CHARUSAT
CHAROTAR UNIVERSITY OF SCIENCE AND TECHNOLOGY

ACADEMIC REGULATIONS & SYLLABUS

Chandubhai S Patel Institute of Technology

First Year B. Tech. (Bachelor of Technology) Programme

(ME/CL/EE)

Faculty of Technology & Engineering

Chandubhai S. Patel Institute of Technology

Charotar University of Science and Technology (CHARUSAT)
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Bachelor of Technology (ME/CL/EE) Programme

FACULTY OF TECHNOLOGY AND ENGINEERING

ACADEMIC REGULATIONS

Bachelor of Technology Programmes

To ensure uniform system of education, duration of undergraduate and post graduate programmes, eligibility criteria for and mode of admission, credit load requirement and its distribution between course and system of examination and other related aspects, following academic rules and regulations are recommended.

1) System of Education

Choice based Credit System (CBCS) with Semester pattern of education shall be followed across The Charotar University of Science and Technology (CHARUSAT) both at Undergraduate and Master levels. Each semester will be at least 90 working day duration. Apart from the programme core courses, provision for choosing University level electives and Programme & Institutional level electives are available under the CBCS.

2) Duration of Programme

i)	**Undergraduate programme**	**(B.Tech.)**	
	Minimum		8 semesters (4 academic years)
	Maximum		16 semesters (8 academic years)

3) Eligibility for admissions

As enacted by Govt. of Gujarat from time to time.

4) Mode of admissions

As enacted by Govt. of Gujarat from time to time.

5) Programme Structure and Credits

As per annexure – 1 attached

6) Attendance

6.1 All activities prescribed under these regulations and listed by the course faculty members in their respective course outlines are compulsory for all students pursuing the courses. No exemption will be given to any student from attendance except on account of serious personal illness or accident or family calamity that may genuinely prevent a student from attending a particular session or a few sessions. However, such unexpected absence from classes and other activities will be required to be condoned by the Dean/Principal.

6.2 Student attendance in a course should be 80%.

7) Course Evaluation

7.1 The performance of every student in each course will be evaluated as follows:

7.1.1 Internal evaluation by the course faculty member(s) based on continuous assessment. The continuous assessment will be conducted by the respective department /institute.

7.1.2 Final end-semester examination by the University through written paper, practical test, oral test, presentation by the student or a combination of these.

7.1.3 The weightages of continuous assessment and end-semester university examination in overall assessment shall depend on individual course as approved by Academic Council through Board of Studies.

7.1.4 The performance of candidate in continuous assessment and in end-semester examination together (if applicable) shall be considered for deciding the final grade in a course.

7.1.5 In order to earn the credit in a course a student has to obtain grade other than FF.

7.2 Performance in continuous assessment and end-semester University Examination

7.2.1 Minimum performance with respect to continuous assessment as well as end-semester university examination will be an important consideration for passing

a course. Details of minimum percentage of marks to be obtained in the examinations are as follows.

Minimum percentage marks to be obtained in end-semester University Examination (for applicable course)	Minimum Overall percentage marks to be obtained in each course.
40%	45%

7.2.2 If a candidate obtains minimum required percentage of marks in end-semester university examination in applicable course but fails to obtain minimum required overall percentage of marks, he/she has to repeat the examination till the minimum required overall percentage of marks are obtained.

8) Grade Point System

1. The total of the internal evaluation marks and end semester examination marks in each course will be converted to a letter grade on a ten-point scale as per the following scheme:

Table 1 Grade Point System (UG)

Range of Marks (%)	≥80	<80 ≥73	<73 ≥66	<66 ≥60	<60 ≥55	<55 ≥50	<50 ≥45	<45
Grade	AA	AB	BB	BC	CC	CD	DD	FF
Grade Point	10	9	8	7	6	5	4	0

2. The student's performance in any semester will be assessed by the Semester Grade Point Average (SGPA). Similarly, his/her performance at the end of two or more consecutive semesters will be denoted by the Cumulative Grade Point Average (CGPA). The SGPA and CGPA are calculated as follows:

(i) SGPA = $\Sigma C_i G_i / \Sigma C_i$ where C_i is the number of credits of course i
G_i is the Grade Point for the course i
and i = 1 to n, n = number of courses in the semester

(ii) CGPA = $\Sigma C_i G_i / \Sigma C_i$ where C_i is the number of credits of course i
G_i is the Grade Point for the course i
and i = 1 to n, n = number of courses of all semesters up to which CGPA is computed.

9) Award of Class

☞ The class awarded to a student in the programme is decided by the final CGPA as per the following scheme:

Award of Class	CGPA Range
First Class with Distinction	CGPA ≥ 7.5 & ≤ 10.0
First class	CGPA ≥ 6.0 & < 7.5
Second Class	CGPA ≥ 5.0 & < 6.0
Pass Class	CGPA < 5.0

10) Detention Criteria

☞ A student will be promoted to next year only if he/she has cleared all the courses of the year he/she is studying in .

Link: https://charusat.ac.in/ => Student's Corner => Detention Rules

11) Transcript

☞ A transcript issued to the student at the time of leaving the university will contain a consolidated record of all the courses taken by him / her, grades obtained and the final CGPA.

Link: https://charusat.ac.in/ => Student's Corner => Transcript

CHOICE BASED CREDIT SYSTEM

Bachelor of Technology (ME/CL/EE) Programme

CHOICE BASED CREDIT SYSTEM

With the aim of incorporating the various guidelines initiated by the University Grants Commission (UGC) to bring equality, efficiency and excellence in the Higher Education System, Choice Based Credit System (CBCS) has been adopted. CBCS offers wide range of choices to students in all semesters to choose the courses based on their aptitude and career objectives. It accelerates the teaching-learning process and provides flexibility to students to opt for the courses of their choice and / or undergo additional courses to strengthen their Knowledge, Skills and Attitude.

1. CBCS – Conceptual Definitions / Key Terms (Terminologies)

Types of Courses: The Programme Structure consist of 4 types of courses: Foundation courses, Core courses, Elective courses and Non-credit (audit) courses.

1.1) Foundation Course

These courses are offered by the institute in order to prepare students for studying courses to be offered at higher levels.

1.2) Core Courses

A Course which shall compulsorily be studied by a candidate to complete the requirements of a degree / diploma in a said programme of study is defined as a core course. Following core courses are incorporated in CBCS structure:

A. **University Core courses(UC)**:

University core courses are compulsory courses which are offered across university and must be completed in order to meet the requirements of programme. Environmental science will be a compulsory University core for all Undergraduate Programmes.

B. **Programme Core courses(PC)**:

Programme core courses are compulsory courses offered by respective programme owners, which must be completed in order to meet the requirements of programme.

1.3) Elective Courses

Generally, a course which can be chosen from a pool of courses and which may be very specific or specialised or advanced or supportive to the discipline of study or which provides an extended scope or which enables an exposure to some other discipline / domain or nurtures the candidates proficiency / skill is called an elective course. Following elective courses are incorporated in CBCS structure:

A. University Elective Courses(UE):

The pool of elective courses offered across all faculties / programmes. As a general guideline, Programme should incorporate 2 University Electives of 2 credits each (total 4 credits).

B. Institute Elective Course (IE)

Institute elective courses are those courses which any students of the University/Institute of a Particular Level (PG/UG) will choose as offered or decided by the University/Institute from time-to-time irrespective of their Programme /Specialisation.

C. Programme Elective Courses(PE):

The programme specific pool of elective courses offered by respective programme.

D. Cluster Elective Course (CE):

An 'Elective Course' is a course which students can choose from the given set of functional course/ Area or Streams of Specialization options (eg. Common Courses to EC/CE/IT/EE) as offered or decided by the Institute from time-to-time.

1.4) Non Credit Course (NC) - AUDIT Course

A 'Non Credit Course' is a course where students will receive Participation or Course Completion certificate. This will be reflected in Student's Grade Sheet but the grade of the course will not be consider to calculate SGPA and CGPA. Attendance and Course Assessment is compulsory for Non Credit Courses.

1.5) Medium of Instruction

The Medium of Instruction will be English.

CHAROTAR UNIVERSITY OF SCIENCE & TECHNOLOGY
FACULTY OF TECHNOLOGY AND ENGINEERING
TEACHING & EXAMINATION SCHEME OF B. TECH. PROGRAMME (ME/CL/EE)

First Year Semester-1

Sr. No.	Course Code	Course Title	Teaching Scheme								Examination Scheme				
			Contact Hours/ Week				Credit				Theory		Practical/Project		Total
			Theory	Practical	Tutorial	Total	Theory	Practical	Tutorial	Total	Internal	External	Internal	External	
1	MA143	Engineering Mathematics I	4	-	1	5	4	-	-	4	30	70	-	-	100
2	ME146	Engineering Graphics	2	2	1	5	2	1	-	3	30	70	25	25	150
3	CL143	Engineering Mechanics	3	2	1	6	3	1	-	4	30	70	25	25	150
4	ME142	Workshop Practices	-	2	-	2	-	1	-	1	-	-	25	25	50
5	PY142	Engineering Physics-I	-	2	-	2	-	2	-	2	-	-	50	50	100
6	CL144.01A	Environmental Sciences	-	2	-	2	-	2	-	2	-	-	30	70	100
7	FS101A	Foundation Course on Mathematics and Physics	-	2	-	2	-	2	-	2	-	-	50	50	100
8	HS101.02 A	Communicative English	-	2	-	2	-	2	-	2	-	-	30	70	100
9	Assignment Practices/Student Counseling/Remedial Classes/Extra Classes/Library Reading/Sports Activity		-	-	-	8	-	-	-	-	-	-	-	-	-
					Total:	**34**				**20**					**850**

First Year Semester-2

Sr. No.	Course Code	Course Title	Teaching Scheme								Examination Scheme				
			Contact Hours/ Week				Credit				Theory		Practical/Project		Total
			Theory	Practical	Tutorial	Total	Theory	Practical	Tutorial	Total	Internal	External	Internal	External	
1	MA144	Engineering Mathematics II	4	0	1	5	4	-	-	4	30	70			100
2	ME147	Basics of Civil & Mech Engineering	3	2	0	5	3	1	-	4	30	70	25	25	150
3	EE145	Basics of Electronics & Electrical Engineering	3	2	0	5	3	1	-	4	30	70	25	25	150
4	IT143	Fundamentals of Computer Programming	2	2	0	4	2	1	-	3	30	70	25	25	150
5	PY143	Engineering Physics-II		2	0	2	-	2	-	2	-	-	50	50	100
5	FS102A	Foundation Course on Chemistry and Biology	0	2		2	-	2	-	2	-	-	50	50	100
7	HS201.02 A to HS210.02 A	A Course on Liberal Arts (HS Elective)	-	2	0	2	-	2	-	2	-	-	30	70	100
8	Assignment Practices/Student Counseling/Remedial Classes/Extra Classes/Library Reading/Sports Activity		-	-	-	8	-	-	-	-	-	-	-	-	-
					Total:	**33**				**21**					**850**

CHAROTAR UNIVERSITY OF SCIENCE AND TECHNOLOGY

B. Tech. (ME/CL/EE) Programme

SYLLABI (Semester – 1)

FACULTY OF APPLIED SCIENCES
DEPARTMENT OF MATHEMATICAL SCIENCES
MA143: Engineering Mathematics-I

Credits and Hours:

Teaching Scheme	Theory	Tutorial	Total	Credit
Hours/week	4	1	5	4
Marks	100	-	100	

A. Outline of the course:

Sr No.	Title of the unit	Number of hours
1	Higher order derivatives and applications	16
2	Complex numbers and Roots of polynomial Equations	14
3	Matrix Algebra- I	12
4	Partial differentiations	08
5	Applications of Partial differentiations	10
	Total hours	60

Total hours (Theory): 60 Hrs.

Practical Hours: 00 Hrs.

Total hours: 60 Hrs.

B. Detailed Syllabus:

1 Higher order derivatives and applications: 16 Hours 27%

1.1 Set theory and Function

1.2 Limit, Continuity, Differentiability for function of single variable and its uses. Mean Value Theorem, Local Maxima and Minima

1.3 Successive differentiation: n^{th} derivative of elementary functions: rational, logarithmic, trigonometric, exponential and hyperbolic etc.

1.4 Leibnitz rule for the n^{th} order derivatives of product of two functions

1.5 Tests of convergence of series viz., comparison test, ratio test, root test, Leibnitz test. Power seriesexpansion of a function: Maclaurin's and Taylor's series expansion.

1.6	L'Hospital's rule and related applications, Indeterminate forms		
2	**Complex numbers and Roots of polynomialEquations:**	**14 Hours**	**23%**
2.1	Complex numbers and their geometric representation		
2.2	Complex numbers in polar and exponential forms		
2.3	De Moivre'stheorem and its applications		
2.4	Exponential, Logarithmic, Trigonometric and hyperbolic functions.		
2.5	Statement of fundamental theorem of Algebra, Analytical solution of cubic equation by Cardan's method		
2.6	Analytic solution of Biquadratic equations by Ferrari's method with their applications.		
3.	**Matrix Algebra- I:**	**12 Hours**	**20%**
3.1	Definition of Matrix, types of matrices and their properties		
3.2	Determinant and their properties		
3.3	Rank and nullity of a matrix		
3.4	Determination of rank		
3.5	The inverse of a matrix by Gauss Jordan method.		
3.6	Solution of a system of linear equations by Gauss elimination and Gauss Jordan Methods.		
4.	**Partial differentiations:**	**08 Hours**	**13%**
4.1	Partial derivative and geometrical interpretation		
4.2	Euler's theorem with corollaries and their applications		
4.3	Chain rule		
4.4	Implicit functions		
4.5	Total differentials		
5.	**Applications of Partial differentiations:**	**10 Hours**	**17%**
5.1	Maclaurin's and Taylor's series expansion in two variables		
5.2	Tangent plane and normal line to a surface		
5.3	Maxima and Minima		
5.4	Langrage's method of multiplier		
5.5	Jacobian		
5.6	Errors and approximations		

C. Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures/tutorials which carries a 5% component of the overall evaluation.
- Minimum two internal exams will be conducted and average of two will be considered as a part of 15% overall evaluation.
- Quiz (surprise test) /Oral tests/ Viva/Assignment/Tutorials will be conducted which carries 10% component of the overall evaluation.

