CHARUSAT

CHAROTAR UNIVERSITY OF SCIENCE AND TECHNOLOGY

ACADEMIC REGULATIONS & SYLLABUS

Chandubhai S Patel Institute of Technology

First Year B. Tech. (Bachelor of Technology) Programme (CL/ME/EE) 2025-26

Faculty of Technology & Engineering

Chandubhai S. Patel Institute of Technology

Charotar University of Science and Technology (CHARUSAT)

CHARUSAT Campus, Off. Nadiad-Petlad Highway, Changa 388 421, Anand, Gujarat, INDIA Telephone: 02697-265011 & 02697-265021, Email: info@charusat.ac.in

www.charusat.ac.in

Table of Contents

Academic Regulations

Bachelor of Technology (CL/ME/EE) Programme

FACULTY OF TECHNOLOGY AND ENGINEERING
ACADEMIC REGULATIONS

Bachelor of Technology Programmes

Academic regulations recommendations are provided to ensure uniform system of education, programmes duration, eligibility criteria for admission, course credits distribution, teaching and examination pedagogy, detailed syllabus with reference material.

1) System of Education

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

2) Duration of Programme

i) Undergraduate programme (B.Tech.)

Minimum	8 semesters (4 academic years)
Maximum	14 semesters (7 academic years)

3) Eligibility for admissions

As enacted by Government of Gujarat/AICTE/UGC from time to time.

4) Mode of admissions

As enacted by Government of Gujarat from time to time.

5) Programme Structure and Credits

As per annexure – 1 attached

6) Attendance

6.1. Students are expected to maintain 100% attendance in all courses. However, students may involuntarily have to miss classes due to illness or some family emergency; students are permitted to maintain a minimum attendance of 75% with producing proof or reason for the absence. In case of medical exigencies, the student/parent should inform the principal immediately through call or by email. Within a week, starting from the day of absence, the proof of medical exigency must be submitted to the Principal's office.

6.2. Unauthorized absence will be considered as part of the discretionary 25% for fulfilling the minimum 75% attendance requirement for appearing in the examination.

6.3. Students nominated/sponsored by the University to represent in various forums like seminars/conferences/workshops/competitions or taking part in co-curricular/extra-curricular events will be given attendance credit provided the student applies in writing for such a leave in advance and obtains sanction from the Principal of his/her Institute for academic related requests.

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 respective department /institute will conduct the continuous assessment. The course faculty members shall share the pedagogy related to the continuous evaluation with the students.

7.1.2 Final end-semester examination shall be conducted 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 Faculty Board and 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.

7.2.2 If a candidate fails to obtain minimum required overall percentage of marks (36%), student has to repeat the examination till the minimum required overall percentage 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:
2. Proposed Grading Scheme to awarding letter grade and grade point as per NEP 2020

Letter Grade	Grade Point	Grading Scheme for Mark (In %)
O (Outstanding)	10	96.0-100
A+ (Excellent)	9	86.0-95.9
A (Very Good)	8	76.0-85.9
B+ (Good)	7	66.0-75.9
B (Above Average)	6	56.0- 65.9
C (Average)	5	46.0 – 55.9
P (Pass)	4	36.0 – 45.9
F (Fail)	0	Below 36.0
Ab (Absent)	0	Absent

- The minimum passing marks for each pattern of evaluation are 36%

3. 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 = Σ Ci Gi / Σ Ci where Ci is the number of credits of course i

Gi is the Grade Point for the course i

and i = 1 to n, n = number of courses in the semester

(ii) CGPA = Σ Ci Gi / Σ Ci where Ci is the number of credits of course i

Gi 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 ≥ 7.0 & ≤ 10.0
First class	CGPA ≥ 6.0 & < 7.0
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

CHOICE BASED CREDIT SYSTEM

Bachelor of Technology (CL/ME/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 Foundation courses, Core courses, Elective courses, Non-credit (audit) courses and SWAYAM MOOCs.

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. Programme Elective Courses(PE):

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

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 considered to calculate SGPA and CGPA. Attendance and Course Assessment is compulsory for Non Credit Courses.

