboratory manual prepared by faculty of Engineering Chemistry AISSMS IOIT (for college circulation only) 2018-2019.

Subject- Engineering Graphics AND Introduction to CAD				
Course Title: Engineering Graphics & Introduction to CAD (FEESC104)				**Engineering Graphics AND Introduction to CAD**
Contact Hours:	**1 Hrs./week (L) 2 Hrs./week (P)**	Type of Course:		**Lecture and practical**
Examination Scheme	**In Sem Exam: -**	**Practical 25 Marks**	**Term work 25 marks**	**End Sem Exam: -**
Course Credit	**02**			

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1.	Term work (CAD Based)	Internal	25
2.	Practical (CAD Based)	External	25
		Total	50

Pre-Requisite: Basic Knowledge of Geometry up to HSC Level,

Course Objectives:	
1	To create awareness and emphasize the need for Engineering Graphics in all the Branches of engineering.
2	To follow basic drawing standards and conventions.
3	To inculcate the habits of logical analysis of the problem using engineering drawing.
4	To develop skills in visualizing 3-Dimensional engineering components.

Course Outcomes:	
CO	**After the completion of the course the student should be able to**
1	Draw the fundamental engineering objects using basic rules and simple geometries, projections of lines and planes.
2	Identify different types of solids and their projections.
3	Draw development of lateral surfaces of Truncated Object.
4	Draw the fully-dimensioned 2D, 3D drawings using computer aided drafting tools and Various Eng. Curves.
5	Apply the concept of orthographic projection of an object to draw several 2D views and its sectional views for visualizing the physical state of the object.
6	Apply the visualization skill to draw a simple isometric projection from given orthographic views precisely using drawing equipment.

Syllabus
Course - Engineering Graphics and Introduction to CAD

Unit1: Fundamentals of Engineering Graphics& Projection of points/lines. (2 Hrs)

A) Fundamentals of Engineering Graphics: Introduction to Drawing instruments and their uses. Layout of drawing sheets, different types of lines used in drawing practice, Geometrical Construction, Dimensioning system as per BIS (Theoretical treatment only).

B) Projection of point, Lines, planes,: - *Theory of projections (Reference planes and Auxiliary planes, First and Third angle Method of Projection)* projection of point only in first quadrant with all possible positions. Introduction to Projection of lines (by first angle method of projection only) Introduction to projection of planes (Triangular, Quadrilateral, Pentagon, hexagon and Circle only).

Applications of point, types of lines and plane to understand the part drawing of engineering components. Locating exact position of component by projection of lines etc.

(Problem of planes resting on HP only)

Unit no-02 Projection of solids, (2 Hrs)

Types of solids, Projection of solids inclined to one & both reference plane. Projection of solids

(Tetrahedron, Cube, Prism, Cylinder, Pyramid, Cone only with maximum six sided base). **[Note: No combination of solids & their frustum...Problem of solid resting on HP only)**
Application: Drafting of 3 Dimensional Engineering Object by 3D packages, position of different solids at various positions. To understand the Drafting of small engineering components and domestic appliances, manufacturing industries.

***Unit no -03 Development of Lateral Surface.* (2 Hrs)**
Introduction to development of lateral surfaces and its industrial applications. Draw the Development of lateral surfaces for cut section of cone, pyramid, prism, Cylinder etc.
Development of lateral surface for Pyramid, prism, cone, cylinder cut by AIP.
(limited to six sided base only & resting on HP only)
Application: Sheet metal work, construction of boiler, stone cutting tunnel, computer components, electrical components, Product Design and Manufacturing Information in manufacturing industries.

Unit 04: Introduction to CAD AND Engineering Curves (2 Hrs)
A) Introduction to 2D and 3D computer aided drafting packages. Evolution of CAD, Importance of CAD, Basic Commands - Edit, View, Insert, Modify, Dimensioning Commands, setting and tools etc. and its applications to construct the 2D and 3D drawings.
B) Engineering Curves:- conic Section- Ellipse, parabola, Hyperbola by Focus-Directory & Rectangle method, Helix for Cylinder, Involutes of Circle, Cycloid, Archimedean Spiral.
Application :- Developer to develop the 2D /3D Packages in software industries, Representation of Electrical components in Electrical Drawings such as motors, transformers, towers, wiring diagrams electrical poles, designing of bridges, gear teeth, parabolic reflectors in automobile industries etc,

Unit 05: Orthographic Projection (2 Hrs)
Orthographic Projection: - Orthographic Projection of a given pictorial view by First Angle Projection Method only, study of types of section, sectional orthographic projection [only full sectional view]
Application: - Representations of 3 dimensional object in term of 2 dimensional. Civil Engineering for representation of building, roads, bridges, dams etc, Mechanical industries to read part drawing of mechanical components.

Unit 06: Isometric Projections (2 Hrs)
Isometric Projections:-Introduction to isometric view with the example of cube, Isometric axes, scale, isometric projection and isometric view, construction of isometric, non isometric lines, Angles, circles, sphere, Arc etc. Drawing isometric View of Simple solids and objects, Dimensioning –only Length, Width & Height of Isometric Views.
Applications: - Construction of 3D Engineering components, drafting and modelling, Bus Architectures & Micro processors Microcomputers, Product Design and Manufacturing Information in manufacturing industries. Drafting and surfacing of Computer parts such as Mouse, CPU, Keyboard etc and 3D Printing Technology, automobile components.

Note: The above syllabus is to be covered according to the first angle method of projection ONLY

Term work: (Internal Mode)):
(CAD Based assignment only no Drawing Sheets)
This session can be utilized to teach the basic commands of any drafting package. By using this Knowledge, students shall be able to complete the six assignments by using any CAD software..

1	Projection of Planes (One Problem)
2	Projections of solids (One Problem)
3	Engineering Curves (One Problems)
4	Development of solids (One problem)
5	Orthographic projections (One Problem)
6	Isometric projections (One Problem)

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Note: -
1) Practical based assignment prepared on six A2 size (594×420 mm) (half imperial) drawing screen using any drafting software.
2) The practical based assignment problems should be different for each student.
3) The practical based assignment problems of batch should be preserved in a form of rewriteable CD/DVD.
GUIDELINES FOR CAD PRACTICAL: -
Minimum 1 problems in each assignment
Initially all the necessary commands for 2D drawing must be taught and simple drawings should be given to students for practice of these commands so that they will get confidence of using the software.

Practical (CAD Based assignment)

This session can be utilized to teach the basic commands of any drafting package. By using this knowledge, students shall be able to complete the six assignments by using any CAD software.

1	Projection of Planes (One Problem)
2	Projections of solids (One Problem)
3	Engineering Curves (One Problem)
4	Development of solids (One Problem)
5	Orthographic projections (One Problem)
6	Isometric projections (One Problem)

Note: -

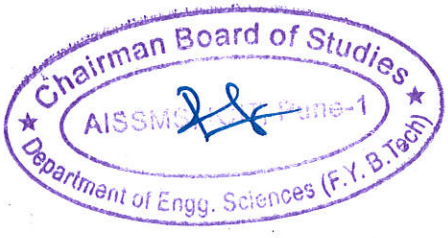
1) Practical based assignment prepared on six A2 size (594×420 mm) (half imperial) drawing screen using any drafting software.
2) The practical based assignment problems should be different for each student.
3) The practical based assignment problems of batch should be preserved in a form of rewriteable CD/DVD.

GUIDELINES FOR CAD PRACTICAL: -

- Minimum 1 problem in each assignment
- Initially all the necessary commands for 2D drawing must be taught and simple drawings should be given to students for practice of these commands so that they will get confidence of using the software.

Textbooks:

1. Engineering Drawing by N. D. Bhatt, Charotor Publication House, Bombay
2. A text book of Engineering Drawing by R. K. Dhawan, S. Chand and Co.
3. Machine Drawing by K. L. Narayana, New Age Publication
4. Engineering Drawing and Graphics Using AutoCAD by T. Jeyapoovan, Vikas Publication.



Engineering Mechanics

Course Title: Engineering Mechanics (FEESC105)

Contact Hours:	**2 Hrs/week (L)** **2 Hrs/week (P)**	Type of Course:	**Lecture & Practical**
Examination Scheme	**In Sem Exam: 40 Marks**	**End Sem Exam 60 Marks**	
Course Credit	**03**		

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1.	In Sem Exam	Internal	40
2.	End Sem Exam	External	60
		Total	100

Prerequisites – 1] Trigonometry, Derivative, Integration
2] Basic concepts of Physics, Newton's Laws of motion

Course Objectives

1	To determine resultant of different force systems.
2	To explain centroid and moment of Inertia of plane figures.
3	To draw Free Body Diagram and apply equations of equilibrium of forces.
4	To find force of friction.
5	To solve problems of particle mechanics using principles of kinematics.
6	To solve problems of particle mechanics using principles of kinetics.

Course Outcomes: Students will be able to

1	Compute resultant of various force systems acting on machine parts.
2	Determine centroid and solve problems related to moment of Inertia of plane figures.
3	Check equilibrium condition of given force system in machine parts.
4	Apply laws of static friction in two dimensional force systems.
5	Calculate position, velocity and acceleration of particle using principles of kinematics.
6	Calculate position, velocity and acceleration of particle using principles of kinetics.

Syllabus
Course: Engineering Mechanics

Unit 01: Resolution and Composition of Forces [5 Hrs]
Principle of statics, Force system, Resolution and composition of forces, Resultant of concurrent forces. Parallelogram Law of forces, Moment of a force, Varignon's theorem, Resultant of parallel and general force system.
Application of resultant force in biomechanics, robotics.

Unit 02: Centroid and Moment of Inertia [4 Hrs]
Centroid of plane lamina. Moment of Inertia (MI), perpendicular axis theorem, parallel axis theorem, MI of standard shapes, MI of composite figures.
Application of Centroid and Moment of Inertia in biomechanics, robotics.

Unit 03: Equilibrium [4 Hrs]
Free body diagram, Equilibrium, Equilibrium of concurrent force system, Equilibrium of parallel forces in a plane, Equilibrium of general forces in a plane
Application of Equilibrium in biomechanics, robotics, mechatronics.

Unit 04: Application of Friction [3 Hrs]
Friction- Laws of friction, application of friction on inclined planes and ladders friction Application to flat belt. Application of Friction in robotics, conveyor belt.

Unit 05: Kinematics of Particle [4 Hrs]
Linear Motion- Basic concepts, Equation of motion for constant acceleration Motion under gravity. Curvilinear motion- Basic Concepts Equation of motion in Cartesian coordinates, Motion of projectile. Application of kinematics in game design, ballistics, astronautics, disaster management

Unit 06: Kinetics of Particle [4 Hrs]
Kinetics- Newton's Second Law of motion. Work, power, energy, Work Energy Principle, Conservation of energy for motion of particle and impulse momentum equation, direct and central impact, coefficient of restitution.
Application of kinetics in game design, ballistics, amusement park design

Textbooks:

1. Vector Mechanics for Engineers STATICS - Beer & Johnston, Tata McGraw Hill Publications
2. Vector Mechanics for Engineers DYNAMICS - Beer & Johnston, Tata McGraw Hill Publications
3. Engineering Mechanics - A. K. Tayal, Umesh Publications
4. Engineering Mechanics- Bhavikatti, Newage Publications

Reference Books:

1. Engineering Mechanics -Singer Harper & Row, Hill Publishers
2. Engineering Mechanics - Meriam and Kraige, Wiley Publications
3. Engineering Mechanics -Timoshenko and Younge, McGraw Hill Publications
4. Engineering Mechanics- R.S. Khurmi, S. Chand Publications

Engineering Mechanics Practical

PART A: Experiments Experiment List (Any 6)

Sr. No.	Title of Experiment
1	Verification of the Polygon law of forces.
2	Finding centroid of plane figures
3	Experiment based on moment of inertia
4	Finding beams reactions
5	Finding coefficient of friction for Flat belt / Incline plane friction
6	Determination of coefficient of restitution.
7	Verifying Newton's second law of motion.
8	Experiment based on Projectile motion

PART B: Assignments

There will be six assignments, one on each unit from the theory course, based on graphical or computer solutions of Engineering Mechanics problems.

Basic Electrical Engineering			
Course Title: Basic Electrical Engineering (FEESC 106)			**Basic Electrical Engineering**
Contact Hours:	**3 Hrs./week (L)**	Type of Course:	**Lecture**
Examination Scheme	**In Sem Exam: 40 Marks**	**End Sem Exam: 60 Marks**	
Course Credit	**3**		

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1.	In Sem Exam	Internal	40
2.	End Sem Exam	External	60
		Total	100

Pre-Requisite:
Engineering physics, electron theory, electricity, potential and kinetic energy

Course Objectives:

1	To introduce fundamental concepts, various laws-principles and theorems associated with electrical systems.
2	To provide basic knowledge of all electrical quantities such as current, voltage, power, energy, frequency along with different types of fields.
3	To provide knowledge about fundamental parameters such as resistance, inductance and capacitance and magnetic circuits, AC and DC circuits.
4	To provide knowledge of the concepts of transformer, different energy conversions techniques.
5	To make students aware of Domestic wiring and protective system.
6	To make students aware of Electrical System and Electrical appliances.

Course Outcomes:
Students will be able to

1	Apply Kirchhoff's Voltage Law (KVL), Kirchhoff's Current Law (KCL) and different network theorems to solve resistive circuits under DC supply.
2	Differentiate between electrical and magnetic circuits and derive mathematical relation for self and mutual inductance along with coupling effect.
3	Calculate series, parallel and composite capacitor as well as characteristic parameters of alternating quantity and phasor arithmetic.
4	Relate phase and line electrical quantities in three phase ac networks.
5	Demonstrate the operation of single-phase transformer and calculate efficiency and regulation at different loading conditions.
6	Understand working of different home appliances and protective devices.

