



**SHIVAJI UNIVERSITY, KOLHAPUR**  
**FIRST YEAR B.TECH**  
 Scheme of Teaching and Examination



**Semester - I (Group-A)**

Sr. No.		Teaching Scheme (Hours / Week)				Examination Scheme (Marks)					
		L	T	P	Credits	Theory			Practical/Tutorial		
						Scheme	Max. Marks	Min. Passing \$	Scheme	Max. Marks	Min. Passing \$
1.	Engineering Mathematics-I	4	1	-	05	CIE	50	40	---	---	---
						SEE	50		---	---	---
2.	Engineering Physics	3	-	-	03	CIE	50	40	---	---	---
						SEE	50		---	---	---
3.	Engineering Mechanics	4	-	-	04	CIE	50	40	---	---	---
						SEE	50		---	---	---
4.	Fundamentals of Mechanical Engineering	3	-	-	03	CIE	50	40	---	---	---
						SEE	50		---	---	---
5.	Electronic Components and Devices	3	-	-	03	CIE	50	40	---	---	---
						SEE	50		---	---	---
6.	Lab.-I Engineering Physics	-	-	2	01	---	---	---	IPE	50	20
7.	Lab.-II Engineering Mechanics	-	-	2	01	---	---	---	IPE	50	20
8.	Lab.-III Fundamentals of Mechanical Engineering	-	-	2	01	---	---	---	IPE	50	20
9.	Lab.-IV Electronic Components and Devices	-	-	2	01	---	---	---	IPE	50	20
10.	Lab.-V Professional Communication	2	-	-	02	---	---	---	IPE	50	20
11.	Lab.-VI Matlab and Scilab	-	1	-	01	---	---	---	IPE	50	20
	<b>Total</b>	<b>19</b>	<b>2</b>	<b>8</b>	<b>25</b>		<b>500</b>			<b>300</b>	

Total Credits: 25

Total Contact Hours/Week: 29 hrs

**Note:**

\$: Minimum 40% marks required in CIE to become eligible for SEE.

Tutorials and practical shall be conducted in batches with batch strength not exceeding 20 students.

CIE – Continuous Internal Evaluation

SEE – Semester End Examination

IPE – Internal Practical Evaluation

\* Semester End Examination duration will be 4 hrs



**SHIVAJI UNIVERSITY, KOLHAPUR**  
**FIRST YEAR B.TECH**  
 Scheme of Teaching and Examination



**Semester - I (Group-B)**

Sr. No.		Teaching Scheme (Hours / Week)				Examination Scheme (Marks)					
		L	T	P	Credits	Theory			Practical/Tutorial		
						Scheme	Max. Marks	Min. Passing \$	Scheme	Max. Marks	Min. Passing \$
1.	Engineering Mathematics-I	4	1	-	05	CIE	50	40	---	---	---
						SEE	50		---	---	---
2.	Engineering Chemistry	3	-	-	03	CIE	50	40	---	---	---
						SEE	50		---	---	---
3.	Fundamentals of Civil Engineering	3	-		03	CIE	50	40	---	---	---
						SEE	50		---	---	---
4. *	Engineering Graphics	4	-		04	CIE	50	40	---	---	---
						SEE	50		---	---	---
5.	Fundamentals of Electrical Engineering	3	-		03	CIE	50	40	---	---	---
						SEE	50		---	---	---
6.	Lab.-I Engineering Chemistry	-	-	2	01	---	---	---	IPE	50	20
7.	Lab.-II Fundamentals of Civil Engineering	-	-	2	01	---	---	---	IPE	50	20
8.	Lab.-III Engineering Graphics	-	-	2	01	---	---	---	IPE	50	20
9.	Lab.-IV Fundamentals of Electrical Engineering	-	-	2	01	---	---	---	IPE	50	20
10.	Lab.-V Workshop Practice	-	-	2	01	---	---	---	IPE	50	40
11.	Lab.-VI Computer Programming	1	-	2	02	---	---	---	IPE	50	20
	<b>Total</b>	<b>18</b>	<b>1</b>	<b>12</b>	<b>25</b>		<b>500</b>			<b>300</b>	

Total Credits: 25

Total Contact Hours/Week: 31 hrs

**Note:**

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CIE – Continuous Internal Evaluation

SEE – Semester End Examination

IPE – Internal Practical Evaluation

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**SHIVAJI UNIVERSITY, KOLHAPUR**  
**FIRST YEAR B.TECH**  
 Scheme of Teaching and Examination



**Semester - II (Group-A)**

Sr. No.		Teaching Scheme (Hours / Week)				Examination Scheme (Marks)					
		L	T	P	Credits	Theory			Practical/Tutorial		
						Scheme	Max. Marks	Min. Passing \$	Scheme	Max. Marks	Min. Passing \$
1.	Engineering Mathematics-II	4	1	-	05	CIE	50	40	---	---	---
						SEE	50		---	---	---
2.	Engineering Chemistry	3	-	-	03	CIE	50	40	---	---	---
						SEE	50		---	---	---
3.	Fundamentals of Civil Engineering	3	-		03	CIE	50	40	---	---	---
						SEE	50		---	---	---
4.*	Engineering Graphics	4	-		04	CIE	50	40	---	---	---
						SEE	50		---	---	---
5.	Fundamentals of Electrical Engineering	3	-		03	CIE	50	40	---	---	---
						SEE	50		---	---	---
6.	Lab.-I Engineering Chemistry	-	-	2	01	---	---	---	IPE	50	20
7.	Lab.-II Fundamentals of Civil Engineering	-	-	2	01	---	---	---	IPE	50	20
8.	Lab.-III Engineering Graphics	-	-	2	01	---	---	---	IPE	50	20
9.	Lab.-IV Fundamentals of Electrical Engineering	-	-	2	01	---	---	---	IPE	50	20
10.	Lab.-V Workshop Practice	-	-	2	01	---	---	---	IPE	50	40
11.	Lab.-VI Computer Programming	1	-	2	02	---	---	---	IPE	50	20
<b>Total</b>		<b>18</b>	<b>1</b>	<b>12</b>	<b>25</b>		<b>500</b>			<b>300</b>	

Total Credits: 25

Total Contact Hours/Week: 31 hrs

**Note:**

\$: Minimum 40% marks required in CIE to become eligible for SEE.

Tutorials and practical shall be conducted in batches with batch strength not exceeding 20 students.

CIE – Continuous Internal Evaluation

SEE – Semester End Examination

IPE – Internal Practical Evaluation

\* Semester End Examination duration will be 4 hrs



**SHIVAJI UNIVERSITY, KOLHAPUR**  
**FIRST YEAR B.TECH**  
 Scheme of Teaching and Examination



**Semester - II (Group-B)**

Sr. No.		Teaching Scheme (Hours / Week)				Examination Scheme (Marks)					
		L	T	P	Credits	Theory			Practical/Tutorial		
						Scheme	Max. Marks	Min. Passing \$	Scheme	Max. Marks	Min. Passing \$
1.	Engineering Mathematics-II	4	1	-	05	CIE	50	40	---	---	---
						SEE	50		---	---	---
2.	Engineering Physics	3	-	-	03	CIE	50	40	---	---	---
						SEE	50		---	---	---
3.	Engineering Mechanics	4	-	-	04	CIE	50	40	---	---	---
						SEE	50		---	---	---
4.	Fundamentals of Mechanical Engineering	3	-	-	03	CIE	50	40	---	---	---
						SEE	50		---	---	---
5.	Electronic Components and Devices	3	-	-	03	CIE	50	40	---	---	---
						SEE	50		---	---	---
6.	Lab.-I Engineering Physics	-	-	2	01	---	---	---	IPE	50	20
7.	Lab.-II Engineering Mechanics	-	-	2	01	---	---	---	IPE	50	20
8.	Lab.-III Fundamentals of Mechanical Engineering	-	-	2	01	---	---	---	IPE	50	20
9.	Lab.-IV Electronic Components and Devices	-	-	2	01	---	---	---	IPE	50	20
10.	Lab.-V Professional Communication	2	-	-	02	---	---	---	IPE	50	20
11.	Lab.-VI Matlab and Scilab	-	1	-	01	---	---	---	IPE	50	20
<b>Total</b>		<b>19</b>	<b>2</b>	<b>8</b>	<b>25</b>		<b>500</b>			<b>300</b>	

Total Credits: 25

Total Contact Hours/Week: 29 hrs

**Note:**

\$: Minimum 40% marks required in CIE to become eligible for SEE.

Tutorials and practical shall be conducted in batches with batch strength not exceeding 20 students.

CIE – Continuous Internal Evaluation

SEE – Semester End Examination

IPE – Internal Practical Evaluation

\* Semester End Examination duration will be 4 hrs

### **Detailed Examination Scheme**

1. Out of total 100 theory marks, 50 marks are allotted for Continuous Internal Evaluation (CIE). In CIE minimum 20 marks are required to become eligible for Semester End Examination (SEE).
2. CIE (50 marks) includes :
  - Internal Test – 1, of 25 marks in 5<sup>th</sup> week on 1<sup>st</sup> and 2<sup>nd</sup> UNIT
  - Internal Test - 2, of 25 marks in 10<sup>th</sup> week on 3<sup>rd</sup> and 4<sup>th</sup> UNIT
3. For the Semester End Examination (SEE), 100 marks (3 hrs.) paper will be set and finally it will be converted to 50 marks, in which student must secure minimum 40 % i.e. 20 marks as university examination passing head.
4. Final theory marks (out of 100) will be the addition of CIE (out of 50 marks) and SEE (out of 50 marks).
5. Internal Practical Evaluation (IPE) will be assessed on the basis of Internal Oral/ Practical/Tutorials/seminar in which student must secure minimum 40% i.e. 20 marks.
6. \*Semester End Examination duration will be 4 hrs.

