DEPARMENT OF TECHNOLOGY
SHIVAJI UNIVERSITY, KOLHAPUR
FIRST YEAR B.TECH
Scheme of Teaching and Examination

Semester – I (Group-A)

Course Code	Sr. No.	Course Title	Teaching Scheme with Credits (Hours / Week)				Examination Scheme (Marks)					
							Theory			Practical/Tutorial		
			L	T	P	Credits	Scheme	Max. Marks	Min. Passing $	Scheme	Max. Marks	Min. Passing $
BS-11A1	1.	Engineering Mathematics–I	4	1	-	05	CIE	30	40	---	---	---
							SEE	70		---	---	---
BS-11A2	2.	Engineering Physics	3	-	-	03	CIE	30	40	---	---	---
							SEE	70		---	---	---
ES-11A1	3.	Basics of Mechanical Engineering	3	-	-	03	CIE	30	40	---	---	---
							SEE	70		---	---	---
ES-11A2	4.	Engineering Mechanics	4	-	-	04	CIE	30	40	---	---	---
							SEE	70		---	---	---
ES-11A3	5.	Basic Electronics Engineering	3	-	-	03	CIE	30	40	---	---	---
							SEE	70		---	---	---
BS-11A3	6.	Lab. –I Engineering Physics	-	-	2	01	---	---	---	IPE	50	20
ES-11A4	7.	Lab.–II Basics of Mechanical Engineering	-	-	2	01	---	---	---	IPE	50	20
ES-11A5	8.	Lab.–III Engineering Mechanics	-	-	2	01	---	---	---	IPE	50	20
ES-11A6	9.	Lab.–IV Basic Electronics Engineering	-	-	2	01	---	---	---	IPE	50	20
ES-11A7	10.	Lab.–V Computer Programming	1	-	2	02	---	---	---	IPE	50	20
ES-11A8	11.	Lab.–VI Workshop Practice	-	-	2	01	---	---	---	IPE	50	20
		Total	**18**	**1**	**12**	**25**		**500**			**300**	

Total Credits: 25
Total Contact Hours/Week: 31 hrs

Note:
$: In theory student should appear for the CIE (Mid Semester Exam), submit the assignment and must secure 40% marks in SEE.
Tutorials and practical shall be conducted in batches with batch strength not exceeding 15 students.
CIE – Continuous Internal Evaluation
SEE – Semester End Examination
IPE – Internal Practical Evaluation
* Semester End Examination duration will be 4 hrs

DEPARMENT OF TECHNOLOGY
SHIVAJI UNIVERSITY, KOLHAPUR
FIRST YEAR B.TECH
Scheme of Teaching and Examination

Semester – II (Group-A)

Course Code	Sr. No.	Course Title	Teaching Scheme with Credits (Hours / Week))				Examination Scheme (Marks)					
							Theory			Practical/Tutorial		
			L	T	P	Credits	Scheme	Max. Marks	Min. Passing $	Scheme	Max. Marks	Min. Passing $
BS-12A1	1.	Engineering Mathematics–II	4	1	-	05	CIE	30	40	---	---	---
							SEE	70		---	---	---
BS-12A2	2.	Engineering Chemistry	3	-	-	03	CIE	30	40	---	---	---
							SEE	70		---	---	---
ES-12A1	3.*	Engineering Graphics	4	-		04	CIE	30	40	---	---	---
							SEE	70		---	---	---
ES-12A2	4.	Basic Civil Engineering	3	-		03	CIE	30	40	---	---	---
							SEE	70		---	---	---
ES-12A3	5.	Basic Electrical Engineering	3	-		03	CIE	30	40	---	---	---
							SEE	70		---	---	---
BS-12A3	6.	Lab.–I Engineering Chemistry	-	-	2	01	---	---	---	IPE	50	20
ES-12A4	7.	Lab.–II Engineering Graphics	-	-	2	01	---	---	---	IPE	50	20
ES-12A5	8.	Lab.–III Basic Civil Engineering	-	-	2	01	---	---	---	IPE	50	20
ES-12A6	9.	Lab. –IV Basic Electrical Engineering	-	-	2	01	---	---	---	IPE	50	20
ES-12A7	10.	Lab. –V Programming with Scilab and Matlab	-	1	-	01	---	---	---	IPE	50	20
HS-12A1	11.	Lab.–VI Professional Communication	2	-	-	02	---	---	---	IPE	50	20
		Total	**19**	**2**	**8**	**25**		**500**			**300**	

Total Credits: 25
Total Contact Hours/Week: 29 hrs

Note:
$: In theory student should appear for the CIE (Mid Semester Exam), submit the assignment and must secure 40% marks in SEE.
Tutorials and practical shall be conducted in batches with batch strength not exceeding 15 students.
CIE – Continuous Internal Evaluation
SEE – Semester End Examination
IPE – Internal Practical Evaluation
* Semester End Examination duration will be 4 hrs

DEPARMENT OF TECHNOLOGY
SHIVAJI UNIVERSITY, KOLHAPUR
FIRST YEAR B.TECH
Scheme of Teaching and Examination

Semester – I (Group-B)

Course Code	Sr. No.	Course Title	Teaching Scheme with Credits (Hours / Week))				Examination Scheme (Marks)					
							Theory			Practical/Tutorial		
			L	T	P	Credits	Scheme	Max. Marks	Min. Passing $	Scheme	Max. Marks	Min. Passing $
BS-11B1	1.	Engineering Mathematics–I	4	1	-	05	CIE	30	40	---	---	---
							SEE	70		---	---	---
BS-11B2	2.	Engineering Chemistry	3	-	-	03	CIE	30	40	---	---	---
							SEE	70		---	---	---
ES-11B1	3.*	Engineering Graphics	4	-		04	CIE	30	40	---	---	---
							SEE	70		---	---	---
ES-11B2	4.	Basic Civil Engineering	3	-		03	CIE	30	40	---	---	---
							SEE	70		---	---	---
ES-11B3	5.	Basic Electrical Engineering	3	-		03	CIE	30	40	---	---	---
							SEE	70		---	---	---
BS-11B3	6.	Lab.–I Engineering Chemistry	-	-	2	01	---	---	---	IPE	50	20
ES-11B4	7.	Lab.–II Engineering Graphics	-	-	2	01	---	---	---	IPE	50	20
ES-11B5	8.	Lab.–III Basic Civil Engineering	-	-	2	01	---	---	---	IPE	50	20
ES-11B6	9.	Lab. –IV Basic Electrical Engineering	-	-	2	01	---	---	---	IPE	50	20
ES-11B7	10.	Lab. –V Programming with Scilab and Matlab	-	1	-	01	---	---	---	IPE	50	20
HS-11B1	11.	Lab.–VI Professional Communication	2	-	-	02	---	---	---	IPE	50	20
		Total	**19**	**2**	**8**	**25**		**500**			**300**	

Total Credits: 25
Total Contact Hours/Week: 29 hrs

Note:
$: In theory student should appear for the CIE (Mid Semester Exam), submit the assignment and must secure 40% marks in SEE.
Tutorials and practical shall be conducted in batches with batch strength not exceeding 15 students.
CIE – Continuous Internal Evaluation
SEE – Semester End Examination
IPE – Internal Practical Evaluation
* Semester End Examination duration will be 4 hrs

DEPARMENT OF TECHNOLOGY
SHIVAJI UNIVERSITY, KOLHAPUR
FIRST YEAR B.TECH
Scheme of Teaching and Examination

Semester – II (Group-B)

Course Code	Sr. No.	Course Title	Teaching Scheme with Credits (Hours / Week)				Examination Scheme (Marks)					
							Theory			Practical/Tutorial		
			L	T	P	Credits	Scheme	Max. Marks	Min. Passing $	Scheme	Max. Marks	Min. Passing $
BS-12B1	1.	Engineering Mathematics–II	4	1	-	05	CIE	30	40	---	---	---
							SEE	70		---	---	---
BS-12B2	2.	Engineering Physics	3	-	-	03	CIE	30	40	---	---	---
							SEE	70		---	---	---
ES-12B1	3.	Basics of Mechanical Engineering	3	-	-	03	CIE	30	40	---	---	---
							SEE	70		---	---	---
ES-12B2	4.	Engineering Mechanics	4	-	-	04	CIE	30	40	---	---	---
							SEE	70		---	---	---
ES-12B3	5.	Basic Electronics Engineering	3	-	-	03	CIE	30	40	---	---	---
							SEE	70		---	---	---
BS-12B3	6.	Lab. –I Engineering Physics	-	-	2	01	---	---	---	IPE	50	20
ES-12B4	7.	Lab.–II Basics of Mechanical Engineering	-	-	2	01	---	---	---	IPE	50	20
ES-12B5	8.	Lab.–III Engineering Mechanics	-	-	2	01	---	---	---	IPE	50	20
ES-12B6	9.	Lab.–IV Basic Electronics Engineering	-	-	2	01	---	---	---	IPE	50	20
ES-12B7	10.	Lab.–V Computer Programming	1	-	2	02	---	---	---	IPE	50	20
ES-12B8	11.	Lab.–VI Workshop Practice	-	-	2	01	---	---	---	IPE	50	20
		Total	**18**	**1**	**12**	**25**		**500**			**300**	

Total Credits: 25
Total Contact Hours/Week: 31 hrs

Note:
$: In theory student should appear for the CIE (Mid Semester Exam), submit the assignment and must secure 40% marks in SEE.
Tutorials and practical shall be conducted in batches with batch strength not exceeding 15 students.
CIE – Continuous Internal Evaluation
SEE – Semester End Examination
IPE – Internal Practical Evaluation
* Semester End Examination duration will be 4 hrs

Class	**:**	**First Year B. Tech (All Program)**					
Course Title	**:**	**Engineering Mathematics – I** (Linear Algebra and Calculus)			***Course Code*:**	**:**	BS-11A1 BS-11B1
Teaching Scheme (Hours)	**:**	Lecture :	4 Hrs/week		***Total Credits***	**:**	05
		Tutorial :	1 Hrs/week				
Evaluation Scheme (Marks)	**:**	CIE=30 (20+10)	SEE = 70	Grand Total= 100	***Duration of SEE***	**:**	3 hrs
Revision:	**:**	Fourth			***Month***	**:**	March 2020
Pre-requisites *(if any)*	**:**	Basics of matrix algebra, Derivatives and Integration					
Type of Course	**:**	Theory					
Course Domain	**:**	Basic Sciences					
Skills Imbibed	**:**	Cognitive: Remember, Understand, Apply					

Course Assessment Methods:

1. Continuous Internal Evaluation (CIE): Mid Semester Examination, Assignments, Regular Tutorials.
2. Semester End Examination (SEE)

Course Objectives:

1.	To familiarize the students with linear algebra and differential Calculus
2.	To teach Mathematical methodologies and models.
3.	To develop mathematical skills and enhance logical thinking power of students.
4.	To provide students with skills in matrix, differential calculus, complex variable which would enable them to devise engineering solutions for given situations they may encounter in their profession.

Course Outcomes: Students will be able to

1.	Apply the knowledge of matrix algebra to solve the mathematical problems.
2.	Understand basic calculus and how to model real world scenario using differential calculus.
3.	Determine partial derivatives and its application in related field of engineering.
4.	Understand the basic algebra of complex numbers.
5.	Evaluation and analysis of analytic function.

Curriculum Content:	**Hours**
Unit 1 Matrices and System of Linear Equations Algebra of matrices, Inverse of a matrix, Rank of a matrix, Normal and echelon form of a matrix, Consistency of the system of linear equations, Solution of system of linear homogeneous equations and solution of system of linear non-homogeneous equations.	9
Unit 2 Eigen values and Eigen Vector Linear dependence and independence of vectors, Eigen values and Eigen vectors, Cayley-Hamilton's Theorem (Without proof), Inverse and higher powers of matrix by using Cayley-Hamilton's Theorem.	8
Unit 3 Differential Calculus Successive differentiation, Leibnitz's Theorem and its applications, Taylor's and	9

Maclaurin's series, indeterminate forms.	
Unit 4 Partial Differentiation Partial derivatives of first and higher order, total differentials, differentiation of composite and implicit functions. Euler's Theorem on Homogeneous functions with two and three independent variables. Deductions from Euler's Theorem.	9
Unit 5 Applications of Partial Differentiation Errors and Approximation, Maxima and Minima of functions of two variables, Jacobian, Properties of Jacobian, Jacobian of Implicit function**.**	8
Unit 6 Complex Variable-Differentiation Algebra of complex number, Circular and hyperbolic functions, Functions of complex variable, Cauchy-Riemann equations, Analytic functions, Harmonic functions.	9

Suggested list of Tutorials and Assignments-

1. To find rank of the matrix
2. Solution of system of linear equations
3. Eigen values and Eigen Vectors
4. Applications of Leibnitz theorem
5. Indeterminate form
6. Euler's Theorem on Homogeneous functions
7. Applications of partial differentiation
8. Analytic Functions
9. Harmonic Functions
10. Introduction to mathematical software's like Scilab, Matlab, Mathematica.