Course Outcomes (COs):

At the end of the course, the students will be able to

CO1	develop skill of successive differentiation, utilize appropriate theory and computational techniques to construct Taylor's series with its interval of convergence for using in a variety of applications such as approximating values, creating series representation and behaviour of a functions, use L'Hospital's rule to compute limits of the indeterminate forms.
CO2	perform basic mathematical operations with complex numbers in Cartesian and polar forms, know methods of finding the n^{th} roots of a complex number and solutions of simple polynomial equations, work with functions of complex variable.
CO3	find determinant and inverse of a square matrix, evaluate rank and nullity of a matrix, solve system of linear equations by using concept of matrices which are useful in various fields of engineering.
CO4	evaluate partial derivatives including higher order derivatives, solve problems using the chain rules, Euler's theorem with corollaries, implicit function and total differentials.
CO5	expand any function of two variables in ascending power of variables, solve problems using the techniques of multivariable calculus in various branches of engineering.

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	1	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	1	-	2	-	-	-	-	-	-	-	-	-
CO4	3	-	-	-	1	-	-	-	-	-	-	-	-	-
CO5	3	2	1	1	1	-	-	-	-	-	-	-	-	-

Enter correlation levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

If there is no correlation, put "-"

Recommended Study Material:

❖ **Text Books:**

1. Erwin Kreyszig; Advanced Engineering Mathematics, 8th Ed., Jhon Wiley & Sons, India, 1999.
2. H. K. Dass and RajnishVerma; Higher Engineering Mathematics, S Chand & Co Pvt Ltd. 2012.
3. B. S. Grewal; Higher Engineering Mathematics, Khanna Publ., Delhi, 2012

❖ **Reference Books:**

1. M. D. Weir *et al.;* Thomas' Calculus, 11th Ed., PearsonEducation, 2008.
2. James Stewart; Calculus Early Transcendental, 5th Ed., Thomson India, 2007
3. C. R. Wylie and L. C. Barrett; Advanced Engineering Mathematics. 1982., McGraw-Hill Book Company.
4. Michael D. Greenberg; Advanced Engineering Mathematics. Prentice-Hall, 1988.

❖ **Web Materials:**

1. https://ocw.mit.edu/ans7870/resources/Strang/Edited/Calculus/Calculus.pdf
2. http://nptel.ac.in/courses/111107108/
3. http://nptel.ac.in/courses/122101003/
4. http://nptel.ac.in/courses/111104085/

FACULTY OF TECHNOLOGY & ENGINEERING
CHAMOS MATRUSANSTHA DEPARTMENT OF MECHANICAL ENGINEERING
ME146: Engineering Graphics

Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	2	2	1	5	**3**
Marks	100	50	0	150	

A. Outline of the course:

Sr. No.	Title of the unit	Minimum number of hours
1	Fundamentals of Engineering Graphics	05
2	Projections of Points and Lines	03
3	Projections of Planes	03
4	Projections & Section of Solid	04
5	Orthographic Projection*	05
6	Isometric Projections*	04
7	Computer Graphics*	03
8	Development of Lateral Surfaces	03

Total hours (Theory): 30 Hrs.

Practical Hours: 30 Hrs.

Total hours: 60 Hrs.

B. Detailed Syllabus:

1. Fundamentals of Engineering Drawing 05 Hours 17%

1.1 Importance of engineering drawing, drawing instruments and materials, BIS and ISO

1.2 Different types of lines used in engineering practice, methods of projections as per SP 46-1988.

1.3 Engineering scale.

1.4 Engineering curve.

2.	**Projections of Points and Lines**	**03 Hours**	**10%**
2.1	Introduction to methods of projections		
2.2	Projections of lines inclined to both the planes		
3.	**Projections of Planes**	**03 Hours**	**10%**
3.1	Projection of plane		
3.2	Auxiliary projection method		
4.	**Projections & Section of Solid**	**04 Hours**	**13%**
4.1	Projection of solids		
4.2	Sectional view		
4.3	True shape of Sections		
4.4	Auxiliary Inclined Plane (AIP), Auxiliary Vertical Plane (AVP)		
5.	**Orthographic Projection**	**05 Hours**	**17%**
5.1	Principle projection		
5.2	Methods of first and third angle projection with examples / problems		
6.	**Isometric Projections**	**04 Hours**	**13%**
6.1	Terminology, Isometric scale		
6.2	Isometric view and Isometric projection with examples / problems		
7.	**Computer Graphics**	**03 Hours**	**10%**
7.1	Introduce computer graphics		
7.2	Importance of computer graphics		
7.3	Demonstration of CAD Modeling software		
7.4	Training of Fusion 360 software		
8.	**Development of Lateral Surfaces**	**03 Hours**	**10%**
8.1	Method of Development		
8.2	Developments of cylinder, cone, prism, pyramid		

C. Instructional Methods and Pedagogy:

- At the starting of the course, delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of Multi-Media projector, Black Board, OHP etc.
- Attendance is compulsory in lectures and laboratory.

- Internal exams/Unit tests/Surprise tests/Quizzes/Seminar/Assignments etc. will be conducted as a part of continuous internal theory evaluation.
- The course includes a laboratory, where students will get opportunities to build appreciation for the concepts being taught in lectures.
- Drawing sheets/Tutorials related to course content will be carried out in the laboratory.
- In the lectures and laboratory discipline and behavior will be observed strictly.

Course Outcome (COs):

At the end of the course, the students will be able to:

CO1	Realize and interpret various engineering drawings.
CO2	Understand the concept and application of engineering scale and engineering curve.
CO3	Visualize three-dimensional drawing of engineering components through orthographic, sectional orthographic and isometric drawing.
CO4	Explore the basic principle of projections and development of lateral surface of solid.
CO5	Use the computer for geometric modeling.

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	1	-	-	-	3	-	-	-	-	-	-	-	-	-

Enter correlation levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

If there is no correlation, put "-"

Recommended Study Material:

- **Text book:**
    1. N. D. Bhatt & V. M. Panchal, “Engineering Drawing”, Charotar Publishing House Pvt. Ltd.
    2. P. J. Shah, “Engineering Graphics”, S. Chand Publishing & Co.
- **Reference book:**
    1. P.B. Patel & P.D. Patel, “Engineering Graphics”, Mahajan Publishing House.
    2. Arunoday Kumar, “Engineering Graphics”, Tech-Max Publication.
    3. Gopal Krishna K.L., “Engineering Drawing”, Subhas Publications
    4. Venugopal, K., “Engineering Drawing made Easy”, Wiley Eastern Ltd.
    5. M.L. Agrawal & R.K. Garg, “Engineering Drawing”, Vol. I, Dhanpatrai & Co.
    6. T.E. French, C.J. Vierck & R. J. Foster, “Graphic Science and Design”, McGraw Hill.
    7. W. J. Luzadder & J. M. Duff, “Fundamentals of Engineering Drawing”, Prentice Hall.
    8. K. Venugopal, “Engineering Drawing and Graphics”, New Age international Pry. Ltd.
- **Web Materials:**
    1. http://nptel.ac.in/courses/112103019/
    2. http://nptel.ac.in/downloads/112105125/
    3. http://nptel.ac.in/syllabus/syllabus.php?subjectId=105104101
    4. http://nptel.ac.in/courses/105107122/
    5. https://law.resource.org/pub/in/bis/S01/is.sp.46.2003.pdf

FACULTY OF TECHNOLOGY & ENGINEERING
M S PATEL DEPARTMENT OF CIVIL ENGINEERING
CL143 Engineering Mechanics

Credits and Hours:

Teaching Scheme	Theory	Tutorial	Practical	Total	Credit
Hours/week	3	1	2	6	4
Marks	100	-	50	150	

A. Outline of the Course:

Sr. No.	Title of the Unit	Minimum Number of Hours
1	Introduction	04
2	Fundamental of Statics	20
3	Friction	05
4	Truss	05
5	Centroid and Centre of Gravity	06
6	Fundamentals of Kinematics and Kinetics of Particles	05

Total Hours (Theory): 45

Total Hours (Lab): 30

Total Hours: 75

B. Detailed Syllabus:

1 Introduction **04 Hours 08%**

Introduction of Mechanics, Fundamental concepts and idealization of mechanics, Fundamental principles & Laws of mechanics, Scalar and Vector Quantities, Components, unit vectors and position vector, Composition and resolution of vector, System of Units

2 Fundamental of Statics **20 Hours 45%**

2.1 Coplanar Concurrent Force system

Introduction of Force, Effect of force and Characteristics of force, Types of force, Type of force systems, Principle of Transmissibility, Resultant of force systems, Resolution of a

	single force, Composition and Resolution of force system, Resolution method for coplanar concurrent force system		
2.2	**Moments and Couples** Moment of a force, Principle of moments, Coplanar applications, Parallel force system, Couples, Equivalent couples, Operations with couples, Equivalent system of forces		
2.3	**Coplanar Non-Concurrent Force system** Introduction, Resultant of coplanar non-concurrent force system, Concentrated and distributed loads		
2.4	**Equilibrium of Rigid bodies** Equilibrium, Resultant & Equilibrant, Principle of action and reaction, Free body diagram & Lami's theorem, Tensions of strings, condition of equilibrium for Coplanar concurrent forces & Coplanar non-concurrent forces, Equilibrium of Coplanar concurrent forces, Equilibrium of Coplanar non-concurrent forces		
3	**Friction** Friction and its applications, Types of friction and Laws of dry friction, Angle of friction, Angle of repose, Coefficient of friction, Block Friction, Ladder friction, Wedge friction	**5 Hours**	**11%**
4	**Truss** Classification of Truss, Perfect & Imperfect truss, Analysis of pin jointed perfect truss using method of joints and Method of section.	**5 Hours**	**11%**
5	**Centroid and Centre of Gravity** Introduction, basic definitions and their understanding, Concept of centre of gravity, Centroids of Linear elements & Planar elements, Determination of centroids by integrations, Centroids of Composite sections (1D & 2D).	**6 Hours**	**14%**
6	**Fundamentals of Kinematics and Kinetics of Particles** Rectilinear motion, Curvilinear motion, Motion of rigid bodies, Velocity and acceleration, Newton's law of motion, Energy and momentum.	**5 Hours**	**11%**

Course Outcomes (COs):

On the completion of the course one should be able to:

CO1	Understand laws of mechanics and their application to engineering problems.
CO2	Understand the fundamentals of statics and apply them to simple structural problems
CO3	Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple practical problems.
CO4	Compute centroid of composite sections.
CO5	Recognize different types of friction and its effects on an object.
CO6	Classify different types of truss and analyze the pin jointed perfect truss.

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO 5	PO 6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PS O2	PSO 3
CO1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	-	-	-	1	-	-	-	-	-	-	-	-	-	-
CO3	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	2	1	1	-	-	-	-	-	-	-	-	-	-	-	-
CO5	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	1	1	2	-	1	-	-	-	-	-	-	1	-	-	-

Enter correlation levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

If there is no correlation, put "-"

Recommended Study Material:

❖ **Text Books:**

1. Junarkar, S.B. & Shah, H.J., Mechanics of Structures Vol-I & II, Charotar Publishing House
2. Junnarkar, S. B. & Shah, H. J., Applied Mechanics, Charotar Publishing House
3. Beer and Johnston, Engineering Mechanics (Statics & Dynamics)

❖ **Reference Books:**

1. Beer and Johnston, Mechanics of Materials
2. Gere & Timoshenko, Mechanics of Materials, CBS Publishers & Distributors, Delhi
3. Hibbler, R.C., Engineering Mechanics, Pearson Education
4. Popov, E.P., Engineering Mechanics of Solids, Prentice Hall of India, New Delhi
5. Meriam, J. L. & Kraige, L. G., Engineering Mechanics Statics, John Wiley & Son, Singapore
6. A K Tayal, Engineering Mechanics (Statics & Dynamics), Umesh Publications

❖ **Web Materials:**

1. http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT-Delhi/Mechanics%20Of%20Solids/index.htm
2. http://nptel.iitm.ac.in/video.php?subjectId=105106116

FACULTY OF TECHNOLOGY & ENGINEERING
DEPARTMENT OF MECHANICAL ENGINEERING
ME142: WORKSHOP PRACTICES

Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	-	2	-	2	**1**
Marks	-	50	-	50	

A. Outline of the course:

Sr. No.	Title of the unit	Minimum number of hours
1.	Introduction to workshop facility.	02
2.	Carpentry shop	06
3.	Fitting shop.	08
4.	Different Metal Joining Processes.	04
5.	Smithy shop.	02
6.	Sheet metal working.	02
7.	Plumbing shop.	02
8.	Introduction to machine tools.	02
9.	Injection molding process.	02

Total hours (Lab): 30

Total hours: 30

B. Detailed Syllabus:

1. Introduction to workshop facility **02 hours 07%**

Familiarization with work shop facility, Introduction to different shops of the workshop.