1.5 Credit Transfer through SWAYAM MOOCs

CHARUSAT provides credit transfer as per UGC guidelines to all the students from SWAYAM against elective courses. The credit transfer is offered in two modes: (a) Partial credit transfer (b) Full credit transfer.

1.6 Medium of Instruction

The Medium of Instruction will be English.

In consonance with the National Education Policy (NEP) 2020 and the guidelines of the University Grants Commission (UGC), Charotar University of Science and Technology (CHARUSAT) implements the Multiple Exit scheme in their Bachelor of Technology programme.

Facilitating multiple exit options with UG certificate/UG diploma/or UG degree depending upon the number of credits secured. Skill component with progressive enhancement in skills in respective disciplines is introduced in the curriculum right from the 1st year of the program to ensure the student employability after every exit.

Students may be permitted to take a break from the study during the period of study but the total duration for completing the programme shall not exceed 7 years. If student wishes, he/she shall be allowed to re-enter the degree programme within three years and complete the degree programme within the stipulated maximum period of seven years. Table 1 shows the exit qualifications along with credit requirements.

Table 1 Exit Qualifications along with Credit Requirements

ACADEMIC LEVEL	EXIT QUALIFICATION AND CREDITS REQUIRED	NATIONAL CREDIT LEVEL (NCrF)
1st year of UG Degree	UG Certificate will be awarded Minimum 40 credits followed by an exit 4-credit skills enhancement course	4.5
2nd year of UG Degree	UG Diploma will be awarded Minimum of 80 credits followed by an exit 4-credit skills enhancement course	5.0
3rd year of UG Degree	B.Sc. will be awarded Minimum of 120 credits	5.5
4th year of UG Degree	B. Tech. will be awarded Minimum of 160 credits, with minimum of 40 credits each at level	6.0

Guidelines for multiple exit along with awarding UG Certificate, UG Diploma, and Degrees:

A. Exit after First Year

Award: UG Certificate in XXXX

Student must undertake a 4-Credits skill enhancement course before commencement of 2nd year. This shall require 120 hours engagement in the relevant industry/organization. Student shall have an option to continue the 2nd year onward study.

The student shall be awarded with "UG Certificate in XXXX", with redemption of credits from ABC. Total credits redemption shall be 1st year credits + 4 credits earned in summer.

B. Exit after Second Year

Award: UG Diploma in XXXX

Student must undertake a 4-Credits summer internship/ skill enhancement course before commencement of 3rd year. This shall require 120 hours engagement in the relevant industry/organization. Student shall have an option to continue the 3rd year onward study.

The student shall be awarded with "UG Diploma in XXXX", with redemption of credits from ABC. Total credits redemption shall be 1st and 2nd year credits + 4 credits earned in summer.

C. Exit after Third Year

Award: B.Sc. Degree in XXXX

The student shall be awarded with "B.Sc. Degree in XXXX", with redemption of 3 years' credits from ABC.

4-Credit (120 hrs.) Skills Enhancement Courses:

Level/ Branch	ME	CL	EE
1st year of UG Degree	MEUS102: Machine Drawing	CLUS101: Elementary Surveying	EEUS101: Electrical Drawing

Value Added Courses:

Inclusion of 2 credits courses on Community Service/ NSS/NCC/ Sports; and provision to earn extra credits based on undertaking Research/ Academic/Cultural/ and other Developmental activities is introduced.

- The component of 'Value-added Courses' could be enriched to include alternatives that could contribute to the holistic development of the students. In light of this, it is proposed to include a 02 credit Course on Community Service/ NSS/NCC/Sports as a compulsory course in the existing curricula offered across all UG programs at CHARUSAT. It is mandatory for all UG students (2025-26 admission batch) to undertake this course and the course shall not account for the overall CGPA.
- Provision to earn extra credits (**Skill Augmentation** course) based on co-curricular & extra-curricular activities is proposed. It was emphasized that the extra credits could help in fuller realization of the Graduate Attributes laid down by the university as well as could serve as an important ingredient facilitating the progression and recognition of fast learners. It is mandatory for all UG students (2025-26 admission batch) to undertake this course during the study and the credits of the course shall not account for the overall CGPA.