### **Academic Autonomy:**

1. Flexibility in deciding Structure and Contents of Curriculum with reasonable frequency for changes in the same.
2. Continuous Assessment of Students performance with newly adopted - Credit System based on Award of Grade.
3. Credits are quite simply a means of attaching relative values to courses different components. They are a currency of learning, and in general regarded as a measure of the time typically required to achieve a given curricular outcome.
4. All subjects (year-wise) under each course/discipline are unitized.

**Credit system:**

Education at the Institute is organized around the semester-based credit system of study. The prominent features of the credit system are a process of continuous evaluation of a student's performance/progress and flexibility to allow a student to progress at an optimum pace suited to his/her ability or convenience, subject to fulfilling minimum requirements for continuation.

A student's performance/progress is measured by the number of credits that he/she has earned, i.e. completed satisfactorily. Based on the course credits and grades obtained by the student, grade point average is calculated. A minimum grade point average is required to be maintained for satisfactory progress and continuation in the program. Also a minimum number of earned credits and a minimum grade point average should be acquired in order to qualify for the degree. All programs are defined by the total credit requirement and a pattern of credit distribution over courses of different categories.

**Course credits assignment:**

Each course, except a few special courses, has a certain number of credits assigned to it depending upon its lecture, tutorial and laboratory contact hours in a week. This weight-age is also indicative of the academic expectation that includes in-class contact and self-study outside of class hours.

**Lectures and Tutorials:** One lecture or tutorial hour per week per semester is assigned one credit.

**Practical/Laboratory:** One laboratory hour per week per semester is assigned half credit.

**Example:** Course: Engineering Graphics: 4 credits (3-0-2)

The credits indicated for this course are computed as follows:

3 hours/week lectures = 3 credits

0 hours/week tutorial = 0 credit

2 hours/week practical =  $2 \times 0.5 = 1$  credit

Also, (3-0-2) **5** credit course = (3 h Lectures + 0 h Tutorial + 2 h Practical) per week  
= **5** contact hours per week

For each lecture or tutorial credit, the self study component is 1 hour/week and 2 hours/week. In the above example, the student is expected to devote  $3 + 1 = 4$  hours per week on self study for this course, in addition to class contact of 5 hours per week.

### **Earning credits:**

At the end of every course, a letter grade is awarded in each course for which a student had registered. On obtaining a pass grade, the student accumulates the course credits as earned credits. A student's performance is measured by the number of credits that he/she has earned and by the weighted grade point average.

The credit system enables continuous evaluation of a student's performance, and allows the students to progress at an optimum pace suited to individual ability and convenience, subject to fulfilling minimum requirement for continuation.

### **Features of Credit System at Department of Technology, Shivaji University, Kolhapur:**

Every subject is allotted credits based on its academic importance/weight age.

1. All subjects may not have same credits.
2. 25 Credits / Semester.
3. Absolute Grading System with 7 Passing Grades viz. AA, AB, BB, BC, CC, CD, DD and FF for failure.
4. Getting FF grades in 4 heads in the one academic year he/she considered as failed.
5. Continuous Evaluation: Internal Test 1 [25 marks], and Internal Test 2 [25 marks].
6. Standardization of courses; each course is of 6 units. T1 for UNIT 1 and 2, T2 for UNIT 3 and 4, SEE for all units and more weightage for UNIT 5 and UNIT 6.
7. Internal Test 1 and Internal Test 2 handled by internal; SEE mostly by external.
8. Under no circumstances will a request for re-test be entertained after internal test.

### **Attendance rule:**

All students must attend every lecture, tutorial and practical class. However, to account for late registration, sickness or other such contingencies, the attendance requirement will be a minimum of 75 % of the classes actually held. A student with less than 75 % attendance in a course during the semester, in lectures, tutorials and practicals taken together (as applicable), will be awarded an 'XX' grade in that course irrespective of his/her performance in the tests.

The course coordinator will award 'XX' grade to the student who is deficient in attendance taking into account the consolidated attendance record for the whole semester. For the purpose of attendance calculation, every scheduled practical class will count as one unit irrespective of the number of contact hours.

Attendance record will be maintained based upon roll calls (or any equivalent operation) in

every scheduled lecture, tutorial and practical class. The course coordinator will maintain and consolidate attendance record for the course (lectures, tutorials and practicals together, as applicable).

### Evaluation system:

1. Semester Grade Point Average (SGPA) =

$$\frac{\sum (\text{course credits in passed courses} \times \text{earned grade points})}{\sum (\text{Course credits in registered courses})}$$

2. Cumulative Grade Point Average (CGPA) =

$$\frac{\sum (\text{course credits in passed courses} \times \text{earned grade points}) \text{ of all Semesters}}{\sum (\text{Course credits in registered courses}) \text{ of all Semesters}}$$

3. At the end of B. Tech Program, student will be placed in any one of the divisions as detailed below (According to AICTE Handbook 2011-12):

I<sup>st</sup> Division with distinction: CGPA  $\geq$  8.25 and above

I<sup>st</sup> Division : CGPA  $\geq$  6.75 and  $<$  8.25

II<sup>nd</sup> Division : CGPA  $\geq$  6.75 and  $<$  6.25

As per AICTE Handbook (2011-12), new gradation suggested as follows.

Grade Points	Equivalent Range
6.25	55%
6.75	60%
7.25	65%
7.75	70%
8.25	75%

Conversion of CGPA to percentage marks for CGPA  $>$  5.0 can be obtained using equations.

Percentage marks = (CGPA  $\times$  10) – 7.5

An example of these calculations is given below:

Typical academic performance calculations - I semester



Course no.	Course credits	Grade awarded	Earned credits	Grade points	Points secured
Col 1	Col 2	Col 3	Col 4	Col 5	Col 6 (col4 *col5)
MALXXX	5	CC	5	6	30
CSLXXX	4	CD	4	5	20
PHLXXX	4	AA	4	10	40
PHPXXX	2	BB	2	8	16
MELXXX	4	FF	0	0	00
TTNXXX	2	AB	2	9	18
Total	21		17	38	124

1. Semester Grade Point Average (SGPA) =

$$\frac{(124)}{(21)} = 5.90$$

2. Cumulative Grade Point Average (CGPA) =

Cumulative points earned in all passed courses = 124 (past semesters) + 124 (this sem.) = 248

Cumulative earned credits = 23 (past semesters) + 21 (this sem.) = 44

$$\frac{\sum (124 + 124)}{\sum (23 + 21)} = 5.63$$

#### System of Evaluation

Grade	Grade Points	Range	Description of Performance
AA	10	91-100	Outstanding
AB	09	86-90	Excellent
BB	08	76-85	Very Good
BC	07	66-75	Good
CC	06	56-65	Fair
CD	05	46-55	Average
DD	04	40-45	Poor
FF	00	Below 40	Fail
XX	--	--	Detained

ABSENT	--	--	Absent
*, **, ***, ...	--	--	Passed in 2 <sup>nd</sup> , 3 <sup>rd</sup> , 4 <sup>th</sup> ... Attempt
PP	--	--	Passed (Audit Course)
NP	--	--	Not Passed (Audit Course)

**Audit Courses:**

Additional courses shall be included as audit courses from the third semester onwards. While the performance of the student in audited courses shall be included in the Grade Card. These grades are not contributed to SGPA or CGPA of the concerned student.

**Award of Degree:**

Following rules prevail for the award of degree:

1. A Student has registered and passed all the prescribed courses under the general institutional and departmental requirements.
2. A student has obtained  $CGPA \geq 4.5$ .
3. A student has paid all the institute dues and satisfied all the requirements prescribed.
4. A student has no case of indiscipline pending against him/her.
5. Institute authorities shall recommend the award of B. Tech. Degree to a student who is declared to be eligible and qualified for above norms.

**CGPA Improvement Policy for award of degree:**

An opportunity shall be given to a student who has earned all the credits required by the respective program with CGPA greater than or equal to 4.00 but less than 4.50, to improve his/her grade by allowing him/her to appear for 100% examinations of maximum two theory courses of seventh and eighth semester. However, CGPA shall be limited to 4.5 even though the performance of a student as calculated through modified CGPA becomes greater than 4.5.

## Shivaji University, Kolhapur

### First Year B. Tech

### ENGINEERING MATHEMATICS - I

Teaching Scheme : L : 4 hrs/week

: T: 1 hrs/week

Evaluation Scheme: CIE SEE  
(25 + 25) 50

Credits: 5

Minimum Passing Marks  
40

#### Course Objective

1. To teach Mathematical methodologies and models.
2. To develop mathematical skills and enhance logical thinking power of students.
3. To provide students with skills in matrix, differential calculus, complex numbers & curve fitting 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 Outcome

1. Students in this course will apply the Procedure and methods to solve technical problems.
2. Student can understand how to model real world scenario using Mathematics
3. Students will be able to solve computational problems using Scilab/Matlab

#### Unit 1 Matrix Theory

8 hrs

Rank of a matrix, Normal form of a matrix, Consistency of the system of linear equations, linear dependence and independence of vectors, Eigen values and eigen vectors, Cayley-Hamilton Theorem and its applications.

#### Unit 2 Differential Calculus

8 hrs

Successive differentiation, Leibnitz's Theorem and its applications, Taylor's and Maclaurin's series, indeterminate forms.

#### Unit 3 Partial Differentiation

8 hrs

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.

#### Unit 4 Applications of Partial Differentiation

8 hrs

Errors and Approximation, Jacobian, Properties of Jacobian, Jacobian of Implicit function, Maxima and Minima of functions of two variables

#### Unit 5 Complex Numbers

8 hrs

Complex number, representation of a complex number in Cartesian & Polar co-ordinate systems, Argand's diagram, De'Moivre's Theorem and its applications, circular and inverse circular functions, hyperbolic and inverse hyperbolic functions, logarithm of complex numbers.