2.	**Carpentry Shop** Introduction to different tools of carpentry shop, Making of drawing of the job to be made, Making of finished job as per drawing out of the given raw material of wood, Identification on the job for traceability.	**06 hours**	**20%**
3.	**Fitting Shop** Introduction to different tools of fitting shop, Making of drawing of the job to be made, Making of finished job as per drawing out of the given raw material. Identification on the job for traceability	**08 hours**	**27%**
4.	**Different Metal Joining Processes** Introduction to different tools of welding shop, Making of drawing of the job to be made, Making or demonstration of finished job as per drawing, Introduction to Soldering and brazing of metal joining process, Joining of two metal sheet or plate by Riveting, Making of drawing of the job to be made by riveting	**02 hours**	**14%**
5.	**Smithy Shop.** Introduction to different tools of smithy shop, Making of drawing of the job to be made for Cold smithy, Making or demonstration of finished job as per drawing, Making of drawing of the job to be made for Hot smithy, Making or demonstration of finished job as per drawing	**04 hours**	**07%**
6.	**Sheet Metal Working.** Introduction to different tools of sheet metal working shop, Making of drawing of the job to be made from sheet metal, Making or demonstration of finished job as per drawing	**02 hours**	**06%**
7.	**Plumbing Shop.** Introduction to all plumbing tools, Demonstration of plumbing on the piping model	**02 hours**	**06%**
8.	**Introduction to Machine Tools.** Detailed introduction to Lathe machine, Shaping machine, Drilling machine, Grinding machine, Milling machine, Bending machine, Mechanical press.	**02 hours**	**07%**
9.	**Injection molding process.**	**02 hours**	**06%**

Introduction and demonstration to Injection Molding Process for making job out of plastic material

C. Instructional Method and Pedagogy:

- Attendance is compulsory in laboratory session.
- Journal writing based on above course content and practical work in form of performance practical's by preparing job at the workshop floor.
- In the laboratory discipline and behavior will be observed strictly.
- All the students must follow code of conduct during working at the shop floor.
- Journal should be submitted to the respective course teacher within the given time limit.

Course Outcome (COs):

On the completion of the course one should be able to:

CO1	Recognize essential tools and process of carpentry.
CO2	Understand the joining process like welding, soldering and brazing.
CO3	Recognize and use essential tools and different machines.
CO4	Recognize various forging and forming processes with the aid of smithy process.
CO5	Understand different types of sheet metal joints which are useful in working.
CO6	Recognize process of fitting,different types of fittings plumbing tools and plastic molding processes.

Course Articulation Matrix:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	1	-	-	-	-	-	-	-	-	-	-	-	-	-

Recommended Study Material:

- **Text book:**

1. Anderson, James, and Earl E. Tatro. "Shop Theory. 5th ed." (1968).

2. Bawa, H. S. Workshop Technology. India: Tata McGraw-Hill, (1995).

3. Choudhury, Hajra. "Elements of Workshop Technology, Vol. I & II." Media Promotors Pvt Ltd (2009).

4. Raghuwanshi, B. S. Course in Workshop Technology. Dhanpat Rai and Company (P) Limited, (2009).

❖ **Reference book:**

1. Chapman, W. A. J. "Workshop Technology Part 1-3." (1998).

2. Tejwani V.K., “Basic Machine Shop Practic e Vol. I, II”, Tata McGraw Hill Pub. Co., New Delhi, (1989).

3. Arora B.D., “Workshop Technology Vol. I, II”, Satya Prakashan, New Delhi, (1981).

❖ **Web Materials:**

1. www.nptel.iitm.ac.in

FACULTY OF APPLIED SCIENCES
DEPARTMENT OF PHYSICAL SCIENCES
PY 142: Engineering Physics – I

Credit and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	-	2	-	2	2
Marks	-	100	-	100	

A. Outline of the Course:

Sr. No.	Title of the Unit	Minimum number of Hours
1	Mechanics Lab	16
2	Thermodynamics Lab	14

Total hours (Theory): 00 Hrs.

Practical Hours: 30 Hrs.

Total hours: 30 Hrs.

B. Detailed Syllabus:

1. **Mechanics** **16 hours** **55%**

1.1 **Uncertainties in Measurements:** Sources and estimation of errors, accuracy and precision, systematic error, random error, Significant figure and round off, error propagation

1.2 **Laws of Motion:** Frames of reference. Newton's Laws of motion, Dynamics of a system of particles, Centre of Mass, Projectile motion

1.3 **Collisions:** Elastic and inelastic collisions between particles

1.4 **Momentum and Energy:** Conservation of momentum, Work and energy, Conservation of energy. Motion of rockets

1.5 **Rotational Motion:** Angular velocity and angular momentum. Torque. Conservation of angular momentum

1.6 **Elasticity:** Hooke's law - Simple Stress and Strain: Introduction, Normal and Shear stresses, Stress- Strain Diagrams for ductile and brittle material, Elastic Constants

No. of Experiment

1. Understanding Errors and Uncertainties in the measurements
2. Conservation of Energy, Hook's law
3. Young modulus and elasticity
4. To determine g by Bar Pendulum and Kater's Pendulum.

2.	**Thermodynamics:**	**14 hours**	**45%**

2.1 Zeroth Law of thermodynamics and temperature

2.2 First law, second, third law and internal energy, conversion of heat into work

2.3 Various Thermo dynamical Processes, Enthalpy, Gibbs, Helmholtz and Internal Energy functions,

2.4 Transport Phenomena: Viscosity, Conduction and Diffusion

2.5 Applications to specific heat of gases and metals

2.6 Blackbody radiation, Spectral distribution, Derivation of Planck's law

No. of Experiment

1. Specific Heat of Metals
2. Thermal conductivity of materials by Searl's apparatus
3. Heat Transfer and Newton's Law of Cooling
4. Radiation from a black body: Stefan-Boltzmann Law

C. Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Section wise Online Quiz will be taken.
- Lab manual: Student will be required to read the lab material prior to the start of class. A way to ensure this is by lab quizzes and assignments.
- Lab Reports: Student has to write lab reports and submit them hardcopy/electronically. The purpose of this exercise is both to demonstrate your work in lab and to guide you to think

a bit more deeply about what you are doing. The act of technical writing also helps improve your communication skills, which are broadly relevant far beyond the physics lab

Course Outcome (COs):

At the end of the course, the students will be able to

CO1	Students will be able to apply and demonstrate the concepts of mechanics to practical engineering problems.
CO2	Understand the basic concepts of thermodynamics such as internal energy, thermodynamic properties, transport phenomena, blackbody radiation.

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	2	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	3	1	1	-	-	-	-	-	-	-	-	-	-

Enter correlation levels 1, 2 or 3 as defined below:
1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)
If there is no correlation, put "-"

Recommended Study Material:

- **Text Books:**
  1. Physics for Scientists and Engineers by Randall D. Knight, 4th Edition, Pearson
  2. University Physics by Hugh D. Young, Roger A. Freedman and A. Lewis Ford, 13th Edition, Pearson
  3. Physics by John D. Cutnell& Kenneth W. Johnson, 8th Edition, John Wiley & Sons, Inc.
- **Reference Books:**
  1. An introduction to mechanics, D. Kleppner, R.J. Kolenkow, 1973, McGraw-Hill.
  2. University Physics, Ronald Lane Reese, 2003, Thomson Brooks/Cole.
  3. Physics, Resnick, Halliday and Walker 8/e. 2008, Wiley.
  4. Physics for scientists and Engineers with Modern Phys., J.W. Jewett, R.A. Serway, 2010, Cengage Learning
  5. Heat and Thermodynamics, M.W. Zemansky, Richard Dittman, 1981, McGraw-Hill.

6. Concepts in Thermal Physics, S.J. Blundell and K.M. Blundell, 2nd Ed., 2012, Oxford University Press

❖ **Web Materials:**

1. Uncertainty and error in measurement - https://www.youtube.com/watch?v=pWEflsClyTk
2. Vernier Callipers principle and description (Introduction) - https://www.youtube.com/watch?v=ySRN3yuZUT0
3. Hooke's law - https://www.youtube.com/watch?v=PWQm4ynYVSE
4. Law Of Conservation Of energy in a Simple Pendulum - https://www.youtube.com/watch?v=51RCyBr_nGk, https://www.youtube.com/watch?v=QlViWmQcwpQ
5. Young's modulus of the material of a beam by method of bending of beam - https://www.youtube.com/watch?v=iUhfstf10rk
6. Bar pendulum - https://www.youtube.com/watch?v=3uZ_Boyt_AI
7. Kater's Pendulum - https://www.youtube.com/watch?v=TxbDyv17Jfs
8. Specific Heat of Metals - https://www.youtube.com/watch?v=8gHFaL2990U
9. Thermal conductivity of materials by Searl's apparatus - https://www.youtube.com/watch?v=qKhhcrqhPfY
10. Newton's Law of Cooling - https://www.youtube.com/watch?v=lC9o6ikJlR8
11. Radiation from a black body: Stefan-Boltzmann Law - https://www.youtube.com/watch?v=riRsMfNmicM

FACULTY OF TECHNOLOGY AND ENGINEERING

M. S. PATEL DEPARTMENT CIVIL ENGINEERING

CL144.01 A Environmental Sciences

Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	-	2	-	2	2
Marks	-	100	-	100	

A. OUTLINE OF THE COURSE:

Sr. No.	Title of the Unit	Minimum Number of Hours
1	Multidisciplinary nature of environmental Sciences	03
2	Environmental Pollution	07
3	Ecology & Ecosystems	05
4	Biodiversity and Conservation	04
5	Natural Resources	04
6	Human Communities and the Environment	07

Total Hours (Theory): 00

Total Hours (Lab): 30

Total Hours: 30

B. DETAILED SYLLABUS:

1. Multidisciplinary nature of environmental studies **03 Hours 11%**

1.1 Definition, scope and importance

1.2 Earths-Evolution and Systems

1.3 Components of the Environment: Biotic, Abiotic, Atmosphere, Lithosphere, Hydrosphere, Biosphere

1.4 Concept of sustainable development

2. Environmental Pollution **07 Hours 23%**

2.1 Environmental pollution: types, causes, effects and controls; Air, water, soil and noise pollution

	Nuclear hazards and human health risks		
2.2	Solid waste management: Control measures of urban and industrial		
2.3	waste		
2.4	Pollution case studies – Ganga/Yamuna River, Bhopal Gas Tragedy, Delhi Air Pollution, Effect of Pandemics on the Environment		
3.	**Ecology & Ecosystems**	**05 Hours**	**17%**
3.1	Concept of an ecosystem, Structure and function of an		
3.2	ecosystem		
3.3	Producers, consumers and decomposers		
	Energy flow in the ecosystem, Food chains, food webs and		
3.4	ecological pyramids		
	Case studies of the following ecosystems:		
	Forest ecosystem, Grassland ecosystem Aquatic ecosystems (ponds, streams, lakes, rivers)		
4.	**Biodiversity and Conservation**	**04 Hours**	**13%**
4.1	Introduction – Definition: genetic, species and ecosystem		
4.2	diversity		
	Value of biodiversity: consumptive use, productive use,		
4.3	social, ethical, aesthetic and option values		
	Hot-sports of biodiversity, Threats to biodiversity: habitat		
4.4	loss, poaching of wildlife, man-wildlife conflicts.		
4.5	Endangered and endemic species of India, Conservation of biodiversity		
	Biodiversity Act 2002/ BD Rule 2004: Mandate & Functions of National Biodiversity Authority (NBA), Role of State Biodiversity Board (SBB) and Biodiversity Management Committees(BMC).		
5.	**Natural Resources**	**04 Hours**	**13%**
5.1	Renewable and non-renewable resources		
5.2	Recyclable and Non-recyclable resources		
5.3	Energy resources: Growing energy needs, use of alternate energy sources. Case studies.		
5.4	Role of an individual in conservation of natural resources		
6.	**Human Communities and the Environment**	**07 Hours**	**23%**

6.1 Pandemics: Causes, Effects, Impact on the Environment: Positive & Negative, Lessons to learn

6.2 Floods, Cyclones, Earthquakes, Landslides & Forest Fires

6.3 Human population growth: Impacts on environment, human health and welfare.

6.4 Case Studies: Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents, etc.

C. INSTRUCTIONAL METHOD AND PEDAGOGY:

The course is based on practical learning. Teaching will be facilitated by Slides Presentations, Reading Material, Discussions, Case Studies, Ted Talks, Videos, Task-Based Learning, Projects, Assignments and various Individual and Interpersonal activities like, Critical reading, Group work, Independent and Collaborative Research, Presentations, etc.

Course Outcomes (COs):

At the end of the course, students will be able:

CO1	To perceive the elementary knowledge about natural environment and its relation with science.
CO2	To identify and analyze human impacts on the environment.
CO3	To understand the facts and concepts of natural and energy resources thereby applying them to lessen the environmental degradation.
CO4	To Initiate new and innovative environmental friendly practices.
CO5	To communicate on recent environmental problems thereby creating awareness among society.