General Instructions:

1. Batch wise tutorials are to be conducted. The number of students per batch should be as per the practical batches.
2. Students must be encouraged to write mathematical Programs in tutorial class only. Each Student has to write at least 4 Scilab tutorials (including print out) and at least 6 class tutorials on entire syllabus.
3. Scilab/Matlab Tutorials will be based on
    1. To find rank of the matrix
    2. Solution of system of linear equations
    3. Eigen values and Eigen Vectors
    4. Errors and Approximation
    5. Maxima and Minima
    6. Complex variable
    7. Analytic functions.

Suggested Text Books:

1.	B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, Delhi.
2.	Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons.
3.	B. V. Ramana, "Higher Engineering Mathematics", Tata McGraw-Hill, New Delhi.

Suggested Reference Books:	
1.	C. R. Wylie, "Advanced Engineering Mathematics", McGraw Hill Publication, New Delhi.
2.	Shanti Narayan, "Differential Calculus" S. Chand and company, New Delhi.
3.	S. S. Sastry, "Engineering Mathematics (Volume-I)", Prentice Hall Publication, New Delhi.
4.	H. K. Dass, "Advanced Engineering Mathematics", S. Chand Publishing.
5.	N. P. Bali, Iyengar "A text book of Engineering Mathematics by", Laxmi Publications (P)Ltd., New Delhi.
6.	M. D. Greenberg, "Advanced Engineering Mathematics", Pearson Education.

Class	**:**	**First Year B. Tech (All Program)**					
Course Title		**Engineering Physics**			***Course Code*:**	**:**	BS- 11A2 BS- 12B2
Teaching Scheme (Hours)	**:**	Lecture :	3 Hrs/week		***Total Credits***	**:**	03
		Tutorial :	0 Hrs/week				
Evaluation Scheme (Marks)	**:**	CIE=30 (20+10)	SEE = 70	Grand Total= 100	***Duration of SEE***	**:**	3 hrs
Revision:		Fourth			***Month***	**:**	March 2020
Pre-requisites	**:**	**---**					
Type of Course	:	Theory					
Course Domain	**:**	Basic Sciences					
Skills Imbibed	**:**						

Course Assessment Methods:

1. Continuous Internal Evaluation (CIE):Mid-Semester Examination, Assignments
2. Semester End Examination (SEE)

Course Objectives:

1.	To study the basic concepts of physics and engineering applications of physics.
2.	To develop an ability to identify, formulate and solve physics and engineering problems.

Course Outcomes:

1.	The student would be able to apply the concepts of physics in various engineering applications
2.	The student would be able to use the techniques, skills, and modern tools necessary for physics and engineering careers
3.	Understand and apply the concepts of optical fibers in light wave communication systems and in holography.
4.	Understand the use of LASERS as light sources for low and high energy applications.
5.	Understand the nature and characteristics of ultrasonic waves and its various engineering applications.

Curriculum Content:	**Hours**
Unit 1 Ultrasonic Introduction, production of ultrasonic waves- piezo-electric generator, detection of ultrasonic waves, properties of ultrasonic waves, use of ultrasonics for non-destructive testing, Industrial and medical applications of ultrasonics.	4
Unit 2 Optics Interference – Superposition of waves, spatial and temporal coherence, interference in thin films by reflection, Diffraction – Fressnel and Fraunhofer diffractions, Diffraction grating, Determination of wavelength using diffraction grating. Polarization – Types of polarization, polarization by reflection and polarization by scattering.	7
Unit 3 Lasers Introduction, characteristics of lasers, spontaneous and stimulated emission of radiation, Einstein's coefficients, population inversion, Ruby laser, Helium-Neon laser, Applications of lasers in Industrial, scientific and medical fields. Holography – Basic principles and	8

applications of holography. **Fibre optics:** Principle of optical fibre, cross sectional view of optical fibre, acceptance angle, acceptance cone (no derivation), numerical aperture, step index fibre, graded index fibre, transmission of light in step and graded index fibre, attenuation in optical fibre, applications of optical fibre(medical, military, communication)	
Unit 4 Crystallography Basics of crystal structure-space lattice & point lattice, Unit cell, number of atoms per unit cell, coordination number, seven crystal systems, packing fraction for close packed systems, Miller indices. X-Ray diffraction and Bragg's law.	7
Unit 5 Physics of Materials Superconductivity- General properties, Meissner effect, Type I and Type II superconductors, applications of superconductors Nanoscience: Nano Scale, nanostructured materials, properties of materials at nanoscale: Surface to Volume Ratio, Quantum Confinement effect.	6
Unit 6 Nuclear and Solar energy Nuclear fission – Discovery of fission, binding energy curve, chain reaction (fission of U^{235}), essentials of nuclear reactor. Nuclear fusion – Thermonuclear reactions, p-p chain, C-N-O cycle. Introduction to particle physics. Solar energy – solar spectrum, Ways of harnessing solar energy-solar photovoltaics and solar thermal devices. In addition a study tour to space observatory at Panhala,: study the operations of Indian Regional Navigation Satellite System (IRNSS) programme. (Satellite signal receiver has been installed at Panhala, space center) or MF RADAR facility, Shivaji University campus, Kolhapur.	7

Suggested Text Books:

1.	M. N. Avadhanulu and P. G. Kshirsagar "Engineering Physics", S. Chand Publication.
2.	R. K. Gaur and Gupta S. L, "Engineering Physics", Dhanapat Rai and Sons Publication.
3.	V. Rajendran, "Engineering Physics", Tata Mc-GRaw Hill Company Ltd, New Delhi
4.	Malik and Singh, "Engineering Physics", Tata Mc Graw Hill Company Ltd, New Delhi
5.	Naidu, "Engineering Physics", Pearson
6.	N.K. Bajaj, The Physics of waves and Oscillations , Tata Mc Graw Hill Company Ltd, New Delhi

Suggested Reference Books:

1.	A. Ghatak, "Optics", S. Chand and Company Ltd
2.	Brijlal and Subramanian, "Optics", 5006, 23rd Edition
3.	B. L. Theraja, "Modern Physics", S. Chand & Company Ltd., Delhi.
4.	Charles Kittle, "Introduction to Solid State Physics," Wiley India Pvt
5.	L. Tarasov, "Laser Physics and Applications," Mir Publishers.
6.	P.K. Palanisamy, "Solid State Physics", Scitech Publications (India) Pvt. Ltd.

7.	Resnick Halliday, "Physics Volume-I", Krane -John Wiley & Sons Pub.
8.	Resnick Halliday, "Physics Volume-II", Krane -John Wiley & Sons Pub. Ltd.
9.	S. O. Pillai, "Solid State Physics: Structure & Electron Related Properties", Eastern Ltd,, New Age International Ltd.
10.	I. Kaplan, Nuclear Physics(Narosa)
11.	K. S. Krane, Introduction to Nuclear Physics (Wiley)
12.	D. H. Perkins, Introduction to High Energy Physics (Cambridge University Press)
13.	C. Kittel, Introduction to Solid State Physics (Wiley)
14.	N. W. Ashcroft and N. D. Mermin, Solid State Physics (Cengage Learning)
15.	H. Ibach and H. Luth, Solid State Physics (Springer)
16.	A. Beiser, Concept of the Modern Physics, McGraw-Hil
17.	E. Hecht and A. R Ganesan ,Optics, Dorling Kindersley

Class	**:**	**First Year B. Tech (All Program)**					
Course Title		**Basics of Mechanical Engineering**			***Course Code*:**	**:**	ES-11A1 ES-12B1
Teaching Scheme (Hours)	**:**	Lecture :	3 Hrs/week		***Total Credits***	**:**	03
		Tutorial :	0 Hrs/week				
Evaluation Scheme (Marks)	**:**	CIE=30 (20+10)	SEE = 70	Grand Total= 100	***Duration of SEE***	**:**	3 hrs
Revision:	**:**	Fourth			***Month***	**:**	March 2020
Pre-requisites	**:**	---					
Type of Course	**:**	Theory					
Course Domain	**:**	Engineering Sciences					
Skills Imbibed	**:**	Cognitive: Remember, Understand.					

Course Assessment Methods:

1. Continuous Internal Evaluation (CIE): Mid Semester Examination, Assignments.
2. Semester End Examination (SEE)

Course Objectives:

1.	Acquire basic knowledge of mechanical engineering.
2.	To understand fundamental aspects of design.
3.	Understand principle of energy conversion system and power plants.
4.	Understand and identify power transmission devices with their functions.
5.	Describe the scope of mechanical engineering in multidisciplinary industries.

Course Outcomes:

1.	Study of thermodynamics, Internal combustion and Refrigeration.
2.	To study machine design and basic procedures of machine design.
3.	To learn and describe non-conventional energy sources.
4.	Study of power transmission devices such as belt drive, gear drive, pumps, compressor etc.
5.	To understand Role of Mechanical Engineer in various branches of engineering

Curriculum Content:	**Hours**
Unit 1 Basics of Thermodynamics Thermodynamics state, systems, path, process and cycle, point and path functions, energy forms, work and heat, types of work such as shaft work, displacement work, flow work, electrical work, paddle wheel work and magnetic work. Thermodynamics Laws – Zeroth law, first law and second law of thermodynamics, Perpetual motion machine (PMM-I), steady flow energy equation and its applications. Gas Laws: Boyle's law, Charle's law, Combined gas law. (Numerical based on laws of Thermodynamics)	7
Unit 2 Internal Combustion Engines and Refrigeration Introduction and Classification of IC Engine, construction and working of two and four stroke petrol and diesel engine with air standard cycles (Otto and Diesel Cycle) Refrigeration Cycles and Systems: Reverse Carnot cycle, Coefficient of Performance	7

(COP),Vapor compression and Vapor absorption refrigeration system, Applications of Air conditioning and Refrigeration.	
Unit 3 Basics of Mechanical Design Machine, Machine Design, Basic Procedure for design of machine elements, Factor of safety and its selection parameters, Use of standards in design, Concurrent engineering, Aesthetic and Ergonomic considerations in design.	6
Unit 4 Energy Sources Energy crisis, Introduction to non-conventional energy sources such as solar energy, Solar collector, wind Energy, Tidal Energy, Ocean wave, Hydraulic Energy and geothermal energy etc.	6
Unit 5 Power Transmission Devices and Introduction to Manufacturing Technology Types of Belts and belt drives, Slip and Creep of belt, Types of gears, Pumps, Compressor and their types, Introduction to manufacturing technology and its application, Casting Process. (Numericals Based on Belt Drives)	7
Unit 6 Industrial Applications of Mechanical Engineering Role of Mechanical Engineer in various branches of engineering- Mechanical, Civil, Electronics, Computer and Chemical Engineering. Interdisciplinary branches of Mechanical Engineering.	6

Suggested Text Books:	
1.	P.K.Nag " Basic and Applied Thermodynamics", Tata McGraw Hill
2.	Rayner Joel, "Basic Engineering Thermodynamics", Addison Wesley Longman
3.	V. Ganesan, "Internal Combustion Engines", Tata McGraw Hill, Second Edition.
4.	Mathur and Sharma, "A Course in Internal Combustion Engines", R. P. Dhanapat Rai Pub. 1997
5.	Arora C P, "Refrigeration and Air Conditioning" Tata McGraw Hill
6.	Bhandari V.B., "Design of Machine Elements", Tata McGraw Hill Publ. Co. Ltd.
7.	Shigley J.E. and Mischke C.R., "Mechanical Engineering Design", McGraw Hill Publ.Co. Ltd.
8.	Sukhatme S.P., " Solar Energy", Tata McGraw Hill Publishing Company Limited, New Delhi, 1994
9.	S.S.Rattan, "Theory of Machine", Tata McGraw Hill, New Delhi
10.	Hajara Chaudhari S.K., "Workshop Technology, Vol. I and II", Media Prom and Publication, Mumbai.
Suggested Reference Books:	
1.	Hawkins G. A., "Engineering Thermodynamics" John Wiley and Sons.
2.	Lynn D. Russell, " Engineering Thermodynamics" Oxford University Press
3.	Edward E. Obert, "Internal Combustion Engines and Air Pollution", Internal Educational Pub, 1973
4.	John B. L. Heywood, "Internal Combustion Engine", McGraw-Hill.