CHAROTAR UNIVERSITY OF SCIENCE & TECHNOLOGY
FACULTY OF TECHNOLOGY AND ENGINEERING

Teaching & Examination Scheme of B.Tech. Programme (CL/ME/EE)
First Year Semester-1

Level	Course Code	Course Title	Teaching Scheme				Examination Scheme				
			Contact Hours			Credit	Theory		Practical		Total
			Theory	Practical	Total		Internal	External	Internal	External	
FY Sem 1	HSUA101	Communicative English	0	2	2	2	0	0	25	25	**50**
	MSUD101	Engineering Mathematics I	4	0	4	4	50	50	0	0	**100**
	MEUC101	Engineering Graphics	3	2	5	4	50	50	25	25	**150**
	PSUD101	Engineering Physics-I	0	2	2	2	0	0	25	25	**50**
	CLUC102	Engineering Mechanics	4	2	6	5	50	50	25	25	**150**
	CLUV101	Environmental Sciences		2	2	2	0	0	25	25	**50**
	MEUS101	Workshop Practices	0	2	2	1	0	0	25	25	**50**
	FTUC101	Foundation Course on Mathematics and Physics	0	2	2	0	0	0	0	50	**50**
	CUUV102	Physical Education and Sports	90			2	--	--	--	--	--
	CUUV101	Community Engagement and Sustainable Development	90			2	--	--	--	--	--
	FTXXXX	Skill Augmentation	200			2	--	100 Activity Points	--	--	--

CHAROTAR UNIVERSITY OF SCIENCE & TECHNOLOGY
FACULTY OF TECHNOLOGY AND ENGINEERING

Teaching & Examination Scheme of B.Tech. Programme (CL/ME/EE)
First Year Semester-2

Level	Course Code	Course Title	Teaching Scheme				Examination Scheme				
			Contact Hours			Credit	Theory		Practical		Total
			Theory	Practical	Total		Internal	External	Internal	External	
FY Sem 2	HSUS101-117	A Course on Liberal Arts (HS Electives)	2	0	2	2	0	0	25	25	**50**
	MSUD102	Engineering Mathematics II	4	0	4	4	50	50	0	0	**100**
	ITUD101	Introduction to Computer Programming	2	2	4	3	50	50	25	25	**150**
	MEUC102	Basics of Civil and Mechanical Engineering	3	2	5	4	50	50	25	25	**150**
	EEUC101	Basics of Electronics and Electrical Engineering	4	2	6	5	50	50	25	25	**150**
	PSUD102	Engineering Physics-II	0	2	2	2	0	0	25	25	**50**
	CUUV102	Physical Education and Sports	90			2	--	--	--	--	--
	CUUV101	Community Engagement and Sustainable Development	90			2	--	--	--	100	100
	FTXXXX	Skill Augmentation	200			2	--	100 Activity Points	--	--	FTXXXX

CHAROTAR UNIVERSITY OF SCIENCE AND TECHNOLOGY

B.Tech (CL/ME/EE) Programme

SYLLABI (SEMESTER-1)

HSUA101: COMMUNICATIVE ENGLISH

Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	--	02	--	02	2
Marks	--	50	--	50	

Pre-requisite:

- Basic knowledge of English Language & Communication

Objectives of the Course:

- To make students aware of and give them first-hand experience of Communicative English
- To make the students aware of the different communicative functions of English and help them communicate using those functions
- To assist and guide the learners to be able to listen to and to read a text and identify specific and global information
- To assist and guide the learners to be able to speak and to write clearly and effectively

Outline of the Course:

Sr. No.	Title of the unit	Minimum number of hours
1.	Introduction to Communicative English	03
2.	Communication Functions and Grammar	06
3.	Communication Skills I – Listening	03
4.	Communication Skills II – Reading	03
5.	Communication Skills III – Speaking	06
6.	Communication Skills IV – Writing Composition	06
7.	Developing Vocabulary	03
	Total hours (Practical):	30
	Total hours (Lab) :	--
	Total hours :	**30**

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 and Grammar**	6 Hours	20%
	Communicative Grammar: Usage of parts of speech in communicative way, Sentence Structure & Tense, Active Passive & Direct-Indirect 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.	**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.	**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.	**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 & Presentation		
6.	**Communication Skills IV – Writing Composition**	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.