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	3	-	-	-	-	-	-	-
CO3	-	-	-	-	-	2	3	-	-	-	-	-	-	-
CO4	-	-	2	-	-	-	3	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	2	-	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation "-"

Recommended Study Material:

❖ **Text Books:**

1. Varandani, N.S., Basics of Environmental Studies
2. Sharma, J. P., Basics of Environmental Studies

❖ **Reference Books:**

1. Shah Shefali & Goyal Rupali, Basics of Environmental Studies
2. Agrawal, K.C., Environmental Pollution : Causes, Effects & Control
3. Dameja, S. K., Environmental Engineering & Management
4. Rajagopalan, R., Environmental Studies, Oxford University Press
5. Wright Richard T. & Nebel Bernard J., Environmental Science
6. Shah, S.G., Shah, S.G. & Shah, G. N., Basics of Environmental Studies, Superior Publications, Vadodara

❖ **Web Materials:**

- http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT Delhi/Environmental%20Air%20Pollution/index.htm
- http://nptel.iitm.ac.in/video.php?subjectId=105104099
- http://apollo.lsc.vsc.edu/classes/met130/notes/chapter1/vert_temp_all.html
- http://www.epa.gov
- http://www.globalwarming.org.in
- http://nopr.niscair.res.in
- http://www.indiaenvironmentportal.org.in
- http://nbaindia.org/

FACULTY OF APPLIED SCIENCES
DEPARTMENT OF MATHEMATICAL SCIENCES & DEPARTMENT OF PHYSICAL SCIENCES
FS101A: Foundation Course on Mathematics and Physics

Credits and Hours:

Teaching Scheme	Theory	Practical	Total	Credit
Hours/week	-	2	2	2
Marks	-	100	100	

A. Outline of the Course:

Sr. No.	Title of Units	Number of Hours
1	Scientific phenomena related to Mathematics and discussion, presentation, and its explanation	15
2	Scientific phenomena related to Physics and discussion, presentation, and its explanation	15

Total hours (Theory): -- Hrs
Total hours (Lab) : 30 Hrs
Total hours : 30 Hrs

B. Detailed Syllabus:

Scientific Problems in Mathematics

Sr. No	Phenomena	15 Hours	50%
1	Applications of Mathematics in nature through Fibonacci sequence.		
2	Applications of Mathematics in science (Geometry, Graphs, Heat and Light, Solar System and Planets, Solar System and Stars, Space Science, Sun).		
3	Applications of Mathematics in growth or decay model of bacteria/animals.		
4	Applications of Mathematics in cryptography.		
5	Applications of Mathematics in data science (data security, AI, encryptions of code etc.).		
6	Applications of calculus in day to day life.		
7	Applications of geometry in real life (Birds flying patterns, geometry of Bridges, plantations, Surveying etc.).		
8	Applications of Graph theory in real life (Labeling Problems, colors problems, Shortest path, tree etc.).		

9	Applications of Mathematics in Bioscience (COVid-19 model, infectious disease dynamics, transmissions models etc.)
10	Applications of Graph theory in networking (social networks, biological networks, internet, neuroscience etc.
11	Applications of differential equations in engineering (Electric Circuits, Problems of Vibrations, Beam-Columns Problems etc).
12	Applications of mathematics in road Traffic control problems.
13	Applications of mathematics in Weather forecasting.
14	Application of Matrices in Real life and computer network.
15	Application of Mathematics in Business.
16	Real life statistical problems e.g. counting of birds or fishes in the pond.
17	Measuring of area of an irregular figures using mathematical concepts.

Scientific Problems in Physics

Sr. No	**Phenomena**	**15 Hours**	**50%**
1	Basic Mechanics of Rocket Launching.		
2	Quantum Computation.		
3	Average heights of Human in reaction of G.		
4	Planetary motion.		
5	Solar cells—a window to the future?		
6	Big discoveries about tiny particles		
7	Know about Earth's marvellous magnetism		
8	How big is nano		
9	Why Sky is blue? – Raman effect.		
10	Communication & Solar flare.		
11	Geo Satellite & GPS System		
12	Tsunami and wave		
13	Motion of electrons (Electricity) at our Home!		
14	Laws of attraction and rejection (Gravitational, electric, magnetic, nuclear etc force)		
15	Pressure of life in deep sea.		
16	Why the violin sings		
17	why winds never blow in a straight line		
18	The challenge and promise of studying burning plasmas		
19	How atom emit lights:		
20	A vacuum is not exactly nothing		

C. Course Outcomes (COs):

Upon successful completion of this course, a student will be able to

CO1	Acquire the fundamental knowledge of Mathematics and Physics.
CO2	Able to apply foundational knowledge to solve daily life problems.
CO3	Solve basic phenomena of sciences by a scientific approach.

Course Articulation Matrix

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	2	-	-	-	1	-	-	1	-	-	1	-	-
CO3	2	2	2	-	-	-	-	-	1	-	-	1	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation "-"

D. Instructional Methods and Pedagogy

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Labs will be conducted with the aid of multi-media projector, black board, OHP, models etc.
- Attendance is compulsory in labs which carries a 10% component of the overall evaluation.
- Course content presentation should be based on experimental demonstration which can induce scientific inquiry among students.
- Identify the audio-visual resources/materials related to the topic which could be played during lab session to improve understanding of theory.
- Problem solving activities should be done in lab along with specific practical exercises to inculcate prediction on final result/outcome.
- Critical thinking activities should be incorporated after course content presentation so that students can develop ability to reach generalization and apply them to solve everyday problems.
- Include a range of learning experiences, such as investigations, practical activities, field trials, field trips, speakers, and group and individual activities. On field activities and excursion(s) must be done.
- After the presentation of course content, active involvement of student must be solicited in form of either pair/group work or presentation to motivate and engage the students. Furthermore, these activities will promote higher level skills and attributes such as communication, teamwork and perseverance in the students.
- Adaptive course contents based on recent events with its background, current trends should be added in course.

- More real life exposure should be included.
- More comprehensive practical must be included to fulfil the requirement of learning while doing.
- Use of models and modelling techniques in teaching to strengthening the understanding.
- Practical should be conducted in such a way that the development of process skills like observation, classification, measurement etc. will become strong in the students.

Recommended Study Material:

❖ **Text Book:**

❖ **Reference Book:**

1. The Science Book, DK Publishing
2. How It Works Book 2: Amazing Physics Imagine Publishing
3. How Science Works: The Facts Visually Explained. DK Publishing
4. The Physics Book: Big Ideas Simply Explained. DK Publishing
5. The Math Book: Big Ideas Simply Explained. DK Publishing

❖ **Web Material:**

- https://www.mathsisfun.com/

FACULTY OF MANAGEMENT STUDIES
DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES
HS101.02 A: Communicative English

Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	--	2	--	2	**2**
Marks	--	100	--	100	

A. Outline of the Course:

Sr. No.	Title of the unit	Minimum number of hours
1.	Introduction to Communicative English	03
2.	Communication Functions	06
3.	Basic Communication Skills I – Listening	03
4.	Basic Communication Skills II – Reading	03
5.	Basic Communication Skills III – Speaking	06
6.	Basic Communication Skills IV – Writing	06
7.	Developing Vocabulary	03

Total hours (Theory): 00 Hrs.

Practical Hours: 30 Hrs.

Total hours: 30 Hrs.

B. Detailed Syllabus:

1. Introduction to Communicative English **03 Hours** **10%**

English as a Window Language; Varieties of English: British English, American English, Indian English; Language Variations; Importance of English for Academic and Professional Development; Strategies for Language Acquisition; Formal VS Informal English

2. Communication Functions **6 Hours** **20%**

Greeting and Introducing; Making Requests and Asking for Information; Expressing Likes and Dislikes; Seeking Permission; Giving and Taking Advice; Describing People, Place, Things; Retelling Past Events; Comparing and Contrasting; Persuading; Describing Cause and Effect

3. Basic Communication Skills I – Listening **3 Hours** **10%**

Importance of Listening as a Language Skill; Basic Listening Skills; Types of Listening; Barriers to Listening; Strategies for Effective Listening; Listening Practice

4.	**Basic Communication Skills II – Reading**	**3 Hours**	**10%**

Importance of Reading as a Language Skill, Reading Strategies: Skimming, Scanning, Intensive Reading, Extensive Reading, Strategies for Effective Reading Comprehension, Reading Practice

5.	**Basic Communication Skills III – Speaking**	**6 Hours**	**20%**

Importance of Speaking as a Language Skill, Basic Speaking Skills; Paralanguage for Effective Speaking; Strategies for Oral Communication; Extempore and Public Speaking

6.	**Basic Communication Skills IV – Writing**	**6 Hours**	**20%**

Importance of Writing as a Language Skill; Process of writing: Prewriting, Drafting, Revision, Editing, Publication; Seven C's of Writing; Sentence Construction – Complex, Compound, Paragraph Development; Letter Writing (Academic Context)

7.	**Developing Vocabulary**	**3 Hours**	**10%**

High Frequency Vocabulary (Everyday and Academic use); Words Often Confused and Misused; Useful Phrasal Verbs, Idioms and Proverbs, Homonyms and Homographs; Lexical Range, Word Games

Course Outcome (COs):

At the end of the course, the students will be able to:

CO1	Communicate with people using English language functions including greetings, introductions, making and responding to requests, suggestions, invitations and apologies, conducting simple transactions in shops and offices, asking for and giving directions, etc
CO2	Go through a text and identify specific and global information.
CO3	Become more knowledgeable about speaking strategies and speak effectively using appropriate words, expression, tone and pronunciation.
CO4	Be aware about various reading strategies and read and comprehend academic and non-academic prose (text).
CO5	Write systematically using nuances of writing
CO6	Express their opinion and likes and dislikes, advice and convince others in a more polite and accepted way.

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	2	-	-	-	2	-	-	-	3	2	-	-	-
CO2	-	2	-	2	-	-	-	-	-	2	-	2	-	-

CO3	-	-	-	1	-	-	2	-	-	3	2	-	-	-
CO4	-	-	-	-	-	-	-	-	-	2	-	1	-	-
CO5	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO6	-	-	-	-	-	-	-	1	2	2	-	-	-	-

Enter correlation levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

If there is no correlation, put "-"

Recommended Study Material:

- **Text book:**

1. Sanjay Kumar and PushpLata (Second Edition, 2015), Communication Skills, Oxford University Press, New Delhi
2. M V Rodriques (2013), Effective Business Communication, Concept Publishing Company (P) Ltd., New Delhi
3. Krishna Mohan and Meera Banerji (2010), Developing Communication Skills, Macmillan Publications India Ltd., New Delhi

- **Reference book:**

1. Mohan and Meenakshi Raman (2006), Effective English Communication, Mcgraw-Hill Publishing Company Limited, New Delhi
2. Geoffrey Leech & Jan Swartvik (1994), A Communicative Grammar of English, Longman Publications, New York
3. Jones Leo (1979), Functions of English, Cambridge University Press, UK
4. European Journal of Language and Literature Studies Vol.1 Nr, 1 April 2015
5. English for Academic Purpose: A Tool for Enhancing Students' Proficiency in English Language Skills

- **Web material:**

1. https://www.futurelearn.com/courses/language-assessment
2. https://www.coursera.org/learn/importance-of-listening?#syllabus
3. https://www.futurelearn.com/courses/english-academic-study

CHAROTAR UNIVERSITY OF SCIENCE AND TECHNOLOGY

B. Tech. (ME/CL/EE) Programme

SYLLABI (Semester – 2)

FACULTY OF APPLIED SCIENCES
DEPARTMENT OF MATHEMATICAL SCIENCES
MA144: Engineering Mathematics- II

Credits and Hours:

Teaching Scheme	Theory	Tutorial	Total	Credit
Hours/week	4	1	5	4
Marks	100	-	100	

A. Outline of the course:

Sr. No.	Title of the unit	Minimum number of hours
1	First order and First degree Ordinary Differential Equations	08
2	Higher Order Ordinary Linear Differential Equations	12
3	Partial Differential Equations and Applications	10
4	Matrix Algebra –II	10
5	Improper and Multiple Integrals	10
6	Probability and Statistics	10

Total hours (Theory): 60 Hrs.

Practical Hours: 00 Hrs.

Total hours: 60 Hrs.

B. Detailed Syllabus:

1. First order and First degree Ordinary Differential Equations: 08 Hours 13%

1.1 Modeling of real world problems in terms of first order ODE

1.2 Concept of general and particular solutions

1.3 Initial value problems

1.4 Existence and Uniqueness of solutions by illustrations

1.5 Solutions of first order and first degree differential equations

1.6 Linear, Bernoulli, Exact and non-exact differential equations

2. Higher Order Ordinary Linear Differential Equations: 12 Hours 20%

2.1 Model of real world problems of higher order LDE

2.2 General Solution of Higher Order Ordinary Linear Differential Equations with Constant coefficients

2.3	Methods for finding particular integrals viz. variation of parameters and undetermined coefficients		
2.4	LDE of higher order with variable coefficients: Legendre's Equations (Special case: Cauchy-Euler equation)		
2.5	System of simultaneous first order linear differential equations		
3.	**Partial Differential Equations and Applications:**	**10 Hours**	**17%**
3.1	Boundary valued problems		
3.2	Methods of solutions of first order PDE		
3.3	Lagrange's Linear Partial Differential Equations.		
3.4	Special types of Nonlinear PDE of the first order		
3.5	Solutions of Heat, Wave and Laplace equations using separation of variables.		
3.6	Modeling of real world problem in terms of PDE		
4.	**Matrix Algebra –II:**	**10 Hours**	**17%**
4.1	Revision of matrices, determinant		
4.2	Eigenvalues and Eigenvectors of matrices		
4.3	Eigenvalues and Eigenvectors of special matrices		
4.4	Cayley-Hamilton's Theorem and its applications.		
4.5	LU decomposition		
5.	**Improper and Multiple Integrals:**	**10 Hours**	**17%**
5.1	Improper integrals and their convergence		
5.2	Definitions, properties and examples of Gamma, Beta and Error functions		
5.3	Evaluation of double and triple integrals		
5.4	Change of order of double integration		
5.5	Transformation to polar and cylindrical coordinates		
5.6	Applications of double and triple integrals		
6.	**Probability and Statistics:**	**10 Hours**	**16%**
6.1	Mean, median, mode and standard deviation		
6.2	Combinatorial probability		
6.3	Joint and Conditional probability and Bayes theorem		
6.4	Random variables, probability distribution functions - Binomial, Poisson, exponential and normal.		

C. Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures/tutorials which carries a 5% component of the overall evaluation.
- Minimum two internal exams will be conducted and average of two will be considered as a part of 15% overall evaluation.

- Quiz (surprise test) /Oral tests/ Viva/Assignment/Tutorials will be conducted which carries 10% component of the overall evaluation.

Course Outcomes (COs):

At the end of the course, the students will be able to

CO1	formulate models of natural phenomena using differential equations and find its solution using standard methods.
CO2	identify, analyze and subsequently solve physical problems analytically whose behaviour can be described by linear and nonlinear differential equations.
CO3	find and explain significant of Eigenvalues and Eigenvectors of a square matrix, use Cayley-Hamilton's theorem to find inverse and power of a square matrix, construct LU decomposition of a square matrix.
CO4	use advanced techniques to evaluate improper integrals, apply multiple integrals to find area, volume and mass in engineering field.
CO5	recognize the difference between different measure of central tendency, summarize and interpret data.
CO6	understand and solve the problems using probability axioms, rules and Bayes theorem, use distributions such as Binomial, Poisson, Exponential and Normal to solve real world problems.

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	1	-	-	-	-	-	-	-	-	-	-	-
CO3	3	1	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	1	-	-	-	-	-	-	-	-	-	-	-	-
CO5	2	2	-	1	1	-	-	-	-	-	-	-	-	-
CO6	2	2	1	2	1	1	1	-	-	-	-	-	-	-

Enter correlation levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

If there is no correlation, put "-"

Recommended Study Material:

❖ Text Books:

1. Erwin Kreyszig; Advanced Engineering Mathematics, 8th Ed., Jhon Wiley & Sons, India, 1999.
2. H. K. Dass and Rajnish Verma; Higher Engineering Mathematics, S Chand & Co Pvt. Ltd.
3. Sheldon Ross; A first course in probability. Pearson, 2014.
4. B. S. Grewal; Higher Engineering Mathematics, Khanna Publ., Delhi, 2012

❖ Reference Books:

1. M. D. Weir et al*;* Thomas' Calculus, 11th Ed., Pearson Education, 2008.
2. James Stewart; Calculus Early Transcendental, 5th Ed., Thomson India, 2007
3. C. R. Wylie and L. C. Barrett; Advanced Engineering Mathematics. 1982, McGraw-Hill Book Company.
4. Michael D. Greenberg; Advanced engineering mathematics. Prentice-Hall, 1988.
5. R. V. Hogg, E. A. Tanis and D. L. Zimmerman; Probability and Statistical Inference, 9th edition, Prentice Hall, 2015.
6. Zafar Ahsan; Differential Equations and Their Applications, φ Learning, Pvt Ltd,Third Edition (2017).

❖ URL Links:

1. http://nptel.ac.in/courses/122107037/
2. http://nptel.ac.in/courses/111107108/
3. http://nptel.ac.in/courses/122103012/
4. http://nptel.ac.in/courses/122104018/
5. http://nptel.ac.in/courses/111106100/
6. http://nptel.ac.in/courses/122101003/
7. https://ocw.mit.edu/courses/mathematics/18-02-multivariable-calculus-fall-2007/lecture-notes/
8. https://nptel.ac.in/courses/111105041/

FACULTY OF TECHNOLOGY & ENGINEERING
CHAMOS MATRUSANSTHA DEPARTMENT OF MECHANICAL ENGINEERING
ME 147: BASICS OF CIVIL & MECHANICAL ENGINEERING
(Introduced in 2019-20)

Credits and Hours:

Teaching Scheme	Theory	Practical	Total	Credit
Hours/week	3	2	5	**4**
Marks	100	50	150	

A. Outline of the course:

Sr. No.	Title of the unit	Minimum number of hours
1.	Introduction of Mechanical Engineering	06
2.	Steam and Steam Generator	05
3.	Internal Combustion Engines	06
4.	Pumps and Compressors	03
5.	Refrigeration and Air Conditioning Systems	05
6.	Power and Motion Transmission	05
7.	Scope of Civil Engineering	02
8.	Introduction to Surveying	06
9.	Elements of building Construction	07

Total hours (Theory): 45 Hrs.

Practical Hours: 30 Hrs.

Total hours: 75 Hrs.

B. Detailed Syllabus:

PART A:

1. Introduction of Mechanical Engineering **06 Hours** **13%**

1.1 Prime movers and its types, sources of energy

1.2 Basic terminology: force and mass, pressure, work, power, energy, heat, temperature, units of heat, specific heat capacity, interchange of heat, change of state, internal energy, enthalpy, entropy, efficiency

1.3	Zeroth law and first law of thermodynamics, Boyle's law, Charle's law and combined gas law, Relation between Cp and Cv		
1.4	Constant volume process, constant pressure process, isothermal process, poly-tropic process, adiabatic process		
1.5	Numerical practice		
2.	**Steam and Steam Generator**	**05 Hours**	**11%**
2.1	Introduction to steam formation and its types		
2.2	Introduction to steam table		
2.3	Calorimeter and its types		
2.4	Boiler definition and its classification		
2.5	Cochran boiler, Babcock and Wilcox boiler and its mountings and accessories		
2.6	Efficiencies of boiler		
3.	**Internal Combustion Engines**	**06 Hours**	**13%**
3.1	Introduction		
3.2	Basic terminology of I.C. engine		
3.3	Types of I. C. engines- four stroke & two stroke engines		
3.4	Efficiencies of an engine		
3.5	Numerical practice		
4.	**Pumps and Compressors**	**03 Hours**	**7%**
4.1	Introduction		
4.2	Classification and application of pumps and compressors		
4.3	Working of reciprocating and centrifugal type pumps & compressors		
5.	**Refrigeration and Air Conditioning Systems**	**05 Hours**	**11%**
5.1	Introduction to refrigeration and air conditioning		
5.2	Basic terminology, principal and application of refrigeration		
5.3	Vapour compression refrigeration system		
5.4	Domestic refrigerator		
5.5	Window and split air conditioning systems		
6.	**Power and Motion Transmission**	**05 Hours**	**11%**
6.1	Introduction		
6.2	Types of couplings, brakes and clutches		

6.3 Belt drive and its types

6.4 Gear drives and its types, gear trains, chain drives

PART B:

7.	**Scope of Civil Engineering**	**02 Hours**	**05%**
7.1	Scope of Civil engineering		
7.2	Branches of civil engineering,		
7.3	Role of civil engineer		
8.	**Introduction to Surveying**	**06 Hours**	**13%**
8.1	Definition of surveying		
8.2	Objects of surveying, uses of surveying		
8.3	Primary divisions of surveying, principles of surveying		
8.4	List of classification of surveying, definition: plan and map		
8.5	Introduction to linear and angular measurements		
9.	**Elements of building Construction**	**07 Hours**	**16%**
9.1	Types of building		
9.2	Design loads		
9.3	Building components (super structure and substructure)		
9.4	Principles of planning		
9.5	Basics requirements of a building planning		
9.5	Types of residential building		

C. Instructional Methods and Pedagogy:

- At the starting of the course, delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of Multi-Media projector, Black Board, OHP etc.
- Attendance is compulsory in lectures and laboratory.
- Internal exams/Unit tests/Surprise tests/Quizzes/Seminar/Assignments etc. will be conducted as a part of continuous internal theory evaluation.
- The course includes a laboratory, where students will get opportunities to build appreciation for the concepts being taught in lectures.
- Experiments/Tutorials related to course content will be carried out in the laboratory.

- In the lectures and laboratory discipline and behaviour will be observed strictly.

Course Outcome (COs):

At the end of the course, the students will be able to:

CO1	Understand fundamental principles of mechanical engineering
CO2	Learn the formation of steam and different types of the boilers and its mounting and accessories
CO3	Explore the basics of internal combustion engine and pumps & compressors
CO4	Learn basics of refrigeration and air conditioning system and power & motion transmission systems
CO5	Learn importance and application of civil engineering
CO6	Understand the fundamentals of surveying and building planning and Identify different building components

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	1	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	1	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	-	-	-	-	-	1	-	-	-	-	-	-	-
CO5	2	-	-	-	-	1	-	-	-	-	-	-	-	-
CO6	2	-	-	-	-	-	1	-	-	-	-	-	-	-

Enter correlation levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

If there is no correlation, put "-"

Recommended Study Material:

- **Text book:**
  1. S.M.Bhatt, H.G.Katariya, J.P.Hadiya, “Elements of Mechanical Engineering”, Books India Publication, Ahmedabad.
  2. P.S.Desai, S.B.Soni, “Elements of Mechanical Engineering”, Atul Prakashan, Ahmedabad
  3. Kandya Anurag, “Elements of Civil Engineering”, Charotar Publishing House Pvt. Ltd.
- **Reference book:**
  1. Dr. Sadhu Singh, “Elements of Mechanical Engineering”, S.CHAND Publication, New Delhi
  2. V.K.Manglik, “Elements of Mechanical Engineering”, PHI Learning, Delhi.
  3. Khasia R.B. and Shukla R.N., “Elements of Civil Engineering”, Mahajan Publication.
  4. Punamia B.C., “Surveying”, Vol. I & II
- **Web Materials:**
  1. http://nptel.ac.in/downloads/112105125/
  2. http://nptel.ac.in/syllabus/syllabus.php?subjectId=105104101
  3. http://nptel.ac.in/courses/105107122/
  4. https://swayam.gov.in/nd1_noc19_me58/preview

FACULTY OF TECHNOLOGY & ENGINEERING
M & V PATEL DEPARTMENT OF ELECTRICAL ENGINEERING
EE145: Basics of Electronics & Electrical Engineering

Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	3	2	0	5	**4**
Marks	100	50	0	150	

A. Outline of the course:

Sr. No.	Title of the unit	Minimum number of hours
1	Basic Electrical Terms and Units	04
2	Electrical Circuit Analysis	07
3	Electrostatic	08
4	Electromagnetism	05
5	AC Fundamentals	05
6	Single Phase AC Series Circuits	05
7	Polyphase Circuits	04
8	Basics of Electronics	07

Total hours (Theory): 45 Hrs

Total hours (Lab) : 30 Hrs

Total hours : 75 Hrs

B. Detailed Syllabus

1. Basic Electrical Terms and Units **04 Hours** **08%**

1.1 Ohm's law, resistor and its coding, properties, temperature co- efficient of resistance, resistance variation with temperature, examples

2. Electrical Circuit Analysis **07 Hours** **15%**

2.1 Kirchhoff's current and voltage law, mesh and nodal analysis, Examples

2.2 Series parallel circuits, star-delta transformation

3. Electrostatic **08 Hours** **18%**

3.1 Capacitors, charge and voltage, capacitance, electric fields, electric field strength and electric flux density, relative permittivity, dielectric strength, Examples

3.2 Capacitors in parallel and series, Calculation of capacitance of parallel plate and multi

plate capacitor, examples

4.	**Electromagnetism**	**05 Hours**	**12%**
4.1	Magnetic field, its direction and characteristics, magnetic flux and flux density, magneto motive force and magnetic field strength, examples		
4.2	Faraday's law of electromagnetic induction, Fleming's left hand and right hand rule, Lenz law, force on a current carrying conductor, examples		
4.3	Self and mutual inductance		
5.	**AC Fundamentals**	**05 Hours**	**12%**
5.1	AC Waveform and definition of its terms, relation between speed and frequency		
5.2	Average and RMS value and its determination for sinusoidal wave shapes, examples		
6.	**Single Phase AC Series Circuits**	**05 Hours**	**12%**
6.1	R–L and R-C series circuit, power in ac circuits, examples		
6.2	R-L-C series circuit, resonance in R-L-C series circuit, relevant examples		
7.	**Polyphase Circuits**	**04 Hours**	**08%**
7.1	Phase sequence, voltage and current relations in star and delta connected system		
8.	**Basics of Electronics**	**07 Hours**	**15%**
8.1	Electronic Systems: Basic amplifier, voltage, current and power gain, Basic attenuators, CRO		
8.2	Transmission and Signals: Analog and digital signals, bandwidth,		
8.3	Forward and reverse bias of PN junction diode, Zener diode		
8.4	Rectifiers: Half Wave, Full Wave - Centre Tap, Bridge		
8.4	Transistor: Bipolar junction transistor, construction and biasing, configuration		

C. Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, pre-requisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, blackboard, OHP etc.
- Attendance is compulsory in lectures and laboratory which carries 5 Marks weightage.
- Two internal exams will be conducted and average of the same will be converted to equivalent of 15 Marks as a part of internal theory evaluation.
- Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval. It carries a weightage of 5Marks as a part of internal theory evaluation.
- Surprise tests/Quizzes/Seminar will be conducted which carries 5 Marks as a part of internal theory evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Experiments/Tutorials related to course content will be carried out in the laboratory.