Unit 01: DC Circuits (05 Hrs)
Ohm's Law, Kirchhoff's Voltage Law (KVL), Kirchhoff's Current Law (KCL), ideal and practical voltage and current source (only independent sources), source transformation, simplifications of networks using series and parallel combinations and star-delta conversions, Superposition theorem, Thevenin's theorem.

Unit 02: Electromagnetism and Electrostatics (07 Hrs)
(A) Electromagnetism: Terminologies and fundamentals of Electromagnetism, series and parallel magnetic circuits, Electromagnetic induction and faraday's laws, Energy stored in magnetic circuit.
(B) Electrostatics: Terminologies and fundamentals of Electrostatics, Capacitor- series and parallel, charging, discharging, time constant, energy stored. .

Unit 03: AC Fundamentals (06 Hrs)
Generation of alternating voltage and currents, root mean square (RMS) and average value, form factor, crest factor, AC applied to resistance, inductance and capacitance, R-L, R-C and R-L-C series circuit, simple parallel circuits, phasor diagrams, calculations of power (active, reactive, apparent) and power factor, impedance and admittance concept. Series resonance, Q-factor and bandwidth in AC circuits.

Unit 04: Three Phase Circuits (06 Hrs)
Three phase voltages, current and power relations in star connected and delta connected balanced circuits, delta/star equivalence analysis of balanced three phase circuits, power measurement in three phase circuit.

Unit 05: Introduction to Transformer and Electric Motors (06 Hrs)
(A) Single phase transformer: construction, operating principle, types, emf equation, voltage and current ratio, operation on no load and with load, power losses, efficiency, voltage regulation.
(B) Electric Motors: Classification of electric motors, types of DC motors and their working principle, applications, need of DC motor starters.

Unit 06: Electrical Appliances and Protective Equipments (06 Hrs)
Working principle and operation of Electric iron, Geyser, Water heater, Uninterruptible Power Supply (UPS), Storage batteries, introduction to star ratings of electrical equipments.
Electric lamps: Fluorescent tube, Compact Fluorescent Lamp (CFL), Light-emitting diode (LED) lamp.
Earthing: Necessity of earthing, earthing methods, fuse, Miniature Circuit Breaker (MCB), Molded Case Circuit Breaker (MCCB), Earth-leakage Circuit Breaker (ELCB).
Single line diagram of domestic wiring.
Introduction to electric vehicle (EV).

Textbooks:

1. V.D. Toro, Principles of Electrical Engineering, Prentice Hall India, 1989.
2. V.K. Mehta, Rohit Mehta, Basic Electrical Engineering, S Chand and Company, 2nd Edition, 2015.
3. D. P. Kothari, I.J. Nagrath, Theory and Problems of Basic Electrical Engineering, PHI Publication, 2nd Edition, 2010.
4. B. L. Theraja, A Textbook of Electrical Technology Vol. I & II, S. Chand and Company, Reprint Edition 2014.
5. Ashfaq Husain, "Electrical Machines", Dhanpat Rai & Sons.

Reference Books:

1. H Cotton, Electrical Technology, CBS Publications, 2015.
2. L. S. Bobrow, -Fundamentals of Electrical Engineering, Oxford University Press, 2011.
3. E. Hughes -Electrical and Electronics Technology, Pearson, 2010.
4. D. C. Kulshreshtha, -Basic Electrical Engineering, McGraw Hill, 2009.
5. A.S. Langsdorf -Theory and performance of DC machines", Tata McGraw Hill 2008.

Basic Electrical Engineering			
Course Title: Basic Electrical Engineering (FEESC 113)			**Basic Electrical Engineering**
Contact Hours:	**02 Hrs./week**	Type of Course:	**Practical**
Examination Scheme	**In Sem Exam:** -	**End Sem Exam:** -	**Practical: 25 Marks**
Course Credit	**1**		

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1.	Practical	External	25
		Total	25

Pre-Requisite:
Engineering physics, electron theory, electricity, potential and kinetic energy

Course Objectives:

1	To introduce fundamental concepts, various laws-principles and theorems associated with electrical systems.
2	To provide basic knowledge of all electrical quantities such as current, voltage, power, energy, frequency along with different types of fields.
3	To provide knowledge about fundamental parameters such as resistance, inductance and capacitance and magnetic circuits, AC and DC circuits.
4	To provide knowledge of the concepts of transformer, different energy conversions techniques.
5	To make students aware of Domestic wiring and protective system.
6	To make students aware of Electrical System and Electrical appliances.

Course Outcomes:
Students will be able to

1	Apply Kirchhoff's Voltage Law (KVL), Kirchhoff's Current Law (KCL) and different network theorems to solve resistive circuits under DC supply.
2	Differentiate between electrical and magnetic circuits and derive mathematical relation for self and mutual inductance along with coupling effect.
3	Calculate series, parallel and composite capacitor as well as characteristic parameters of alternating quantity and phasor arithmetic.
4	Relate phase and line electrical quantities in three phase ac networks.
5	Demonstrate the operation of single-phase transformer and calculate efficiency and regulation at different loading conditions.
6	Understand working of different home appliances and protective devices.

Total **Ten** experiments should be performed.

A. Any **one experiment** is to be performed out of following:

1	To verify Kirchhoff's Voltage Law (KVL), Kirchhoff's Current Law (KCL) and Superposition theorem.
2	To verify Thevenin theorem.

B. Any **one experiment** is to be performed using any professional simulation software.

1	Determination of R-L series circuit parameters.
2	Determination of R-C series circuit parameters.
3	Determination of R-L-C series circuit parameters and verification of series resonance.

C. **Compulsory experiments:**	
1	To study safety precautions while working on electrical systems, handling of various equipment's such as multimeter, ammeters, voltmeters, wattmeter's, megger, real life resistors, inductors and capacitors.
2	Observation of ac and dc voltage and current waveform on cathode ray oscilloscope (CRO)/ digital storage oscilloscope (DSO).
3	To determine the charging and discharging of a capacitor as a function of time.
4	To verify the relation between phase and line quantities in three phase balanced star delta connections of load.
5	To determine efficiency and regulation of transformer by direct loading test of a single-phase transformer.
6	To demonstrate different types of electrical protection equipments such as fuses, MCB, MCCB, ELCB.
7	To study of Low Tension (LT) and High Tension (HT) electricity bills (a case study).
8	Study of DC motor starters.

Textbooks:

1. V.D. Toro, Principles of Electrical Engineering, Prentice Hall India, 1989.
2. V.K. Mehta, Rohit Mehta, Basic Electrical Engineering, S Chand and Company, 2nd Edition, 2015.
3. D. P. Kothari, I.J. Nagrath, Theory and Problems of Basic Electrical Engineering, PHI Publication, 2nd Edition, 2010.
4. B. L. Theraja, A Textbook of Electrical Technology Vol. I & II, S. Chand and Company, Reprint Edition 2014.
5. Ashfaq Husain, "Electrical Machines", Dhanpat Rai & Sons.

Reference Books:

1. H Cotton, Electrical Technology, CBS Publications, 2015.
2. L. S. Bobrow, -Fundamentals of Electrical Engineering, Oxford University Press, 2011.
3. E. Hughes -Electrical and Electronics Technology, Pearson, 2010.
4. D. C. Kulshreshtha, -Basic Electrical Engineering, McGraw Hill, 2009.
5. A.S. Langsdorf -Theory and performance of DC machines", Tata McGraw Hill 2008.

Basic Electronics Engineering

Course Title: Basic Electronics Engineering (FEESC107)			Basic Electronics Engineering
Contact Hours:	**3 Hrs/week (L)**	Type of Course:	**Lecture**
Examination Scheme	**In Sem Exam** 40	**End Sem Exam** 60	**Practical** -
Course Credit	**03**		

Pre-requisites:

Semiconductor physics

Course assessment methods/tools:

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1	In Sem Exam	Internal	40
2	End Sem Exam	External	60
	Total		100

Course Objectives

1	The principle of electronics and working principle of PN junction diode and special purpose diodes.
2	The functioning of transistors like BJT, MOSFETs and OPAMP.
3	Basics of various logic gates, digital circuits and their applications
4	Functions of various electronic instruments, operating principles of various sensors and its applications.
5	Basic principles of communication systems

Course Outcomes: Students will be able

1	Explain the working of P-N junction diode and its applications.
2	Identify types of diodes, BJT, MOSFET, OP-AMP, Build and test analog circuits using OPAMP
3	Build and test digital circuits using universal/basic gates and flip flops.
4	Use different electronics measuring instruments to measure various electrical parameters and Select sensors for specific applications.
5	Describe basic principles of Communication Systems

Syllabus
Subject-Basic Electronics Engineering

Unit 01: Introduction to Electronics (07 Hrs)

P-type Semiconductor, N-type Semiconductor, Introduction to active and passive components, P-N Junction diode construction, working and V-I characteristics of P-N junction Diode, Types of Rectifiers.

Special purpose diodes: Zener diode, Zener diode as voltage regulator, Light Emitting Diode (LED), photo diode and its applications.

Unit 02: Bipolar Junction Transistor (BJT) (06 Hrs)

Construction of BJT, types, Operation (CE Configuration), Transistor configurations (CE, CB, CC only circuit diagram). Transistor currents, Transistor parameters, Current and Voltage analysis of transistor (VBE, IB, VCE, VCB). Input and output Characteristics of BJT in CE Configuration, BJT application-CE amplifier.

Unit 03: MOSFET & OPAMP (07 Hrs):

Metal Oxide Semiconductor Field Effect Transistors (MOSFET): Construction, Types, Operation (E-MOSFET), Application of MOSFET as switch.

Operational amplifier: Introduction to OP-Amp (Symbol, Ideal Characteristics, Input modes), Pin configuration of IC 741. Functional block diagram of operational amplifier, Op-Amp parameters, Op-amp as Inverting and Non inverting amplifier (Derivation of voltage gain Av).

Unit 04: Digital Systems (06Hrs)

Number System: Binary, Octal, Decimal, Hexadecimal, their conversion and arithmetic (Binary addition, subtraction using 1's & 2's complement), De-Morgan's theorem. Logic Gates: AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR. Nand gate as Universal Gate. Half adder, Full adder, Flip Flop's SR, JK.

Unit 05: Electronic Instruments and Sensors (05 Hrs)

Electronic Instruments: Principles and block diagram of digital multimeter, Function Generator, Digital Storage Oscilloscope (DSO).

Sensors: Classification of a sensors, Temperature Sensor-Thermocouple , Optical Sensors, Motion Sensors –LVDT, Mechanical Sensors -Load Cell, Biosensors.

Unit 06: Communication Systems (05 Hrs)

Basic Communication System: Block Diagram, Modes of Transmission, Communication Media: Wired and Wireless, Allotment of frequency band for different applications. Modulation, Need of Modulation. Introduction to AM & FM.

Mobile Communication System: Cellular concept, Simple block diagram of GSM system.

Textbooks:

1. "Electronics Devices" Thomas. L. Floyd, 9th Edition, Pearson (Unit I, II, III)
2. "Modern Digital Electronics" R.P. Jain, 4th Edition, Tata McGraw Hill (Unit IV)
3. "Electronic Instrumentation" H.S. Kalsi, 3rd Edition, Tata McGraw Hill (Unit V)
4. "Sensors and Transducers" D. Patrnabis, 2nd Edition, PHI (Unit V)
5. "Communication Electronics: Principles and Applications" Frenzel, Tata McGraw Hill (Unit VI)

Reference Books:

1. "Digital Fundamentals" Thomas. L. Floyd, 11th Edition, Pearson
2. "Mobile Communication" J. Schiller, 2nd Edition, Pearson
3. "Sensors Handbook", S. Soloman, 2nd Edition

Basic Electronics Engineering			
Course Title: Basic Electronics Engineering (FEESC114)			Basic Electronics Engineering
Contact Hours:	**2 Hrs/week (P)**	Type of Course:	**Practical**
Examination Scheme		**Practical** **25**	**Term work** -
Course Credit	**01**		

Pre-requisites:

Semiconductor physics

Course assessment methods/tools:

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1	Practical	External	25
	Total		25

Course Objectives	
1	Introduction of various Electronics components, functions of various electronic instruments for measuring different electronic parameters.
2	The working principle of PN junction diode, special purpose diodes, BJT, MOSFET, OP-AMP and its applications
3	Basics of various logic gates, digital circuits and their applications
4	The operating principles of various sensors and its applications

Course Outcomes: Students will be able

1	Identify the various electronics components and test it in the laboratory using electronic instruments.
2	Identify types of diodes, build and test application circuits of Diode, BJT , MOSFET & OPAMP
3	Build and test digital circuits using logic gates and flip flops
4	Select sensors for specific applications and demonstrate any electronic appliance with respect to its technical specifications and function.

Course-Basic Electronics Engineering (Practical)

List of Experiments (Any 8 Experiments)

Group A: Electronic Components & Instruments (Any two)

1	**Electronic Components:** Study of Active and Passive components a) Resistors (Fixed & Variable), Calculation of resistor value using color code. c) Devices such Diode, BJT, MOSFETs, various IC packages d) Switches
2	**Measurements using various measuring equipment's:** To Measure voltage, resistance using digital multimeter. Also use multimeter to check diode, BJT, etc
3	To Set up CRO and function generator for measurement of voltage, frequency.

Group B: Diode & Transistors (Any four)

1	V-I characteristics of P-N Junction Diode
2	V-I characteristics of Zener Diode
3	**Rectifier circuits:** a) Implement bridge rectifier circuit using diodes b) Observe the effect of capacitor filter on rectifier output.
4	To find voltage gain Av of CE Amplifier
5	a) To plot frequency response of BJT amplifier.(Simulation) OR b) To plot frequency response of MOSFET amplifier. (Simulation)
6	**Linear applications of Op-amp:** Build inverting and non-inverting amplifier using op-amp IC 741.
7	Simulation/ Build and test: load and line regulation using Zener diode

Group C: Digital Systems (Any two)

1	**Test and verify the truth tables of:** Basic Gates and Universal Gates
2	**Test and verify the truth tables of:** Half Adder / Full Adder
3	**Test and verify the truth tables of:** SR and JK FF

Group D: Experiment beyond Syllabus (Any two)

1	Build and test any one application using digital IC's
2	Case Study of any one electronics appliance with block diagram, specification etc.
3	Build and test any application circuit using sensor.