Evaluation Scheme:

The evaluation scheme for the course will comprise the following components:

- Formative: Internal / Continuous and Comprehensive Evaluation (CCE) – 25 Marks
- Summative: External / Semester End Evaluation (SEE) – 25 Marks

Internal / Continuous and Comprehensive Evaluation (CCE) – 25 Marks	
Exam Pattern	**Marks**
Lab Work Assessment (Best 3 out of 4)	45
Viva voce/ Lab Quiz (Best 3 out of 4) (Note: Quiz Number 1 and 3 will be administered as lab quizzes, while Quiz Number 2 and/or 4 shall serve as part of the mid-term evaluation.)	45
Attendance	10
Total	**100* (scaled to 25 marks)**

*Note: The total Internal / CCE score out of 100 marks will be converted to 25 marks.

External / Semester End Evaluation (SEE) – 25 Marks	
Exam Pattern	**Marks**
Quiz	40
Viva-voce	30
Presentation/Task/GD/Case Analysis etc. (The Course Convenor / Faculty will brief the students about the examination components and weightage)	30
Total	**100* (scaled to 25 marks)**

*Note: The total External / SEE score out of 100 marks will be converted to 25 marks.

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
4. https://www.coursera.org/learn/grammar-punctuation
5. https://www.coursra.org/specializations/improve-english

MSUDI01: ENGINEERING MATHEMATICS-I

Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	4	-	-	4	**4**
Marks	100	-	-	100	

Prerequisites: Set theory, Function, Limit, Continuity, Differentiability for function of single variable and its uses, Sequence and Series

Outline of the course:

Sr. No.	Title of the unit	Minimum number of hours
1	Higher-order derivatives and applications	16
2	Infinite Series and Complex numbers	14
3	Matrix Algebra- I	10
4	Partial differentiation	08
5	Applications of Partial Differentiation	12
	Total hours (Theory):	**60**
	Total hours (Lab):	**00**
	Total hours:	**60**

Detailed Syllabus:

1	**Higher-order derivatives and applications**	**16 Hrs**	**27%**
Lagrange's Mean Value Theorem, Local Maxima and Minima of function of one variable Successive differentiation: n^{th} derivative of elementary functions: rational, logarithmic, trigonometric, exponential and hyperbolic, Leibnitz rule for the n^{th} order derivatives of product of two functions, Power series expansion of a function: Maclaurin's and Taylor's series expansion, L'Hospital's rule and related applications, Indeterminate forms.			
2	**Infinite Series and Complex numbers**	**14 Hrs**	**23%**
Tests of convergence of series viz., comparison test, ratio test, root test, Leibnitz test, Complex numbers and their geometric representation, Complex numbers in polar and exponential forms, De Moivre's theorem and its applications, Exponential, Logarithmic, Trigonometric and hyperbolic functions			
3	**Matrix Algebra- I**	**10 Hrs**	**17%**

Definition of Matrix, types of matrices and their properties, Determinant and their properties, Rank and nullity of a matrix, Determination of rank, Solution of a system of linear equations by Gauss elimination and Gauss Jordan Methods			
4	**Partial differentiation**	**08 Hrs**	**13%**
Partial derivative and geometrical interpretation, Euler's theorem with corollaries and their applications, Chain rule, Implicit functions, Total differentials			
5	**Applications of Partial Differentiations**	**12 Hrs**	**20%**
Maclaurin's and Taylor's series expansion in two variables, Tangent plane and normal line to a surface, Maxima and Minima of function of two variables, Lagrange's method of undetermined multiplier, Jacobian, Errors and approximations			

Course Outcome (COs):

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

CO1	find successive differentiation, utilize appropriate theory and computational techniques to construct Taylor's series, use L'Hospital's rule to compute limits of the indeterminate forms.
CO2	Check the convergence of infinite series, perform basic mathematical operations on complex numbers in Cartesian and polar forms, find the n^{th} roots of a complex number and solutions of simple polynomial equations
CO3	find the determinant 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	-	-	-	--	-	-	-	-	-

Correlation levels 1, 2 or 3 as defined below:
1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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.