5.	Anantnarayan, "Basic of Refrigeration and Air Conditioning", Tata McGraw Hill Publications
6.	Spotts M.F. and Shoup T.E., "Design of Machine Elements", Prentice Hall International.
7.	Black P.H. and O. Eugene Adams, " Machine Design", McGraw Hill Book Co. Ltd.
8.	Krieth and Krieder, "Principles Of Solar Engineering", Tata McGraw Hill Publishing Company Limited, New Delhi, 1994
9.	Ghosh Amitabha and Mallik Asok Kumar, "Theory of Mechanisms and Machines" east- West Press Pvt. Ltd. New Delhi
10.	S. E. Rusinoff, "Manufacturing Processes", Times India Press. Doyle, "Manufacturing Processes and Materials for engineers, Prentice Hall of India Press

Class	:	**First Year B. Tech (All Program)**					
Course Title	:	**Engineering Mechanics**			***Course Code*:**	:	ES-11A2 ES-12B2
Teaching Scheme (Hours)	:	Lecture :	4 Hrs/week		***Total Credits***	:	04
		Tutorial :	0 Hrs/week				
Evaluation Scheme (Marks)	:	CIE=30 (20+10)	SEE = 70	Grand Total= 100	***Duration of SEE***	:	3 hrs
Revision:	:	Fourth			***Month***	:	March 2020
Pre-requisites	:	Basic Mathematics, Basic Physics					
Type of Course	:	Theory					
Course Domain	:	Engineering Sciences					
Skills Imbibed	:	Cognitive: Remember, Understand, Apply					

Course Assessment Methods:

1. Continuous Internal Evaluation (CIE): Mid Semester Examination, Assignments.
2. Semester End Examination (SEE)

Course Objectives:

1.	To introduce scope of mechanics, concepts and methods of mechanics needed for application in various branches of engineering problems.
2.	To develop the logic so that student will able to draw free body diagram in solving mechanics problems.
3.	To recognize various types of static as well as dynamic problems.
4.	To apply laws of mechanics to solve simple engineering problems.
5.	To prepare students for future courses in Mechanics, structural analysis and Structural Design and Drawing.

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

1.	Determine resultant force and moment for the given force system.
2.	Develop the Free Body Diagram for given system.
3.	Apply laws of mechanics to calculate reactions and frictional forces and other relevant data required for the given system.
4.	Determine Centroid and Second Moment of area.
5.	Apply fundamental concepts of Kinematics and Kinetics to solve simple engineering problems.

Curriculum Content:	**Hours**
Unit 1 Force Systems Introduction to Mechanics, Force system, concept of Resultant, Composition and Resolution of Forces, Equivalent force system, Rectangular Components, Moment, Couple, Varignon's Theorem, Resultant for 2D and 3D force system	9
Unit 2 Equilibrium Concept of Equilibrium, System Isolation and Free Body Diagram, Equilibrium Condition, Two and Three Force Members, Engineering Application like beams, frames, trusses and cables, Equilibrium of 2D and 3D force system, Virtual Work Method for support Reactions, Friction, Types of Friction, Application of Friction	9

Unit 3 Distributed Forces Introduction to Distributed Forces, Center of Gravity, Center of Mass, Centroid, Centroid of composite area, Second moment of area, Moment of inertia of sections, Parallel and Perpendicular axes theorem, M.I. of unsymmetrical sections, Radius of gyration, polar moment of inertia.	9
Unit 4 Kinematics of Particles Kinematics of particles: motion related to Rectangular coordinates, Normal and Tangential coordinates, Polar Co-ordinates, motion curves, relative motion, Constrained Motion of Connected Particles	9
Unit 5 Kinetics of Particles Kinetics of particles: Newton's second law, Equation of Motion, Rectilinear and Curvilinear Motion, Work and Energy, Impulse momentum, D'Alembert's Principle, Impact, Central Force Motion, Relative Motion.	9
Unit 6 Dynamics of Rigid Bodies Kinematics of rigid bodies: general plane motion, absolute motion, relative velocity, instantaneous center of zero velocity, Relative acceleration, Kinetics of Rigid Bodies: applications to Newton's Second law, Acceleration from Work- Energy, Virtual work, Impulse Momentum Equations	9

Suggested Text Books:	
1.	S. S. Bhavikattis, "Engineering Mechanics", New Age International Pvt. Ltd
2.	S. Timoshenko, "Engineering Mechanics", McGraw Hill Education
Suggested Reference Books:	
1.	Meriam J. L., Kraige L. G., "Engineering Mechanics – Statics, Vol.1", Wiley Student Edition, (8th Edition) 2017.
2.	Meriam J. L., Kraige L. G., "Engineering Mechanics – Dynamics, Vol.2", Wiley Student Edition, (8th Edition) 2017.
3.	Beer F. P. , Johnston E. R., "Vector Mechanics for Engineers -Statics", Tata McGraw Hill Publishing company Ltd., New Delhi (12th Edition, SIE)
4.	Beer F. P. , Johnston E. R., "Vector Mechanics for Engineers -Dynamics", Tata McGraw Hill Publishing company Ltd., New Delhi (12th Edition, SIE)
5.	R.C.Hibbeler, "Engineering Mechanics", Pearson Publication(14th edition)
6.	Shames Irving H., "Engineering Mechanics", Prentice Hall, New Delhi (4th edition)

Class	**:**	**First Year B. Tech (All Program)**					
Course Title	**:**	**Basic Electronics Engineering**			***Course Code*:**	**:**	ES-11A3 ES-12B3
Teaching Scheme (Hours)	**:**	Lecture :	3 Hrs/week		***Total Credits***	**:**	03
		Tutorial :	0 Hrs/week				
Evaluation Scheme (Marks)	**:**	CIE=30 (20+10)	SEE = 70	Grand Total= 100	***Duration of SEE***	**:**	3 hrs
Revision:	**:**	Fourth			***Month***	**:**	March 2020
Pre-requisites	**:**	In order to complete the course studies successfully, it is important to have a good command of English. Other Pre-requisites include knowledge of basic physics**,** electron theory and electricity.					
Type of Course	**:**	Theory					
Course Domain	**:**	Engineering Sciences					
Skills Imbibed	**:**	Cognitive: Remember, Understand, Apply.					

Course Assessment Methods:
1. Continuous Internal Evaluation (CIE): Mid Semester Examination, Assignments.
2. Semester End Examination (SEE)

Course Objectives: The objective of this course is to

1.	To impart knowledge of electronics components and semiconductor diodes
2.	To provide fundamental knowledge about transistor and power device
3.	To make the students familiar with suitability of various electronics components and transducers for different application
4.	To become Familiarize with digital electronics and microcontroller

Course Outcomes: Students will be able to

1.	To understand , basics of electronic components and their practical use
2.	To apply the concepts of diode in rectifiers, filter circuits
3.	To analyze performance parameters based on study of characteristics of electronic devices like diode, transistors etc
4.	To gain knowledge of power devices and their practical use
5.	To compile the different building blocks in digital electronics using logic gates and implement simple logic function using basic universal gates
6.	To gain the knowledge of transducers and selection of suitable transducer for application

Curriculum Content:	**Hours**
Unit 1 Resistors : Concept of resistors, classification, specification: - maximum power rating, tolerance, temperature co-efficient. Construction of carbon film, wire wound resistors, potentiometer, LDR. Color coding.	3

Unit 2 Capacitors and Inductors : Classification of capacitors, materials used for capacitors, capacitors specification , Fixed capacitor - construction, specification and application of disc, ceramic capacitor, aluminum electrolytic capacitor. Variable capacitor- Trimmer capacitor. **Inductor :** construction and application of air core, iron core, ferrite core inductor Relays Construction, working and application of general purpose relay	6
Unit 3 Semiconductor Diode : **PN Junction diodes** : Energy band Structure of insulators, semiconductor and metals Review of P-type and N-type semiconductor, characteristics of PN junction diode, forward voltage drop , potential barrier , reversed saturation current, Power dissipation, breakdown voltage. **Rectifier** : Need of rectifier, , types of rectifier – half wave rectifier voltage (no derivation) ,ripple, ripple factor ,Need of filters ,types of filters **Zener diode:-** Breakdown mechanism, Zener versus Avalanche Break down, V-I characteristics, , application , photo diode and varactor diode.	8
Unit 4 Introduction to Transistors and Power devices : Transistor construction, Types of transistor (NPN & PNP) ,Transistor operation and amplifying action. Transistor Characteristics for CB,CE,CC configuration and comparison. Relation between current gain, alpha and beta. **Power devices** - Need of power devices, comparison between low and high power semiconductor devices, Structure, Operation, V-I Characteristics & application of SCR, Triac and diac.	8
Unit 5 Transducers: Introduction, Need of transducers, Classification of Transducers, Advantages and Disadvantages of Electrical Transducers, Transducers Actuating Mechanisms, Resistance Transducers, Variable Inductance Transducers, Capacitive Transducers, Piezoelectric Transducers, Photoelectric Transducers.	6
Unit 6 Digital Electronics : **Number Systems:** Binary Number System, Hexadecimal Number System, octal number system , inert conversion of number systems **Logic gates:** NOT Gate, AND Gate, OR Gate, XOR Gate, NAND Gate, NOR Gate, X-NOR Gate, system implementation using logic gates. Introduction to microprocessor and micro controller.	8

Suggested Text Books:	
1.	R.P.Jain,"Modern Digital Electronics",Tata McGraw Hill,4th edition 2009
2.	Robert Boylestad ,Louis Nashelsky, Electronic Devices and Circuits,Pearson,11th edition,2015
Suggested Reference Books:	
1.	Allen Mottershead. (PHI)"Electronics Devices & Circuits".
2.	Bernard Grob "Basic Electronics"
3.	Thomas L. Floyd"Electronics Devices"
4.	J Millman &C.C Halkias (TMH)"Basics Electronics &Linear circuits"
5.	Madhuri Joshi ,"Electronics materials &components "

6.	N.N Bharagava, D.C.Kulshreshtha &S.C Gupta(TMH)"Basic Electronics & Linear circuits "
7.	R.S. Sedha. "A text book of Applied Electronics". (S.Chand &Company)
8.	R Boylested &Louis Nashalsky ."Electronics Devices & Circuit Theory"
9.	V.K.Mehta "Principles of Electronics ".(New Edition)

Class	**:**	**First Year B. Tech (All Program)**				
Course Title		**Lab. I-Engineering Physics**		***Course Code*:**	**:**	BS- 11A3 BS-12 B3
Teaching Scheme (Hours)	**:**	Practical :	2 Hrs/week	***Total Credits***	**:**	01
Evaluation Scheme (Marks)	**:**	IPE=50		***Duration of IPE***	**:**	2 Hrs
Revision:		Fourth		***Month***	**:**	March 2020
Pre-requisites	**:**	12th Science				
Type of Course	**:**	Practical				
Course Domain	**:**	Basic Sciences				
Skills Imbibed	**:**					

Course Assessment Methods:
Attendance (10 Marks) +Assignments (10 Marks) +Practical Journal Assessment (10 Marks) + Internal Practical Evaluation (20 Marks)

Course Objectives:

1.	To study the basic concepts of physics and engineering applications of physics.
2.	To develop an ability to identify, formulate and solve physics and engineering problems.