Course Outcomes (COs):

On the completion of the course, one should be able to:

CO1	Describe resistors, capacitors and inductors properties, readings and calculation.
CO2	State the basic electrical laws and apply these laws to solve electrical network.
CO3	Identify the property of magnetic materials and understand the laws of emf generation.
CO4	Solve the series and parallel DC circuits and AC circuits for single and poly-phase networks.
CO5	Develop skill and design AC-DC rectification circuits, operate basic electrical and electronics instruments.

Course Articulation Matrix:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	-	1	-
CO2	2	3	-	-	-	-	-	-	-	-	-	-	1	-
CO3	1	3	-	-	-	-	-	-	-	-	-	-	1	-
CO4	1	2	-	2	-	-	-	-	-	-	-	-	3	-
CO5	1	2	3	-	3	-	-	-	-	-	-	-	3	-

Recommended Study Material:

- **Text Books:**
  1. Elements of Electrical Engineering and Electronics by U.A.Patel and R. P. Ajwalia
  2. A Text Book of Electrical Technology by B. L. Thareja, S. Chand
  3. Principles of Electrical Engineering and Electronics by V. K. Mehta, S. Chand
- **Reference Books:**
  1. Electrical Technology by Hughes, Pearson Education.
  2. Electrical Engineering Fundamentals by Vincent Del Toro, Pearson Education.
- **Web Material**
  1. **https://www.electronics-tutorials.ws/**

FACULTY OF TECHNOLOGY & ENGINEERING
Smt. Kundanben Dinsha Patel Department of Information Technology
IT143: Fundamentals of Computer Programming

Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	2	2	0	4	**3**
Marks	100	50	0	150	

A. Outline of the course

Sr. No.	Title of the unit	Minimum number of hours
1	Introduction to Computation and Algorithm	03
2	Introduction to Programming and 'C' language	02
3	Constants, Variables & Data Types in 'C'	03
4	Operators and Expression in 'C'	03
5	Managing Input & Output Operations	02
6	Conditional Statements, Branching & Looping	04
7	Arrays	04
8	Character Arrays	03
9	User-Defined Functions in 'C'	03
10	Structures and Basics of pointer	03

Total hours (Theory): 30 Hrs.

Total hours (Lab): 30 Hrs.

Total hours: 60 Hrs.

B. Detailed Syllabus:

The following contents will be delivered to the students during laboratory sessions.

1 **Introduction to Computation and Algorithm** **03 Hours** **9%**

Various number systems: Decimal, Binary, Octal, Hexadecimal, conversion from one number system to another, What is computer,

	Algorithms, Flow-charts. Solve Various types of algorithms like Exchanging values of two variables, (using 3 variables & 2 variables), Arrange numbers in ascending order, Evaluate various series e.g.: sin x, $1^2-2^2+3^2-\ldots$, $1+2/2!+3/3!+\ldots$,		
2	**Introduction to Programming and 'C' language** What is program & programming, programming languages and it's types, compiler, and interpreter, History of C, Characteristics of C, Basic structure of a program, Compiling process of C a Program	**02 Hours**	**7%**
3	**Constants, Variables & Data Types in 'C'** Character set, C tokens, Keyword, Constants, and Variables Data types – declaration & initialization, User-defined type declaration - typedef, enum, Symbolic constant (#define)	**03 Hours**	**9%**
4	**Operators and Expression in 'C'** Classification of operators: arithmetic, relational, logical, assignment, increment / decrement, bitwise, special operators. Unary, binary and ternary operators, Arithmetic expression, evaluation, type conversion: implicit & explicit, precedence and associativity, use of math.h file	**03 Hours**	**13%**
5	**Managing Input & Output Operations** Basic input and output operations, Input a character, introduction to ASCII code, various library functions from ctype.h. Formatted input using scanf( ), formatted output of integer and real data using printf ( )	**02 Hours**	**6%**
6	**Conditional Statements, Branching & Looping** Decision making using if, if…else statement, nesting of if…else, else…if Ladder. *switch*, use of if…else instead of conditional operator, *goto* statement Need of looping, entry-controlled loop: while, for, exit-controlled loop: do…while, difference, Nesting of looping statements, use of break and continue, use of if, if…else in loop	**04 Hours**	**14%**
7	**Arrays** Need of array, declaration & initialization 1D array, various programs of 1D	**04 Hours**	**10%**

2D array and their memory allocation, 2D array basic programs and matrix operations

8	**Character Arrays**	**03 Hours**	**8%**

Difference of character array with numeric array and importance of NULL character, Declaration, initialization and various input and output methods of string.

9	**User-Defined Functions in 'C'**	**03 Hours**	**12%**

Need of modularization, advantages, introduction to user-defined function, form of C functions, function prototype, function call, function body, Call by value, actual & formal arguments, use of return, nesting of functions, recursion, Array as function arguments, storage classes: scope, life of a variable in C

10	**Structures and Basics of pointer**	**03 Hour**	**12%**

Need of user-defined data type, structure definition, declaration and initialization of variables. Background of memory, variable, value, address of variable, introduction to pointer, declaration & initialization, access value using pointer, indirection (*) operator

C. Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed. Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Two internal exams will be conducted and average of the same will be converted to equivalent of 15 Marks as a part of internal theory evaluation.
- Assignment/Surprise tests/Quizzes/Seminar will be conducted which carries 5 Marks as a part of internal theory evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Experiments/Tutorials related to course content will be carried out in the laboratory and tutorial session respectively.

Course Outcome (COs):

At the end of the course, the students will be able to

CO1	Identify situations where computational methods would be apply and develop various problem solving skills.
CO2	Define, select, and compare data types, operators, and functions to solve mathematical as well as scientific problems.
CO3	Describe, design and develop modular programs using control structures.
CO4	Illustrate the use of different data structures with practical aspect.
CO5	Validate the logic building and code formulation by designing code capable of passing various test cases.

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	1	1	-	-	-	-	-	-	-	-	-	-	1	-
CO2	1	1	1	-	-	-	-	-	-	-	-	-	1	-
CO3	2	-	-	-	1	-	-	-	-	-	-	-	1	-
CO4	-	-	-	1	-	-	-	-	-	-	-	-	1	1
CO5	2	1	2	-	-	-	-	-	-	-	-	-	2	2

Enter correlation levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

If there is no correlation, put "-"

Recommended Study Material:

- **Text book:**
  1. Programming in ANSI C, E.Balagurusamy, Tata McGraw Hill.
- **Reference book:**
  1. C Programming Language (2nd Edition), Brian W. Kernighan, Dennis M. Ritchie, Prentice-Hall (PHI)
  2. C: The Complete Reference, Herbert Schildt, McGrawHill
  3. Let us C: Yashwant Kanetkar, BPB publications new delhi

4. Computer programming and utilization: M.T.Savaliya, Atul Prakashan
5. Computer concepts and Programming , Vikas Gupta, DreamTech
6. Computer fundamentals and Programming in C, Pradip dey and Manas Ghosh, Oxford.

❖ **Web Materials:**

1. http://www.tutorials4u.com/c/
2. http://www.cprogramming.com/tutorial.html
3. http://www.howstuffworks.com/c.htm
4. http://www.programmingtutorials.com/c.aspx
5. http://www.physics.drexel.edu/courses/Comp_Phys/General/C_basics/

FACULTY OF APPLIED SCIENCES
DEPARTMENT OF PHYSICAL SCIENCES
PY 143: Engineering Physics - II

Credit and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	-	2	-	2	2
Marks	-	100	-	100	

A. Outline of the Course:

Sr. No.	Title of the Unit	Minimum number of Hours
1	Electricity and magnetism Lab	12
2	Light and Optics Lab	8
3	Modern Physics Lab	10

Total hours (Theory): 00 Hrs.

Practical Hours: 30 Hrs.

Total hours: 30 Hrs.

B. Detailed Syllabus:

1	**Electricity and magnetism**	**12 hours**	**35%**
1.1	Charge, Conductors and Insulators, Coulomb's law, The electric field		
1.2	Principle of Superposition, Electric potential energy, Electric potential		
1.3	Capacitance and capacitors, The electric potential inside a parallel plate capacitor, electron current,		
1.4	Conductivity and resistivity, resistance and Ohm's law, Kirchhoff's laws and basic circuit, energy and power		
1.5	Magnetic field, The magnetic field of a current, magnetic dipoles		

1.6 Ampere's law and solenoids, Magnetic forces on current-carrying wires

1.7 Magnetic properties of matter, Induced currents, Lenz's law, Faraday's law,

1.8 Induced currents: Three Applications, Inductors, LC Circuits, LR Circuits, LRC Circuits

No. of Experiment

1. Measurement of capacitance by the bridge method
2. Induction and LR, LC, and LRC Circuits
3. Magnetic field along the axis of a coil
4. Time Constant of RC Circuit
5. Measurement of susceptibility of paramagnetic solution (Quinck`s Tube Method)

2 Wave and Optics: 08 hours 25%

2.1 Classification of waves: Plane and Spherical Waves. Longitudinal and Transverse Waves. Plane Progressive (Travelling) Waves, Pressure of a Longitudinal Wave. Energy Transport

2.2 Intensity of Wave, Standing (Stationary) Waves in a String: Fixed and Free Ends, Longitudinal Standing Waves and Normal Modes, Superposition of Waves, Propagation of electromagnetic waves

2.3 Diffraction and Interference, reflection, refraction, refractive index,

2.4 Basics of LASER Physics, Total Internal reflection, Basics of optical fiber, Acceptance angle and Numerical aperture

No. of Experiment

1. The wavelength of light, LASER, and Diffraction
2. Numerical Aperture and Bending Losses in Optical fiber
3. Standing (Transverse) Waves and resonance Using Vibrating Strings. Melde's Experiment

3 Modern Physics: 10 hours 30%

3.1 Planck's quantum theory, Planck's constant and light as a collection of photons

3.2 Photo-electric effect and Compton scattering. De Broglie wavelength and matter waves

3.3 Davisson- Germer experiment, Wave-particle duality, Heisenberg uncertainty principle-impossibility of a particle following a trajectory

3.4 Two slit interference experiment with photons, atoms and particles; Radioactivity: stability of nucleus; Law of radioactive decay

No. of Experiment

1. The Photoelectric Effect; photo current versus intensity and wavelength of light; maximum energy of photo-electrons versus frequency of light
2. Frank hertz experiment; To determine the ionization potential of mercury
3. To determine value of Planck's constant using LEDs of at least 4 different colours

C. Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Section wise Online Quiz will be taken.
- Lab manual: Student will be required to read the lab material prior to the start of class. A way to ensure this is by lab quizzes and assignments.
- Lab Reports: Student has to write lab reports and submit them hardcopy/electronically. The purpose of this exercise is both to demonstrate your work in lab and to guide you to think a bit more deeply about what you are doing. The act of technical writing also helps improve your communication skills, which are broadly relevant far beyond the physics lab

Course Outcome (COs):

CO1	Students would be able to describe the static and dynamic electric and magnetic fields for technologically important structures.
CO2	Ability to identify and illustrate physical concepts and terminology used in optics and other wave phenomena.
CO3	Students would be able to appreciate the need for quantum mechanics, wave particle duality, uncertainty principle etc. and their applications.

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	2	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	3	1	1	-	-	-	-	-	-	-	-	-	-
CO3	3	3	-	2	1	-	-	-	-	-	-	-	-	-	-

Enter correlation levels 1, 2 or 3 as defined below:
1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)
If there is no correlation, put "-"

Recommended Study Material:

❖ **Text Books:**

1. Physics for Scientists and Engineers by Randall D. Knight, 4th Edition, Pearson
2. University Physics by Hugh D. Young, Roger A. Freedman and A. Lewis Ford, 13th Edition, Pearson
3. Physics by John D. Cutnell& Kenneth W. Johnson, 8th Edition, John Wiley & Sons, Inc.

❖ **Reference Books:**

1. Electricity and Magnetism, Edward M. Purcell, 1986 McGraw-Hill Education
2. Waves: Berkeley Physics Course, vol. 3, Francis Crawford, 2007, Tata McGraw-Hill.
3. Fundamentals of Optics, F.A. Jenkins and H.E. White, 1981, McGraw-Hill
4. Principles of Optics, Max Born and Emil Wolf, 7th Edn. 1999, Pergamon Press.
5. Optics, AjoyGhatak, 2008, Tata McGraw Hill
6. Concepts of Modern Physics, Arthur Beiser, 2002, McGraw-Hill.
7. Introduction to Modern Physics, Rich Meyer, Kennard, Coop, 2002, Tata McGraw Hill
8. Introduction to Quantum Mechanics, David J. Griffith, 2005, Pearson Education.