The practical's are to be performed based on the above topics. All these observations and related theory should be written in A4 size sheets and has to be checked before final exam.

Textbooks:

1. "Electronics Devices" Thomas. L. Floyd, 9th Edition, Pearson (Unit I, II, III)
2. "Modern Digital Electronics" R.P. Jain, 4th Edition, Tata McGraw Hill (Unit IV)
3. "Electronic Instrumentation" H.S. Kalsi, 3rd Edition, Tata McGraw Hill (Unit V)
4. "Sensors and Transducers" D. Patrnabis, 2nd Edition, PHI (Unit V)
5. "Communication Electronics: Principles and Applications" Frenzel, Tata McGraw Hill (Unit VI)

Reference Books:

1. "Digital Fundamentals" Thomas. L. Floyd, 11th Edition, Pearson
2. "Mobile Communication" J. Schiller, 2nd Edition, Pearson
3. "Sensors Handbook", S. Soloman, 2nd Edition

Chairman Board of Studies
Department of Engg. Sciences (F.Y. B.Tech)

Problem Solving and Programming I

Course Title: Problem Solving and Programming I (FEESC108)

Contact Hours:	**2 Hrs/week (L)** **2 Hrs/Week (Pr)**	Type of Course:	**Lecture & Practical**
Examination Scheme	**In Sem Exam** **40**	**Practical** **60 Marks**	
Course Credit	**03**		

Pre-requisites:
Students are expected to have a good understanding of basic computer principles.

Course assessment methods/tools:

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1	In Sem Exam	Internal	40
2	Practical	External	60
	Total		100

Course Objectives

1	To provide programming basics using C programming language.
2	To discuss advanced concept like Array, Function, Pointer, String and Structure

Course Outcomes:
At the end of course students will be able to

1	Apply basics of C language in problem solving.
2	Apply Array & String concepts in problem solving
3	Use of structure & union in C
4	Use of Pointer in problem solving
5	Apply concept of Function in solving problem

Syllabus
Subject- Programming and Problem Solving I

Unit I Introduction C Programming (04Hrs)
Introduction, Procedural programming, Structure of C, Variables, Keywords, Identifiers, Constants, Operators & expressions, ternary operator, Data types.

Unit II Decision Control Structure in C (04Hrs)
Control structures in 'C': if, if-else, nested if-else, cascaded if-else & switch statement, loop control structures: for, while, do-while, break & continue statement, go to statement.

Unit III Array & String in C(04Hrs)
Array-Declaration, Initialization, Two-Dimensional Arrays, Multi-Dimensional Array
Self Study:- String-Declaration and Initialization of Strings, Array of Strings, String functions.

Unit IV Function(04 Hrs)
Function-Definition of a Function, Declaration of a Function, Function Prototypes, Types of variables, types of functions, call by value.

Unit V Pointer in C(04Hrs)
Pointers- Introduction, Definition and Declaration of pointers, address operator, Pointer variables. Use of pointers for calling a function by reference

Unit VI Structure & Union in C (04Hrs)
Structures and Unions-Declaration, Initialization, Accessing members of a Structure, Structures vs. union, initializing a Union, Accessing the Members of a Union.

Text Books:

1. Yashavant Kanetkar, "Let Us C", BPB Publication
2. Yashavant Kanetkar, "Let Us C++", BPB Publications
3. Maureen Spankle "Problem solving & programming concept" Pearson,2011

Reference Books:

1. B. W. Kernighan and D. M. Ritchie, "The C Programming Language", Second Edition, PHI.
2. Herbert Schildt, "C: The Complete Reference", Fourth Edition, McGraw Hill
3. Ashok N. Kamthane, "Programming with ANSI and Turbo C", Pearson Education (2008)
4. ISRD Group, "Programming and Problem-Solving Using C", Tata McGraw Hill, 2008.
5. Bjarne Stroustrup, "The C++ Programming Language", 3rd Edition, Pearson Education. Herbert Schildt, "C++: The Complete Reference", 4th Edition, McGraw Hill.

PPS LAB

Sr. No	Laboratory Assignment
	Group A: Essentials Prerequisites (Compulsory)
1	Use and Study of Linux GUI and Commands
	Group B Foundation Programming in C (At Least 8)
1	Write a c program to print fibonacci series
2	Write a c program to check prime number.
3	Write a c program to check palindrome number.
4	Write a c program to print factorial of a number.
5	Write a c program to check armstrong number.
6	Write a c program to print sum of digits.
7	Write a c program to reverse given number.
8	Write a c program to swap two numbers without using third variable.
9	Write a c program to print multiplication of 2 matrices.
10	Write a c program to convert decimal number to binary.
11	Write a c program to print alphabet triangle.
	Problem solving assignment (At Least 2)
1	Write a program in C to define a structure for Customer bank account that holds Information like Account Number, Name of account holder, balance, Internet banking facility availed(Yes or No), Pin code (422001 to 422013) , Account type(saving, recurring, deposit). a) Read account details for N customers b) Identify the golden, silver and general customers. Golden customers: Balance> 10,00000 Silver Customers: Balance >500000 and <10,00000 c) Display the list of customers availing the Internet banking facility d) Display the customers belonging to a particular geographical location depending on postal code e) Display the customer list as per their account type.
2	Write a program in C to define a structure that holds Information of items like- Item Number, Item Names, Item Category(Electronics, Food, Cosmetics etc), Available stock. Display the available items.
3	Write a program in C using structure for maintaining extracurricular activities of students (roll, name, year, activity name, and prize). The prize can be either cash prize or memento but not both. Cash prize is to be recorded as integer and memento is to be recorded as character string. Use union within structure for prize. Read extracurricular activity record for n students and Display extracurricular activities.

Textbooks:

1. Yashavant Kanetkar, "Let Us C", BPB Publication
2. Yashavant Kanetkar, "Let Us C++", BPB Publications

Reference Books:

1. B. W. Kernighan and D. M. Ritchie, "The C Programming Language", Second Edition, PHI.
2. Herbert Schildt, "C: The Complete Reference", Fourth Edition, McGraw Hill
3. Ashok N. Kamthane, "Programming with ANSI and Turbo C", Pearson Education (2008)
4. ISRD Group, "Programming and Problem-Solving Using C", Tata McGraw Hill, 2008.
5. Bjarne Stroustrup, "The C++ Programming Language", 3rd Edition, Pearson Education. Herbert Schildt, "C++: The Complete Reference", 4th Edition, McGraw Hill.

Project Based Learning Management I

Course Title: Project Based Learning Management I (FEHSM109)

Contact Hours:	**2 Hrs./week (P)**	Type of Course:	**Practical**
Examination Scheme	**Oral 25 Marks**		
Course Credit	**01**		

Pre-requisites:

Students are expected to have a good understanding in

1. Algebra 2. Geometry

Course assessment methods/tools:

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1	Oral	External	25
	Total		25

Course Objectives:

1	To introduce various machine tools and demonstration of machines.
2	To introduce different materials and machine tools in engineering practices with respect to their workability and machinability in manufacturing and assembly shop.
3	To explain workshop layout and safety norms.
4	To develop skills through hands on experience

Course Outcomes: After successful completion of the course, the learner will be able to

1	Select various manufacturing processes for given material.
2	Categories appropriate hand tool, cutting tool and machine tools to manufacture a job.
3	Explain the construction, working and functions of machine tools and their parts.
4	Apply safety practices on shop floor.

Guidelines for Instructor's Manual

Instructor manual shall contain:

1. The production drawing of a job with all linear and geometric dimensions, Raw material, size and shape, allowances provided.
2. List of tooling required.
3. Process plan to complete the job.
4. General safety instructions.

Guidelines for Student's Lab Journal

1. Student must maintain a workshop diary consisting of drawing / sketches of the jobs and a brief description of tools, equipment, and procedure used for doing the job and time schedule.
2. Student must maintain one file for write ups based on demonstration of machine tools and safety norms.

Guidelines for Oral Assessment

Oral assessment shall be based on the timely completion of jobs, quality of job, skill acquired, and maintain of workshop diary and brief write-ups on illustrations/sketches of demonstrated parts/mechanisms/machine tools etc.

Suggested List of Laboratory Experiments (Any 8)

Experiment No.	List of Experiments	Branch
1.	Mandatory briefing on safety in Electronics, Information Technology, Electrical and Process industry etc.	**ALL**
2.	**Demonstration and working of centre lathe and lathe operation** Demonstration on various functions of lathe parts: Headstock, Tailstock, Carriage, Lead screw, All geared Mechanism, Apron mechanism etc. Step turning and facing, drilling operation on a Mild Steel cylindrical job on centre lathe. Understanding the concept of speed, feed and depth of cut	**ALL**
3	**Demonstration of Drilling machine** Demonstration on construction of Radial drilling machine, Tool holding devices, Concept of speed, feed and depth of cut.	**ALL**
4	**Demonstration of Shaper/Grinding machine (Any one)** **Shaper:** Crank and slotted link mechanism, Work feed mechanism **Grinding**: Surface grinder/Cylindrical grinding machine, Mounting of grinding wheel	**ALL**
5	**One job of Carpentry** Introduction to wood working, kinds of woods, hand tools & machines, Types of joints, wood turning. Pattern making, types of patterns and its allowances.	**ALL**
6	**One job involving fitting to size** male-female fitting with drilling and tapping operation on Mild Steel plate, Introduction to marking, cutting and sawing, sizing of metal, shearing, Concept of fits and interchangeability, selection of datum and measurements.	**ALL**
7	**Prepare a Layout of Workshop**	**ALL**
	Section B	
8	**Demonstration on PCB design and making** Layout drawing, positive and negative film making, PCB Etching and drilling **Introduction of different type motors used in industry and battery (lithium iron) used in electrical vehicle**	**EN&TC, Electrical, Instrumentation**
9	**Demonstration of assembly and Disassembly of personal computer, Router configuration, Introduction of Operating system and networking systems**	**Computer, IT and AIDS**
10	**Demonstration using sheet metal with riveting/welding/brazing/soldering** (at least one temporary and one Permanent joint either using **resistance welding/Arc welding and soldering)**	**ALL**

Note –

1 Experiment no.1 is mandatory.

2 Students will perform three utility jobs from experiment number 5, 6 and 10.

3 Minimum eight experiments to be conducted out of 10.

Chairman Board of Studies
AISSMS, Pune-1
Department of Engg. Sciences (F.Y. B.Tech)

Reference/Textbooks

1. John, K. C., (2010), "Mechanical Workshop Practice, Prentice Hall Publication, New Delhi
2. Hazara and Chaudhary, Workshop Technology-I & II, Media promoters & Publisher Pvt. Ltd.

Audit Course 1

Course Title: Audit Course 1 (FEMC115)
a) UHV I
b) Sports

Contact Hours:	**2 Hrs./week**	Type of Course:	**Lecture**
Examination Scheme	**Non – Credit -**		

Total Hours:12 Hrs. (SESSIONS)

a) UHV I

Module 1: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education (6 hrs)

1. Understanding the need, basic guidelines, content and process for Value Education
2. Self-Exploration–what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self-exploration
3. Continuous Happiness and Prosperity- A look at basic Human Aspirations
4. Right understanding, Relationship and Physical Facilities- the basic requirements for fulfilment of aspirations of every human being with their correct priority
5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
6. Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

Module 2: Understanding Harmony in the Human Being - Harmony in Myself! (6 hrs)

7 Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
8 Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha
9 Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
10 Understanding the characteristics and activities of 'I' and harmony in 'I'
11 Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail
12 Programs to ensure Sanyam and Swasthya - Practice Exercises and Case Studies will be taken up in Practice Sessions.

BOOKS

TEXTBOOKS

1. Human values and Professional Ethics by "Jayshree Suresh andB.S. Raghvan"S Chand Publication.
2. A.N Tripathy, New Age International Publishers, 2003.
3.Bajpai. B. L , , New Royal Book Co, Lucknow, Reprinted, 2004
4.Bertrand Russell Human Society in Ethics & Politics
5. Yogasana by V.K. Sahastrabuddhe.
6. Best of Family Doctor by Dr. Balaji Tambe
7. Sport and Healthy life by Dr. Sardesai.

REFERENCEBOOKS

1.Body language by "DrShaliniVerma" S Chand Publication.
2. Practical personality and Development by "J K Pillamarri" Scitech Publication.
3. Corliss Lamont, Philosophy of Humanism
4.Gaur. R.R. ,Sangal. R, Bagaria. G.P, A Foundation Course in Value Education, Excel Books, 2009.
5.Gaur. R.R. ,Sangal. R ,Bagaria. G.P, Teachers Manual Excel Books, 2009.
6. I.C. Sharma . Ethical Philosophy of India Nagin& co Julundhar

7. Mortimer. J. Adler, – Whatman has made of man
8. William Lilly Introduction to Ethic Allied Publisher

Relevant websites, movies, and documentaries

1. Value Education websites, http://uhv.ac.in, http://www.uptu.ac.in
2. Story of Stuff,http://www.storyofstuff.com
3.AlGore, An Inconvenient Truth, Paramount Classics, USA
4. Charlie Chaplin, Modern Times, United Artists, USA
5. IIT Delhi, Modern Technology – the Untold Story
6.Gandhi A. Right Here Right Now, Cyclewala Productions

b) Sports

Unit I) Health Education (4 Hrs.)

a) Meaning, definitions of Health Education.
b) Nature and scope of Health Education.