#### Unit 6 Curve fitting

8 hrs

Fitting of Curves by method of Least-squares for linear, parabolic, and exponential, Coefficient of correlation, Spearman's rank correlation, coefficient and lines of regression of bivariate data.

**Suggested list of Tutorials/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. Applications of De'Moivres theorem
9. Fitting of curves
10. Coefficient of Correlation
11. Lines of Regression
12. Introduction to scilab/Matlab

**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 Scilab/Matlab 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. Fitting of curves
  5. Coefficient of Correlation
  6. Lines of Regression

**Reference Books-**

1. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publications, New Delhi.
2. C.R.Wylie, "Advanced Engineering Mathematics", McGraw Hill Publication, New Delhi.
3. Erwin Kreyszig, "Advanced Engineering Mathematics (7th Edition)", Wiley Eastern Ltd., Bombay.
4. P. N. Wartikar and J. N. Wartikar, "A Text Book of Engineering Mathematics (Volume-I & II)", Pune Vidyarthi Griha Prakashan, Pune.
5. Shanti Narayan, "Differential Calculus" S. Chand and company, New Delhi.
6. S. S. Sastry, "Engineering Mathematics (Volume-I)", Prentice Hall Publication, New Delhi.
7. B.V. Ramana, "Higher Engineering Mathematics", Tata McGraw-Hill.

## Shivaji University, Kolhapur

### First Year B. Tech

### ENGINEERING PHYSICS

Teaching Scheme : L : 3 hrs/week

: T: 0 hrs/week

Evaluation Scheme: CIE SEE  
(25 + 25) 50

Credits: 3

Minimum Passing Marks  
40

#### Course Objective

- 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 Outcome

- 1 The student would be able to apply the concepts of physics in various branches of engineering
- 2 The student would be able to use the techniques, skills, and modern tools necessary for physics and engineering careers

#### UNIT 1 Ultrasonic

4 hrs

Introduction, production of ultrasonic waves- piezo-electric generator, detection of ultrasonic waves, properties of ultrasonic waves, use of ultrasonics for non-destructive testing, Industrial applications of ultrasonics.

#### UNIT 2 Optics

7 hrs

Interference – Superposition of waves, spatial and temporal coherence, interference in thin films by reflection, Diffraction – Fresnel and Fraunhofer diffractions, Diffraction grating, Determination of wavelength using diffraction grating.

Polarization – Types of polarization, polarization by reflection and polarization by scattering.

#### UNIT 3 Lasers

8 hrs

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 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, transmission of light in step index fibre, graded index fibre, transmission of light in graded index fibre, attenuation in optical fibre, applications (medical, military, communication)

#### UNIT 4 Crystallography

7 hrs

Basics of crystal structure-space lattice & point lattice, Unit cell, number of atoms per unit cell, coordination number, Bravais lattice (seven crystal systems), Packing fraction for close packed systems, Miller indices. X-Ray diffraction and Bragg's law.

#### UNIT 5 Physics of Materials

6 hrs

superconductivity- General properties, Meissner effect, Type I and Type II superconductors, applications of superconductors

Nanoscience: Nano Scale, nanostructured materials, properties of material at nanoscale:Surface to Volume Ratio, Quantum Confinement.

**UNIT 6 Nuclear and Solar energy**

**7 hrs**

Nuclear fission – Discovery of fission, binding energy curve, chain reaction (fission of U235), essentials of nuclear reactor. Nuclear fusion – Thermonuclear reaction, p-p chain, C-N cycle.

Classification of particles.

Solar energy – solar spectrum, Ways of harnessing solar energy-solar photovoltaic and solar thermal.

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)

**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 Kittel, "Introduction to Solid State Physics," Wiley India Pvt
5. L. Tarasov, "Laser Physics and Applications," Mir Publishers.
6. M. N. Avadhanulu and P. G. Kshirsagar "Engineering Physics", S. Chand Publication.
7. P.K. Palanisamy, "Solid State Physics", Scitech Publications (India) Pvt. Ltd.
8. R. K. Gaur and Gupta S. L, "Engineering Physics", Dhanapat Rai and Sons Publication.
9. Resnick Halliday, "Physics Volume-I", Krane -John Wiley & Sons Pub.
10. Resnick Halliday, "Physics Volume-II", Krane -John Wiley & Sons Pub. Ltd.
11. S. O. Pillai, "Solid State Physics: Structure & Electron Related Properties", Eastern Ltd,, New Age International Ltd.
12. V. Rajendran, "Engineering Physics", Tata Mc-Graw Hill Company Ltd, New Delhi
13. I. Kaplan, Nuclear Physics(Narosa)
14. K. S. Krane, Introduction to Nuclear Physics (Wiley)
15. D. H. Perkins, Introduction to High Energy Physics (Cambridge University Press)
16. C. Kittel, Introduction to Solid State Physics (Wiley)
17. N. W. Ashcroft and N. D. Mermin, Solid State Physics (Cengage Learning)
18. H. Ibach and H. Luth, Solid State Physics (Springer)
19. A. Beiser, Concept of the Modern Physics, McGraw-Hil
20. E. Hecht and A. R Ganesan ,Optics, Dorling Kindersley

## Shivaji University, Kolhapur

### First Year B. Tech

### ENGINEERING MECHANICS

Teaching Scheme : L : 4 hrs/week

: T: 0 hrs/week

Evaluation Scheme: CIE SEE  
(25 + 25) 50

Credits: 4  
Minimum Passing Marks  
40

#### Course Objectives :

1. To introduce scope of mechanics, concepts and methods of mechanics needed for application in various branches of engineering problems.
2. To learn various branches of mechanics and distinguish between particle and rigid body
3. To develop the logic in such a way that student will be able to draw free body diagram in solving in solving mechanics problems.
4. To recognize various types of static as well as dynamic problems.
5. To prepare students for future courses in Mechanics, structural analysis and Structural Steel Design and Drawing

#### Course Outcomes :

Students will be able to

1. Differentiate between Scalar and Vector Quantities
2. Understand the characteristics of force, system of forces, learn to resolve forces.
3. Understand the moment and couple of forces and effect of moment on rigid body
4. Compute resultant of coplanar concurrent and non-concurrent force system.
5. Distinguish between C.G. and Centroid, Compute moment of inertia of plane figures and composite figures.
6. Understand and analyze beam as a structure and compute support reactions using Lami's theorem & equilibrium Conditions for concurrent, parallel and general force system.
7. Understand Truss as a structural member and analyze plane trusses by the method of joints and sections
8. Understand the concept of dynamic as applied to particle.
9. Introduce & define Kinematics of Rigid body, get idea about translation, rotation, general plane motion
10. To Know principle of work & energy application

#### UNIT 1 Laws of Forces and Moments Centroid and Second moment of area

8 hrs

SI Units, Basic Units, Derived units, Particle, Body, Elastic Body, Rigid Body, Scalar quantities, Vector Quantities, Force, Resolution of a force, Law of Transmissibility of force, Moment of a force, couple, moment of a couple, Resultant, Parallelogram of forces, triangle law of forces, polygon of forces, Varignon's theorem, Composition of forces, co-planar concurrent and non concurrent forces, analytical method, and Graphical method

Centre of gravity, Centroid, Centroid of composite area, Second moment of area, Moment of inertia of sections, Parallel axes theorem, Perpendicular axes theorem, M.I. of unsymmetrical sections, Radius of gyration, polar moment of inertia.

#### UNIT 2 Equilibrium of Co-planer Forces

6 hrs

Analytical and graphical conditions of equilibrium, different types of supports, free body diagram, Lami's theorem, Problems on compound frames with hinged joints, Pulleys, Theory of friction, Laws of Friction and Applications of friction. Equilibrium of beam, point load, uniformly varying load and couple, Support reactions of statically determinate beams, Virtual work

#### UNIT 3 Analysis of Trusses

5 hrs

Pin-jointed statically determinate plane trusses, Assumptions, Static degree of indeterminacy, Analysis of statically determinate trusses by method of joints, method of sections.

**UNIT 4 Kinematics**

**9 hrs**

Introduction to various types of motions, Kinematics of particles, rectilinear motion, Equations of linear motion with constant and variable acceleration, motion under gravity, Angular motion, Relation between angular motion and linear motion, Equation of angular motion, Tangential and radial acceleration, Centrifugal and Centripetal forces, Motion along a curved path, Super elevation of road and railway curves, motion of a projectile.

**UNIT 5 Kinetics**

**4 hrs**

Newton's Laws of motion for linear and angular motion, Torque, Mass moment of inertia, D'Alembert's principle, Problems on linear motion and centroidal rotation.

**UNIT 6 Work, Power, Energy**

**7 hrs**

Work done by a force, spring, potential energy, kinetic energy of linear motion and rotation, work energy equation, Principle of conservation of energy, impulse momentum principle. Collision of elastic bodies; direct central impact, oblique impact, coefficient of restitution, loss of kinetic energy.