❖ **Web Materials:**

1. Measurement of capacitance by the bridge method - https://www.youtube.com/watch?v=loZC-2A3LLg
2. Phasor Diagram of RL, RC and RLC Circuits - https://www.youtube.com/watch?v=HaFrY0qQ-NU

3. Magnetic field along the axis of a coil - https://www.youtube.com/watch?v=S0N4eVg7I3Y
4. Quinck`s Tube Method - https://www.youtube.com/watch?v=yzgdq8uUfO4
5. The wavelength of light, LASER - https://www.youtube.com/watch?v=desLn3tMLcc
6. Numerical Aperture and Bending Losses in Optical fiber - https://www.youtube.com/watch?v=b7dLcINlvwE, https://www.youtube.com/watch?v=Wh9knsYSodI
7. Melde's Experiment - https://www.youtube.com/watch?v=pvX5y95Sye0, https://www.youtube.com/watch?v=1CyFsGk-_l4
8. The Photoelectric Effect - https://www.youtube.com/watch?v=6VqNz4oT0ng, https://www.youtube.com/watch?v=kcSYV8bJox8
9. Frank hertz experiment - https://www.youtube.com/watch?v=aFLnOglBxDk
10. To determine value of Planck's constant using LEDs - https://www.youtube.com/watch?v=fmbSTt8dDWs

FACULTY OF APPLIED SCIENCES
DEPARTMENT OF CHEMICAL SCIENCES & DEPARTMENT OF BIOLOGICAL SCIENCES
FS102A: Foundation Course on Chemistry and Biology

Credits and Hours:

Teaching Scheme	Theory	Practical	Total	Credit
Hours/week	-	2	2	2
Marks	-	100	100	

A. Outline of the Course:

Sr. No.	Title of Units	Number of Hours
1	Scientific phenomena related to Chemistry and discussion, presentation, and its explanation	15
2	Scientific phenomena related to Biology and discussion, presentation, and its explanation	15

Total hours (Theory): -- Hrs
Total hours (Lab) : 30 Hrs
Total hours : 30 Hrs

B. Detailed Syllabus:

Scientific Problems in Chemistry

Sr. No.	Phenomena	15 Hours	50%
1	Acidic Seas: How Carbon Dioxide is Changing the Oceans.		
2	Why Paper Thrives in a Digital World? Chemistry of Paper.		
3	A solar future. Chemistry of solar cell.		
4	Smartphones: Smart Chemistry		
5	The Chemistry of Sleep.		
6	Cheese chemistry		
7	Why does your coffee taste and smell delicious?		
8	Chemistry of Compost.		
9	How chemistry changed world war-1?		
10	What's in the smell of first rain?		

11	What's that stuff? (FIREWORKS, FOOD PRESERVATIVES, FOOD COLORING, PENCILS & PENCIL LEAD, SUNSCREENS, ARTIFICIAL SWEETENERS etc.)
12	Significant facts of colours and lights:
13	What is a battery and how it works?
14	How corrosion occurs and can it be prevented?
15	How does detergents/soap clean dirty clothes?
16	Importance of pH in drinking water.
17	Chemistry of insect bites
18	Role of metal ions in life.
19	Chemistry of Cosmetics.
20	Acidity and its treatment
21	chemistry of aging in humans

Scientific Problems in Biology

Sr. No.	**Phenomena**	**15 Hours**	**50%**
1	What is life? How did life begin and evolve on Earth?		
2	Are all cells alike?		
3	Is it possible to reverse tissue type?		
4	What are the building blocks of cells?		
5	What is genetic material?		
6	What are micro-organisms? How does our body fight against the disease causing bacteria?		
7	Can we create life in the lab?		
8	Can human organs and organ systems inspire new technologies?		
9	Physics tools in biology (ECG, EEG, CT Scan, MRI, X Ray, respirometer, ventilators etc.)		

C. Instructional Methods and Pedagogy

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Labs will be conducted with the aid of multi-media projector, black board, OHP, models etc.
- Attendance is compulsory in labs which carries a 10% component of the overall evaluation.
- Course content presentation should be based on experimental demonstration which can induce scientific inquiry among students.
- Identify the audio-visual resources/materials related to the topic which could be played during lab session to improve understanding of theory.

- Problem solving activities should be done in lab along with specific practical exercises to inculcate prediction on final result/outcome.
- Critical thinking activities should be incorporated after course content presentation so that students can develop ability to reach generalization and apply them to solve everyday problems.
- Include a range of learning experiences, such as investigations, practical activities, field trials, field trips, speakers, and group and individual activities. On field activities and excursion(s) must be done.
- After the presentation of course content, active involvement of student must be solicited in form of either pair/group work or presentation to motivate and engage the students. Furthermore, these activities will promote higher level skills and attributes such as communication, teamwork and perseverance in the students.
- Adaptive course contents based on recent events with its background, current trends should be added in course.
- More real life exposure should be included.
- More comprehensive practical must be included to fulfil the requirement of learning while doing.
- Use of models and modelling techniques in teaching to strengthening the understanding.
- Practical should be conducted in such a way that the development of process skills like observation, classification, measurement etc. will become strong in the students.

Course Outcomes (COs):

Upon successful completion of this course, a student will be able to

CO1	Acquire the fundamental knowledge of Mathematics and Physics.
CO2	Able to apply foundational knowledge to solve daily life problems.
CO3	Solve basic phenomena of sciences by a scientific approach.

Course Articulation Matrix

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	2	-	-	-	1	-	-	1	-	-	1	-	-
CO3	2	2	2	-	-	-	-	-	1	-	-	1	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation "-"

Recommended Study Material:

- **Text Book:**

- **Reference Book:**

  1. The Science Book, DK Publishing
  2. How Science Works: The Facts Visually Explained. DK Publishing

- **Web Material:**

  - https://wonderopolis.org/wonders?tag=biology
  - https://www.schoolandcollegelistings.com/XX/Unknown/1399327706947869/Chemistry-is-Fun

FACULTY OF MANAGEMENT STUDIES
DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES
HS201.02 A: Painting

Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	-	2	-	2	**2**
Marks	-	100	-	100	

A. Outline of the course:

Sr. No.	Title of the unit	Minimum number of hours
1	An Introduction to Painting	02
2	Drawing from Nature and Object	04
3	Colour Design and Colour Value	06
4	Composition and Perspective	06
5	Figure Drawing and Proportion	04
6	Sketching	04
7	Contemporary Issues in Painting	04

Total hours (Theory): - Hrs.

Practical Hours: 30 Hrs.

Total hours: 30 Hrs.

B. Detailed Syllabus:

1. An Introduction to Painting **02 Hours 06%**

- *An Introduction to Painting*
- *Principles of Composition*
- *Medium and Techniques of Painting*
- *History of Painting: Folk Indian Painting / Western Painting*
- *2D and 3D Painting*

2. Drawing from Nature and Object **04 Hours 12%**

- *Objects of Drawing: Nature and Manmade / Artificial Objects*
- *Drawing Still / Live Objects*
- *Drawing from Memory*
- *Drawing from Life*

3. Light and Shade **06 Hours 18%**

- ***Color Theory****:*
  Color wheel (primary/secondary, complementary), transparency/opacity, hue, value (intensity, brightness), chroma (saturation, purity) & temperature (warm/cold)
- ***Color Contrast & Attributes****:*
  Interaction, harmony, psychology/mood, culture & expression
- ***Media Characteristics & Surfaces****:*
  Acrylic, oil, paper, wood & canvas (primed/unprimed)

4. Composition and Perspective **06 Hours 18%**

- ***Composition:***
  Space, movement, balance, asymmetry, rhythm, shapes, proportion & lighting
- *Perspective: An approximate reproduction*
- ***Types of Perspectives:***
- *Linear Perspective, One-point Perspective, Two-point Perspective, Three-point Perspective, Four-Point Perspective*

5. Figure Drawing and Proportion **04 Hours 12%**

- *Proportions of the Human Body*
- *Three views –* ***Anterior (front), Lateral (side) and Posterior (back)***
- *Fundamental Proportion – The Big Three*

6. Sketching **04 Hours 12%**

- *Sketching and Freehand*
- *Sketching Techniques*
- *Sketch and Drawing Medium*

7. Contemporary Issues in Painting **04 Hours 12%**

- *Contemporary Indian Art*
- *Pioneers of Contemporary Indian Art*
- *Contemporary Issues in Painting*

C. Instructional Methods and Pedagogy:

Teaching will be practical based on the hands on experiences, live and interactive sessions. It will run in the workshop mode. Four Workshops (each of a day) will be organised during the semester.

Evaluation

The students will be evaluated continuously in the form of their consistent performance throughout the semester. There is no theoretical evaluation. There is just practical evaluation.

The evaluation (practical) is schemed as 30 marks for internal evaluation and 70 marks for external evaluation.

Internal Evaluation

Students' performance in the course will be evaluated on a continuous basis through the following components:

Sl. No.	Component	Number	Marks per incidence	Total Marks
1	Participation	-	05	05
2	Performance/ Activities	-	05	05
3	Project	-	15	15
4	Attendance	-	05	05
			Total	**30**

External Evaluation

University Practical examination will be for 70 marks and will test the performance, activities and creative presentations of the students with reference to the course selected**:**

Sl. No.	Component	Number	Marks per incidence	Total Marks
1	Viva / Practical	-	70	70
			Total	**70**

Course Outcome (COs):

At the end of the course, the students will be able to:

CO1	have cultivated a sense of creativity.
CO2	be appreciative of art history, art criticism and aesthetics.
CO3	be able to recognize the elements of arts in painting.
CO4	have better cognizance and association of meaning of colors, shapes, and composition.
CO5	be able to acknowledge the principles of painting as in design and colors, concept, medium and formats.
CO6	have instantaneous painting experience about designing, lights, shades and colors and such other important aspects.

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	2	-	-

Recommended Study Material:

❖ **Reference Books**

1. A.N. Hodge (2007) *The History of Art: The Essential Guide to Painting Through the Ages* Arcturus Foulsham, London
2. David Lewis (1984) Pencil *Drawing Techniques* Watson-Guptill Publications, New York
3. John C Van Dyke L H D (1895) *A Text Book of the History of Painting* Longmans Green and Co., London
4. Sarah Parks (2014) Drawing *Secrets Revealed - Basics How to Draw Anything*- North Light Books, Ohio

❖ **Web Material**

1. https://conceptartempire.com/what-are-the-fundamentals/
2. https://www.creativebloq.com/art/painting-techniques-artists-31619638
3. https://www.thesprucecrafts.com/perspective-in-paintings-2578098
4. https://www.thehansindia.com/posts/index/Hans/2016-05-19/Origin-of-painting-in-India/229138

FACULTY OF MANAGEMENT STUDIES
DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES
HS202.02 A: Photography

Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	-	2	-	2	**2**
Marks	-	100	-	100	

A. Outline of the course:

Sr. No.	Title of the unit	Minimum number of hours
1	An Introduction to Photography	03
2	Camera and Operating System	05
3	Light and Shade	10
4	Composition	09
5	Contemporary Issues in Photography	03

Total hours (Theory): - Hrs.

Practical Hours: 30 Hrs.

Total hours: 30 Hrs.

B. Detailed Syllabus:

1. An Introduction to Photography **03 Hours** **10%**

- *Art, Design and Visualization*
- *Basics of Photography and Various Types of Photography*
- *Basics of Post Production*
- *A Brief History of Photography:*
- *Early Experiments and Later Developments*

2. Camera and Operating System **05 Hours** **16%**

- *Role of Camera in the Photography*
- *Types of Camera*

Pin-hole, box, folding, large and medium format cameras, single lens reflex (SLR) and twin lens reflex (TLR), miniature, subminiature and instant camera

- *Principal Parts of Photographic Camera*
  Lens, Aperture, Shutters, various types and their functions, focal plane shutter and in-between the lens shutter, shutter synchronization, self-timer
- *Types of Lenses*
  Single (meniscus), achromatic, symmetrical and unsymmetrical lenses, telephoto, zoom, macro, supplementary and fish-eye lenses
- *Different Models of Camera, their Features and Operating Systems*
- *Camera and Size of the Image, Speed and Power of Lens*

3. Light and Shade **10 Hours 34%**

- *Reflection and refraction of light*
- *Dispersion of light through a glass prism, lenses*
- *Colour Filters:*
  Different kinds, Red, yellow, green, neutral density, half filters, filter factor, colour correction filter
- *Photographic Light Sources:*
  Natural source, the Sun, nature and intensity of the sunlight at different times of the day, different weather conditions
- *Artificial light sources:*
  Nature, intensity of different types of light sources used in photography namely; (i) Photo flood lamp, (ii) Spot light, (iii) Halogen lamp, Barn doors and snoot, lighting stands
  Flash unit: Bulb flash and Electronic flash, main components, electronic flash units, studio flash, slave unit, multiple flash, computer flash, x-contact, exposure table

4. Composition **09 Hours 30%**

- *Different kinds of image formations*
- *Principal focus and focal length of the lens*
- *Depth of field, angle of view and perspective*
- *Perspective and composition*
- *Rules of composition*

5. Contemporary Issues in Photography **03 Hours 10%**

- *Present Day Photography*
- *Contemporary Photographers and their Contributions*
- *Major Issues in Contemporary Photography*

C. Instructional Methods and Pedagogy:

Teaching will be practical based on the hands on experiences, live and interactive sessions. It will run in the workshop mode. Four Workshops (each of a day) will be organised during the semester.

Evaluation

The students will be evaluated continuously in the form of their consistent performance throughout the semester. There is no theoretical evaluation. There is just practical evaluation. The evaluation (practical) is schemed as 30 marks for internal evaluation and 70 marks for external evaluation.