Unit II) Health care (4 Hrs.)

a) Personal Health

1) Factors of Personal Health -I) Physical II) Mental
2) Factors influencing on Health
I) Heredity II) environment II) Habits IV) Exercise

b) Social Health

a) Communicable diseases Causes & Prevention
(HIV / AIDS, Malaria, Dengue, Chikungunya, Swine Flu, Corona etc.)

Unit III) Health of the Community (4 Hrs.)

a) Health problems in family, Community, School and Colleges.

BOOKS

1. Health Education and Hygiene - J. S. Manjal. Universal Publishers, Agra.
2. Health in India - Grant.
3. Preventive and Social Medicine — J. E. Park.
4. Adapted and Corrective Physical Education - Kielly.
5. Applied anatomy and Kinesiology - Rash and Burke.
6. Exercise Physiology - Fox.
7. Physical Education and Health, Singh Mandeep (2009) Khel sahitya Kendra, New Delhi.

Semester – II

Engineering Mathematics-II

Course Title: Engineering Mathematics-II (FEBSC201A)
(For Computer, IT and AIDS branch)

Contact Hours:	**3 Hrs/week (L)**	Type of Course:	**Lecture**
Examination Scheme	**In Sem Exam: 40 Marks**	**End Sem Exam: 60 Marks**	**Practical:** -
Course Credit	**03**		

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1.	In Sem Exam	External	40
2.	End Sem Exam	External	60
		Total	100

Pre-requisites: Sound knowledge about Integration, Differential Equation, Three-dimensional coordinate systems.

Course Objectives:

1	To explain the various methods for solving differential equations.
2	To develop capability in student to use differential equations in various physical processes.
3	To enable the students to understand the basic concept of periodic functions and the Fourier series representation.
4	To present sound knowledge of reduction formulae, Beta functions, Gamma functions, DUIS.
5	To develop the understanding of tracing of curves.
6	To explain the concept of multiple integral and its applications.

Course Outcomes:
After successfully completing the course students will be able to

1	Solve first order differential equations by using various methods and use it for developing machine learning algorithms.
2	Apply the concept of ordinary differential equations to various physical systems.
3	Find the Fourier series representation for continuous & discrete systems and use it in circuit analysis, image processing and signal processing.
4	Solve various types of integration with the help reduction formulae and special functions and use it in analysis of electronics component.
5	Sketch the curves of various forms and use it in failure analysis and reliability.
6	Evaluate double integrals, triple integrals and use it to find area and volume.

Syllabus
Course: Engineering Mathematics-II

Unit I: First Order Ordinary Differential Equations (DE) (06Hrs.)
Definition, Order and Degree of DE, Formation of DE. Solutions of Variable Separable DE, Exact DE, Linear DE and reducible to these types, Applications to Machine learning and Deep learning.

Unit II: Application of Differential Equations (06Hrs.)
Applications of DE to Orthogonal Trajectories, Newton's Law of Cooling, Kirchhoff's Law of Electrical Circuits, Rectilinear Motion, Fourier Law of heat conduction.

Unit III: Fourier series (06Hrs.)
Definition, Dirichlet's conditions, Full range Fourier series, half range Fourier series, Harmonic analysis, Applications in circuit analysis, image processing and signal processing.

Unit IV: Integral Calculus (06Hrs.)
Differentiation Under the Integral Sign, Reduction formulae, Beta and Gamma functions, Applications of Special Functions in Machine learning and Deep learning.

Unit V: Curve Tracing (06Hrs.)
Tracing of Cartesian, Polar and Parametric curves, Applications of curve tracing in failure analysis and reliability.

Unit VI: Multiple Integral and their applications (06Hrs.)
Double and Triple integration, applications to find to area and Volume.

Text Books:
1. B. V. Ramana, Higher Engineering Mathematics, Tata McGraw Hill.
2. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley Eastern Ltd.
3. B.S. Grewal, 'Higher engineering Mathematics', Khanna publishers.

Reference Books:
1. P. V. O'Niel, Advanced Engineering Mathematics, Thomson Learning.
2. M. D. Greenberg Advanced Engineering Mathematics, Pearson Education.
3. P. N. Wartikar, J. N. Wartikar, Applied Mathematics (Vol I & II), P. V. G. Prakashan.

Following topics are important for Competitive Examination from this course.
Differential Equations, Fourier series, Area, volume

Engineering Mathematics-II

Course Title: Engineering Mathematics-II (FEBSC210A)
(For Computer, IT and AIDS branch)

Contact Hours:	**2Hrs/week (P)**	Type of Course:	**Practical**
Examination Scheme	**In Sem Exam: -**	**End Sem Exam: -**	**Practical: - 25 Marks**
Course Credit	**01**		

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1	Practical	External	25
		Total	25

Course Objectives:

1	To develop the capabilities of students to perform experiments based on theory of Differential Equations, Integral Calculus, Fourier Series and Curve Tracing.
2	To expose student to Mathematical software SCILAB/MATLAB and perform simulations and calculation based on theory of Differential Equations, Integral Calculus, Fourier Series and Curve Tracing.

Course Outcomes:
After successfully completing the course students will be able to

1	Solve first order differential equations by using various methods.
2	Apply the concept of ordinary differential equations to various physical systems.
3	Find the Fourier series representation for continuous and discrete systems.
4	Solve various types of integration with the help reduction formulae and Special functions.
5	Sketch the curve in various forms and use it to measure arc length.
6	Evaluate double integrals, triple integrals, and use it to find area, volume.

List of Practical's (any 8)

1. Formation of Differential Equations and Solutions of Differential Equations by Variable Separable method.
2. To find the solution of Exact Differential Equations, Linear Differential Equations and reducible to these types using SCILAB/MATLAB
3. Applications of Differential Equations to Orthogonal Trajectories, Newton's Law of Cooling, Kirchoff's Law of Electrical Circuits.
4. Applications of Differential Equations Motion under Gravity, Rectilinear Motion, Fourier Law of heat conduction.
5. To determine Fourier series and half range Fourier series for periodic functions using SCILAB/MATLAB
6. Application of Fourier series to study Harmonic analysis.
7. To study Differentiation Under the Integral Sign, Reduction formulae, Beta and Gamma functions.
8. To study the rules for tracing Cartesian curves, Polar curves, Parametric curves and sketch the curves using SCILAB/MATLAB

9.	To evaluate double integral and triple integration using SCILAB/MATLAB
10.	To study Mathematical Modeling on one of the following topics. 1) Differential Equations 2)Fourier series 3) Multiple integration

Textbooks:

1. B. V. Ramana, Higher Engineering Mathematics, Tata McGraw Hill.
2. B.S. Grewal, 'Higher engineering Mathematics', Khanna publishers.
3. Peter Issa Kattan, MATLAB for Beginners: A Gentle Approach, Petra Books, 2008.

Engineering Mathematics-II

Course Title: Engineering Mathematics-II (FEBSC201B)

(For E&TC, Electrical and Instrumentation branch)

Contact Hours:	**3Hrs/week (L)**	Type of Course:	**Lecture**
Examination Scheme	**In Sem Exam: 40 Marks**	**End Sem Exam: 60 Marks**	**Practical: -**
Course Credit	**03**		

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1.	In Sem Exam	External	40
2.	End Sem Exam	External	60
		Total	100

Pre-requisites: Sound knowledge about Integration, Differential Equation, Three-dimensional coordinate systems.

Course Objectives:

1	To explain the various methods for solving linear differential equations.
2	To enable the students understand the basic concept of periodic functions and the Fourier series representation.
3	To make the students familiarize with concept and techniques of Fourier and Z-Transform.
4	To present sound knowledge of reduction formulae, Beta functions, Gamma functions, DUIS.
5	To develop the understanding of tracing of curves.
6	To explain the concept of multiple integral and its applications.

Course Outcomes:

After successfully completing the course students will be able to

1	Solve first order differential equations by using various methods and use it for developing machine learning algorithms.
2	Find the Fourier series representation for continuous and discrete systems and use it in circuit analysis, electronics, signal processing.
3	Apply concept of Fourier transform & Z-transform and use it in signal processing.
4	Solve various types of integration with the help reduction formulae and special functions and use it in analysis of electronics component.
5	Sketch the curves of various forms and use it in failure analysis and reliability.
6	Evaluate double integrals, triple integrals and use it to find area and volume.

Syllabus

Course: Engineering Mathematics II

Unit I: First Order Ordinary Differential Equations (DE) (06hr)

Definition, Order and Degree of DE, Formation of DE, Solutions of Variable Separable DE, Exact DE, Linear DE and reducible to these types, Applications to Electric circuits and electronic circuits, Control System, Electromagnetic, Theory of antenna.

Unit II: Fourier series (06hr)

Definition, Dirichlet's conditions. Full range Fourier series, half range Fourier series, Harmonic analysis, Applications to pulse width modulation, electrical engineering, vibration analysis, acoustics, optics,

signal processing, image processing.

Unit III: Fourier and Z Transforms (06hr)

Fourier Transform (FT): Complex exponential form of Fourier series, Fourier integral theorem, Fourier Sine & Cosine integrals, Fourier transform, Fourier Sine and Cosine transforms and their inverses. Applications of image analysis, image filtering, image reconstruction and image compression.

Z - Transform (ZT): Introduction, Definition, Standard properties, ZT of standard sequences and their inverses, Applications to analysis of linear discrete signal, digital control engineering.

Unit IV: Integral Calculus(06hr)

Differentiation Under the Integral Sign, Reduction formulae, Beta and Gamma functions. Applications to electrical circuit analysis.

Unit V: Curve Tracing (06hr)

Tracing of Cartesian, Polar and Parametric curves, Applications of curve tracing in failure analysis and reliability.

Unit VI: Multiple Integral and their applications (06hr)

Double and Triple integration, applications to find to area and Volume.

Text Books:

1. B. V. Ramana, Higher Engineering Mathematics, Tata McGraw Hill.
2. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley Eastern Ltd.
3. B.S. Grewal, 'Higher engineering Mathematics', *Khanna publishers.*

Reference Books:

1. P. V. O'Niel, Advanced Engineering Mathematics, Thomson Learning.
2. M. D. Greenberg Advanced Engineering Mathematics, Pearson Education.
3. P. N. Wartikar, J. N. Wartikar, Applied Mathematics (Vol I & II), P. V. G. Prakashan.

Following topics are important for Competitive Examination from this course.

Differential Equations, Fourier transform, Area, volume

Chairman Board of Studies
Department of Engg. Sciences (F.Y. B.Tech)

Engineering Mathematics-II

Course Title: Engineering Mathematics-II (FEBSC210B)

(For E&TC, Electrical and Instrumentation branch)

Contact Hours:	**2hrs/Practical(P)**	Type of Course:	**Practical**
Examination Scheme	**In Sem Exam:** -	**End Sem Exam:**	**Practical: 25 Marks**
Course Credit	**01**		

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1.	Practical	External	25
		Total	25

Pre-requisites: Sound knowledge about Integration, Differential Equation, Three-dimensional coordinate systems.

Course Objectives:

1	To develop the capabilities of students to perform experiments based on theory of Differential Equations, Integral Calculus, Fourier Series, Fourier Transform & Z Transform and Curve Tracing.
2	To expose student to Mathematical software SCILAB/MATLAB and perform simulations and calculation based on theory of Differential Equations, Integral Calculus, Fourier Series and Curve Tracing.

Course Outcomes:

After successfully completing the course students will be able to

1	Solve first order differential equations by using various methods.
2	Find the Fourier series representation for continuous and discrete systems.
3	Apply the knowledge of Fourier transform & Z-transform to analyze continuous-time and discrete-time.
4	Solve various types of integration with the help reduction formulae and Special functions.
5	Sketch the curve in various forms and use it to measure arc length.
6	Evaluate double integrals, triple integrals, and use it to find area, volume.

List of Practical's (any 8)

1.	Formation of Differential Equations and Solutions of Differential Equations by Variable Separable method.
2.	To find the solution of Exact Differential Equations, Linear Differential Equations and reducible to these types using SCILAB/MATLAB
3.	To determine Fourier series and half range Fourier series for periodic functions using SCILAB/MATLAB
4.	Application of Fourier series to study Harmonic analysis.
5.	To find Fourier transform, Cosine and Sine Transforms of the various function.
6.	To find Z transform of standard sequences and solve difference equations using SCILAB/MATLAB
7.	To study Differentiation Under the Integral Sign, study Reduction formulae, Beta and Gamma functions.
8.	To study the rules for tracing Cartesian curves, Polar curves, Parametric curves and sketch the curves using SCILAB/MATLAB
9.	To evaluate double integral and triple integration using SCILAB/MATLAB
10.	To study Mathematical Modeling on one of the following topics. 1) Differential Equations 2)Fourier series 3) Multiple integration

Textbooks:

1. B. V. Ramana, Higher Engineering Mathematics, Tata McGraw Hill.
2. B.S. Grewal, 'Higher engineering Mathematics', Khanna publishers.
3. Peter Issa Kattan, MATLAB for Beginners: A Gentle Approach, Petra Books, 2008.

Engineering Physics

Course Title: Engineering Physics (FEBSC202)
(For Computer, IT and AIDS branch)

Contact Hours:	**3 Hrs./week (L)**	Type of Course:	**Lecture**
Examination Scheme	**In Sem Exam: 40 Marks**	**End Sem Exam: 60 Marks**	
Course Credit	**03**		

Sr. No.	Course assessment methods/tools	External/Internal	Marks
1.	In Sem Exam	Internal	40
2.	End Sem Exam	External	60
		Total	100

Course Objectives:

1 To explain the principles of Physics required for Engineering.
2 To describe applications of optics required for Engineering.
3 To identify advance technical applications of Quantum Mechanics, Nanophysics and Superconductivity.
4 To explain importance of Semiconductor physics in Engineering.