❖ **URL Links:**

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/

MEUC101: ENGINEERING GRAPHICS

Credits and Hours:

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

Outline of the course:

Sr. No.	Title of the unit	Minimum number of hours
1	Fundamentals of Engineering Graphics	08
2	Projections of Points and Lines	05
3	Projections of Planes	05
4	Projections & Section of Solid	06
5	Orthographic Projection	06
6	Isometric Projections	06
7	Computer Graphics	07
8	Development of Lateral Surfaces	02
	Total hours (Theory):	**45**
	Total hours (Lab):	**30**
	Total hours:	**75**

Detailed Syllabus:

1.	**Fundamentals of Engineering Drawing**	**08 Hours**	**18%**
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**	**05 Hours**	**11%**
2.1	Introduction to methods of projections		
2.2	Projections of lines inclined to both the planes		
2.3	Examples of projection of point & line		
3.	**Projections of Planes**	**05 Hours**	**11%**
3.1	Projection of plane		
3.2	Auxiliary projection method		
3.3	Examples of projection of plane		
4.	**Projections & Section of Solid**	**06 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)		

4.5	Examples of projection of solid and section of solid		
5.	**Orthographic Projection**	**06 Hours**	**14%**
5.1	Principle projection		
5.2	Methods of first and third angle projection with examples		
6.	**Isometric Projections**	**06 Hours**	**14%**
6.1	Terminology, Isometric scale		
6.2	Isometric view and Isometric projection with examples		
7.	**Computer Graphics**	**07 Hours**	**15%**
7.1	Introduction of computer graphics		
7.2	Demonstration of Computer Aided Drafting software		
7.3	Sketching, Modeling, Drafting, Rendering		
7.4	Surface Modelling & Solid Modelling		
7.5	Modeling of parts and assemblies		
8.	**Development of Lateral Surfaces of Solids**	**02 Hours**	**4%**
8.1	Method of Development		
8.2	Development of cylinder, cone, prism, pyramid		

Course Outcome (COs):

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

CO1	Use the concept of engineering scales and curves for given applications.
CO2	Use the concept of projections of point, line, plane and solid for given applications.
CO3	Prepare 2D and 3D drawings for given components using various tools and techniques.
CO4	Develop the surfaces for given solids.

Course Articulation Matrix:

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

- **Other Materials:**
  1. Software: Computer Aided Drafting Packages/software like AutoCAD, Fusion 360, Solidworks, etc.

PSUDI0I: ENGINEERING PHYSICS - 1

Credits and Hours:

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

Outline of the Course:

Unit No.	Title of the Unit	Minimum number of Hours
Unit 1	Mechanics Lab	16
Unit 2	Thermodynamics Lab	14
	Total hours (Theory):	**00**
	Total hours (Lab):	**30**
	Total hours:	**30**

Detailed Syllabus:

Unit	Name	Hours
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 5. To determine g 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		

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	PO 2	PO3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	3	1	2	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	3	1	1	-	-	-	-	-	-	-	-	-	-
PSUD101	3.00	3.00	2.00	1.50	1.00	-	-	-	-	-	-	-	-	-	-

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.