**References-**

1. Arthur Boresi & Richard Schmit, "Engineering Mechanics (Statics & Dynamics)", Brookes/Cole Publications
2. Bhavikatti. S. S and Rajashekarappa. K. G., "Engineering Mechanics", New Age International Publications, 5006, 2nd Edition.
3. F.P. Beer and E. R. Johnston, "Vector Mechanics for Engineers Vol. I and II", McGraw Hill Company Publication, 5006, 7th Edition.
4. Khurmi. R. S., "Textbook of Applied Mechanics", Tata McGraw Hill Publishing Company, 5006, 1st Edition.
5. K. I. Kumar, "Engineering Mechanics", Tata Mc-Graw Hill Publication.
6. McLean and Nelson "Engineering Mechanics", Schaum's outline series, (McGraw Hill Book Company, New Delhi, Publication.)
7. Ramamrutham. S, "Textbook of Applied Mechanics", Dhanpat Rai Publications, 1987, 4th Edition.
8. Singer.F. L, "Engineering Mechanics Statics & Dynamics, (Harper and Row Publishers, New York)
9. Shames. I. H, "Engineering Mechanics", Statics & Dynamics, Prentice Hall Publication, 5007, 4th Edition.
10. Timoshenko. S. & Young. D. H, "Engineering Mechanics", McGraw Hill Book Company Publication, 5006, 4th Edition.
11. Thadani. B. N, "Engineering Mechanics", Weinall Book Corporation, 1987, 1st Edition.



## Shivaji University, Kolhapur

### First Year B. Tech

## FUNDAMENTALS OF MECHANICAL ENGINEERING

Teaching Scheme : L : 3 hrs/week

: T: 0 hrs/week

Evaluation Scheme: CIE SEE

(25 + 25) 50

Credits: 3

Minimum Passing Marks

40

### Course Objectives:

The course will help the student to

1. Acquire basic knowledge of mechanical engineering.
2. Impart knowledge of basic concepts of thermodynamics applied to industrial application.
3. Understand principle of energy conversion system and power plants.
4. Understand and identify power transmission devices with their functions.
5. Learn and understand manufacturing process.
6. Describe the scope of mechanical engineering in multidisciplinary industries.

### UNIT 1 Fundamentals of Thermodynamics

6 hrs

Thermodynamics state, systems, path, process and cycle, point and path functions, energy forms, work and heat, types of work such as shaft work, displacement (PdV) work, flow work, electrical work, paddle wheel work and magnetic work.

Thermodynamics Laws – Zeroth law, first law of thermodynamics: statement, Perpetual motion machine (PMM-I), steady flow energy equation and its applications to nozzle, turbine, compressor, fan, pump, throttling valves, heat exchangers Etc.

Gas Laws: Boyle's law, Charle's law, Combined gas law

### UNIT 2 Internal Combustion Engines and Refrigeration

6 hrs

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 - COP - Vapor compression refrigeration and Vapor absorption refrigeration cycle and system, Applications of Air conditioning and Refrigeration

### UNIT 3 Heats and Mass Transfer

6 hrs

Statement and explanation of Fourier's law of heat conduction, Newton's law of cooling, Stefan Boltzmann's law. Conducting and insulating materials and their properties. Introduction, Modes of mass transfer, Analogy between heat and mass transfer

### UNIT 4 Power Transmission Devices, Pumps, Compressor and Turbines

6 hrs

Types of Belts and belt drives, Chain drive, Types of gears, Pumps, Compressor and Hydraulic Turbines: Types, Construction, working and applications

### UNIT 5 Energy Sources

6 hrs

Energy crisis, Introduction to non-conventional energy sources such as solar, wind, tidal, ocean wave, and ocean thermal, geothermal energy etc.

### UNIT 6 Introduction to Manufacturing Technology

6 hrs

Introduction to Manufacturing Processes & their Applications casting, Sheet metal forming and metal joining processes etc

**REFERENCE BOOKS :-**

1. Dr. S. P. Sukathame, Solar Energy, Tata Mc-Graw Hill Publication
2. Eastop and McConkey, "Applied Thermodynamics" Publisher: Pearson
3. E. Rathakrishnan, "Thermodynamics publisher". PHI
4. G. D. Rai, Non Conventional Sources of Energy, Khanna Publication
5. M.Achuthan, "Engineering Thermodynamics" Publisher: PHI
6. M. K. Rodge, "Basic Thermodynamics", SadhuSudha Prakashan, Nanded.
7. P. B. Nagraj and D. Venkatesh, "Basic Thermodynamics", New Age International Publishers.
8. P. K. Nag, "Engineering Thermodynamics", Tata McGraw Hill Pub. Company Limited, New Delhi
9. Russel and Adebisi, "Engineering Thermodynamics" publisher, Oxford
10. R. K. Rajput, "Heat transfer", S Chand Publication, Delhi.
11. R. K. Rajput, "Thermal Engineering", Laxmi Publications Pvt. Limited, New Delhi
12. T. S. Rajan, "Basic Mechanical Engineering", New Age International Publishers.
13. Van Wylen and Sonntag, "Engineering Thermodynamics" John Wiley
14. Yunus A. Cengel and Michael A. Boles, "Thermodynamics an Engineering approach", Tata McGraw Hill Publishing Company Limited, New Delhi.

## Shivaji University, Kolhapur

### First Year B. Tech

## ELECTRONIC COMPONENTS AND DEVICES

Teaching Scheme : L : 3 hrs/week

: T: 0 hrs/week

Evaluation Scheme: CIE SEE  
(25 + 25) 50

Credits: 3

Minimum Passing Marks  
40

### Course Objective

This course aims to equip the students with the basic understanding of electronics components and semiconductor diode. This course also equips students with an ability to understand basics of transducer and relays.

### Course Outcome

- 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

### UNIT 1 Circuit Elements

5hours

Resistors: - Definition, symbol and colour code method. [Construction, specifications and Application], Types of resistors: - Linear Resistors (Fixed): -Carbon composition, carbon ceramic, carbon film, wire wound. Linear resistors (Variable): -Wire wound, Potentiometer, Preset. Non-Linear resistors: - Thermistors, photo resistors and varistors. Specifications and Applications.

### UNIT 2 Capacitors

5hours

Definition, symbol and colour code method. Capacitance, capacitive reactance  $X_C$ , Energy stored in a capacitor, charging and discharging of a capacitor, leakage current in capacitor, stray capacitance. Types of capacitors: - Fixed electrostatic capacitors: -ceramic, mica, plastic and paper, Fixed electrolytic capacitors: - Aluminum and Tantalum polycarbonate Polyethylene. Construction of capacitors, Variable capacitors: -Air dielectric capacitor and Trimmers. Specifications, Applications.

### UNIT 3 Inductors, other components with specifications and materials

8hours

Definition, symbol, Inductance, Inductive reactance ( $X_L$ ), Energy stored in an inductor, Q Factor. Types of Inductors: - Air core, Iron core and ferrite core inductors. Use of Inductors: - Filter chokes AFC & RFC and Variable inductor. Relays: - Principle, construction and working of electromagnetic relay. Materials: - Dielectrics, ferroelectrics, Magnetic, Piezoelectric Materials, properties, characteristics and applications.

### UNIT 4 Semiconductor diodes and its applications

1 hours

The energy band theory of crystal (Mathematical treatment is not expected), Energy band Structure of insulators, semiconductor and metals. Types of semiconductors, conduction mechanism in semiconductors.

Definition of PN junction, formation of depletion layer and internal potential barrier. Biased junction: - Forward and Reverse biased V-I characteristics of p-n junction diode, Diode applications, power and current rating of diode, effect of temperature on PN junction diode, Diode Capacitances, Specifications of diode.

**Rectifiers:-** Half wave, full wave, bridge with L, C, L section and filter.

**Zener diode:-** Breakdown mechanism, Zener versus Avalanche Break down, V-I characteristics, Zener specifications, applications and effect of temperature on Zener diode, photo diode, varactor diode.

**UNIT 5 Other Semiconductor devices:-**

**5hours**

B.J.T--PNP &NPN construction , working Principle Transistor Configuration ,V-I Characteristics of CB & CE connection

Thyristors - Structure, Operation, V-I Characteristics & application of SCR, Triac ,diac.

**UNIT 6 Display devices &Transducer**

**5hours**

Display Devices - LED, 7segment display, LCD display, CRT.

Transducer - flow , Temp & pressure transducer

**Reference Books-**

1. Allen Mottershead. (PHI)"Electronics Devices & Circuits".
2. Bernard Grob "Basic Electronics"
3. Floyd"Electronics Devices"
4. J millman &C.C Halkias (TMH)"Basics Electronics &Linear circuits"
5. Madhuri Joshi , "Electronics materials &components "
6. Malvino, " Semiconductor Approximation"
7. N.N Bharagava, D.C.Kulshreshtha &S.C Gupta(TMh)"Basic Electronics & Linear circuits "
8. R.S. Sedha. "A text book of Applied Electronics". (S.Chand &Company)
9. R Boylested&Louis Nashalsky ."Electronics Devices & Circuit Theory"
10. V.K.Mehata "Principles of Electronics ".(New Edn)

## Shivaji University, Kolhapur

### First Year B. Tech

#### Lab. - I

### ENGINEERING PHYSICS

Teaching Scheme : P : 2 hrs/week

Credits: 1

Evaluation Scheme: IPE: 50

Minimum Passing Marks: 20

#### Course Objective

- 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 Outcome

- 1 The student would be able to apply the concepts of physics in various engineering branches.
- 2 The student would be able to use the techniques, skills, and modern tools necessary for physics and engineering careers

#### EXPERIMENTS (Any 10):

- 1 Diffraction grating - measurement of **grating element**.
- 2 Diffraction grating - measurement of wavelength of Laser.
- 3 Fresnel Bi-prism – determination of band width.
- 4 Study of divergence of laser beam
- 5 Measure thermophysical properties of nanofluids as a function of temperature & concentration.
- 6 Polarimeter – determination of specific rotation of sugar solution.
- 7 Measurement of dielectric constant of material.
- 8 To determine thermal conductivity in nanofluids.
- 9 Calculation of lattice constant from the given powder XRD pattern.
- 10 Determination of band gap of semiconductor material.
- 11 Study of I-V characteristics of a solar cell, LED and Diode Laser.
- 12 Photodiode – inverse square law.
- 13 Ultrasonic Interferometer -Measurement of velocity of ultrasounds in liquids.
- 14 Determination of compressibility of liquids
- 15 To study properties of LASER- Measurement of Power distribution within beam, beam spot size.
- 16 Band absorption spectrum of liquid (KMnO<sub>4</sub> solution)
- 17 Study of scattering of light (diameter of lycopodium powder)
- 18 Recording and reading of hologram
- 19 Study the losses in fibre optics-measurement of numerical aperture
- 20 Study properties of nanofluids-effect of concentration & temperature

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 6 assignments based on theory syllabus.