Course Outcomes:

Student will be able to:

1 Explain basics of wave optics and use them in engineering applications.
2 Describe the fundamentals of Lasers and Fiber optics with applications.
3 Explain basics of Semiconductor Physics and use them in understanding applications.
4 Reproduce the basics of Quantum Mechanics along with applications.
5 Explain basics of Magnetism and Superconductivity along with applications.
6 Describe the concepts of Nanoscience and its applications

Syllabus
Course: Engineering Physics

Unit I: Wave Optics (6 Hrs)

Concept of thin film, Interference due to thin film, applications: thickness measurement and anti-reflection coating using interference of light. (Self-study: Wedge shaped film). Applications: Flatness of surface, thickness of film on substrate. Numerical on band width, wedge angle, Newton's Rings.
Diffraction, Diffraction grating, Introduction to X-Ray diffraction Polarization: Double refraction, (Self-study : Huygens' theory of double refraction), Photo elasticity, LCD, numerical.

Unit II: Laser & Fibre Optics (6 Hrs)

Introduction, Characteristics of laser, (Self-study : Semiconductor hetero-junction laser, Carbon dioxide laser), Applications of laser-industrial, Defence & medical; introduction to holography Fibre Optics: Propagation of light in optical fibres, acceptance angle, numerical aperture, modes of propagation, types of fibres- step index, graded index, single mode &multimode; Losses -attenuation, dispersion.

Unit III: Physics of Semiconductors (6 Hrs)

Energy band in solids: difference between metals, insulators and semiconductors - semiconductor doping - Intrinsic and Extrinsic semiconductors. FERMI Function, Fermi Energy in semiconductors, Formation of P-N Junction (Self-study : Hall effect), Construction and working of Solar Cell.

Unit IV: Quantum Mechanics (6 Hrs)

De Broglie hypothesis, (Self-study : Concept of wave packet, Phase and group velocity, properties of matter waves), Heisenberg's uncertainty principle, wave function & probability interpretation,

Schrodinger's time independent wave equation, application of independent wave equation to the problem of (i) particle in rigid box (ii) Tunnelling effect, scanning tunnelling microscope (STM), Quantum Computing.

Unit V: Magnetism and Superconductivity (6 Hrs)

Classification of magnetic materials, temperature dependent magnetic transitions (Curie and Neel temperature), magnetic hysteresis loop,(Self-study: magneto-resistance, giant magnetoresistance (GMR), application of magnetic materials in magneto-optical recording , magnetocaloric effect, adiabatic demagnetization) Superconductivity: Properties of superconductors-zero resistance, Meissner effect, isotope effect, BCS theory, type I and II superconductors, (Self-study: Tc superconductors), Josephson effect, applications of DC-SQUID, applications - superconducting magnets, maglev trains

Unit VI: Introduction to Nanoscience (6 Hrs)

Origin of nanoscience, Surface to volume ratio, Quantum confinement, Properties of nanomaterials (Self-study : methods of preparation of nano material's- bottom-up and top-down approaches), physical methods- high energy ball milling, vapour deposition; chemical, applications.

Textbooks

1. A textbook of Engineering Physics – M N Avadhanulu and P G Kshirsagar, S Chand & Co. Ltd.
2. A Textbook of Optics – N Subrahmanyam and BrijLal, S Chand Publications

Reference Books

1. Fundamentals of Physics – Halliday, Resnick and Walker, Wiley Publications
2. Acoustics – Heinrich Kuttruff, CRC Press
3. Optics – Ajay Ghatak, Tata McGrawHill
4. Concepts of Modern Physics – Arthur Bieser, Tata McGrawHill
5. Introduction to Solid State Physics - C. Kittel, Wiley Publications
6. Solar Energy –S P Sukhatme, McGrawHill
7. Introduction to Nanoscience and nanotechnology by Chattopadhyay and Banerjee

Engineering Physics

Course Title: Engineering Physics (FEBSC211)
(For E&TC, Electrical and Instrumentation branch)

Contact Hours:	**2 Hrs./Week (P)**	Type of Course:	**Practical**
Examination Scheme	**Practical: 25 Marks**		
Course Credit	**01**		

Sr. No.	Course assessment methods/tools	External/Internal	Marks
1.	Practical	External	25
		Total	25

Course Objectives:

1. To study and verify laws of Physics.
2. To compute different physical parameters by experimental means.

Course Outcomes:

Students will be able to:

1 Explain basics of experimentations in optics.
2 Demonstrate the experimental aspects in semiconductor physics.
3 Illustrate techniques in Sound.

Laboratory Work

List of experiments (Eight out of the following experiments)

Group A: Optics (Any three)

1 To determine radius of curvature of plano-convex lens by Newton's rings method.
2 To determine the wavelength of light using diffraction grating.
3 To determine the concentration of sugar in solution using a Polarimeter.
4 To verify Law of Malus.
5 To determine the characteristics of laser beam.
6 To record and render 3D image using polarization.
7 To determine R. P. of telescope.
8 To determine R. P. of diffraction Grating

Group B: Semiconductor Physics (Any two)

1 To determine band gap in semiconductor.
2 To determine the Hall coefficient
3 To determine the I-V characteristics and parameters of a Solar cell

Group C: Sound (Anyone)

1 To determine sound absorption coefficient of materials
2 To determine sound pressure level.
3 To determine the ultrasonic velocity in a liquid using Ultrasonic interferometer.

Group D: Experiment beyond syllabus (Any two)

1 Ultrasonic Distance Meter
2 Study of Spectrometer
3 Study of Basic Sound Notes
4 Experiment based on Gravity

5	Study of Resonance
6	Study of LASER Printer / LASER Mouse

Reference Books

1. Fundamentals of Physics – Halliday, Resnick and Walker, Wiley Publications
2. Concepts of Modern Physics – Arthur Bieser, Tata McGrawHill
3. A course on Experiments with He-Ne Laser – R S Sirohi, New Age International Publishers
4. Introduction to Solid State Physics - C. Kittel, Wiley Publications
5. Solar Energy –S P Sukhatme, McGrawHill

Industrial Chemistry - Theory			
Course Title: Industrial Chemistry (FEBSC 203) (Electrical, E&TC, Instrumentation)			Industrial Chemistry **(Required)**
Contact Hours:	**3 Hrs/week (L)**	Type of Course:	**Lecture**
Examination Scheme	**In Sem Exam : 40 Marks**	**End Sem Exam : 60 Marks**	
Course Credit	**03**		

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1.	In Sem Exam	Internal	40
2.	End Sem Exam	External	60
		Total	100

Pre-requisites: Basic Chemistry at 12th Standard or equivalent level

Course Objectives:

1	To prepare students in analysis of water as commodity and corrosion as industrial problem
2	To emphasize the need of technological advancement for utility of nanomaterials and fuels
3	To introduce students to basic knowledge of spectroscopy and electro analytical chemistry

Course Outcome:

CO	After the completion of the course the student should be able to
1	Apply suitable methods for water analysis and various treatment methods.
2	Relate the technological developments with the enhanced understanding of materials further
3	Classify different kinds of fuels on the basis of calorific value and can define need for alternative energy sources
4	Explain working principle of spectrophotometer.
5	Identify control measures of corrosion.
6	Examine the analyte using electro analytical techniques.

Syllabus
Course: Basic Science course

Unit I: Water Technology: (6 Hrs)

Impurities in water, hardness of water: Types, Hardness units and Numericals. Determination of hardness (by EDTA method (using molarity concept) and alkalinity, numericals. Ill effects of hard water in domestic, agriculture and industry

Water treatment: i) Zeolite method and numerical, ii) Demineralization method. Desalination of water: Reverse osmosis and Electrodialysis

Unit II: Engineering Materials (6 Hrs)

[[A] Polymers: Introduction, Properties and Applications of 1. Polyparaphenylene, 2 Polypyrrole. Photoconducting polymers: Introduction, structure properties and applications of polysilane (Application: Photocopier working with xerography)

[B] Sensors: Biosensors- Introduction, Types of Biosensors, and Application of Biosensors. (Case Study related to respective branch).

[C] Nano materials: CNT, Fullerene and graphene

Unit III: Fuels and Energy (6 Hrs)
Introduction (definition, classification of fuel based on chemical reactions and characteristics of an ideal fuel), Calorific value (CV): Higher calorific value (HCV) and Lower calorific value (LCV)
Introduction to Paris Agreement
Solar Energy: Introduction, construction and working, Research (Students will explore various researches for answering the challenges in implementation of PV Solar Cell Technology), Scope of entrepreneurship in the recycling of used solar panels
Battery Technology: Introduction, classification. Construction, working and applications Lithium-ion batteries, comparison and characteristics of different types of batteries. (Students will explore different types of batteries including Li-Ion, Na-Ion, Ni-Fe, Na-$NiCl_2$, Al-ion, Carbon foam batteries)
Fuel Cells: Introduction, Construction, working & applications of H_2-O_2 cell.

Unit IV: Spectroscopic Techniques (6 Hrs)
[A]UV-Visible Spectroscopy:
Introduction, Construction, Working Principle and Applications of UV-visible spectroscopy.
[B] Infrared Spectroscopy:
Introduction, Construction, Working Principle and Applications of IR Spectroscopy

Unit V: Corrosion Science (6 Hrs)
Introduction, Types of corrosion – Dry and Wet corrosion, mechanism of dry corrosion, nature of oxide films and Pilling-Bed worth's rule, wet corrosion – mechanism: hydrogen evolution and oxygen absorption, Factors influencing rate of corrosion. Methods of corrosion control and prevention: cathodic and anodic protection, metallic coatings and its types, surface preparation, methods to apply metallic coatings-hot dipping, electroplating.

Unit VI: Instrumental Methods of Analysis and agricultural technology (6 Hrs)
Introduction to instrumental methods of analysis
[A] Conductometry: Introduction, conductivity cell, conductivity measurement of soil, conductometric titrations of acid versus base with titration curve.
[B] pHmetry: Introduction, standardization of pH meter, pH measurement of soil pH metric titration of strong acid versus strong base with titration curve

Text Books ;

1. A Textbook of Engineering Chemistry by Dr. S.S. Dara, Dr. S.S. Umare, Chand & Company Ltd. (2018).
2. B.R. Puri and L.R. Sharma, "Principles of Physical Chemistry", 45th Edition, Vishal Publishing Co. 2012.
3. Textbook of Engineering Chemistry by Dr. Sunita Rattan, S. K. Kataria & Sons Publisher
4. David Linden, "Hand Book of Batteries", 3 Edition, McGraw Hill Publishers, 2000.

Reference Books :

1. Engineering Chemistry by O.G. Palanna; Tata McGraw-Hill Publishing Co. Ltd
2. Basic Concepts of Analytical Chemistry by S. M. Khopkar; New age International Publishers
3. Instrumental Methods of Analysis by Willard, Merrit, Dean, Settle
4. Spectroscopy of organic compounds, 2 nd, P. S. Kalsi, New Age-International Ltd., Publisher
5. Polymer Science, V. R. Gowarikar, N. V. Viswanathan, Jayadev Sreedhar, Wiley Eastern Ltd
6. Solar Energy 4Th Edition 2017 by S P Sukhatme and J K Nayak, McGraw Hill

Chairman Board of Studies
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Department of Engg. Sciences (F.Y. B.Tech)

Industrial Chemistry –Practical			
Course Title: Industrial Chemistry (FEBSC 212) (Electrical, E&TC, Instrumentation)		Industrial Chemistry **(Required)**	
Contact Hours:	**2 Hrs./week (P)**	Type of Course:	**Practical**
Examination Scheme	**Practical 25 Marks**		
Course Credit	**01**		

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1	Practical	External	25
		Total	25

Pre-requisites: Basic Chemistry at 12th Standard or equivalent level

Course Objectives:

1	To prepare students in analysis of water as commodity and corrosion as industrial problem
2	To emphasize the need of technological advancement for utility of nanomaterials and fuels
3	To introduce students to basic knowledge of spectroscopy and electro analytical chemistry

Course Outcome:

CO	After completion of the course the student should be able to
1	Apply suitable methods for water analysis and various treatment methods.
2	Relate the technological developments with the enhanced understanding of materials further
3	Classify different kinds of fuels on the basis of calorific value and can define need for alternative energy sources
4	Explain working principle of spectrophotometer.
5	Identify control measures of corrosion.
6	Examine the analyte using electro analytical techniques.

Use of simulating software related to respective units through virtual lab

List of Experiments:

Minimum 8 experiments are to be performed from the following list:

Sr No.	Title
1	To determine hardness of water by EDTA method
2	To determine alkalinity of water
3	To determine maximum wavelength of absorption of $CuSO_4$/$FeSO_4$/ $KMnO_4$, verify Beer's law and find unknown concentration of given sample.
4	To determine % fixed carbon of coal
5	To coat copper and zinc on iron plate using electroplating.
6	To preparation biodiesel from waste/nonedible oil
7	To prepare and analyze PFR or Polystyrene in laboratory
8	To determine strength of acid using pH-Metry

Textbooks:

1. Laboratory manual of Engineering Chemistry by Dr Sudharani, Dhanpatrai Publishing House.
2. A textbook on experiments and calculations in Engineering Chemistry by S S Dara, S Chand Publication.
3. Basic Concepts of Analytical Chemistry by S. M. Khopkar; New age International Publishers
4. Laboratory manual prepared by faculty of Engineering Chemistry AISSMS IOIT (for college circulation only).