Course Outcomes:

1.	The student would be able to apply the concepts of physics in various engineering applications.
2.	The student would be able to use the techniques, skills, and modern tools necessary for physics and engineering careers
3.	The student would be able to use various scientific instruments viz. spectrometer, polarimter, LASER, ultrasonic interferometer for various measurements.
4.	The student would be able to test optical components using principles of interference and diffraction of light
5.	The student would be able to use ultrasonic interferometer for measuring velocity of ultrasound in various liquids

List of Practicals:

1.	Diffraction grating - measurement of grating element.
2.	Diffraction grating - measurement of wavelength of LASER.
3.	XRD pattern of thin films and its analysis.
4.	Scanning Electron Microscopy (SEM) studies
5.	Divergence of LASER beam.
6.	Study of properties of nanofluids – effect of concentration & temperature.
7.	Determination of specific rotation of sugar solution using Polarimeter
8.	Dielectric constant of materials.
9.	Thermal conductivity in nanofluids.
10.	Calculation of lattice constant from the given powder XRD pattern

11.	Determination of optical band gap energy of semiconductor materials.
12.	Study of I-V characteristics of a solar cell
13.	Photodiode – inverse square law.
14.	Ultrasonic Interferometer - Measurement of velocity of ultrasound in liquids.
15.	Ultrasonic Interferometer - Determination of compressibility of liquids
16.	To study properties of LASER- Measurement of Power Disribution within beam, beam spot size.
17.	Absorption spectrum of liquid
18.	Study of scattering of light (diameter of lycopodium powder)
19.	Recording and reading of hologram.
20.	Study the losses in fibre optics – measurement of numerical aperture.
21.	Study of Crystal structures
22.	Study of I-V characteristics of LED
23.	Study of I-V characteristics of diode LASER

- At least 12 experiments should be performed by student.

In addition to above
Individual appreciation experiment in Optics (One experiment to be designed and performed by each student anytime during the semester)
ASSIGNMENTS : At least 3 assignments based on theory syllabus

References:

1.	A.C. Melissinos and J. Napolitano, Experiments in Modern Physics,2nd ed.(Academic Press)
2.	D.W. Preston, Experiments in Physics (Wiley)
3.	P. R. Bevington, Data Reduction and Error Analysis for Physical Sciences(McGraw Hill)
4.	Smith E. V. -Manual of Experiments in Applied Physics, London, Butterworth, 1970.
5.	Jerrad H.G. and Mc Neil D.B. -Theoretical and Experimental Physics.
6.	Fretter W.B. -Introduction to Experimental Physics, Blackiee

Class	:	**First Year B. Tech (All Program)**				
Course Title	:	**Lab.-II Basics of Mechanical Engineering**		***Course Code*:**	:	ES-11A4 ES-12B4
Teaching Scheme (Hours)	:	Practical :	2 Hrs/week	***Total Credits***	:	01
Evaluation Scheme (Marks)	:	IPE=50		***Duration of IPE***	:	2 hrs
Revision:	:	Fourth		***Month***	:	March 2020
Pre-requisites	:	---				
Type of Course	:	Practical				
Course Domain	:	Engineering Sciences				
Skills Imbibed	:	Cognitive: Remember, Understand.				

Course Assessment Methods:
Practical Journal Assessment and Internal Practical Examination.

Course Objectives:

1.	To understand I.C. Engine, Refrigeration and Air conditioning.
2.	To learn different power transmitting devices.
3.	To Understand Renewable Energy sources.
4.	To learn different manufacturing processes.

Course Outcomes:

1.	Study of I.C. Engine, Refrigeration and Air conditioning.
2.	Demonstration of Pumps, Compressor, Turbine, Chain Drive and Gear Drive etc.
3.	Study of Wind mill, Solar water Heater, Tidal power plant.
4.	Study of different Manufacturing Processes.

Practical Covered: (Any Eight)

1.	Demonstration of Two stroke and four stroke engine.
2.	Study of domestic refrigerator & window air-conditioner.
3.	Study of Wind mill, solar water heater.
4.	Demonstration of pumps and compressor.
5.	Demonstration of different types of Turbines.
6.	Study of power transmitting elements: Chain drive and Gear Drive.
7.	Study of tidal power plant.
8.	Study of Routine maintenance of two wheeler automobile.
9.	Study of Manufacturing Practices.
10.	Study of Industrial applications of mechanical engineering.

References:

1.	Edward E. Obert, “Internal Combustion Engines and Air Pollution”, Internal Educational Pub, 1973
2.	John B. L. Heywood, “Internal Combustion Engine”, McGraw-Hill.
3.	Anantnarayan, “Basic of Refrigeration and Air Conditioning”, Tata McGraw Hill Publications
4	Krieth and Krieder, “Principles Of Solar Engineering”, Tata McGraw Hill Publishing Company Limited, New Delhi, 1994
5	Ghosh Amitabha and MallikAsok Kumar, “Theory of Mechanisms and Machines” east- West Press Pvt. Ltd. New Delhi
6	S. E. Rusinoff, “Manufacturing Processes”, Times India Press. Doyle, “Manufacturing Processes and Materials for engineers”, Prentice Hall of India Press

Class	:	**First Year B. Tech (All Program)**				
Course Title	:	**Lab.-III Engineering Mechanics**		***Course Code*:**	:	ES-11A5 ES-12B5
Teaching Scheme (Hours)	:	Practical :	2 Hrs/week	***Total Credits***	:	01
Evaluation Scheme (Marks)	:	IPE=50		***Duration of IPE***	:	2 hrs
Revision:	:	Fourth		***Month***	:	March 2020
Pre-requisites	:	---				
Type of Course	:	Practical				
Course Domain	:	Engineering Sciences				
Skills Imbibed	:	Cognitive: Remember, Understand, Apply				

Course Assessment Methods:
Practical Journal Assessment and Internal Practical Examination.

Course Objectives:

1.	To apply the concepts of Engineering Mechanics and develop analytical skills for applications in engineering.
2.	To enable the students to understand the basic concepts involved in the solving problems

Course Outcomes: After successful completion of this course, the student will able to:

1.	Verify and correlate law of polygon of forces.
2.	Verify Lami's theorem and Equilibrium condition
3.	Determine centre of Gravity of Lamina and block.
4.	Determine coefficient of friction for two sliding surfaces.
5.	Verify Law of Moments.

Practical Covered:

1.	Verification of law of polygon of forces
2.	To determine the support reactions of beams.
3.	To verify Principle of Moments.
4.	To Verify Lami's theorem.
5.	Determination of coefficient of friction between different surfaces
6.	Determination of centre of Gravity of block using reactions at support.
7.	Determination of centre of Gravity of regular and irregular shape lamina.
8.	To determine Mechanical Advantage , Velocity Ratio and Efficiency of Worm Wheel
9.	To find Resultant of Force system using Graphical Method
10.	To find beam reactions using Graphical Method
11.	To find forces in the truss members using Graphical Method

Assignments: At least one assignment on each unit.

References:

1.	Meriam J. L., Kraige L. G., "Engineering Mechanics – Statics, Vol.1", Wiley Student Edition, (8th Edition) 2017.
2.	Beer F. P. , Johnston E. R., "Vector Mechanics for Engineers -Statics", Tata McGraw Hill Publishing company Ltd., New Delhi (12th Edition, SIE)
3.	Beer F. P. , Johnston E. R., "Vector Mechanics for Engineers -Dynamics", Tata McGraw Hill Publishing company Ltd., New Delhi (12th Edition, SIE)
4.	R.C.Hibbeler, "Engineering Mechanics", Pearson Publication(14th edition)
5.	Shames Irving H., "Engineering Mechanics", Prentice Hall, New Delhi (4th edition)

Class	:	**First Year B. Tech (All Program)**				
Course Title	:	**Lab.-IV Basic Electronics Engineering**		***Course Code*:**	:	ES-11A6 ES-12B6
Teaching Scheme (Hours)	:	Practical :	2 Hrs/week	***Total Credits***	:	01
Evaluation Scheme (Marks)	:	IPE=50		***Duration of IPE***	:	2 hrs
Revision:	:	Fourth		***Month***	:	March 2020
Pre-requisites	:	Laboratory work in Electronics component and devices . Other Pre-requisites include knowledge of basic physics from higher secondary certificate examinations				
Type of Course	:	Practical				
Course Domain	:	Engineering Sciences				
Skills Imbibed	:	Cognitive: Remember, Understand, Apply.				

Course Assessment Methods:
Practical Journal Assessment and Internal Practical Evaluation.

Course Objectives:	
1.	To Impart Knowledge about basics of Semiconductor Devices and its parameters
2.	To make the students familiar with suitability of various electronics components and transducers for different application
Course Outcomes:	
1.	To understand the basics of Electronics component
2.	To understand the basics of transducer and connectors
3.	To understand construction , V-I characteristics and application of diode and thyristor
4.	To understand the basics of relay and amplifier.
5.	To understand Basic gates.
Practical Covered:	
1.	Characteristics of Si & Ge diodes
2.	Performance characteristics of half wave rectifier with &without filter
3.	Performance characteristics of full wave rectifier with &without filter
4.	Characteristics of Zener diode
5.	Temperature coefficient of zener diode &Avalanche diodes
6.	Input &output Characteristics of C. B & C .E Transistor configuration
7.	I-V characteristics of SCR
8.	Measurements of Temperature using any transducer.
9.	Measurement of distance using LVDT/strain gauge.
10.	Study of mobile Handset
11.	Testing of electronics components- Resister, capacitor, inductor diode ,Transistor ,LED and

	switch using multi-meter and CRO
12.	Logic gates and truth table verification.
	Visit to Telecommunication center
References:	
1.	N.N Bharagava, D.C.Kulshreshtha &S.C Gupta(TMH)"Basic Electronics & Linear circuits "
2.	V.K.Mehata "Principles of Electronics ".(New Edn)

Class	**:**	**First Year B. Tech (All Program)**				
Course Title		**Lab.-V Computer Programming**		***Course Code*:**	**:**	ES-11A7 ES-12B7
Teaching Scheme (Hours)	**:**	Lecture :	1 Hrs/week	***Total Credits***	**:**	*02*
		Practical :	2 Hrs/week			
Evaluation Scheme (Marks)	**:**	IPE=50		***Duration of SEE***	**:**	2 hrs
Revision:	**:**	Fourth		***Month***	**:**	March 2020
Pre-requisites	**:**	Basic Knowledge of Computer				
Type of Course	**:**	Practical				
Course Domain	**:**	Engineering Sciences				
Skills Imbibed	**:**	Cognitive: Remember, Understand, Apply				

Course Assessment Methods:
Practical Journal Assessment, Internal Practical Examination

Course Objectives: Students will be able to

1.	Understand the basic terminology used in computer programming
2.	Write, Compile and debug programs in C.
3.	Increase the ability to learn new programming languages.
4.	Implement data structures and algorithms in C

Course Outcomes: Students will be able to

1.	Illustrate the flowchart and design of an algorithm for a given problem and to develop C programs using operators
2.	Develop conditional and iterative statements to write C programs
3.	Design C programs with the use of Pointers to access arrays, strings and functions
4.	Exercise user defined data types including structures and unions to solve problems.
5.	Design C programs using pointers and to allocate memory using dynamic memory management
6.	Demonstrate files concept to show input and output of files in C

Curriculum Content:	**Hours**
Unit 1 Programming Methodology Step involving in problem solving., Problem definition, Algorithm, Characteristics, Notation of Algorithm, Flowcharts- Definition, Symbol, features, Running and debugging the program.	2
Unit 2 Introduction to 'C' History, Character set and keywords, Structure of 'C' programming, constant and its type,	2

Variable and its type (Data types), Operators- Arithmetic, logical, relational, bitwise, increment, decrement, conditional	
Unit 3 Control Statements and Functions Conditional control statements- if, if else, nested if, switch, Looping – for statements, nested for, while, do-while statements, Unconditional control statements- break, continue, goto **Functions** Definition, declaration, prototype of function, Local and global variable, User defined function, Storage classes, Preprocessor	3
Unit 4 Arrays and Pointers Array definition and declaration, Single and multidimensional array, String functions **Pointers** Definition and declaration, Operation on pointer, Pointer initialization, Pointer and function, Pointer and array, Pointer of pointer, Call by value and Call by reference, Dynamic memory allocation	3
Unit 5 Structures and Union Definition and declaration, Array of structures, Passing structure to function, Pointer to structure, Nested structure, self-referential structure, Sizeof and typedef	2
Unit 6 File Handling Standard input- getchar(), getch(), getche(), Standard output- putchar(), putch(), putche(), Formatted input- scanf(), sscanf(), fscanf(), fread(), Formatted output- printf(), sprintf(), fprintf(), fwrite(), Functions- fseek(), ftell(), fflush(), fclose(), File opening mode- open, modify, write, append, Text and binary mode.	3

Practical Covered:	
1.	Creation editing, compilation, extension, debugging demonstration with some small program.
2.	Constants, variables and data types declaration with the use of storage classes.
3.	Use of operators and expressions
4.	Control statements: if, if-else nested if.
5.	Control statement: for statement, while statement, do while statement, Use of break, continue, goto statements.
6.	Use of arrays
7.	Use of functions: Prototyping, - Concept of local/ global variables
8.	Use of structures and unions: declarations
9.	Use of pointers: Simple pointers, Operations on pointers, Pointer to arrays, Pointer to Functions
10.	Dynamic memory allocation
11.	I/O functions and files handling
Suggested Text Books:	
1.	E Balguruswamy, “Programming with ANSI C”, (TMH).