#### Recommended books:

- 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, Blackie

## Shivaji University, Kolhapur

### First Year B. Tech

#### Lab. - II

### ENGINEERING MECHANICS

Teaching Scheme : P : 2 hrs/week

Credits: 1

Evaluation Scheme: IPE: 50

Minimum Passing Marks: 20

#### Course Objective

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.
3. Verify Equilibrium conditions.
4. Determine coefficient of friction for two sliding surfaces.
5. Verify Law of Moments.
6. Find value of local gravitational acceleration.

#### EXPERIMENTS (Any 10):

1. Law of polygon of forces
2. Bell Crank Lever
3. Jib Crane
4. Simply Supported Beam
5. Fletchers Trolley
6. Centrifugal force
7. Measuring the acceleration due to gravity 'g' by the method of free fall
8. Moment of Inertia
9. Friction experiments on inclined planes
10. Experiment on truss
11. To find resultant (Coplanar Force Systems) - 2 problems
12. To find resultant (Non- Coplanar Force Systems) - 2 problems
13. To find support reactions of Beam- 2 problems
14. Forces in the members of statically determinate truss. - 2 problems
15. Model making based on experiment performed (group activity)
16. Report on field visit

#### ASSIGNMENTS:

At least 6 assignments based on theory syllabus.

#### Reference books:-

1. Engineering Mechanics by Bhavikatti S.S. and Rajashekarappa; New age International publication (India) Pvt. Ltd. New Delhi (2008)3rdEdition.
2. Engineering Mechanics by R. K. Bansal; Laxmi Publications (India) Pvt. Ltd. New Delhi (2005) 2th Edition.

**Shivaji University, Kolhapur**

**First Year B. Tech**

**Lab. - III**

**FUNDAMENTALS OF MECHANICAL ENGINEERING**

Teaching Scheme : P : 2 hrs/week

Credits: 1

Evaluation Scheme: IPE: 50

Minimum Passing Marks: 20

**EXPERIMENTS: ( ANY SIX)**

1. Demonstration of Two stroke and four stroke engine,
2. Demonstration of pumps and compressor
3. Study of domestic refrigerator & window air-conditioner.
4. Study of Wind mill, solar water heaters.
5. Demonstration Pumps, compressor, Turbines,
6. Study of power transmitting elements: Chain, Gear
9. study of Routine maintenance of two wheeler automobile
10. Study of Manufacturing Practices
11. Study of tidal power plant

**INDUSTRIAL VISIT: (ANY TWO)**

1. Industrial visit to Hydroelectric power plant
2. Industrial visit to Diesel power plant
3. Visit to chilling plant
4. Industrial visit to study manufacturing technology

## Shivaji University, Kolhapur

### First Year B. Tech

#### Lab. IV

### ELECTRONIC COMPONENTS AND DEVICES

Teaching Scheme : P : 2 hrs/week

Credits: 1

Evaluation Scheme: IPE: 50

Minimum Passing Marks: 20

#### Course Outcomes:

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

- 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.

#### EXPERIMENTS:

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. Characteristics of FET
8. I-V characteristics of SCR
9. Measurements of Temperature using any transducer.
10. Study of mobile Handset.
11. Measurement of distance using LVDT/strain gauge.
12. Testing of electronics components- Resistor, capacitor, inductor diode , Transistor , LED and switch using multi-meter and CRO
13. Visit to Telecommunication center.



## Shivaji University, Kolhapur

### First Year B. Tech

#### Lab. - V

### PROFESSIONAL COMMUNICATION

Teaching Scheme : L: 2 hrs/week

Credits: 1

Evaluation Scheme: IPE: 50

Minimum Passing Marks: 20

#### Unit 1- Communication

- (a) Nature and Importance of communication
- (b) Process and barriers of Communication
- (c) Types of communication

#### Unit 2- Techniques of Communication

- (a) Verbal Communication- Techniques of Formal speech, Meetings, Interviews, Group Discussion and Debate.
- (b) Non Verbal Communication- Body Language and its aspects.

#### Unit 3- Language Skills

- (a) Listening skills
- (b) Reading skills
- (c) Writing skills
- (d) Speaking skills

#### Unit 4- Introduction of Phonetics

#### Unit 5- Rapid Review of Grammar

- (a) Parts of speech
- (b) Tenses
- (c) Study of Articles- a, an, the
- (d) Study of Prepositions- in, on
- (e) Study of Conjunctions-and, but

#### Unit 6- Formal Writing skills

- (a) Office Drafting- Circulars, notices, memos(memorandum)
- (b) Job application letter with Resume
- (c) Report Writing- Importance and techniques of Report Writing

#### List of Practicals:

- 1) Self Introduction
  - (a) Introduce yourself
  - (b) Telling about your family background
  - (c) Telling about your school or colleges
  - (d) Telling about your hobbies, role model, strengths and goals.

- 2) Group Discussion
- 3) Formal Speech on selected topics
- 4) Vocabulary Development- Synonyms, Antonyms, Idioms and Phrases
- 5) Language Lab Sessions- on Phonetics & Grammar
- 6) A letter writing on job application with resume
- 7) Report writing –each type should be practised
- 8) Presentation techniques

**REFERENCE BOOKS:**

- 1) Pravit S. R. Bhatia, 'Professional Communication Skills', - S. Chand and company
- 2) Communication skills for engineers, Sunita Mishra, C. Murali Krishna – Pearson education
- 3) English for technical communication, K. R. Laxminarayan – Scith publications, Chennai
- 4) J.D.O. connor, Better English Pronunciation
- 5) Communication techniques and skills- R. K. Chadda – Dhanpat Rai Publication, New Delhi

## Shivaji University, Kolhapur

### First Year B. Tech

#### Lab. VI

### Matlab and Scilab

Teaching Scheme : T : 1 hrs/week

Evaluation Scheme: IPE: 50

Credits: 1

Minimum Passing Marks: 20

#### List of Tutorials/Practicals:

1. Introduction of Matlab and Scilab
2. Installation of Matlab and Scilab
3. Introduction to Matrices in Matlab/Scilab
4. Solving system of equations in Matlab/Scilab
5. Finding the eigen values and eigen vectors using Matlab/Scilab
6. Finding the Maxima and Minima of a Curve using Matlab/Scilab
7. Polynomial Curve Fitting using Matlab/Scilab
8. Least Squares Regression using Matlab/Scilab
9. Solving Differential Equations using Matlab/Scilab
10. Numerical solutions of differential equations of first order and first degree using Matlab/Scilab
11. Curve Tracing in Mathlab/Scilab
12. Finding Indefinite Integral using Matlab/Scilab
13. Finding Definite Integral using Matlab/Scilab
14. Complex variable in Scilab/Matlab
15. Solving Basic Algebraic Equations in Matlab/Scilab

#### 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

## Shivaji University, Kolhapur

### First Year B. Tech

### ENGINEERING MATHEMATICS - II

Teaching Scheme : L : 4 hrs/week

: T: 1 hrs/week

Evaluation Scheme: CIE SEE  
(25 + 25) 50

Credits: 5

Minimum Passing Marks  
40

#### Course Objective

1. To teach Mathematical methodologies and models.
2. To develop mathematical skills and enhance logical thinking power of students.
3. To provide students with skills in differential equations, integral calculus & complex variable 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 Outcome

1. Students in this course will apply the Procedure and methods to solve technical problems.
2. Student can understand how to model real world scenario using Mathematics
3. Students will be able to solve computational problems using Scilab/Matlab

#### Unit 1 Differential Equations of first order and first degree and its Applications 8hrs

Exact differential equations, Equations reducible to exact equations, Linear equations, Equations reducible to Linear form, Applications to Orthogonal trajectories and to Simple Electrical Circuits.

#### Unit 2 Numerical solutions of Differential Equations of first order and first degree 8hrs

Taylor's series method , Picard's method, Euler's method , Modified Euler's method, Runge-Kutta fourth order formula

#### Unit 3 Curve Tracing and Rectification 8hrs

Tracing of curves (Cartesian and Polar), Rectification of plane curves (Cartesian and Polar for m)

#### Unit 4 Integral Calculus 8hrs

Beta and Gamma functions, differentiation under the sign of integration, error function.

#### Unit 5 Multiple Integrals & Applications 8hrs

Introduction of Double Integrals, Evaluation of Double Integrals, Change of order of Integration, Change of variables using Jacobians, Change to Polar, Evaluation of Triple Integral with given limits. Applications Of Multiple Integrals: Area enclosed by plane curves, Mass of plane Lamina and volumes of solid.

#### Unit 6 Complex variables 8hrs

Analytic functions, Cauchy's integral theorem, Cauchy's integral formula, Taylor series, Laurent series and Residue theorem.