Chairman Board of Studies ... Dept. of Engg. Sciences (F.Y. B.Tech)

Basics in Mechanical Engineering

Course Title: Basics in Mechanical Engineering (FEESC 204)

Contact Hours:	**1 Hrs/week (L)** **2 Hrs./week (P)**	Type of Course:	**Lecture & practical**
Examination Scheme	**In Sem Exam:** **40 Marks**	**End Sem Exam:** **60 Marks**	
Course Credit	**02**		

Sr. No.	Course assessment methods/tools		Marks
1.	In Sem Exam	Internal	40
2.	End Sem Exam	External	60
		Total	100

Pre-Requisite: Fundamentals of 11th - 12th Physics, Chemistry and Mathematics

Course Objectives:

1 To define and identify the different mechanical machine elements and their materials.
2 To understand, explain the concept of design and household appliances.
3 To explain and demonstrate the fundamental manufacturing process
4 To explain and demonstrate the different Machine tools and their automation.
5 To state the laws of thermal engineering and explain different power plant
6 To understand and relate different vehicle systems.

Course Outcomes:

At the end of course students will be able to

1 Define and identify the different mechanical machine elements and their materials
2 Explain the concept of design and household appliances.
3 Explain and demonstrate the fundamental manufacturing processes.
4 Explain and demonstrate the different Machine tools and their automation.
5 State the laws of thermal engineering and explain different power plant.
6 Compare and relate different vehicle systems.

Syllabus
Course: Basics in Mechanical Engineering (BME)

Unit 01: Intro Mechanical Elements, Power Transmitting Devices [02Hr lectures]

Mechanical Elements- Shaft, Axle, Key[Parallel Key],Coupling[Rigid Flange Coupling], Bearing [Ball Bearing] Power Transmission Devices: Belt, Chain and Gear drive [Spur Gear, Simple Gear Train-simple numerical on Gear ratio], Mechanisms – Four bar and slider crank mechanisms [*note only Definitions, Types, Function, Advantages and Disadvantages, Construction working and Applications to be covered

Unit 02: Design Fundamentals and Domestic [02Hr lectures]

Engineering and Machine Design – Need of Design, Types of Design, Steps of Design,
Household Applications -
Electric motors- Principal Construction, Working,Applications of motors in mixer, fans, washing machine it's working with diagrams, Levers- Door Latches, Blower - Vacuum cleaner, Kitchen Chimney, Gears - Wall clocks, watches, Printers, Valves - Water tap, Solar Water Heater[Any 5 Applications]

Unit 03 : Fundamental Manufacturing Process [02Hr lectures]

Metal casting processes- (Sand casting), Metal forming processes - Forging [Open and Closed Die], Sheet metal cutting and forming operations. Micro machining Process Int. Electric Discharge machining. Metal joining processes- welding, riveting, soldering and brazing.3D printing technology. Introduction of

Robotics [*note only Definitions, Types, Function, Advantages and Disadvantages, simple block diagrams with motions Construction working and Applications to be covered]

Unit 04 : Machine Tools and Automation [02Hr lectures]

Machine tools and its operations- Lathe Machine, Drilling Machines,milling machine [Block Diagrams working Principle and operations with motions].Automation – types –Fixed and flexible. CNC machine with its block diagram,IOT in different Industries. Industry 4.0.

Unit05 : Basics of Thermal Engineering [02Hr lectures]

Basics of thermodynamics system - Types,First Law & Second Law of Thermodynamics Statements, limitations and its significance only. Concept of Heat Engine, refrigerator and Heat Pump. Modes of heat transfer: conduction, convection and radiation, Fourier's law, Newton's law of cooling, Stefan Boltzmann's law. (formula based Simple numerical on modes of heat transfer and 2nd law of thermodynamics on heat engine, heat pump and refrigerator) IC Engine Classification and 4 Stroke Petrol Engine Working, Boiler classification, Working of Package type boiler.

Unit 06: Automobile systems and Specifications [02Hr lectures]

Classifications of Automobile, Parts of Vehicles, Introduction of chassis layouts, steering system-Ackerman steering system, Suspension system-Wishbone and Macpherson strut suspension, Braking system- Internal expanding and disc brakes, Cooling system- Water and air cooling system, fuel injection system-MPFI and fuel supply system. Power transmission system [ECG] in Vehicle, Safety Arrangement system in Vehicle Active and passive systems.

Textbooks:

1. Agrawal,Basant and Agrawal, C. M., (2008), "Basics of Mechanical Engineering", John Wiley and Sons, USA
2. Surinder Kumar, (2011), "Basic of Mechanical Engineering", Ane Books Pvt. Ltd. New Delhi
3. Rajput, R.K., (2007), "Basic Mechanical Engineering", Laxmi Publications Pvt. Ltd

Reference Books:

1. Khan, B. H., "Non-Conventional Energy Sources, Tata McGraw-Hill Publisher Co. Ltd.
2. George Murray, Charles V. White, Introduction to Engineering Materials, CRCPress, Tayler and Francis.
3. Arora and Domkunwar, "Thermal Engineering", Dhanpat Rai and Sons.

List of Practical's (any 8)

01	To Study and Demonstrate various types of boilers.
02	To Study and Demonstration on lathe Machine operations
03	To study and demonstration of Electric Vehicles system and components.
04	To Demonstrate power transmission system in automobile
05	To Demonstrate and compare the vehicle systems like steering, brakes and suspension systems.
06	To study and prepare 3D Simple model using 3D printing Technology
07	To study, prepare and demonstrate CNC turning program for simple product operations using G-code and M-Codes.
08	To study and demonstrate the domestic Refrigeration system.
09	To Study and understand working of 4 Stroke SI Engine.
10	To Prepare report on Industrial visit based on Manufacturing, Automotive or Power systems.
11	To Study and demonstrate the Components and Working of Window Air Conditioner
12	To Study of mechanisms: four bar, slider crank mechanism

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Reference Books:

1. Khurmi, R.S. and Gupta, J. K.,"A Textbook of Thermal Engineering", S. Chand & Sons
2. Kirpal Singh, Automobile Engineering Volume –I and Volume-II, Standard Publishers Distributors.
3. Nil Patel, Electric Vehicles- Modern Technologies and Trends – Springer Publication
4. R.K.Rajput, Manufacturing Process,Laxmi Publications

Environmental Informatics			
Course Title: Environmental Informatics (FEESE 205)			
Contact Hours:	**2 Hrs/week (P)**	Type of Course:	**Practical**
Examination Scheme	**Term Work 25 Marks**	**Practical 25 Marks**	
Course Credit	**01**		

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1.	Term Work	Internal	25
2.	Practical	External	25
		Total	50

Course Objectives	
1	To discuss the concepts sustainable development.
2	To explain various conservation methods of natural resources.
3	To discuss various environmental issues
4	To demonstrate use of remote sensing in environmental studies

Course Outcomes:	
At the end of course students will be able to	
1	Abridge need of sustainable development
2	Find out personal consumption of resources.
3	State technologies associated with monitoring and control of environmental issues.
4	List applications of remote sensing in environmental issues.

Syllabus
Course: Environmental Informatics

Part A:
List of Practical's (any 6)

1	Case study related to environmental conservation.
2	Presentation on topic related to Energy/Environment.
3	Poster making on topic related to Energy/Environment.
4	Visit to a local polluted site – Urban/Rural/Industrial/Agricultural.
5	Case study of solid waste management.
6	Making of compost from organic waste.
7	Demonstration of QGIS Software.
8	To use Google Earth software for Environmental studies.
9	Writing computer code for displaying Environmental data.
10	BOD Calculation
11	Environmental map reading and interpretation
12	Representation of environmental data

Part B: Mini Project

Part C: Activity Based Assignments

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Suggested Reading:

1. Erach Bharucha, Environmental Studies for Undergraduate Courses of all Branches of Higher Studies.
2. Anubha Kaushik, C.P. Kaushik, Perspectives in Environmental Studies
3. McNeil, John R. 2000. Something New Under the Sun: An Environmental History of the Twentieth Century.

Basic Electrical Engineering			
Course Title: Basic Electrical Engineering (FEESC 206)			**Basic Electrical Engineering**
Contact Hours:	**3 Hrs./week (L)**	Type of Course:	**Lecture**
Examination Scheme	**In Sem Exam: 40 Marks**	**End Sem Exam: 60 Marks**	
Course Credit	**3**		

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1.	In Sem Exam	Internal	40
2.	End Sem Exam	External	60
		Total	100

Course Pre-Requisite:
Engineering physics, electron theory, electricity, potential and kinetic energy

Course Objectives:

1 To introduce fundamental concepts, various laws-principles and theorems associated with electrical systems.
2 To provide basic knowledge of all electrical quantities such as current, voltage, power, energy, frequency along with different types of fields.
3 To provide knowledge about fundamental parameters such as resistance, inductance and capacitance and magnetic circuits, AC and DC circuits.
4 To provide knowledge of the concepts of transformer, different energy conversions techniques.
5 To make students aware of Domestic wiring and protective system.
6 To make students aware of Electrical System and Electrical appliances.

Course Outcomes:
Students will be able to
1 Apply Kirchhoff's Voltage Law (KVL), Kirchhoff's Current Law (KCL) and different network theorems to solve resistive circuits under DC supply.
2 Differentiate between electrical and magnetic circuits and derive mathematical relation for self and mutual inductance along with coupling effect.
3 Calculate series, parallel and composite capacitor as well as characteristic parameters of alternating quantity and phasor arithmetic.
4 Relate phase and line electrical quantities in three phase ac networks.
5 Demonstrate the operation of single-phase transformer and calculate efficiency and regulation at different loading conditions.
6 Understand working of different home appliances and protective devices.

Unit 01: DC Circuits (05Hrs)
Ohm's Law, Kirchhoff's Voltage Law (KVL), Kirchhoff's Current Law (KCL), ideal and practical voltage and current source (only independent sources), source transformation, simplifications of networks using series and parallel combinations and star-delta conversions, Superposition theorem, Thevenin's theorem.

Unit 02: Electromagnetism and Electrostatics (07Hrs)
(A) Electromagnetism: Terminologies and fundamentals of Electromagnetism, series and parallel magnetic circuits, Electromagnetic induction and faraday's laws, Energy stored in magnetic circuit.
(B) Electrostatics: Terminologies and fundamentals of Electrostatics, Capacitor- series and parallel, charging, discharging, time constant, energy stored. .

Unit 03: AC Fundamentals (06 Hrs)
Generation of alternating voltage and currents, root mean square (RMS) and average value, form factor, crest factor, AC applied to resistance, inductance and capacitance, R-L, R-C and R-L-C series circuit, simple parallel circuits, phasor diagrams, calculations of power (active, reactive, apparent) and power factor, impedance and admittance concept. Series resonance, Q-factor and bandwidth in AC circuits.

Unit 04: Three Phase Circuits (06 Hrs)
Three phase voltages, current and power relations in star connected and delta connected balanced circuits, delta/star equivalence analysis of balanced three phase circuits, power measurement in three phase circuit.

Unit 05: Introduction to Transformer and Electric Motors (06 Hrs)
(A) Single phase transformer: construction, operating principle, types, emf equation, voltage and current ratio, operation on no load and with load, power losses, efficiency, voltage regulation.
(B) Electric Motors: Classification of electric motors, types of DC motors and their working principle, applications, need of DC motor starters.

Unit 06: Electrical Appliances and Protective Equipments (06 Hrs)
Working principle and operation of Electric iron, Geyser, Water heater, Uninterruptible Power Supply (UPS), Storage batteries, introduction to star ratings of electrical equipments.
Electric lamps: Fluorescent tube, Compact Fluorescent Lamp (CFL), Light-emitting diode (LED) lamp.
Earthing: Necessity of earthing, earthing methods, fuse, Miniature Circuit Breaker (MCB), Molded Case Circuit Breaker (MCCB), Earth-leakage Circuit Breaker (ELCB).
Single line diagram of domestic wiring.
Introduction to electric vehicle (EV).

Textbooks:

1. V.D. Toro, Principles of Electrical Engineering, Prentice Hall India, 1989.
2. V.K. Mehta, Rohit Mehta, Basic Electrical Engineering, S Chand and Company, 2nd Edition, 2015.
3. D. P. Kothari, I.J. Nagrath, Theory and Problems of Basic Electrical Engineering, PHI Publication, 2nd Edition, 2010.
4. B. L. Theraja, A Textbook of Electrical Technology Vol. I & II, S. Chand and Company, Reprint Edition 2014.
5. Ashfaq Husain, "Electrical Machines", Dhanpat Rai & Sons.

Reference Books:

1. H Cotton, Electrical Technology, CBS Publications, 2015.
2. L. S. Bobrow, -Fundamentals of Electrical Engineering, Oxford University Press, 2011.
3. E. Hughes -Electrical and Electronics Technology, Pearson, 2010.
4. D. C. Kulshreshtha, -Basic Electrical Engineering, McGraw Hill, 2009.
5. A.S. Langsdorf -Theory and performance of DC machines", Tata McGraw Hill 2008.

Basic Electrical Engineering

Course Title: Basic Electrical Engineering (FEESC 213)			**Basic Electrical Engineering**
Contact Hours:	**02 Hrs./week**	Type of Course:	**Practical**
Examination Scheme	**In Sem Exam:** -	**End Sem Exam:** -	**Practical: 25 Marks**
Course Credit	**1**		

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1.	Practical	External	25
		Total	25

Course Pre-Requisite:
Engineering physics, electron theory, electricity, potential and kinetic energy

Course Objectives:

1 To introduce fundamental concepts, various laws-principles and theorems associated with electrical systems.
2 To provide basic knowledge of all electrical quantities such as current, voltage, power, energy, frequency along with different types of fields.
3 To provide knowledge about fundamental parameters such as resistance, inductance and capacitance and magnetic circuits, AC and DC circuits.
4 To provide knowledge of the concepts of transformer, different energy conversions techniques.
5 To make students aware of Domestic wiring and protective system.
6 To make students aware of Electrical System and Electrical appliances.