2.	Kernighan and Richie, "The C Programming Language" (PHI)/Pearson Education.
3.	Y.C. Kanetkar, "Let us C".
Suggested Reference Books:	
1.	Gottfried, "Programming in C", Shattern Series.
2.	Herbert Schildt, "Complete 'C' Reference".

Class	:	**First Year B. Tech (All Program)**				
Course Title	:	**Lab.-VI Workshop Practice**		***Course Code*:**	:	ES-11A8 ES-12B8
Teaching Scheme (Hours)	:	Practical :	2 Hrs/week	***Total Credits***	:	01
Evaluation Scheme (Marks)	:	IPE=50		***Duration of IPE***	:	2 hrs
Revision:	:	Fourth		***Month***	:	March 2020
Pre-requisites	:	Nil				
Type of Course	:	Practical				
Course Domain	:	Engineering Sciences				
Skills Imbibed	:	Cognitive: Remember, Understand, Apply.				

Course Assessment Methods:
Practical Journal Assessment and Internal Practical Examination.

Course Objectives:

1.	To inculcate respect for physical work and labor
2.	To understand the safety precaution in the workshop
3.	To understand different tool &equipment for work shop practice.
4.	To gain knowledge of different manufacturing processes.

Course Outcomes:

1.	Execute safety measures, while working in a workshop.
2.	Identify and use of various hand tools and measuring instruments.
3.	Demonstrate and use of different fitting tools and prepare a fitting job as per given drawing.
4.	Perform Arc welding operation to prepare a welding joint.
5.	Demonstrate and application of renewable energy sources

Practical Covered:

1.	Assignment on safety -Common hazards while working with engineering equipment and related safety measures.
2.	Introduction to Measuring instruments like – Steel rule, Vernier Caliper, Micrometer, Dial indicator, their least counts, common errors and care while using them
3.	Fitting : Demonstration of fitting operation and its tools. One job- Male/Female fitting with operations- Marking, cutting, drilling, tapping filing etc.
4.	Welding : Introduction to various Welding Processes. One job - Lap joint/butt joint or T-joint using arc welding.
5.	Carpentry : Introduction to Carpentry tools and wood joints. One composite job involving dovetail joint, T joint, cross halving joint
6.	Demonstration of Additive manufacturing (3-D Printing Technology)
7.	Demonstration - application of renewable energy sources

	(Assembling of solar study lamp , Working of solar cooker / Solar distillation plant / solar Concentration system)
Select any two practicals out of the practical No. 5 to practical No. 7.	
References:	
1.	A Course in Workshop Technology, Vol – I by B. S. Raghuvanshi, Dhanapat Rai and Sons.
2.	Elements of Workshop Technology, Vol – I by HajaraChaudhari, Media Promoters.
3.	Workshop Technology, Vol – I by Gupta and Kaushik, New Heights.
4.	Workshop Technology, Vol – I by Chapman, The English Language Book Society.
5.	Workshop technology, Vol.-I by H.S. Bawa, TMH Publications.

Class	:	**First Year B. Tech (All Program)**					
Course Title	:	**Engineering Mathematics – II** (Differential Equations and Integral Calculus)			***Course Code*:**	:	BS-12A1 BS-12B1
Teaching Scheme (Hours)	:	Lecture :	4 Hrs/week		***Total Credits***	:	05
		Tutorial :	1 Hrs/week				
Evaluation Scheme (Marks)	:	CIE=30 (20+10)	SEE = 70	Grand Total= 100	***Duration of SEE***	:	3 hrs
Revision:	:	Fourth			***Month***	:	March 2020
Pre-requisites	:	Derivatives, Integration and Basics of Differential equations.					
Type of Course	:	Theory					
Course Domain	:	Basic Sciences					
Skills Imbibed	:	Cognitive: Remember, Understand, Apply					

Course Assessment Methods:

1. Continuous Internal Evaluation (CIE): Mid Semester Examination, Assignments, Regular Tutorials.
2. Semester End Examination (SEE)

Course Objectives:

1.	To familiarize the students with ordinary differential equations and integral Calculus
2.	To teach Mathematical methodologies and models.
3.	To develop mathematical skills and enhance logical thinking power of students.
4.	To provide students with skills in differential equations, integral calculus, complex integration which would enable them to devise engineering solutions for given situations they may encounter in their profession.

Course Outcomes: Students will be able to

1.	To understand appropriate methods for solution of differential equations of first order and first degree.
2.	Solve and analyze ordinary differential equations using numerical methods.
3.	To understand the concept of special functions and curve tracing related to multiple integral and various branches of engineering.
4.	To understand how to solve double and triple integrals
5.	Apply the knowledge of evaluation of multiple integral to various engineering problems.
6.	Evaluation and analysis of complex integration.

Curriculum Content:	**Hours**
Unit 1 Differential Equations of first order and first degree and its Applications Linear differential equations, Equations reducible to Linear equations, Exact differential equations, Equations reducible to exact equations, Applications to Orthogonal trajectories and to Simple Electrical Circuits	9
Unit 2 Numerical solutions of Differential Equations of first order and first degree Taylor's series method, Picard's method, Euler's method, Modified Euler's method, Runge-Kutta fourth order formula.	8

Unit 3 Special Functions and Curve Tracing Gamma and Beta functions and their properties, Tracing of curves in Cartesian coordinate system (Simple curves, Semi cubical parabola, Cissiod of Diocles, Strophoid, Astroid, Witch of Agnesi and Common Catenary), Tracing of curves in Polar coordinate system (Simple curves, Cardioid, Pascal's Limacon, Lemniscate of Bernoulli and Rose curves)	9
Unit 4 Multiple Integrals Introduction of Double Integrals, Evaluation of Double Integrals, Change of order of Integration, Change of variables using Jacobians, Change into Polar coordinates, Evaluation of Triple Integral with given limits.	9
Unit 5 Applications of Multiple Integrals Applications of Multiple Integrals to Area enclosed by plane curves, Mass of a Plane Lamina, Moment of Inertia of a plane lamina and Volume of solid of revolution.	8
Unit 6 Complex Variables: Integration Contour integrals, Cauchy's integral theorem (without proof), Cauchy's integral formula (without proof), Taylor series, Laurent series, zeros of analytic functions, singularities, and Cauchy's Residue theorem (without proof).	9

Suggested list of Tutorials and Assignments-

1. Linear differential equations
2. Exact differential Equations
3. Numerical solutions of ODEs
4. Gamma and Beta function
5. Curve tracing
6. Double and Triple Integration
7. Change of order of Integration
8. Applications of Multiple integrals
9. Cauchy's Integral theorem and Cauchy's integral formula
10. Taylor series and Laurent series
11. Residue theorem
12. Introduction to mathematical software's like Scilab, Matlab, Mathematica

General Instructions:

1. Batch wise tutorials are to be conducted. The number of students per batch should be as per the practical batches.
2. Students must be encouraged to write mathematical Programs in tutorial class only. Each Student has to write at least 4 Scilab tutorials (including print out) and at least 6 class tutorials on entire syllabus.
3. Scilab/Matlab Tutorials will be based on
    1. Numerical solutions of differential equations of first order and first degree
    2. Special functions
    3. Tracing of Curves
    4. Evaluation of single integral
    5. Double and triple integral
    6. Area enclosed by plane curves
    7. Complex integration

Suggested Text Books:	
1.	B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, Delhi.
2.	Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons.
3.	B. V. Ramana, "Higher Engineering Mathematics", Tata McGraw-Hill, New Delhi.
Suggested Reference Books:	
1.	H. K. Dass, "Advanced Engineering Mathematics", S. Chand Publishing.
2.	M. K. Jain, S. R. K. Iyengar, R. K. Jain, "Numerical Methods for Scientific and Engineering Computation", New Age International (P) Ltd.
3.	Dr. B. S. Grewal, "Numerical Methods", Khanna Publishers, Delhi.
4.	Merle C. Potter, ''Advanced Engineering Mathematics'', OXFORD University Press, 3rd Edition.
5.	C. R. Wylie, "Advanced Engineering Mathematics", McGraw Hill Publication, New Delhi.
6.	S. S. Sastry, "Engineering Mathematics (Volume-I)", Prentice Hall Publication, New Delhi.
7.	M. D. Greenberg, "Advanced Engineering Mathematics", Pearson Education.

Class	**:**	**First Year B. Tech (All Program)**					
Course Title		**Engineering Chemistry**			***Course Code*:**	**:**	BS-12A2 BS-11B2
Teaching Scheme (Hours)	**:**	Lecture :	3 Hrs/week		***Total Credits***	**:**	03
		Tutorial :	0 Hrs/week				
Evaluation Scheme (Marks)	**:**	CIE=30 (20+10)	SEE = 70	Grand Total= 100	***Duration of SEE***	**:**	3 hrs
Revision:		Fourth			***Month***	**:**	March 2020
Pre-requisites	**:**	Knowledge about basic chemistry related to periodic table, properties of elements, physical and chemical properties, etc					
Type of Course	**:**	Theory					
Course Domain	**:**	Basic Science					
Skills Imbibed	**:**	Cognitive: Remember, Understand, Apply.					

Course Assessment Methods:
1. Continuous Internal Evaluation (CIE): Mid Semester Examination, Assignments.
2. Semester End Examination (SEE)

Course Objectives:

1.	To study basic concepts of chemistry and engineering applications of chemistry
2.	To develop an analytical ability of students.
3.	To provide knowledge on methods of characterization and chemical analysis.

Course Outcomes: Students will be able to:

1.	Understand the basic concepts of water technology and decide suitability of water towards industrial applications.
2.	Describe properties and applications of engineering materials.
3.	Select appropriate materials and processes for specific applications.
4.	Analyze engineering problems and derive solution based on the knowledge of chemistry.
5.	Use relevant techniques for the analysis of the materials.