**Suggested list of Tutorials/Assignments-**

1. Exact differential Equations
2. Linear differential equations
3. Numerical solutions of ODEs
4. Curve tracing
5. Rectification
6. Integral calculus
7. Double and Triple 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 scilab/Matlab

**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 Scilab/Matlab 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. Tracing Curves in Scilab/Matlab
  3. Evaluation of single integral in Scilab/Matlab
  4. Double and triple integral in Scilab/Matlab
  5. Complex variable in Scilab/Matlab

**Reference Books-**

1. Dr. B. S. Grewal , "Higher Engineering Mathematics," - Khanna Publishers, Delhi.
2. Erwin Kreyszig, "Advanced Engineering Mathematics", - New Age International (P) Ltd. Publishers.
3. H K Dass, "Advanced Engineering Mathematics", S. Chand Publishing
4. M. K. Jain, S. R. K. Iyengar, R. K. Jain, "Numerical Methods for Scientific and Engineering Computation", - New Age International (P) Ltd.
5. P. N. Wartikar & J. N. Wartikar , "A Text Book of Applied Mathematics Vol.-I and II," - Pune Vidyarthi Griha Prakashan, Pune.
6. N.P. Bali and Manish Goyal, "A text book of Engineering Mathematics", Laxmi Publications, latest edition
7. B.V. Ramana, "Higher Engineering Mathematics", Tata McGraw-Hill.

## Shivaji University, Kolhapur

### First Year B. Tech

### ENGINEERING CHEMISTRY

Teaching Scheme : L : 3 hrs/week

: T: 0 hrs/week

Evaluation Scheme: CIE SEE

(25 + 25) 50

Credits: 3

Minimum Passing Marks

40

#### Course Objectives:

1. To apply the knowledge of basic science in engineering and technology disciplines
2. To impart technological aspects of modern chemistry
3. To understand the chemistry behind the development of engineering materials.
4. To develop an analytical ability of students.

#### Course Outcomes:

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

1. Illustrate the basic parameters of water, different water softening processes and boiler troubles.
2. Describe the preparation and application of various polymers as engineering material.
3. Summarize the classification, properties and application of polymers in domestic and engineering areas.
4. Demonstrate the classification, mechanism and selection of lubricants and their applications.
5. Describe the principle, types and mechanism of corrosion and its control methods.
6. Use instrumental methods for the analysis of material.

#### UNIT 1 Water

06 hrs

Introduction, water quality parameters (definition, causes and estimation) like hardness, alkalinity, chlorides and dissolved oxygen, boiler feed water, boiler troubles, treatment of water for industrial use by lime soda method, ion exchange process, specifications for drinking water, treatments of water for domestic use by sterilization (chlorination), Reverse osmosis (Numerical problems on calculation of temporary and permanent hardness).

#### UNIT 2 Lubricants

04 hrs

Introduction, types of lubricants (solid, semisolid and liquid), lubrication, mechanism of lubrication (fluid film, boundary and extreme pressure lubrication), characteristics of lubricants (viscosity, viscosity index, cloud and pour point, flash and fire Point), selection of lubricants (transformer oils, hydraulic systems, refrigeration oils, delicate equipments)

#### UNIT 3 Fuels and Combustion

05 hrs

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) Combustion, Chemical reactions, theoretical oxygen requirement for combustion.

#### UNIT 4 Engineering Materials

11 hrs

**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 & hardening of cement (reactions)

**Polymers:** Introduction, classification, polymerization (addition, condensation and copolymerization), **Plastics:** Introduction, definition, types (thermo softening and thermosetting), **Rubber:** Definition, types (natural and synthetic rubber), Isolation of natural rubber, drawbacks of natural rubber, Vulcanization of natural rubber, Synthesis and applications of polythene, polyvinyl chloride, phenol formaldehyde, urea formaldehyde, Polyurethane and silicon rubber, conducting polymers and Bio-degradable Polymers

**Nanomaterials:** Introduction, synthesis and Applications.

#### **UNIT 5 Corrosion and its Control**

**07 hrs**

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

#### **UNIT 6 Instrumental Methods of Chemical Analysis**

**06 hrs**

Introduction, advantages and disadvantages of instrumental methods

**pH-metry:** Introduction, pH measurement using glass electrode, applications of pH-metry.

**Spectrometry:** Introduction, Lambert's Law, Lambert-Beer Law of spectrometry, single beam spectrophotometer (schematic and applications).

**Chromatography:** Introduction, types, gas-liquid chromatography (GLC), basic principle, instrumentation and applications.

#### **References-**

1. Jain & Jain, 'A textbook of Engineering Chemistry', Dhanpatrai & Co.
2. Dr. A. K. Phari and B. S. Chavan, 'Engineering Chemistry', Laxmi Publishing, New Delhi
3. C. P. Murthy, C. V. Agarwal and A. Naidu, 'A Textbook of Engineering Chemistry' by BS Publications, Hyderabad.
4. 'Engineering Chemistry' (Wiley India) (ISBN-9788126519880).
5. Shashi Chawla, 'A text book of Engineering Chemistry', Dhanpatrai & Co.
6. S. S. Dara, 'A textbook of Engineering Chemistry', S. Chand & Co., Delhi.
7. Chatwal, Anand, 'Instrumental methods of chemical analysis', Himalaya publishing house.
8. G.A. Ozin and A.C. Arsenault, 'Nanochemistry: A Chemical Approach to Nanomaterials', RSC Publishing, 2005.

## Shivaji University, Kolhapur

### First Year B. Tech

## FUNDAMENTALS OF CIVIL ENGINEERING

Teaching Scheme : L : 3 hrs/week

: T: 0 hrs/week

Evaluation Scheme: CIE      SEE  
(25 + 25)      50

Credits: 3

Minimum Passing Marks  
40

#### 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 develop the ability of reading, understanding plans required for construction.
4. To develop the logic required for carried out field work for surveying.
5. To introduce modern equipment required for surveying.

#### Course Outcomes:

Students will be able to

1. Understand how civil engineering is related to other branches.
2. Find out linear and angular measurements required to prepare a plan or map by using traditional as well as modern instruments.
3. Find out vertical distances, reduced levels and angles by using total station.
4. Calculate area of irregular surface by using Mechanical and Digital Planimeter.
5. Identify building materials required for construction with current market rates.
6. Understand use, necessity of submission and working drawing.
7. Prepare site visit report.

#### UNIT 1 General Scope

2 hrs

General scope of Civil Engineering, various sub branches in civil engineering and their scope.

#### UNIT 2 Building Constructions

a) Building Materials:

2 hrs

Uses and Engineering properties of following materials from selection point view: stones, bricks, and cement, sand, timber, steel, roofing and flooring materials. Mortar: types, suitability, Concrete: grades and their suitability, idea about plain, reinforced and pressurised concrete. Requirements of good concrete.

b) Components of Building, Foundation, Superstructure:

2 hrs

General idea about substructure and superstructure, building components & their functions.

c) Foundations

3 hrs

Function, soil types as founding strata (Cohesive cohesion-less soils) concept of bearing capacity, Ultimate, safe and presumptive bearing capacity, introduction to various types of shallow and deep foundations and their suitability.

d) Design Loads and their Transfer Mechanism

3 hrs

Types of loads, principles of load transfer, load bearing, concept of strength, stability and factor of safety. Of building, load bearing & framed structures.

e) Building Planning

3 hrs

Principles of planning, introduction to bye laws regarding building line, space requirements, FSI, height of building as per IS 1856.

f) Masonries

1 hr

General constructional precautions in Stone masonry, brick masonry, hollow block masonry.



### UNIT 3 Surveying

- a) General 2 hrs  
Definition, classification and basic principles of surveys, selection of stations, location sketches, Site plan, surveying methods - Triangulations and Traversing, Drawing preparation, use of scales, RF and symbols.
- b) Measurement of Horizontal Distances 2 hrs  
Use of tapes, ranging and reciprocal ranging, tape corrections, tape traversing, main, tie, check stations, offsetting, use of Open Cross Staff, French Cross Staff and line ranger, recording in field book.
- c) Measurement of Horizontal Angles 5 hrs  
Definition of Bearing, types, use of prismatic compass, calculations for included angles, correction for local attraction, numerical problems
- d) Levelling 5 hrs  
Definition, Terms used, Construction, temporary adjustments and use of Dumpy level and levelling staff, reduction of levels by Collimation Plane and Rise-Fall method, concepts of fly, check and profile levelling, numerical problems.
- e) Remote Sensing 1 hr  
Basic concepts of remote sensing and its application in Civil Engineering.

### UNIT 4 Transportation Engineering

- a) General: 1 hr  
Various modes of transportation of man and material, their merits and demerits.
- b) Roads 3 hrs  
Types of roads (NH, SH, MDR, ODR VR) and their general requirements. General cross section of road, Various elements of road structure and their functions

### UNIT 5 Water Management

- Sources of water, introduction to Dams, storage reservoirs, irrigation methods. 2 hrs

### UNIT 6 Computer Applications in Civil Engineering

- Introduction to various available software packages in Civil Engineering field and their general Capabilities. 1 hr

### Reference Books-

1. Arora, "Building Material", S. Publication
2. B.C. Punmia, "Surveying", Vol.- I, Vol.-II, Vol.-III, Laxmi Publication
3. Gidde, Phadke, Kadam, "Basic Civil Engineering", 5007, 2nd Edition.
4. G. K. Hiraskar, "Basic Civil Engineering", Dhanpat Rai Publica
5. L.G. Gole, "Introduction to Civil Engineering", Mahu Publisher House, 5005, 4th Edition.
6. P.D. Deshpande, "Basic Civil Engineering", Nirali Prakashan, 1988, 1st Edition.
7. P. R. Patankar, "Elements of Civil Engineering", New Vrinda Publishing House
8. M. S. Palani Gamy, "Basic Civil Engineering", Tata Mc-Graw Hill Publication
9. N. Basak, "Surveying", Tata Mc-Graw Hill Publication.