Internal Evaluation

Students' performance in the course will be evaluated on a continuous basis through the following components:

Sl. No.	Component	Number	Marks per incidence	Total Marks
1	Participation	-	05	05
2	Performance/ Activities	-	05	05
3	Project	-	15	15
4	Attendance	-	05	05
			Total	**30**

External Evaluation

University Practical examination will be for 70 marks and will test the performance, activities and creative presentations of the students with reference to the course selected**:**

Sl. No.	Component	Number	Marks per incidence	Total Marks
1	Viva / Practical	-	70	70
			Total	**70**

Course Outcome (COs):

At the end of the course, the students will be able to:

CO1	Understand, appreciate and demonstrate innovative approach, beauty and acute acumen in the area of photography
CO2	Develop photography skills and become familiar with the functions and importance of the visual elements of nature and artificial objects
CO3	Become independent thinkers who will contribute inventively and critically to culture through the making of art photography
CO4	Have thorough understanding and acute sense of light and shade, composition, and

	presentation of a piece of an art
CO5	Experiment and Represent the cultivated sense and skills in Photography to the mass
CO6	Prepare an impressive portfolio encompassing holistic approach to art and other the areas of study

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	2	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	3	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	2	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	2	-	-

Recommended Study Material:

❖ **Reference Books**

1. Maria Short, Sri-Kartini Leet and Elisavet Kalpaxi (2020) *Context and Narrative in Photography*-Routledge, New York.
2. Kevin Los (2010) *Improve Your Photography: 50 Essential Digital Photography Tips & Techniques* Digital Photography Series, New York.

❖ **Web Material**

1. https://photographylife.com/photography-basics
2. https://artofvisuals.com/the-basics-of-photography-introduction-to-photography-tutorials/
3. https://www.photographytalk.com/beginner-photography-tips/camera-basics-for-beginners
4. https://www.makeuseof.com/tag/5-photography-tips-for-beginners/
5. https://annamcnaught.com/blog/basics-of-photography

FACULTY OF MANAGEMENT STUDIES
DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES
HS205.02 A: Media and Graphic Design

Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	-	2	-	2	**2**
Marks	-	100	-	100	

A. Outline of the course:

Sr. No.	Title of the unit	Minimum number of hours
1	An Introduction to Media and Graphic Design	03
2	Layout and Design	07
3	Form and Space	06
4	Computer Graphics	04
5	Fonts	04
6	Basic Print Media	03
7	Contemporary Issues in Graphic Design	03

Total hours (Theory): - Hrs.

Practical Hours: 30 Hrs.

Total hours: 30 Hrs.

B. Detailed Syllabus:

1. An Introduction to Media and Graphic Design **03 Hours 10%**

- *Creating Art, Art in Context and Art as Inquiry*
- *History of Graphic Design*
- *Constructional, Representational, and Simplification Drawing*

2. Layout and Design **07 Hours 23%**

- *Layout, Design and Aesthetics*
- *Elements of Design*
- *Principles of Design:*

Harmony, Balance, Rhythm, Perspective, Emphasis, Orientation, Repetition and Proportion

- *Impact/function of Design*
- *Indigenous design practices*
- *Role of design in the changing social scenario*

3. Form and Space **06 Hours** **20%**

- *Types of Forms: Man-made, Nature*
- *Types of Space: Negative and Positive*
- *Composition of Form and Space to create Layout Exploring Creativity*

4. Computer Graphics **04 Hours** **12%**

- *An Introduction to Graphic Software*
- *Flash, Coreldraw, Illustrator and Photoshop*
- *Pre-press Process*

5. Fonts **04 Hours** **12%**

- *Construction of Type*
- *Anatomy of Type*
- *Visual Language*
- *Creating Logo and Symbol*

6. Basic Print Media **03 Hours** **10%**

- *An Introduction to Press and its Development Phases*
- *Types of Press*
- *Types of Printing Technologies*
- *Post-press Processes*

7. Contemporary Issues in Graphic Design **03 Hours** **10%**

- *Present Day Graphic Designs*
- *Contemporary Designers and their Contribution*
- *Major Contemporary Issues in Graphic Design*

C. Instructional Methods and Pedagogy:

Teaching will be practical based on the hands on experiences, live and interactive sessions. It will run in the workshop mode. Four Workshops (each of a day) will be organised during the semester.

Evaluation

The students will be evaluated continuously in the form of their consistent performance throughout the semester. There is no theoretical evaluation. There is just practical evaluation. The evaluation (practical) is schemed as 30 marks for internal evaluation and 70 marks for external evaluation.

Internal Evaluation

Students' performance in the course will be evaluated on a continuous basis through the following components:

Sl. No.	Component	Number	Marks per incidence	Total Marks
1	Participation	-	05	05
2	Performance/ Activities	-	05	05
3	Project	-	15	15
4	Attendance	-	05	05
			Total	**30**

External Evaluation

University Practical examination will be for 70 marks and will test the performance, activities and creative presentations of the students with reference to the course selected**:**

Sl. No.	Component	Number	Marks per incidence	Total Marks
1	Viva / Practical	-	70	70
			Total	**70**

Course Outcome (COs):

At the end of the course, the students will be able to:

CO1	have cultivated a sense of creativity.
CO2	be appreciative of art and designs, art criticism and aesthetics.
CO3	be able to recognize the elements of arts in graphic design.
CO4	have better cognizance and association with the meaning of designs, shapes, colors, print and medium.
CO5	be able to design graphics using computer softwares like Photoshop, CorelDraw, and Illustrator.
CO6	have cultivated a sense of creativity.

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	2	-	-	-	-

CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	3	-	-	-	-	-	-	2	-	-
CO6	-	-	-	-	-	-	-	-	-	3	-	-	-	-

Recommended Study Material:

❖ **Reference Books**

1. Ellen Lupton and Jennifer Cole Philips (2008) Graphic *Design: The New Basics*, Princeton Architectural Press, New York
2. Ryan Hembree (2011) *The Complete Graphic Designer: A Guide to Understanding Graphics and Visual Communication* Rockport Publishers, Beverly

❖ **Web Material**

1. https://99designs.com/blog/tips/graphic-design-basics/
2. https://edu.gcfglobal.org/en/beginning-graphic-design/fundamentals-of-design/1/
3. https://ultragraphicsmt.com/10-basic-concepts-to-improve-your-graphic-design/
4. https://www.jcsocialmedia.com/graphic-design/

FACULTY OF MANAGEMENT STUDIES
DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES
HS209.02 A: Dramatics

Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	-	2	-	2	**2**
Marks	-	100	-	100	

A. Outline of the course:

Sr. No.	Title of the unit	Minimum number of hours
1	Introduction to Drama	06
2	History of Drama and Contemporary Theatre	06
3	Theatre Design and Techniques	06
4	Technicalities of Stage Performance	08
5	Contemporary Trends in Drama	04

Total hours (Theory): - Hrs.

Practical Hours: 30 Hrs.

Total hours: 30 Hrs.

B. Detailed Syllabus:

1. Introduction to Drama **06 Hours 20%**

- Introduction to performing arts
- Drama - An art, a socializing activity, & a way of learning
- Form of Drama
- Elements of Drama
- Types of Drama

2. History of Drama and Contemporary Theatre **06 Hours 20%**

- Important world dramatists & drama–from Greek to modern
- Evolution of contemporary theatre in the context of developments in Indian theatre
- Major Movements in Drama

3. Theatre Design and Techniques **06 Hours 20%**

- Theatre Architecture
- Stage craft: Set, light, costume, make up, sound, props
- Theatre techniques: from selection of script to final performance

4. Technicalities of Stage Performance **08 Hours 26%**

- Selection of plot and character
- Improvisation
- Movement
- Voice, Speech, Imagination
- Character Development
- Scene Enactment

5. Contemporary Trends in Drama **04 Hours 14%**

- New Tendencies in theatre
- Drama and Society
- Using drama for Social Change and Education

C. Instructional Methods and Pedagogy:

Teaching will be practical based on the hands on experiences, live and interactive sessions. It will run in the workshop mode. Four Workshops (each of a day) will be organised during the semester.

Evaluation

The students will be evaluated continuously in the form of their consistent performance throughout the semester. There is no theoretical evaluation. There is just practical evaluation. The evaluation (practical) is schemed as 30 marks for internal evaluation and 70 marks for external evaluation.

Internal Evaluation

Students' performance in the course will be evaluated on a continuous basis through the following components:

Sl. No.	Component	Number	Marks per incidence	Total Marks
1	Participation	-	05	05
2	Performance/ Activities	-	05	05
3	Project	-	15	15
4	Attendance	-	05	05
			Total	**30**

External Evaluation

University Practical examination will be for 70 marks and will test the performance, activities and creative presentations of the students with reference to the course selected**:**

Sl. No.	Component	Number	Marks per incidence	Total Marks
1	Viva / Practical	-	70	70
			Total	**70**

Course Outcome (COs):

At the end of the course, the students will be able to:

CO1	be aware about the concept of performing art and its nuances.
CO2	display a working knowledge of historic of drama, its development and current trends in dramatics.
CO3	demonstrate skills in the technical/design preparation and execution of a theatre performance.
CO4	demonstrate the ability to work collaboratively.
CO5	develop essential transferable skills in various relevant areas of the theatre.

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CO3	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO4	-	-	-	-	-	-	-	-	3	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Recommended Study Material:

❖ **Reference Books**

1. Bridget Panet (2009) Essential Acting: A Practical Handbook for Actors, Teachers and Directors Routledge, New York.
2. Tom Bancroft (2012) Character Mentor: Learn by Example to Use Expressions, Poses, and Staging to Bring Your Characters to Life Focal Press, New York

❖ **Web Material**

1. https://entertainism.com/elements-of-drama
2. https://www.rcboe.org/cms/lib/GA01903614/Centricity/Domain/5069/the%20elements%20of%20drama.pdf
3. https://marrzipandrama.co.nz/the-6-elements-of-drama/
4. https://www.backstage.com/magazine/article/theater-trends-broadway-2019-66726/

FACULTY OF MANAGEMENT STUDIES
DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES
HS210.02 A: Contemporary Dance

Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	-	2	-	2	**2**
Marks	-	100	-	100	

A. Outline of the course:

Sr. No.	Title of the unit	Minimum number of hours
1	Introduction to dance	04
2	Types of Dance	06
3	Basic Elements of Dance	04
4	Technical Skills in Professional Contemporary Dance	06
5	Contemporary Trends in Dance	10

Total hours (Theory): - Hrs.

Practical Hours: 30 Hrs.

Total hours: 30 Hrs.

B. Detailed Syllabus:

1. Introduction to dance **04 Hours 14%**

- Dance as a Performing Art
- Dance as a Medium of Expression
- History and Development of Dance

2. Types of Dance **06 Hours 20%**

- Western dance and classical dance
- Salsa, rumba, hip hop, tap dance, belly dance, etc.
- Indian Classical Dance forms: Odissi, Bharatanatyama, Kathak, Kathakali, Kuchipudi etc.
- Other Regional dance forms in India

3. **Basic Elements of Dance** **04 Hours 14%**

- Movements of different parts of a body for Expression
- Concepts of: Nritya, Laya and Taal

4. **Technical Skills in Professional Contemporary Dance** **06 Hours 20%**

- Dance technique: alignment, balance, co-ordination, flexibility and control
- Expressive / presentation skills: Dynamic energy, physical engagement with the given material and stage, etc.
- Skills and processes of rehearsal and production:
- physical energy, stamina and athleticism

5. **Contemporary Trends in Dance** **10 Hours 32%**

- Prevalent trends and techniques in contemporary dance
- Future trends in contemporary dance form
- On Stage Performance

C. Instructional Methods and Pedagogy:

Teaching will be practical based on the hands on experiences, live and interactive sessions. It will run in the workshop mode. Four Workshops (each of a day) will be organised during the semester.

Evaluation

The students will be evaluated continuously in the form of their consistent performance throughout the semester. There is no theoretical evaluation. There is just practical evaluation. The evaluation (practical) is schemed as 30 marks for internal evaluation and 70 marks for external evaluation.

Internal Evaluation

Students' performance in the course will be evaluated on a continuous basis through the following components:

Sl. No.	Component	Number	Marks per incidence	Total Marks
1	Participation	-	05	05
2	Performance/ Activities	-	05	05
3	Project	-	15	15
4	Attendance	-	05	05
			Total	**30**

External Evaluation

University Practical examination will be for 70 marks and will test the performance, activities and creative presentations of the students with reference to the course selected**:**

Sl. No.	Component	Number	Marks per incidence	Total Marks
1	Viva / Practical	-	70	70
			Total	**70**

Course Outcome (COs):

At the end of the course, the students will be able to:

CO1	be able to develop ability to express through the form of dance.
CO2	have enhanced aesthetic sensitivity.
CO3	have improved concentration, mental alertness, quick reflex action, and physical agility.
CO4	be able to express a natural way human feelings and expressions by creating harmony.
CO5	be able to deliver contemporary dance performance.
CO6	be able to develop ability to express through the form of dance.

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	-	-	-	-	-	-	-	-	-	2	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO3	-	-	-	-	-	-	-	-	2	2	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	2	-	-	-	-

Recommended Study Material:

❖ **Reference Books**

1. Helene Scheff, Marty Sprague and Susan Mc Greeve. (1939) *Experiencing dance from student to dance artist*. Human kinetics, New York

2. Robin Grove, Catherine J. Stevens, Shirley McKenzie (2005) Thinking in Four Dimensions: Creativity and Cognition in Contemporary Dance. Melbourne university press, Melbourne

❖ **Web Material**

1. https://www.liveabout.com/what-is-contemporary-dance-1007423#:~:text=Contemporary%20dance%20is%20a%20style,body%20through%20fluid%20dance%20movements.
2. https://dancemagazine.com.au/2014/01/whats-contemporary-dance-days/
3. https://www.frontiersin.org/articles/10.3389/fpsyg.2019.00071/full
4. https://www.thehindu.com/features/friday-review/dance/what-is-contemporary-dance/article5096022.ece