Course Outcomes:
Students will be able to

1 Apply Kirchhoff's Voltage Law (KVL), Kirchhoff's Current Law (KCL) and different network theorems to solve resistive circuits under DC supply.
2 Differentiate between electrical and magnetic circuits and derive mathematical relation for self and mutual inductance along with coupling effect.
3 Calculate series, parallel and composite capacitor as well as characteristic parameters of alternating quantity and phasor arithmetic.
4 Relate phase and line electrical quantities in three phase ac networks.
5 Demonstrate the operation of single-phase transformer and calculate efficiency and regulation at different loading conditions.
6 Understand working of different home appliances and protective devices.

Total **Ten** experiments should be performed.

A. Any **one experiment** is to be performed out of following:
1 To verify Kirchhoff's Voltage Law (KVL), Kirchhoff's Current Law (KCL) and Superposition theorem.
2 To verify Thevenin theorem.

B. Any **one experiment** is to be performed using any professional simulation software.
1 Determination of R-L series circuit parameters.
2 Determination of R-C series circuit parameters.
3 Determination of R-L-C series circuit parameters and verification of series resonance.

C. **Compulsory experiments:**

1	To study safety precautions while working on electrical systems, handling of various equipment's such as multimeter, ammeters, voltmeters, wattmeter's, megger, real life resistors, inductors and capacitors.
2	Observation of ac and dc voltage and current waveform on cathode ray oscilloscope (CRO)/ digital storage oscilloscope (DSO).
3	To determine the charging and discharging of a capacitor as a function of time.
4	To verify the relation between phase and line quantities in three phase balanced star delta connections of load.
5	To determine efficiency and regulation of transformer by direct loading test of a single phase transformer.
6	To demonstrate different types of electrical protection equipments such as fuses, MCB, MCCB, ELCB.
7	To study of Low Tension (LT) and High Tension (HT) electricity bills (a case study).
8	Study of DC motor starters.

Textbooks:

1. V.D. Toro, Principles of Electrical Engineering, Prentice Hall India, 1989.
2. V.K. Mehta, Rohit Mehta, Basic Electrical Engineering, S Chand and Company, 2nd Edition, 2015.
3. D. P. Kothari, I.J. Nagrath, Theory and Problems of Basic Electrical Engineering, PHI Publication, 2nd Edition, 2010.
4. B. L. Theraja, A Textbook of Electrical Technology Vol. I & II, S. Chand and Company, Reprint Edition 2014.
5. Ashfaq Husain, "Electrical Machines", Dhanpat Rai & Sons.

Reference Books:

1. H Cotton, Electrical Technology, CBS Publications, 2015.
2. L. S. Bobrow, -Fundamentals of Electrical Engineering, Oxford University Press, 2011.
3. E. Hughes -Electrical and Electronics Technology, Pearson, 2010.
4. D. C. Kulshreshtha, -Basic Electrical Engineering, McGraw Hill, 2009.
5. A.S. Langsdorf -Theory and performance of DC machines", Tata McGraw Hill 2008.

Course Title: Basic Electronics Engineering (FEESC207)			Basic Electronics Engineering
Contact Hours:	**3 Hrs/week (L)**	Type of Course:	**Lecture**
Examination Scheme	**In Sem Exam** 40	**End Sem Exam** 60	**Practical** -
Course Credit	03		

Pre-requisites: Semiconductor physics

Course assessment methods/tools:

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1	In Sem Exam	Internal	40
2	End Sem Exam	External	60
	Total		100

Course Objectives	
1	The principle of electronics and working principle of PN junction diode and special purpose diodes.
2	The functioning of transistors like BJT, MOSFETs and OPAMP.
3	Basics of various logic gates, digital circuits and their applications
4	Functions of various electronic instruments, operating principles of various sensors and its applications.
5	Basic principles of communication systems

Course Outcomes: Students will be able	
1	Explain the working of P-N junction diode and its applications.
2	Identify types of diodes, BJT, MOSFET, OP-AMP, Build and test analog circuits using OPAMP
3	Build and test digital circuits using universal/basic gates and flip flops.
4	Use different electronics measuring instruments to measure various electrical parameters and Select sensors for specific applications.
5	Describe basic principles of Communication Systems

Syllabus
Subject-Basic Electronics Engineering

Unit 01: Introduction to Electronics (07 Hrs)
P-type Semiconductor, N-type Semiconductor, Introduction to active and passive components, P-N Junction diode construction, working and V-I characteristics of P-N junction Diode, Types of Rectifiers.
Special purpose diodes: Zener diode, Zener diode as voltage regulator, Light Emitting Diode (LED), photo diode and its applications.

Unit 02: Bipolar Junction Transistor (BJT) (06 Hrs)
Construction of BJT, types, Operation (CE Configuration), Transistor configurations (CE, CB, CC only circuit diagram). Transistor currents, Transistor parameters, Current and Voltage analysis of transistor (VBE, IB, VCE, VCB). Input and output Characteristics of BJT in CE Configuration, BJT application-CE amplifier.

Unit 03: MOSFET & OPAMP (07 Hrs):
Metal Oxide Semiconductor Field Effect Transistors (MOSFET): Construction, Types, Operation (E-MOSFET), Application of MOSFET as switch.
Operational amplifier: Introduction to OP-Amp (Symbol, Ideal Characteristics, Input modes), Pin configuration of IC 741. Functional block diagram of operational amplifier, Op-Amp parameters, Op-amp as Inverting and Non inverting amplifier (Derivation of voltage gain Av).

Unit 04: Digital Systems (06 Hrs)
Number System: Binary, Octal, Decimal, Hexadecimal, their conversion and arithmetic (Binary addition, subtraction using 1's & 2's complement), De-Morgan's theorem. Logic Gates: AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR. Nand gate as Universal Gate. Half adder, Full adder, Flip Flop's SR, JK.

Unit 05: Electronic Instruments and Sensors (05 Hrs)
Electronic Instruments: Principles and block diagram of digital multimeter, Function Generator, Digital Storage Oscilloscope (DSO).
Sensors: Classification of a sensors, Temperature Sensor-Thermocouple , Optical Sensors, Motion Sensors –LVDT, Mechanical Sensors -Load Cell, Biosensors.

Unit 06: Communication Systems (05 Hrs)
Basic Communication System: Block Diagram, Modes of Transmission, Communication Media: Wired and Wireless, Allotment of frequency band for different applications. Modulation, Need of Modulation. Introduction to AM & FM.
Mobile Communication System: Cellular concept, Simple block diagram of GSM system.

Textbooks:
1. "Electronics Devices" Thomas. L. Floyd, 9th Edition, Pearson (Unit I, II, III)
2. "Modern Digital Electronics" R.P. Jain, 4th Edition, Tata McGraw Hill (Unit IV)
3. "Electronic Instrumentation" H.S. Kalsi, 3rd Edition, Tata McGraw Hill (Unit V)
4. "Sensors and Transducers" D. Patrnabis, 2nd Edition, PHI (Unit V)
5. "Communication Electronics: Principles and Applications" Frenzel, Tata McGraw Hill (Unit VI)

Reference Books:
1. "Digital Fundamentals" Thomas. L. Floyd, 11th Edition, Pearson
2. "Mobile Communication" J. Schiller, 2nd Edition, Pearson
3. "Sensors Handbook", S. Soloman, 2nd Edition

Basic Electronics Engineering			
Course Title: Basic Electronics Engineering (FEESC214)			Basic Electronics Engineering
Contact Hours:	**2 Hrs/week (P)**	Type of Course:	**Practical**
Examination Scheme		**Practical** **25**	**Term work** -
Course Credit	**01**		

Pre-requisites: Semiconductor physics

Course assessment methods/tools:

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1	Practical	External	25
	Total		25

Course Objectives	
1	Introduction of various Electronics components, functions of various electronic instruments for measuring different electronic parameters.
2	The working principle of PN junction diode, special purpose diodes, BJT, MOSFET, OP-AMP and its applications
3	Basics of various logic gates, digital circuits and their applications
4	The operating principles of various sensors and its applications

Course Outcomes: Students will be able	
1	Identify the various electronics components and test it in the laboratory using electronic instruments.
2	Identify types of diodes, build and test application circuits of Diode, BJT , MOSFET & OPAMP
3	Build and test digital circuits using logic gates and flip flops
4	Select sensors for specific applications and demonstrate any electronic appliance with respect to its technical specifications and function.

Course-Basic Electronics Engineering (Practical)

List of Experiments (Any-8 Experiments)
Group A: Electronic Components & Instruments (Any two)

1	**Electronic Components:** Study of Active and Passive components a) Resistors (Fixed & Variable), Calculation of resistor value using color code. c) Devices such Diode, BJT, MOSFETs, various IC packages d) Switches
2	**Measurements using various measuring equipment's:** To Measure voltage, resistance using digital multimeter. Also use multimeter to check diode, BJT, etc
3	To Set up CRO and function generator for measurement of voltage, frequency.

Group B: Diode & Transistors (Any four)

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1	V-I characteristics of P-N Junction Diode
2	V-I characteristics of Zener Diode
3	**Rectifier circuits:** a) Implement bridge rectifier circuit using diodes b) Observe the effect of capacitor filter on rectifier output.
4	To find voltage gain Av of CE Amplifier
5	a)To plot frequency response of BJT amplifier.(Simulation) OR b) To plot frequency response of MOSFET amplifier.(Simulation)
6	**Linear applications of Op-amp:** Build inverting and non-inverting amplifier using op-amp IC 741.
7	Simulation/ Build and test : load and line regulation using Zener diode

Group C: Digital Systems (Any two)

1	**Test and verify the truth tables of:** Basic Gates and Universal Gates
2	**Test and verify the truth tables of:** Half Adder / Full Adder
3	**Test and verify the truth tables of:** SR and JK FF

Group D: Experiment beyond Syllabus (Any two)

1	Build and test any one application using digital IC's
2	Case Study of any one electronics appliance with block diagram, specification etc.
3	Build and test any application circuit using sensor.

The practical's are to be performed based on the above topics. All these observations and related theory should be written in A4 size sheets and has to be checked before final exam.

Textbooks:

1. "Electronics Devices" Thomas. L. Floyd, 9th Edition, Pearson (Unit I, II, III)
2. "Modern Digital Electronics" R.P. Jain, 4th Edition, Tata McGraw Hill (Unit IV)
3. "Electronic Instrumentation" H.S. Kalsi, 3rd Edition, Tata McGraw Hill (Unit V)
4. "Sensors and Transducers" D. Patrnabis, 2nd Edition, PHI (Unit V)
5. "Communication Electronics: Principles and Applications" Frenzel, Tata McGraw Hill (Unit VI)

Reference Books:

1. "Digital Fundamentals" Thomas. L. Floyd, 11th Edition, Pearson
2. "Mobile Communication" J. Schiller, 2nd Edition, Pearson
3. "Sensors Handbook", S. Soloman, 2nd Edition

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Problem Solving and Programming II

Course Title: Problem Solving and Programming II (FEESC 208)

Contact Hours:	**2 Hrs/week (L)** **2 Hrs/week (Pr)**	Type of Course:	**Lecture& Practical**
Examination Scheme	**In semester** **40**	**Practical** **60 Marks**	
Course Credit	**03**		

Sr. No.	Course methods/tools assessment	External/ Internal	Marks
1.	In Sem Exam	Internal	40
	Practical	External	60
		Total	100

Course Objectives

Main objective is to give students a basic introduction to programming and problem solving with computer language Python. And to introduce students not merely to the coding of computer programs, but to computational thinking, the methodology of computer programming, and the principles of good program design including modularity and encapsulation

1	To understand problem solving, problem solving aspects, programming and to know about various program design tools.
2	To learn problem solving with Python
3	To learn basics, features of Python programming.
4	To acquaint with data types, input output statements, decision making, looping and functions in Python
5	To learn features of Object Oriented Programming using Python
6	To acquaint with the use and benefits of files handling in Python

Course Outcomes: After successful completion of the course, the learner will be able to

1	Inculcate and apply various skills in problem solving.
2	Choose most appropriate programming constructs and features to solve the problems in diversified domains.
3	Exhibit the programming skills for the problems those require the writing of well documented programs including use of the logical constructs of language, Python.
4	Demonstrate significant experience with the Python program development environment.
5	Exhibit the programming skills for the problems those require the manipulation of strings.
6	Demonstrate object oriented and File handling programming construct.

Syllabus

Course: Programming and Problem Solving-II

Unit I: Basics of Python Programming and List **(4 Hours)**

Basics of Python Programming: Features of Python, History and Future of Python, Writing and executing Python program, Literal constants, variables and identifiers, Data Types, Input operation, Comments, Reserved words, Indentation, Operators and expressions, Expressions in Python.

Self Study:

List:

Creation of lists , List slicing, List replication

Appending two lists: append(),extend(),using '+' operator
Removing an element from a list: pop(),delete keyword
List comprehension : Using for loop, using, List Comprehension using single if condition, List comprehension with multiple if conditions, List comprehension using else condition
Accessing list: Using for loop, Using range(),Accessing elements present within nested list,Reversing a list

Unit II: Decision Control Statements **(4 Hours)**

Decision Control Statements: Decision control statements, Selection/conditional branching Statements: if, if-else, nested if, if-elif-else statements. Basic loop Structures/Iterative statements: while loop, for loop, selecting appropriate loop. Nested loops, The break, continue, pass, else statement used with loops.

Unit III: Function **(4 Hours)**

Need for functions, Function: definition, call, variable scope and lifetime, the return statement. Defining functions, Lambda or anonymous function, documentation string,

Self Study:
Types of Arguments: Positional arguments, Default arguments, Built-in Functions, Keyword arguments,Variable length arguments, Variable length Keyword argument.