## Shivaji University, Kolhapur

### First Year B. Tech

### ENGINEERING GRAPHICS

Teaching Scheme : L : 4 hrs/week

: T: 0 hrs/week

Evaluation Scheme: CIE SEE  
(25 + 25) 50

Credits: 4  
Minimum Passing Marks  
40

#### Course Objectives:

1. Students should be able to visualize the objects.
2. They should be able to understand and read drawing.
3. They should be able to present the same.
5. Learn to take data and transform it into graphic drawings.
6. Learn basic Auto Cad skills.
7. Prepare the student for future Engineering positions

#### UNIT 1 Drafting Fundamentals and Plane Curve

6hrs

Layout of drawing sheets, sizes of drawing sheets, different types of lines used in drawing practice, Dimensioning – linear, angular, aligned system, unidirectional system, parallel dimensioning, chain dimensioning. Regular Polygons up to hexagon. Plane Curve: Ellipse, Parabola and Hyperbola, Cycloid, Involutives

#### UNIT 2 Projections of points and lines

7 hrs

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 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.

#### UNIT 3 Projections of planes

6 hrs

Projections on regular and on auxiliary reference planes. (Including coordinate system). 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 4 Projections of solids and Computer Aided Drafting

7 hrs

Prisms, Pyramids, Cylinders and Cones, in simple positions only.  
Computer Aided Drafting (CAD): Introduction to drafting packages, Orientation of software with basic commands and demonstration of their use.

#### UNIT 5 Orthographic views

6 hrs

Lines used, selection of views, spacing of views. ISI conventions used in drawing, dimensioning and sections. Drawing required views from given pictorial views (conversion of pictorial views in to orthographic views).

#### UNIT 6 Isometric projections Development of plane and curved surfaces

7 hrs

Isometric scale, Isometric projections and Isometric views / drawings. Circles in isometric view. Isometric views of simple solids and objects. Development of plane and curved surfaces: Prisms, Pyramids, Cylinders and Cones along with cutting planes.

**NOTE: All the above syllabus is to be covered according to the first angle method of projection.**

**REFERENCE BOOKS:-**

1. French and Vierck, "Graphic Science", Mc-Graw Hill International.
2. K. L. Narayana, "Machine Drawing", New Age Publication
3. K. Venugopal, "Engineering Drawing and Graphics", New Age Publication
4. N. B. Shaha and B. C. Rana, "Engineering Drawing", Pearson Education.
5. N. D. Bhatt, "Engineering Drawing", Charotor Publication House, Bombay
6. N. D. Bhatt, "Machine Drawing", Charotor Publication House, Bombay
7. R. K. Dhawan, "A text book of Engineering Drawing", S. Chand and Co.
8. Rowes, "Descriptive Geometry".
9. Sevsen and Street, "Engineering Drawing".
10. W. J. Luzadder, "Fundamentals of Engineering Drawing", Prentice Hall of India.

## Shivaji University, Kolhapur

### First Year B. Tech

#### FUNDAMENTALS OF ELECTRICAL ENGINEERING

Teaching Scheme : L : 3 hrs/week

: T: 0 hrs/week

Evaluation Scheme: CIE SEE  
(25 + 25) 50

Credits: 3

Minimum Passing Marks  
40

#### Course Objective

- i) The objective of this course is to provide basic knowledge of Electrical Engineering to the student.
- ii) To provide knowledge about various electrical machines.

#### Course Outcome

After completing this course the student will be able

- 1) To understand relevance and basics of Electrical Engineering
- 2) To understand different electrical components and the basic Laws of electrical circuits
- 3) To understand electrical power generation, transmission and distribution system

#### UNIT 1 D.C. Circuit

**7hours**

Concept of power and energy, voltage and current source, Review of KVL, KCL and numerical, Numerical Based on energy conversion between electrical, mechanical and thermal quantities.

#### UNIT 2 A.C. Fundamentals & circuits

**8hours**

Faradays law of electromagnetic induction. Lenz's law, Generation of sinusoidal voltage Cycle, frequency, time period, amplitude, average value, RMS value, form factor, peak factor phase, phase difference, phasor representation of AC quantity.

A.C. Circuits-Analysis of purely resistive, inductive and capacitive circuits. R-L, R-C, R-L-C circuits, power factor and its significance. Different powers in A.C. circuits. (Numerical expected)

#### UNIT 3 Magnetic circuits

**6hours**

Concept of magnetic circuit, MMF, reluctance, magnetic flux, flux density, magnetic field strength, Comparison between electrical and magnetic circuit, B – H curve, magnetic leakage and fringing Simple examples on series magnetic circuit. (Numerical expected)

#### UNIT 4 D.C. Machine

**7hours**

Operation and principle, EMF equation types, characteristics and industrial application

#### UNIT 5 Transformer and AC machine

**7hours**

Principle of operation, construction features of single phase transformer, ideal and practical transformer, emf equation, equivalent circuit and testing.

AC machine –Construction, working and application.

#### UNIT 6 Domestic Wiring Lamps

**4hours**

Simple staircase and godown wiring, necessity of earthing, Construction and working of fluorescent lamp, sodium vapour lamp, mercury vapour lamp, CFL, LED lamp and single line diagram of electrical system, Study of energy meter.

**References-**

- 1) B. L. Theraja, “A Text Book of Electrical Technology (Vol.-I and II)”
- 2) D.P. Kotlan and I.J .Nagrath Basic Electrical Engineering 2001, Tata Mc graw Hill
- 3) Nagarath & Kothari, “Electrical Machines” (TMH)
- 4) Fundamentals of Electrical Engineering by Ashfaq Husain, Dhanpat Rai Company
- 5) Fundamentals of Electrical Engineering by Bharati Dwivedi and anoroy Tripathi, Wileyprecise Text Book.
- 6) Electrical Technology By H.Cotton.
- 7) S.L. Uppal, Electrical power, Khanna Publishers, X edition 1984
- 8) V. K. Mehta “Fundamentals of Electrical Technology”, S. Chand Publications

## Shivaji University, Kolhapur

### First Year B. Tech

#### Lab. - I

### ENGINEERING CHEMISTRY

Teaching Scheme : P : 2 hrs/week

Credits: 1

Evaluation Scheme: IPE: 50

Minimum Passing Marks: 20

#### Course Objective

1. To apply the concepts of chemistry and develop analytical skills for applications in engineering
2. To enable the students to understand the basic concepts involved in the analyses

#### Course Outcomes:

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

1. Apply analytical skills for applications in engineering
2. Determine various water quality parameters and preparation of polymers
3. Apply basic concepts of chemistry for analysis
4. Use instrumental methods for analysis of the material

#### EXPERIMENTS (Any 10):

1. Determination of total hardness of a water sample using disodium salt.
2. Determination of chloride content of water sample.
3. Determination of alkalinity of a water sample.
4. Estimation of dissolved oxygen in given water sample.
5. Determination of relative viscosity of given liquid with respect to water at room temperature by Ostwald's viscometer.
6. Demonstration of determination of flash point, fire point/cloud and pour point of oils.
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. Demonstration of pH meter.
14. Demonstration of spectrophotometer.
15. Demonstration of TLC/paper chromatography.

#### Visit to Industry/Institute

#### References:

1. 'Laboratory manual on Engineering Chemistry' by Dr. Sudha Rani, Dhanpat Rai Publishing Company (P) Ltd, New Delhi.
2. 'Vogel's Textbook of Quantitative Chemical Analysis' (Latest ed.), Revised by G. H. Jeffery, J. Bassett, J. Mendham & R. C. Denney.

## Shivaji University, Kolhapur

### First Year B. Tech

#### Lab. - II

### FUNDAMENTALS OF CIVIL ENGINEERING

Teaching Scheme : P : 2 hrs/week

Credits: 1

Evaluation Scheme: IPE: 50

Minimum Passing Marks: 20

#### Course Objective

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

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 develop the ability of reading, understanding plans required for construction.
4. To develop the logic required for carried out field work for surveying.
5. To introduce modern equipment required for surveying.

#### Course Outcomes

Students will be able to

1. Understand how civil engineering is related to other branches.
2. Find out linear and angular measurements required to prepare a plan or map by using traditional as well as modern instruments.
3. Find out vertical distances, reduced levels and angles by using total station.
4. Calculate area of irregular surface by using Mechanical and Digital Planimeter.
5. Identify building materials required for construction with current market rates.
6. Understand use, necessity of submission and working drawing.
7. Prepare site visit report.

#### Experiments (Any 10)

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. Demonstration to Total Station.
8. Linear and angular measurement by using total station.
9. Determination of reduced levels by using total station.
10. Preparation of Half Imperial Drawing Sheet showing types of lines, symbols of doors, windows, Building materials, North line etc. according to IS 962.
11. Reading the submission and working drawings of existing building.
12. Layout and setting out of small residential building showing plan, elevation and section of a building.
13. Preparation of Report based on use of building materials and current market rates of materials.
14. Preparation of Report based on collected information of any civil Structure.  
(e.g. bridges, dams, tunnel, high rise building, road, flyovers, Sky-scrappers.  
Information can be collected by using Internet, journals, magazine, videos etc.)
15. Site Visit.(Wastewater/Water Treatment Plant.)

**ASSIGNMENTS:**

ONE assignment based on each unit of theory syllabus.

**Reference books:-**

1. Arora, "Building Material", S. Publication
2. 2.B.C. Punmia, "Surveying", Vol.- I, Vol.-II, Vol.-III, Laxmi Publication
3. Gidde, Phadke, Kadam, "Basic Civil Engineering", 5007, 2nd Edition.
4. G. K. Hiraskar, "Basic Civil Engineering", Dhanpat Rai Publica
5. L.G. Gole, "Introduction to Civil Engineering", Mahu Publisher House, 5005, 4th Edition.
6. P.D. Deshpande, "Basic Civil Engineering", Nirali Prakashan, 1988, 1st Edition.
7. P. R. Patankar, "Elements of Civil Engineering", New Vrinda Publishing House
8. M. S. Palani Gamy, "Basic Civil Engineering", Tata Mc-Graw Hill Publication
9. N. Basak, "Surveying", Tata Mc-Graw Hill Publication.