Curriculum Content:	**Hours**
Unit 1 Water Introduction, Impurities in Water, Water Quality Parameters (Definition, Causes and Estimation) like Hardness, Alkalinity, Chlorides, Dissolved Oxygen (DO), Biological Oxygen Demand (BOD) and Chemical Oxygen Demand (COD), Specifications for Drinking Water, Boiler Feed Water, Problems Associated with Use of Hard Water in Boiler, Treatment of Water: Ion Exchange Process and Reverse Osmosis (Numerical Problems on Calculation of Temporary and Permanent Hardness).	**07**
Unit 2 Engineering Materials **Alloys:** Introduction, Classification, Purposes of Making Alloys, Composition, Properties And Applications of Plain Carbon Steels (Mild, Medium and High), Copper Alloy (Brass), Nickel Alloy (Nichrome) and Aluminum Alloy (Duralumin and Alnico). **Ceramics:** Introduction, Classification, Applications of Ceramics. **Cement:** Introduction, Composition of Portland Cement, Setting and Hardening of Cement (Reactions) **Nanomaterials:** Introduction, Synthesis and Applications.	**06**
Unit 3 Fuels and Combustion	**07**

Introduction, Classification, Calorific Value and Its Units, Characteristics of Good Fuels, Determination of Calorific Value by Bomb and Boy's Calorimeters (Numerical Problems on Dulong's Formula, Bomb and Boy's Calorimeters) Solid Fuels: Coal, Classification of Coal, Proximate Analysis of Coal. Liquid Fuels: Petroleum, Classification of Petroleum, Refining of Petroleum, Octane Number, Cetane Number, Combustion: Chemical Reactions, Calculation on Air Requirement for Combustion-Numericals.	
Unit 4 Polymers Introduction, Classification, Methods of Polymerization (Addition, Condensation and Copolymerization), Properties of Polymers, Commercially Important Polymers (Synthesis And Applications): PE, PVC, Teflon, Bakelite, Kevlar, Silicon Based Polymers, Conducting Polymers, Reinforced Plastic, Isolation of Natural Rubber, Vulcanization of Rubber,	**06**
Unit 5 Corrosion and Its Control Introduction, Causes, Types of Corrosion, Atmospheric Corrosion, Corrosion due to Oxygen and Other Gases, Electrochemical Corrosion, Mechanism of Electrochemical Corrosion (Hydrogen Evolution and Oxygen Absorption), Galvanic Series, Factors Influencing Corrosion, Corrosion Control Methods- Proper Design and Material Selection, Cathodic Protection, Metallic Coating like Hot Dipping (Galvanizing and Tinning), Metal Cladding, Spraying and Electroplating	**07**
Unit 6 Instrumental Methods of Chemical Analysis Chemical Analysis, Qualitative and Quantitative Analysis, Conventional Methods of Analysis: Titrimetry, Gravimetry, An Overview of Various Analytical Techniques, **pH-Metry:** Introduction, pH Measurement using Glass Electrode, Applications of Ph-Metry. **Spectroscopy**: Principle, Basic Instrumentation and Applications of Ultraviolet-Visible Spectroscopy, **Chromatography:** Introduction, Types, Gas-Liquid Chromatography (GLC), Basic Principle, Instrumentation and Applications.	**06**

Suggested Text Books:

1.	Engineering Chemistry, Satyaprakash & Manisha Agrawal, Khanna Book Publishing, Delhi
2.	A Text Book of Engg. Chemistry, Shashi Chawla, Dhanpat Rai & Co. (P) Ltd.
3.	Essentials of Physical Chemistry, Bahl & Tuli, S. Chand Publishing
4.	Applied Chemistry, Sunita Rattan, Kataria
5.	Engineering Chemistry – I, D. GrourKrishana, Vikas Publishing
6.	Engineering Chemistry, Baskar, Wiley
7.	A textbook of Engineering Chemistry: Jain and Jain, Dhanpatrai Publication.
8.	A textbook of Engineering Chemistry: S. S. Dara, S. Chand Publication

Suggested Reference Books:

1.	Instrumental Methods of Chemical Analysis, Chatwal and Anand, Himalaya Publishing

	House, New Delhi.
2.	Introduction to Nanotechnology, S. K. Kulkarni.
3.	Organic Polymer Chemistry, K. J. Sundars, Springer Publication.
4.	Instrumental Methods of Chemical Analysis, B. K. Sharma, Goel Publication, Meerut.
5.	Polymer Science, V.R. Gowariker, New Age International Publication

Class	**:**	**First Year B. Tech (All Program)**					
Course Title	**:**	**Engineering Graphics**			***Course Code*:**	**:**	ES-12A1 ES-11B1
Teaching Scheme (Hours)	**:**	Lecture :	4 Hrs/week		***Total Credits***	**:**	04
		Tutorial :	0 Hrs/week				
Evaluation Scheme (Marks)	**:**	CIE=30 (20+10)	SEE = 70	Grand Total= 100	***Duration of SEE***	**:**	4 hrs
Revision:	**:**	Fourth			***Month***	**:**	March 2020
Pre-requisites	**:**	Knowledge of plane geometry and solid geometry					
Type of Course	**:**	Theory					
Course Domain	**:**	Engineering Sciences					
Skills Imbibed	**:**	Cognitive: Remember, Understand, Apply.					

Course Assessment Methods:

1. Continuous Internal Evaluation (CIE): Mid Semester Examination, Assignments.
2. Semester End Examination (SEE)

Course Objectives:

1.	The course is aimed at developing Basic Graphic skills.
2.	To learn the engineering graphics standards.
3.	To develop Skills in Reading and Interpretation of Engineering Drawings.
4.	To introduce Computer-Aided Drafting tools

Course Outcomes:

1.	Identify basic concepts of BIS conventions and their application.
2.	Interpret first angle and third angle projection system.
3.	Construct orthographic projections of points, lines and planes.
4.	Apply principles of projection and construct orthographic and isometric views of an object.
5.	Develop a skill of visualization to understand and read the drawing.

Curriculum Content:	**Hours**
Unit 1 Fundamentals of Engineering Graphics& Engineering Curves **A) Fundamentals of Engineering Graphics:** Drawing instruments and their uses , BIS Standard code, Sheet layout, Different types of lines used in drawing practice, Lettering and Dimensioning, Scales, Geometrical Constructions **B) Engineering curves:** Construction of regular polygons , Construction of Ellipse –(Directrix-Focus & Arcs of circle Method) Parabola-(Directrix-Focus & Rectangle Method) , Hyperbola-(Directrix-Focus & Rectangular Method), Involutes, Archimedian spiral and Cycloid only.	6
Unit 2 Projections of Points, lines & Planes **A) Projections of Points and lines:** Introduction to First angle and third angle methods of projection. Projections of points on regular and auxiliary reference planes (Including coordinate system of points). Projections of lines (horizontal, frontal, oblique and Profile lines) on regular and auxiliary reference	9

planes. True length of a line, Point View of a line, angles made by the line with reference planes. Projections of intersecting lines, Parallel lines, perpendicular lines, and skew lines. Distance between point and line, grade and bearing of a line. **B) Projections of Planes:** Types of planes (horizontal, frontal, oblique and Profile planes), Edge view and True shape of a Plane. Angles made by the plane with Principle reference planes. Strike and Dip of the plane.	
Unit 3 Projections of solids Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes.	5
Unit 4 Development of surfaces Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones. (Solids in simple position only)	6
Unit 5 Orthographic Projections Different types of lines, Selection of views, spacing of views, dimensioning and sections, Conversion of pictorial view into orthographic view including sectional orthographic view.	8
Unit 6 Isometric projections Principles of Isometric Projection, Isometric scale, Isometric projections and Isometric views / drawings. Circles in isometric view. Isometric views of simple solids and objects.	6
Note: The above syllabus is to be covered according to the first angle method of projection.	

Suggested Text Books:	
1.	Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
2.	K. Venugopal, Engineering Drawing and Graphics, New Age Publication
Suggested Reference Books:	
1.	Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
2.	Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
3.	Narayana, K. L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers
Useful links:	
1.	https://nptel.ac.in/courses/112103019/ National Programme on Technology Enhanced Learning (NPTEL) - Phase II Course Name : Engineering Drawing
2.	https://nptel.ac.in/courses/112/104/112104172/
3.	http://moodle.unishivaji.ac.in/course/search.php?search=engineering+graphics Moodle Services, Shivaji University, Kolhapur
4.	http://web.iitd.ac.in/~achawla/public_html/201/lectures/sp46.pdf

Class	**:**	**First Year B. Tech (All Program)**					
Course Title	**:**	**Basic Civil Engineering**			***Course Code*:**	**:**	ES-12A2 ES-11B2
Teaching Scheme (Hours)	**:**	Lecture :	3 Hrs/week		***Total Credits***	**:**	03
		Tutorial :	0 Hrs/week				
Evaluation Scheme (Marks)	**:**	CIE=30 (20+10)	SEE = 70	Grand Total= 100	***Duration of SEE***	**:**	3 hrs
Revision:	**:**	Fourth			***Month***	**:**	March 2020
Pre-requisites	**:**	Basic Mathematics, Basic Physics					
Type of Course	**:**	Theory					
Course Domain	**:**	Engineering Sciences					
Skills Imbibed	**:**	Cognitive: Remember, Understand, Apply					

Course Assessment Methods:

1. Continuous Internal Evaluation (CIE): Mid Semester Examination, Assignments.
2. Semester End Examination (SEE)

Course Objectives:

1.	To introduce the necessity and use of civil engineering knowledge allied to other branches.
2.	To introduce the fundamental knowledge required for any building construction.
3.	To understand load transfer mechanism of various building components.
4.	To develop the logic required for carried out field work for surveying.
5.	To introduce modern equipment required for surveying.
6.	To introduce current advances in Civil Engineering Field.

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

1.	Express importance of Civil Engineering with relevance to other Engineering Profession.
2.	Identify building materials alongwith its properties used in construction.
3.	Identify and analyze components of Building, Bridges and Dams, functions of components and their load transfer mechanism.
4.	Identify services required in building construction.
5.	Compute linear and angular measurements required to prepare a plan by using traditional as well as modern instruments.
6.	Express current advances in Civil Engineering field.

Curriculum Content:	**Hours**
Unit 1 Introduction to Civil Engineering and Surveying: Introduction to civil Engineering Branches, Scope, Impact, Role of Civil Engineer, Units of measurement, Unit conversion (Length, Area, Volume), List of materials Introduction to surveying Fundamental principles, Classification. **Linear measurement:** Instruments used, Chaining on plane ground, Offset, Ranging. **Angular measurement:** Compass-Instrument used Meridian, Bearing, and Local attraction. Problems based on Bearing and Local attraction.	7

Unit 2 Leveling and Introduction to Modern Surveying **Leveling:** Instrument used, Terminology, Types of leveling, and Methods of leveling, Introduction to contour **Modern tools:** Introduction to Theodolite, use of Theodolite to measure Horizontal angle and vertical angle, Total Station, Introduction to GPS, GIS and RS	7
Unit 3 Civil Engineering Materials Uses and Engineering properties of materials from selection point view, Details (types, properties, uses) of materials: Cement, Aggregate, Brick, Steel, Concrete, Stone, Soil, Mortar, Timber, Plastic, Epoxy, Fly ash, Steel slag, Copper slag, Bitumen, Optical fiber, Pipe, Wire, Cable, Smart material, Basic hand fill tests, FRP . Water and waste water quality characteristics, drinking water standards Road traffic, traffic control, traffic signals & Intersections.	5
Unit 4 Introduction to Building and Town Planning Definition and concept of plan of a simple residential building, Principles of planning, Elementary principles and basic requirements for building planning, elevation and section of a residential building. Principles of town planning, Necessity of town planning, Origin of town, Growth of town, Land use, Principles and objects of zoning, Advantages of zoning, Low cost housing, Prevention of slum, FSI.	7
Unit 5 Building Construction , Building Services, Bridges and Dams **Building Construction**: Types of building, Components of building & its functions, types of loads acting on building, Types of brick bonds, Typical building layout, Symbols used in electrical layout, Symbols used for water supply, plumbing and sanitation. Nominal dimensions for door, window and furniture. **Building Services**: Types of building services like plumbing & sanitation, water supply& drainage system, electricity, building finishes, HVAC. **Bridges and Dams :** Types of Bridges and Dams, Selection Criteria, Load Transfer Mechanism	7
Unit 6 Advances In Civil Engineering Smart city and it's features, Mass Transportation systems-BRTS, Metro. **Environmental Engineering**- Solid waste management systems, Rain water harvesting systems, Watershed Management, Green building, Energy efficient building, Development of River fronts. Heritage structures & its conservations, Features of Earthquake resistant structures, **Computer Application in Civil Engineering-** Introduction to various software's used in various sectors of Civil Engineering, Features of various software.	6

Suggested Text Books:	
1.	S. S. Bhavikattis, "Basic Civil Engineering", New Age International Pvt. Ltd
2.	G.K.Hiraskar, "Basic Civil Engineering", Dhanapat Rai Publications
Suggested Reference Books:	
1.	B.C. Punmia, "Surveying", Vol.- I, Vol.-II, Vol.-III, Laxmi Publication
2.	Arora, "Building Material", S. Publication
3.	Victor D. J. , "Essentials of Bridge Engineering", Oxford Publication
4.	A.M.Chandra, "Higher Surveying", New Age Publication
5.	A.M.Chandra, "Plane Surveying", New Age Publication

Class	**:**	**First Year B. Tech (All Program)**					
Course Title	**:**	**Basic Electrical Engineering**			***Course Code*:**	**:**	ES-12A3 ES-11B3
Teaching Scheme (Hours)	**:**	Lecture :	3 Hrs/week		***Total Credits***	**:**	03
		Tutorial :	0 Hrs/week				
Evaluation Scheme (Marks)	**:**	CIE=30 (20+10)	SEE = 70	Grand Total= 100	***Duration of SEE***	**:**	3 hrs
Revision:	**:**	Fourth			***Month***	**:**	March 2020
Pre-requisites	**:**	In order to complete the course studies successfully, it is important to have a good command of English. Other Pre-requisites include knowledge of basic physics**,** electron theory, electricity, potential and kinetic energy					
Type of Course	:	Theory					
Course Domain	**:**	Engineering Sciences					
Skills Imbibed	**:**	Cognitive: Remember, Understand, Apply.					