Unit IV: Strings and Operations **(4 Hours)**

Different ways of creating a string
String Formatting: Default formatting , Positional formatting, Keyword formatting, Binary formatting, % Formatting Specifier.
Built-in functions in String: lower(),upper(),title(),capitalize(),swapcase(),maketrans(),split()
Self Study:
String Comparison: Using values, Using Reference, Ignoring case, Difference between casefold() and lower()

Unit V: File Handling **(4 Hours)**

File Handling: Reading a file, Modes of file, Closing a file, Writing files, Dictionary method, Reading file contents line by line , Reading a single line in a file, Reading a character in a line, readline

Unit VI: Data Visualization in Python **(4 Hours)**

Matplotlib library: Scatter Plot, Line Chart, Bar Chart, Histogram, importance of data visualization.

Text Books:

1. Reema Thareja, "Python Programming Using Problem Solving Approach", Oxford University Press, ISBN 13: 978-0-19-948017-6
2. R. Nageswara Rao, "Core Python Programming", Dreamtech Press; Second edition ISBN-10: 938605230X, ISBN-13: 978-9386052308 ASIN: B07BFSR3LL

Reference Books:

1. R. G. Dromey, "How to Solve it by Computer", Pearson Education India; 1st edition, ISBN-10: 8131705625, ISBN-13: 978-8131705629 Maureen Spankle, "Problem Solving and Programming Concepts", Pearson; 9th edition, ISBN-10: 9780132492645, ISBN-13: 978-0132492645
2. Romano Fabrizio, "Learning Python", Packt Publishing Limited, ISBN: 9781783551712, 1783551712
3. Paul Barry, "Head First Python- A Brain Friendly Guide", SPD O'Reilly, 2nd Edition, ISBN:978-93-5213-482-3
4. Martin C. Brown, "Python: The Complete Reference", McGraw Hill Education, ISBN-10: 9789387572942, ISBN-13: 978-9387572942, ASIN: 9387572943
5. Jeeva Jose, P. Sojan Lal, "Introduction to Computing & Problem Solving with Python", Khanna Computer Book Store; First edition, ISBN-10: 9789382609810, ISBN-13: 978-9382609810

PPS II LAB

Suggested List of Laboratory Experiments/Assignments (Any 12 laboratory assignments)	
Sr. No.	**Problem Statement Write Program in Python (with function/class/file, as applicable)**
1.	To calculate salary of an employee given his basic pay (take as input from user). Calculate gross salary of employee. Let HRA be 10 % of basic pay and TA be 5% of basic pay. Let employee pay professional tax as 2% of total salary. Calculate net salary payable after deductions.
2.	To accept student's five courses marks and compute his/her result. Student is passing if he/she scores marks equal to and above 40 in each course. If student scores aggregate greater than 75%, then the grade is distinction. If aggregate is 60>= and <75 then the grade if first division. If aggregate is 50>= and <60, then the grade is second division. If aggregate is 40>= and <50, then the grade is third division.
3.	To check whether input number is Armstrong number or not. An Armstrong number is an integer with three digits such that the sum of the cubes of its digits is equal to the number itself. Ex. 371.
4.	To simulate simple calculator that performs basic tasks such as addition, subtraction, multiplication and division with special operations like computing xy and x!.
5.	To accept the number and Compute a) square root of number, b) Square of number, c) Cube of number d) check for prime, d) factorial of number e) prime factors
6.	To accept two numbers from user and compute smallest divisor and Greatest Common Divisor of these two numbers.
7.	To accept a number from user and print digits of number in a reverse order.

8.	To input binary number from user and convert it into decimal number.
9.	To accept list of N integers and partition list into two sub lists even and odd numbers.
10.	To accept the number of terms a finds the sum of *sine* series.
11.	To accept from user the number of Fibonacci numbers to be generated and print the Fibonacci series.
12.	Write a python program that accepts a string from user and perform following string operations- i. Calculate length of string ii. String reversal iii. Equality check of two strings iii. Check palindrome ii. Check substring
13.	To copy contents of one file to other. While copying a) all full stops are to be replaced with commas b) lower case are to be replaced with upper case c) upper case are to be replaced with lower case.
14.	To count total characters in file, total words in file, total lines in file and frequency of given word in file.

Text Books:

3. Reema Thareja, "Python Programming Using Problem Solving Approach", Oxford University Press, ISBN 13: 978-0-19-948017-6
4. R. Nageswara Rao, "Core Python Programming", Dreamtech Press; Second edition ISBN-10: 938605230X, ISBN-13: 978-9386052308 ASIN: B07BFSR3LL

Reference Books:

6. R. G. Dromey, "How to Solve it by Computer", Pearson Education India; 1st edition, ISBN-10: 8131705625, ISBN-13: 978-8131705629 Maureen Spankle, "Problem Solving and Programming Concepts", Pearson; 9th edition, ISBN-10: 9780132492645, ISBN-13: 978-0132492645
7. Romano Fabrizio, "Learning Python", Packt Publishing Limited, ISBN: 9781783551712, 1783551712
8. Paul Barry, "Head First Python- A Brain Friendly Guide", SPD O'Reilly, 2nd Edition, ISBN:978-93-5213-482-3
9. Martin C. Brown, "Python: The Complete Reference", McGraw Hill Education, ISBN-10: 9789387572942, ISBN-13: 978-9387572942, ASIN: 9387572943
10. Jeeva Jose, P. Sojan Lal, "Introduction to Computing & Problem Solving with Python", Khanna Computer Book Store; First edition, ISBN-10: 9789382609810, ISBN-13: 978-9382609810

Project Based Learning management II

Course Title: Project Based Learning management II (FEESC209)

Contact Hours:	**2 Hrs./week (P)**	Type of Course:	**Practical**
Examination Scheme	**Oral** **25 Marks**		
Course Credit	**01**		

Sr. No.	Course assessment methods/tools	External/ Internal	Marks
1.	Oral	External	25
		Total	25

Course Objectives

1	To emphasizes learning activities that are long-term, interdisciplinary and student-centric.
2	To inculcate independent learning by problem solving with social context.
3	To engages students in rich and authentic learning experiences.
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.

Course Outcomes: Students will be able

1	Project based learning will increase their capacity and learning through shared cognition.
2	Students able to draw on lessons from several disciplines and apply them in practical way.
3	Learning by doing approach in PBL will promote long-term retention of material and replicable skill, as well as improve teachers and students attitudes towards learning.

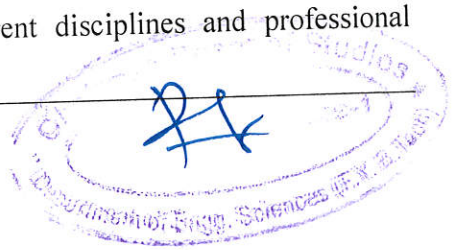
General Guidelines to implement:

Project based learning (PBL) requires continuous mentoring by faculty throughout the semester for successful completion of the tasks selected by the students per batch. While assigning the teaching workload a load of 2 Hrs./week/batch needs to be considered for the faculty involved. The Batch needs to be divided into sub-groups of 5 to 6 students. Assignments / activities / models/ projects etc. under project-based learning is carried throughout semester and Credit for PBL has to be awarded on the basis of internal continuous assessment and evaluation at the end of semester.

Group Structure: Working in supervisor/mentor –monitored groups. The students plan, manage and complete a
task/project/activity which addresses the stated problem.

- There should be team/group of 5 -6 students
- A supervisor/mentor teacher assigned to individual groups

Selection of Project/Problem: The problem-based project oriented 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. 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.

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

Designed and Prepared By: Dr. Yogesh Patil, Subject Coordinator PBLM-II

First Year Engineering (F. Y. B. Tech.)

Assessment: The institution/head/mentor is committed to assessing and evaluating both student performance and
program effectiveness. Progress of PBL is monitored regularly on weekly basis. Weekly review of the work is
necessary. During process of monitoring and continuous assessment AND evaluation the individual and team
performance is to be measured. PBL is monitored and continuous assessment is done by supervisor /mentor and
authorities. Students must maintain an institutional culture of authentic collaboration, self-motivation, peer learning
and personal responsibility. The institution/department should support students in this regard through guidance/orientation programs and the provision of appropriate resources and services. Supervisor/mentor and
Students must actively participate in assessment and evaluation processes.
Group may demonstrate their knowledge and skills by developing a public product and/or report and/or presentation.

- Individual assessment for each student (Understanding individual capacity, role and involvement in the project)
- Group assessment (roles defined, distribution of work, intra-team communication and togetherness)
- Documentation and presentation Evaluation and Continuous
- It is recommended that the all activities are to be record and regularly, regular assessment of work to be done and
- proper documents are to be maintained at college end by both students as well as mentor (you may call it PBL work
- book). Continuous Assessment Sheet (CAS) is to be maintained by all mentors/department and institutes.
- Recommended parameters for assessment, evaluation and weightage:
- Idea Inception (5%)
- Outcomes of PBL/ Problem Solving Skills/ Solution provided/ Final product (50%)

(Individual assessment and
team assessment)

- Documentation (Gathering requirements, design & modeling, implementation/execution, use of technology and
- final report, other documents) (25%)
- Demonstration (Presentation, User Interface, Usability etc) (10%)
- Contest Participation/ publication (5%)
- Awareness /Consideration of -Environment/ Social /Ethics/ Safety measures/Legal aspects (5%)
- PBL workbook will serve the purpose and facilitate the job of students, mentorand project coordinator. This
- workbook will reflect accountability, punctuality, technical writing ability and work flow of the work undertaken.
- References:
- Project-Based Learning, Edutopia, March 14, 2016.
- What is PBL? Buck Institute for Education.
- www.schoology.com
- www.wikipedia.org
- www.howstuffworks.com

Audit Course II

Course Title: Audit Course II (FEHSMC215)

Contact Hours:	**2 Hrs./week**	Type of Course:	**Lecture**
Examination Scheme			
Course Credit	**Non – Credit**		

a) UHV II

Module 1: Understanding Harmony in the Family and Society-Harmony in Human-Human Relationship (6 hrs)

Session-1. Understanding Harmony in the family-the basic unit of human interaction

Session-2. Understanding values in human-human relationship; meaning of Nyaya and Program for its fulfillment to ensure Ubhay-tripti Trust (Vishwas) and respect (Samman) as the foundational values of relationship

Session-3. Understanding the meaning of Vishwas; Difference between intention and competence

Session-4. Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship

Session-5. Understanding the harmony in the society (society being a extension of family): Samadhan, Samridhi, Abhay, Sah-astitvaas comprehensive Human Goals

Session-6. Visualizing a universal harmonious order in society-Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha)-from family to world family! –Practice Exercises and Case Studies will be taken up in Practice Sessions.

Module 2: Understanding Harmony in the Nature and Existence-Whole existence as Co-existence (6 hrs)

Session-7. Understanding the harmony in the Nature, Inter connectedness and mutualfulfillmentamongthefourordersonaturerecyclabilityandself-regulation in nature

Session-8. Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space

Session-9. Holistic perception of harmony at all level so existence-Practice Exercises and Case Studies will be taken up in Practice Sessions.

Session-10. Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basis for Humanistic Education Humanistic Constitution and Humanistic Universal Order.

Session-11. Competence in professional ethics

a) Ability to utilize the professional competence for augmenting universal human order

b) Ability to identify the scope and characteristics of people-friendly and ecofriendly production systems,

c)Ability to identify and develop appropriate technologies and management patterns for above production systems.

Session-12. Case studies of typical holistic technologies, management models and production systems, Strategy for transition from the present state to Universal Human Order:

a) At the level of individual :as socially and ecologically responsible engineers, technologists and managers

b) At the level of society : as mutually enriching institutions and organizations

BOOKS

TEXT BOOKS

1. Human values and Professional Ethics by "Jayshree Suresh andB.S. Raghvan"S Chand Publication.
2. A.N Tripathy, New Age International Publishers, 2003.
3.Bajpai. B. L , , New Royal Book Co, Lucknow, Reprinted, 2004
4.Bertrand Russell Human Society in Ethics & Politics

REFERENCE BOOKS

1.Body language by "DrShaliniVerma" S Chand Publication.
2. Practical personality and Development by "J K Pillamarri" Scitech Publication.
3. Corliss Lamont, Philosophy of Humanism
4.Gaur. R.R. ,Sangal. R, Bagaria. G.P, A Foundation Course in Value Education, Excel Books, 2009.
5.Gaur. R.R. ,Sangal. R ,Bagaria. G.P, Teachers Manual Excel Books, 2009.
6. I.C. Sharma . Ethical Philosophy of India Nagin& co Julundhar
7.Mortimer. J. Adler, – Whatman has made of man 8.William Lilly Introduction to Ethic Allied Publisher

Relevant websites, movies and documentaries

1.Value Education websites, http://uhv.ac.in, http://www.uptu.ac.in
2. Story of Stuff, http://www.storyofstuff.com
3.AlGore,AnInconvenientTruth,ParamountClassics, USA
4. Charlie Chaplin, Modern Times, United Artists, USA
5. IIT Delhi, Modern Technology – the Untold Story
6.Gandhi A Right Here Right Now, Cyclewala Productions

b) Sports

YOGA

Unit I) Aim, Objectives and Scope of Yoga in Human Life. (4 Hrs.)

Unit II) Yoga and Physical Health: Promotive, Preventive and Curative aspects of Physical Health tackled through Yogic practices (4 Hrs.)

Unit III) Yoga and Mental Health: Nature of problems in mental health. Promotive, Preventive and Curative aspects of mental health through Yogic practices. (4 Hrs.)

BOOKS -

1. Applied Yoga - Dr. M. L. Gharote. Kaivaiyadhama, Lonavala.
2. Yoga and your heart - Datey K. K., Gharote, M. L. and Soli Parri, Jaico Publications, Bombay,
3. Yogic Therapy - Swami KuvalYananda and S. L., Vinekar, Central Bureau of Health Services, New Delhi-1963.

4. Yogasana - A. Teachers guide, N.C.E.R.T. - New Delhi,

5. Teaching methods for yogic practices Dr. M. L. Gharote, Kaivalyadhama, Lonavala.

6. Light on Yoga - B. S, lyangar.