**Shivaji University, Kolhapur**

**First Year B. Tech**

**Lab. - III**

**Engineering Graphics**

Teaching Scheme : P : 2 hrs/week

Credits: 1

Evaluation Scheme: IPE: 50

Minimum Passing Marks: 20

From the following eight sheets to be drawn. All these sheets should be drawn on half imperial (A2 size) drawing sheets only.

1. Plane curves
2. Projections of lines
3. Projections of planes
4. Orthographic projections
5. Isometric projections
6. Projections of solids
7. Sections of solids
8. Development of Plane and curved surfaces of solids
9. Demonstration of drafting software with commands

## Shivaji University, Kolhapur

### First Year B. Tech

#### Lab. - IV

### FUNDAMENTALS OF ELECTRICAL ENGINEERING

Teaching Scheme : P : 2 hrs/week

Credits: 1

Evaluation Scheme: IPE: 50

Minimum Passing Marks: 20

#### Course Outcomes –

The Student will be able to-

- 1) Demonstrate electrical safety rules
- 2) Identify and use of various electrical measuring devices
- 3) Apply basics concepts about electrical circuits to compute various circuit parameters

#### EXPERIMENTS:

1. Study of RLC series circuit.
2. Efficiency and voltage regulation of a single phase transformer by direct loading with variac.
3. Efficiency of a single phase transformer by open circuit / short circuit test.
4. To plot B-H curve for magnetic material
5. To plot characteristics of D. C. shunt motor.
6. Working of a simple staircase and godown wiring.
7. Load test on single phase induction motor.
8. Study of different electric lamps.
9. Verification of Kirchhoff's voltage law.
10. Verification of Kirchhoff's current law.
11. Study of Ohm's law.
12. Working of table fans, ceiling fan, electric iron, and geyser.
13. Determination of resistance and inductance of a choke coil by voltmeter ammeter method.
14. Demonstration of P.F. Improvement
15. Study of earthing system, electrical shocks and precautions against shocks
16. Visit to electrical substation

## Shivaji University, Kolhapur

### First Year B. Tech

#### Lab. - V

#### Workshop Practice

Teaching Scheme : P : 2 hrs/week

Credits: 1

Evaluation Scheme: IPE: 50

Minimum Passing Marks: 20

#### **UNIT 1 Safety**

**1 hrs**

Common hazards while working with engineering equipment and related safety measures.

#### **UNIT 2 Materials**

**2 hrs**

Brief introduction of materials used in Industries, steels and alloys, cast iron, non-ferrous metals, timber, plastics and polymers, glass etc. and; their applications.

#### **UNIT 3 Measuring Instruments**

**2 hrs**

Brief introduction to instruments like – Steel rule, Vernier Caliper, Micrometer, Dial indicator, their least counts, common errors and care while using them, Use of marking gauge, 'V' block and surface plate.

#### **UNIT 4 Carpentry and Fitting**

**1 hrs**

Brief study of various hand tools like chisel, saw, planer and fitting tools like files, saw, drills, taps and dies.

#### **UNIT 5 Welding**

**2 hrs**

Classification and brief introduction to welding processes - Arc, Gas and Resistance.

#### **UNIT 6 Sheet Metal Working**

**2 hrs**

Specifications of metal sheets, Surface coatings; Operations like cutting, bending, folding, punching, riveting ; Joining by brazing and soldering.

#### **UNIT 7 Smithy**

**2 hrs**

Introduction to smithy operations like upsetting, drawing, bending, Forming ; Tools- hammer, hot and cold chisels, swages, drifts, flatters, tongs, Anvils.

#### **UNIT 8 Brief introductions to machine tools and processes-**

**1 hrs**

Metal removing, metal shaping, plastic molding.

#### **TERM WORK :-**

##### **One Job Each In:**

1. Sheet metal working involving marking, cutting, bending, joining operations such as a tray in, funnel etc.
2. Fitting involving marking, filing, hacksaw cutting, drilling and tapping such as a male-female type pare.
3. Smithy involving upsetting, drawing, bending, forming such as a square / hexagonal headed bolt, hook etc.
1. Welding involving But / Tee / Lap joints and demonstration of welding processes – Arc, Gas, Spot, etc.

**REFERENCE BOOKS :-**

1. B. S. Raghuvanshi, "A Course in Workshop Technology, Vol – I", Dhanapat Rai and Sons.
2. Chapman, "Workshop Technology, Vol – I", The English Language Book Society.
3. Gupta and Kaushik, "Workshop Technology, Vol – I", New Heights.
4. H.S.Bawa, "Workshop technology, Vol.-I", TMH Publications, New Delhi.
5. Hajara Choudhari, "Elements of Workshop Technology, Vol – I", Media Promoters.

## Shivaji University, Kolhapur

### First Year B. Tech

#### Lab. VI

### COMPUTER PROGRAMMING

Teaching Scheme : L : 1 hrs/week

: P: 2 hrs/week

Evaluation Scheme: IPE 50

Credits: 2

Minimum Passing Marks 20

#### **UNIT 1 Programming Methodology**

**3 hrs**

Step involving in problem solving., Problem definition, Algorithm, Characteristics, Notation of Algorithm, Flowcharts- Definition, Symbol, features, Running and debugging the program.

#### **UNIT 2 Introduction to 'C'**

**4 hrs**

History, Character set and keywords, Structure of 'C' programming, constant and its type, Variable and its type (Data types), Operators- Arithmetic, logical, relational, bitwise, increment, decrement, conditional

#### **UNIT 3 Control Statements**

**4 hrs**

Conditional control statements- if, if else, nested if, switch, Looping – for statements, nested for, while, do-while statements, Unconditional control statements- break, continue, goto

#### **UNIT 4 Functions**

**3 hrs**

Definition, declaration, prototype of function, Local and global variable, User defined function, Storage classes, Preprocessor

#### **UNIT 5 Arrays**

**3 hrs**

Array definition and declaration, Single and multidimensional array, String functions

#### **UNIT 6 Pointers**

**4 hrs**

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

#### **UNIT 7 Structures and Union**

**3 hrs**

Definition and declaration, Array of structures, Passing structure to function, Pointer to structure, Nested structure, self referential structure, Sizeof and typedef

#### **UNIT 8 File Handling**

**3 hrs**

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.

#### **EXPERIMENTS:-**

**Eight experiments/Assignment based on the following topics may be carried out during Practical session and submitted as termwork.**

1. Creation editing, compilation, extension, deluging demonstration with some small program.

2. Constants, variables and data types declaration 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

**References-**

1. E Balguruswamy, "Programming with ANSI C", (TMH).
2. Gottfried, "Programming in C", Shatter Series.
3. Herbert Schildt, "Complete 'C' Reference"
4. Kernighan and Richie, "The C Programming Language" (PHI)/Pearson Education
5. Y.C. Kanekar, "Let us C"

**Equivalence of F.Y B. Tech Semester I & II**

The above detailed syllabus is a revised version of the F. Y. B. Tech course being conducted by the Shivaji University at the Technology Department of the University. This syllabus is to be implemented from June 2016.

The Equivalence for the subjects of F.Y.B. Tech Semester I and II pre-revised course under the faculty of Engineering and Technology is as follows.

**F.Y.B Tech Semester I & II**

<b>Sr. No</b>	<b>F. Y. B. Tech Semester I &amp; II Pre-revised syllabus</b>	<b>F. Y. B. Tech Semester I &amp; II Revised syllabus</b>	<b>Remark</b>
1	Engineering Chemistry	Engineering Chemistry	Change in the subject content.
2	Engineering Mathematics – I	Engineering Mathematics – I	Change in the subject content.
3	Engineering Mechanics	Engineering Mechanics	Change in the subject content.
4	Engineering Graphics	Engineering Graphics	Change in the subject content.
5	Electronic Components and Devices	Electronic Components and Devices	Change in the subject content.
6	Lab. – I Engineering Physics	Lab. – I Engineering Physics	Change in the subject content.
7	Lab. – II Professional Communication	Lab. – V Professional Communication	Change in the subject content.
8	Lab. – III Electronic Components and Devices	Lab. – IV Electronic Components and Devices	Change in the subject content.
9	Lab. – IV Engineering Mechanics	Lab. – II Engineering Mechanics	Change in the subject content.
10	Lab. –V Engineering Graphics	Lab. –III Engineering Graphics	Change in the subject content.
11	Engineering Physics	Engineering Physics	Change in the subject content.
12	Engineering Mathematics– II	Engineering Mathematics– II	Change in the subject content.
13	Fundamentals of Mechanical Engineering	Fundamentals of Mechanical Engineering	Change in the subject content.
14	Fundamentals of Civil Engineering	Fundamentals of Civil Engineering	Change in the subject content.
15	Fundamentals of Electrical Engineering	Fundamentals of Electrical Engineering	Change in the subject content.
16	Lab.– I Engineering Physics	Lab.– I Engineering Physics	Change in the subject content.

**SHIVAJI UNIVERSITY, KOLHAPUR–Syllabus w.e.f. 2016-17**

17	Lab. – II Workshop Practice	Lab. – V Workshop Practice	No change in the subject content.
18	Lab. – III Fundamentals of Mechanical Engineering	Lab. – III Fundamentals of Mechanical Engineering	Change in the subject content.
19	Lab. – IV Fundamentals of Civil Engineering	Lab. – II Fundamentals of Civil Engineering	Change in the subject content.
20	Lab. -V Fundamentals of Electrical Engineering	Lab. -IV Fundamentals of Electrical Engineering	Change in the subject content.
21	Lab. – VI Computer Programming	Lab. – VI Computer Programming	No change in the subject content.
22	Not Specified	Lab.-VI Matlab and Scilab	No change in the subject content.