Course Assessment Methods:
1. Continuous Internal Evaluation (CIE): Mid Semester Examination, Assignments.
2. Semester End Examination (SEE)

Course Objectives: The objective of this course is

1.	To introduce fundamental laws, various concepts and theorems related with electrical Engineering
2.	To provide fundamental knowledge about AC, DC and magnetic circuits
3.	To impart knowledge of electrical machines applicable in various field of engineering.
4.	To become Familiarize with protection equipment and lighting schemes used in day to day life.

Course Outcomes: At the end of course Students will be able

1.	To understand the basic concepts of Electrical and Magnetic circuits.
2.	To Apply and analyze the resistive circuits using star-delta conversion, KVL and KCL under DC supply.
3.	To analyze expression for impedance, current, power in series RLC circuit with AC supply along with phasor diagram.
4.	To Gain the knowledge of principle and working of various rotating electrical machines.
5.	To understand various wiring system and protection equipment.

Curriculum Content:	**Hours**
Unit 1 DC Circuit **Review :** Resistance, emf, current, potential, potential difference and Ohm's law **DC circuit:** Kirchhoff's laws, Star- delta conversion, ideal and practical voltage and current sources. **Magnetic circuits:** Magnetic effect of an electric current, Concept of mmf, flux, flux density, reluctance, permeability and field strength, their units and relationships. Simple series magnetic circuit , comparison of electric and magnetic circuit, force on current carrying conductor placed in magnetic field, Fleming's left hand rule. Faradays laws of electromagnetic induction, Fleming's right hand rule, statically and dynamically induced	6

e.m.f., self and mutual inductance.	
Unit 2 AC Circuits: **AC Fundamentals:** Sinusoidal voltages and currents, their mathematical and graphical representation, Concept of cycle, Period, frequency, instantaneous, peak(maximum), average and r.m.s. values, peak factor and form factor. Phase difference, lagging, leading and in phase quantities **Single Phase AC Circuits :**Study of AC circuits consisting of pure resistance, pure inductance, pure capacitance, series R-L, R-C and R-L-C circuits, phasor diagrams, voltage, current and power waveforms, concept of impedance, concept of active, reactive, apparent power and power factor.	6
Unit 3 DC Machines: Principle of operation of DC motor and DC generators, construction and classification of DC machines, applications and speed control methods, necessity of starter.	7
Unit 4 Single Phase Transformer: Construction, working principle, emf equation, ideal and practical transformer, transformer on no load and on load, phasor diagrams, equivalent circuit, OC and SC test, regulation and efficiency.	7
Unit 5 AC Machine Concept of three-phase supply and phase sequence , Construction and working principle of single and three- phase induction motor. Types, torque- speed characteristics and applications of induction motor , necessity of starter	7
Unit 6 Electrical Installation Switch fuse unit, MCB, ELCB, MCCB. Types of wire and cables. Staircase, Godown and Domestic wiring, CFL, LED, Fluorescent tube. Necessity of earthing, types of batteries and applications.	7

Suggested Text Books:	
1.	V. N. Mittal and Arvind Mittal "Basic Electrical Engineering" Tata McGraw Hill,(Revised Edition)
2.	D P Kothari and I J Nagrath "Theory and Problems of Basic Electrical Engineering", PHI 13 th edition 2011.
3.	Vincent Del Toro "Electrical Engineering Fundamentals", PHI Second edition,2011
4.	B.L. Theraja "Electrical Engineering " Vol-I and II
5.	V.K.Mehta" Fundamentals of Electrical Technology",S.Chand Publications
Suggested Reference Books:	
1.	Edward Hughes: Electrical and Electrical Technology, Pearson Education (Tenth edition)
2.	Fundamentals of Electrical Engineering by Ashfaq Husain,Dhanpat Rai Company
3.	Electrical Technology By H.Cotton.
4.	L. S. Bobrow, —Fundamentals of Electrical Engineering, Oxford University Press, 2011.
5.	D. C. Kulshreshtha, —Basic Electrical Engineering, McGraw Hill,2009.

Class	:	**First Year B. Tech (All Program)**				
Course Title		**Lab. I-Engineering Chemistry**		***Course Code*:**	:	BS-12A3 BS-11B3
Teaching Scheme (Hours)	:	Practical :	2 Hrs/week	***Total Credits***	:	01
Evaluation Scheme (Marks)	:	IPE=50		***Duration of IPE***	:	2 Hrs
Revision:		Fourth		***Month***	:	March 2020
Pre-requisites	:	Knowledge about basic chemistry related to periodic table, properties of elements and handling of glass wares and chemicals, etc				
Type of Course	:	Practical				
Course Domain	:	Basic Science				
Skills Imbibed	:	Cognitive: Understand, Apply, Analyze.				

Course Assessment Methods:
Practical Attendance, Practical Journal Assessment, and Internal Practical Evaluation.

Course Objectives:

1.	To apply the concepts of chemistry and develop analytical skills for engineering applications.
2.	To provide hands on practice of titrimetric analysis.
3.	To analyze various samples by using instrumental methods.

Course Outcomes: After successful completion of this course, the student will able to:

1.	Apply basic concepts of chemistry in various engineering applications.
2.	Determine various water quality parameters and preparation of polymers
3.	Select the appropriate method for chemical analysis.
4.	Use various instruments for analysis of the material

Practical Covered:

1.	Preparation and Standardization of Analytical Reagents
2.	Determination of total hardness of a water sample using disodium salt.
3.	Determination of chloride content of water sample.
4.	Determination of alkalinity of a water sample.
5.	Estimation of dissolved oxygen in given water sample
6.	Determination of relative viscosity of given liquid with respect to water at room temperature by Ostwald's viscometer.
7.	Proximate analysis of coal in the given sample.
8.	Estimation of copper in the given brass solution.
9.	Estimation of zinc in the given brass solution.
10.	Preparation of phenol formaldehyde resin.
11.	Preparation of urea formaldehyde resin.
12.	Estimation of rate of corrosion of aluminum in acidic and alkaline medium.

13.	pH-metric titration of Acid/Base
14.	Spectrometric/Colorimetric determination of concentration of given inorganic sample.
15.	Demonstration of TLC/Ion Exchange Chromatography/Paper Chromatography.
	*** (Note: Students should perform 10 experiments out of 15)**
References:	
1.	Quantitative Chemical Analysis, A. I. Vogel, Longmann Publication
2.	Instrumental Methods of Chemical Analysis, B. K. Sharma, Goel Publication, Meerut.
3.	Engineering Chemistry, Renu Bapna and Renu Gupta, MacMillan Publishers (India) Ltd, Delhi
4.	Fundamentals of Analytical Chemistry, D. A. Skoog, D. M. West, Cengage Learning.
5.	Laboratory Manual Engineering Chemistry, Anupma Rajput, Dhanpat Rai & Co.

Class	:	**First Year B. Tech (All Program)**				
Course Title	:	**Lab.–II Engineering Graphics**		***Course Code*:**	:	ES-12A4 ES-11B4
Teaching Scheme (Hours)	:	Practical :	2 Hrs/week	***Total Credits***	:	01
Evaluation Scheme (Marks)	:	IPE=50		***Duration of IPE***	:	2 hrs
Revision:		Fourth		***Month***	:	March 2020
Pre-requisites	:	Knowledge of plane geometry and solid geometry				
Type of Course	:	Practical				
Course Domain	:	Engineering Sciences				
Skills Imbibed	:	Cognitive: Remember, Understand, Apply.				

Course Assessment Methods:
Practical Journal Assessment and Internal Practical Examination.

Course Objectives:

1.	Fundamental Engineering Graphics standards
2.	Dimensioning and preparation of neat drawings.
3.	Reading and Interpretation of Engineering Drawings.
4.	Exposure to Computer-Aided Drafting tools

Course Outcomes:

1.	Identify and implement B.I.S. code of practice for Engineering Drawing.
2.	Create geometrical constructions with hand tools.
3.	Construct orthographic projection and sectional view of a machine part.
4.	Create isometric projection from multiview drawings of an object.
5.	Sketch projection of solids and development of lateral surfaces of solids.

Practical Covered:

1.	Lettering and geometrical constructions
2.	Engineering curves
3.	Projections of Points and lines
4.	Projections of planes
5.	Projections of solids
6.	Development of lateral surfaces of solids
7.	Orthographic projections
8.	Isometric projections
9.	Demonstration of drafting software with commands

All these sheets should be drawn on half imperial (A2 size) drawing sheets only

References:

1.	Engineering Drawing Practice for Schools and Colleges- Bureau Of Indian Standards

2.	Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
3.	K. Venugopal, Engineering Drawing and Graphics, New Age Publication
4.	Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
5.	CAD Software Theory and User Manuals
Useful links:	
1.	https://nptel.ac.in/courses/112103019/ National Programme on Technology Enhanced Learning (NPTEL) - Phase II Course Name: Engineering Drawing
2.	https://nptel.ac.in/courses/112/104/112104172/
3.	http://moodle.unishivaji.ac.in/course/search.php?search=engineering+graphics Moodle Services, Shivaji University, Kolhapur
4.	http://web.iitd.ac.in/~achawla/public_html/201/lectures/sp46.pdf

Class	:	**First Year B. Tech (All Program)**				
Course Title	:	**Lab.-III Basic Civil Engineering**		***Course Code*:**	:	ES-12A5 ES-11B5
Teaching Scheme (Hours)	:	Practical :	2Hrs/week	***Total Credits***	:	01
Evaluation Scheme (Marks)	:	IPE=50		***Duration of IPE***	:	2 hrs
Revision:	:	Fourth		***Month***	:	March 2020
Pre-requisites	:	---				
Type of Course	:	Practical				
Course Domain	:	Engineering Sciences				
Skills Imbibed	:	Cognitive: Remember, Understand, Apply				

Course Assessment Methods:
Practical Journal Assessment and Internal Practical Examination.

Course Objectives:

1.	To learn methods of surveying for the preparation of plan.
2.	To identify components of buildings, materials used in the construction.

Course Outcomes: After successful completion of this course, the student will able to:

1.	Prepare plan for outline of building by observing linear measurements.
2.	Compute Reduced Level using levelling instrument.
3.	Measure Horizontal Angle, Vertical angle using Theodolite.
4.	Compute area of irregular surface by using Mechanical and Digital Planimeter.
5.	Identify building materials required for construction with current market rates.

Practical Covered:

1.	Plotting the outlines of building by chaining, ranging and Offsetting.
2.	Study and use of Prismatic Compass and Surveyor Compass.
3.	Plotting of closed traverse by Prismatic compass and Surveyor Compass.
4.	Introduction to Levelling Instruments.
5.	Determination of Reduced Levels by using dumpy level .(Use of Collimation Plane and Rise and Fall method)
6.	Measurement of area by mechanical Planimeter and Digital Planimeter.
7.	Use of Theodolite to measure Horizontal Angle using Repetition Method.
8.	Use of Theodolite to measure Horizontal Angle by Reiteration Method.
9.	Use of Theodolite to measure Vertical Angle.
10.	Use of Total Station to measure angle, R.L., elevation.(Demonstration)
11.	Layout and setting out of small residential building showing plan, elevation and section of a building.
12.	Components of building (field visit).
13.	Preparation of Report based on use of building materials and current market rates of materials

References:	
1.	A.M.Chandra, "Higher Surveying", New Age Publication
2.	A.M.Chandra, "Plane Surveying", New Age Publication
3.	B.C. Punmia, "Surveying", Vol.- I, Vol.-II, Vol.-III, Laxmi Publication
4.	K.R.Arora, " Surveying Vol.I", Standard Book House

Class & Semester	:	**First Year B. Tech (All Program)**				
Course Title	:	**Lab.-IV Basic Electrical Engineering**		***Course Code*:**	:	ES-12A6 ES-11B6
Teaching Scheme (Hours)	:	Practical :	2 Hrs/week	***Total Credits***	:	01
Evaluation Scheme (Marks)	:	IPE=50		***Duration of IPE***	:	2 hrs
Revision:	:	Fourth		***Month***	:	March 2020
Pre-requisites	:	Laboratory work in Electrical Engineering. Other Pre-requisites include knowledge of basic physics from higher secondary certificate examinations				
Type of Course	:	Practical				
Course Domain	:	Engineering Sciences				
Skills Imbibed	:	Cognitive: Remember, Understand, Apply.				

Course Assessment Methods:
Practical Journal Assessment and Internal Practical Evaluation.

Course Objectives:

1.	To expose the students for practical training through experiments to understand about fundamental parameters such as resistance, inductance, capacitance and magnetic ,AC and DC circuits.
2.	To impart knowledge of the concepts of transformer, different energy conversions machines
3.	To make them understand electrical safety precautions

Course Outcomes: Learner will be able to

1.	To conduct experiments on D.C. circuits and AC circuits.
2.	To understand the basics laws of magnetic circuit
3.	To understand the applications of various rotating machines
4.	To study the speed control methods for DC motor
5.	To understand Basic wiring and Earthing systems.

Practical Covered:

1.	Verification of Kirchhoff's law
2.	Verification of Ohms law
3.	Study of series RLC circuit
4.	Open circuit and short circuit test on single phase transformer
5.	Study of AC and DC motor starters
6.	Speed control methods of DC motors
7.	Study of various electrical lamps
8.	Study of BH curve for magnetic material
9.	Study of various wiring systems and switchgear

10.	To study safety precautions while working on electrical systems, handling of various equipment's such as multimeter, ammeters, voltmeters, wattmeter's, real life resistors, inductors and capacitors
11.	To demonstrate different types of electrical protection equipments such as fuses, MCB, MCCB, ELCB.
12.	To study of LT and HT electricity bills
References:	
1	Fundamentals of Electrical Engineering by Ashfaq Husain, Dhanpat Rai Company
2	Electrical Technology By H.Cotton.
3	L. S. Bobrow, —Fundamentals of Electrical Engineering, Oxford University Press, 2011
4	D.C. Kulshreshtha, —Basic Electrical Engineering, McGraw Hill,2009

Class	:	**First Year B. Tech (All Program)**				
Course Title	:	**Lab.-V Programming with Scilab and Matlab**		***Course Code*:**	:	ES-12A7 ES-11B7
Teaching Scheme (Hours)	:	Tutorial :	1 Hrs/week	***Total Credits***	:	01
Evaluation Scheme (Marks)	:	IPE=50		***Duration of IPE***	:	2 hrs
Revision:	:	Fourth		***Month***	:	March 2020
Pre-requisites	:	Basic knowledge of Mathematics, Differentiation, Integration.				
Type of Course	:	Practical				
Course Domain	:	Engineering Sciences				
Skills Imbibed	:	Cognitive: Remember, Understand, Apply				

Course Assessment Methods:
Student is evaluated during Internal Examination.

Course Objectives:

1.	To familiarize the students with mathematical software's.
2.	To develop mathematical skills and enhance logical thinking power of students using mathematical software's.
3.	To provide students with skills in Scilab and Matlab programming which would enable them to devise engineering solutions for given situations they may encounter in their profession.
4.	To produce graduates with mathematical knowledge, computational skills and the ability to deploy these skills effectively in the solution of problems, principally in the area of engineering.

Course Outcomes:

1.	To familiarize the student in introducing and exploring Scilab and Matlab software's.
2.	Understand the main features of the Scilab and Matlab.
3.	To enable the student on how to approach for solving Engineering Mathematics problems using Scilab and Matlab.
4.	To solve complicated numerical problems by writing Scilab and Matlab programs.
5.	Interpret and visualize simple mathematical functions and operations using Scilab and Matlab.

List of Tutorials/Practical Covered:

1.	Introduction of programming with Scilab and Matlab.
2.	Installation of Scilab and Matlab.
3.	Introduction to Matrices in Scilab and Matlab
4.	Solving system of equations.
5.	Finding the Eigen values and Eigen vectors.

6.	Plotting of 2D and 3D Curves.
7.	Finding the roots of equation.
8.	Finding the Maxima and Minima of a Curve.
9.	Algebra of Complex variable.
10.	Plotting of Complex function.
11.	Solving Differential Equations.
12.	Numerical solutions of differential equations of first order and first degree
13.	Finding Indefinite Integral.
14.	Finding Definite Integral.
15.	Complex variable: Integration
References:	
1.	Scilab Textbook Companion for Higher Engineering Mathematics by B. S. Grewal
2.	Claude Gomez, Engineering and Scientific Computing with Scilab, Springer Science & Business Media, 01-Jul-1999
3.	Vinu V. Das, Programming in Scilab 4.1, 2009 ISBN: 978-8122424713
4.	Dr. M. Affouf, Scilab by example, 2012, ISBN: 978-1479203444
5.	William J. Palm III, Introduction to MATLAB for Engineers, Published by McGraw-Hill

Class	:	**First Year B. Tech (All Program)**				
Course Title	:	**Lab.-VI Professional Communication**		***Course Code*:**	:	HS-12A1 HS-11B1
Teaching Scheme (Hours)	:	Lecture :	2 Hrs/week	***Total Credits***	:	02
		Tutorial :	0 Hrs/week			
Evaluation Scheme (Marks)	:	IPE=50		***Duration of IPE***	:	2 hrs
Revision:	:	Fourth		***Month***	:	March 2020
Pre-requisites	:	Class Room, Language Lab, Projector etc.				
Type of Course	:	Theory and Practical				
Course Domain	:	Humanities and Social Sciences				
Skills Imbibed	:	Cognitive: Remember, Understand, Apply				

Course Assessment Methods:
Internal oral and overall performance.

Course Objectives:

1.	To help the students to use communicative language and effectively express information.
2.	To learn the art of effective use of grammar rules in speaking and writing.
3.	To help the students to make appropriate decisions, self-understanding, team building skills.
4.	To acquire the techniques of letter and report writing in the world of business.
5.	To learn pronunciation for fluency in speech
6.	To know the tenets of presentation by using audio-visual aids.

Course Outcomes:

1.	Students will be able to communicate language effectively.
2.	Students learn to use grammar rules in spoken and written English.
3.	Students will be able to learn personality traits and soft skills.
4.	Students acquire required skills for technical writings.
5.	Students learn fluency and pronunciation.
6.	Students acquire techniques for presentation skills.

Curriculum Content:	**Hours**
Unit 1 Communication Skills 1.1 Nature & importance of Communication Skills 1.2 Communication Process 1.3 Types of communication- Verbal and Non-Verbal 1.4 Barriers and filters of communication 1.5 Strategic Communication	3
Unit 2 Grammar 2.1 Types of Sentences 2.2 Word Classes 2.3 Tenses	2
Unit 3 Introducing Soft Skills 3.1 Self-understanding	3

3.2 Time Management and Stress Management 3.3 Leadership Skills 3.4 Problem Solving Skills 3.5 Team Work and Decision Making Skills	
Unit 4 Technical Writing and Career Skills 4.1 Job Application and Resume Writing 4.2 Report Writing 4.3 Interview 4.4 Group Discussion and Debate	2
Unit 5 Understanding Phonetics 5.1 Introduction to phonetics and alphabets 5.2 Phonetic Transcription 5.3 Listening and Practice of phonetics	2
Unit 6 Presentation Skills 6.1 Introduction to oral presentation 6.2 Plan and prepare your presentation 6.3 Organize your presentation	2

Practical Covered:	
1.	Introduce Yourself
2.	Effective reading and active listening
3.	Dialogue Writing and Role Play
4.	Team Building Activities / Story Writing
5.	Group Discussion and Debate (Practice and Lab Session)
6.	Mock Interviews (Practice and Lab Session)
7.	Report Writing (Practice and Lab Session)
8.	Letter Writing (Practice and Lab Session)
9.	Fluency Tips and Pronunciation (Lab Session)
10.	Computer aided Presentation
Suggested Text Books:	
1.	Effective Technical Communication by M Ashraf Rizvi
2.	Professional Communication Skills by Mr. A.K.Jain , Pravin S. R. Bhatia
3.	Bahvioral Science by Dr. Abha Singh
4.	Soft Skills for Everyone by Jeff Butterfield
5.	Body Language by Allen Pease
6.	Write Right by Syed Abdur Raheem
7.	Better English Pronunciation by J.D.O' Connor
8.	I Can't Speak English by Jason West
Suggested Reference Books:	
1.	Oxford Guide To English Grammar by John Eastwood

2.	Communication Skills Handbook: How to succeed in written and oral communication by Jane Summers.
3.	Dealing With Difficult People by Ken Pierce
4.	Business Ethics and Communication by C.S.TejpalSeth

Equivalence of First Year B. Tech Semester I & II

The above detailed syllabus is a revised version of the First Year B. Tech course being conducted by the Shivaji University at the Technology Department of the University. This syllabus is to be implemented from June 2020 (Academic Year 2020-21).

The Equivalence for the subjects of First Year B. Tech Semester I and II pre-revised course under the faculty of Science and Technology is as follows.

First Year B. Tech Semester I & II

Sr. No.	First Year B. Tech Semester I & II Pre-revised syllabus	First Year B. Tech Semester I & II Revised syllabus	Remark
1	Engineering Mathematics–I	Engineering Mathematics–I	Change in the Course content.
2	Engineering Physics	Engineering Physics	Change in the Course content.
3	Engineering Mechanics	Engineering Mechanics	Change in the Course content.
4	Fundamentals of Mechanical Engineering	Basics of Mechanical Engineering	Change in the title and Course content.
5	Electronic Components and Devices	Basic Electronics Engineering	Change in the title and Course content.
6	Lab.-I Engineering Physics	Lab.-I Engineering Physics	Change in the Course content.
7	Lab.–II Engineering Mechanics	Lab.–III Engineering Mechanics	Change in the Course content.
8	Lab.–III Fundamentals of Mechanical Engineering	Lab.–II Basics of Mechanical Engineering	Change in the title and Course content.
9	Lab.–IV Electronic Components and Devices	Lab.–IV Basic Electronics Engineering	Change in the title and Course content.
10	Lab.–V Professional Communication	Lab.–VI Professional Communication	Change in the Course content.
11	Lab.-VI Matlab and Scilab	Lab.-V Programming with Scilab and Matlab	Change in the title and Course content.
12	Engineering Mathematics–II	Engineering Mathematics–II	Change in the Course content.
13	Engineering Chemistry	Engineering Chemistry	Change in the Course content.

14	Fundamentals of Civil Engineering	Basic Civil Engineering	Change in the title and Course content.
15	Engineering Graphics	Engineering Graphics	Change in the Course content.
16	Fundamentals of Electrical Engineering	Basic Electrical Engineering	Change in the title and Course content.
17	Lab.–I Engineering Chemistry	Lab.–I Engineering Chemistry	Change in the Course content.
18	Lab.–II Fundamentals of Civil Engineering	Lab.–III Basic Civil Engineering	Change in the title and Course content.
19	Lab.–III Engineering Graphics	Lab.–II Engineering Graphics	Change in the Course content.
20	Lab.-IV Fundamentals of Electrical Engineering	Lab.-IV Basic Electrical Engineering	Change in the title and Course content.
21	Lab.–V Workshop Practice	Lab.–VI Workshop Practice	Change in the Course content.
22	Lab.–VI Computer Programming	Lab.–V Computer Programming	Change in the Course content.