❖ **Web material:**

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

CLUCI02 ENGINEERING MECHANICS

Credits and Hours:

Teaching Scheme	Theory	Tutorial	Practical	Total	Credit
Hours/week	4	-	2	6	5
Marks	100	-	50	150	

Outline of the Course:

Sr. No.	Title of the Unit	Minimum Number of Hours
1	Introduction	04
2	Fundamental of Statics	23
3	Friction	07
4	Truss	07
5	Centroid and Centre of Gravity	07
6	Fundamentals of Kinematics and Kinetics of Particles	07
7	Application of engineering Mechanics- Cable system	05
	Total Hours (Theory):	**60**
	Total Hours (Lab):	**30**
	Total Hours:	**90**

Detailed Syllabus:

1	**Introduction**	**04 Hours**	**06%**
	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**	**23 Hours**	**38%**
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		
2.5	**Forces in Space**	**3 Hours**	**05%**
	Introduction, Force in space, resultant of concurrent forces in space, equilibrium of particle in space.		
3	**Friction**	**7 Hours**	**11%**
	Friction and its applications, Types of friction and Laws of dry friction, advantages of friction, disadvantages of friction. Angle of friction, Angle of repose, Coefficient of friction, Applications of friction: Block Friction, Ladder friction, Wedge friction		
4	**Truss**	**7 Hours**	**11%**
	Definition, Stability and determinacy, Types of truss, Types of supports, Assumptions, Concept of zero force member, Analysis of plane trusses by method of joint, Analysis of plane trusses by method of sections.		

5	**Centroid and Centre of Gravity**	**7 Hours**	**11%**
	Introduction, basic definitions and their understanding, axis of reference, axis of symmetry, Concept of centre of gravity, Centroids of Linear elements & Planar elements, Determination of centroids by integrations, Centroids of Composite sections (1D & 2D).		
6	**Dynamic**	**7 Hours**	**11%**
	Kinematics and Kinetics, Principle of dynamics, Newton's law of motion, Rectilinear motion, circular motion, Rotatory motion, Projectile motion, equations of motion, motion along smooth curve & super elevation, D' Alembert's Principle, Recoil of Gun, Work, Power and Energy, Momentum and Impulse, Law of Conservation of Linear Momentum, Law of Conservation of Energy		
7	**Application of Engineering Mechanics – Cable system** Cable system, Assumptions, Analysis of cable under concentrated load	**5 Hours**	**07%**

Course Outcomes (COs):

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

CO1	Demonstrate the understanding of the basics of mechanics.
CO2	Apply fundamental principles of mechanics, equilibrium and static to the practical problems of engineering to determine responses.
CO3	Determine the centroid of a different geometrical shape and its use in engineering problems.
CO4	Demonstrate a comprehensive understanding of the principles governing motion, forces, and energy in mechanical systems.

Course Articulation Matrix:

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

CO4	3	2	1	1	1	1	-	-	1	-	-	1	1	-	1

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

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

CLUVI01: ENVIRONMENTAL SCIENCES

Credit And Scheme:

Teaching Scheme	Theory/ Practical	Total	Credit	Evaluation Scheme				
				Theory		Practical		Total
Hours/week	2	2	2	Internal	External	Internal	External	
Marks	50	50		--	--	25	25	50

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**

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 andnoise pollution		
2.2	Nuclear hazards and human health risks		
2.3	Solid waste management: Control measures of urban and industrial waste Pollution case studies – Ganga/Yamuna River,		
2.4	Bhopal Gas Tragedy, Delhi AirPollution, Effect of Pandemics on the Environment		
3.	**Ecology & Ecosystems**	**05 Hours**	**17%**
3.1	Concept of an ecosystem, Structure and function of an ecosystemProducers, consumers and decomposers		
3.2	Energy flow in the ecosystem, Food chains, food webs and ecologicalpyramids		
3.3			
3.4	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 diversity Value of biodiversity: consumptive use, productive use, social, ethical,aesthetic and option values		
4.2	Hot-sports of biodiversity, Threats to biodiversity: habitat loss, poaching ofwildlife, man-wildlife conflicts.		
4.3	Endangered and endemic species of India, Conservation of biodiversityBiodiversity Act 2002/ BD Rule 2004: Mandate & Functions of National Biodiversity Authority (NBA),		
4.4	Role of State Biodiversity Board (SBB) and		
4.5	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 energysources. 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.		

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.

Evaluation:

There will be end semester university examinations based on Practical/ Viva. Students will be evaluated continuously in the form of internal as well as external evaluation. The evaluation is schemed as 25 marks for internal evaluation and 25 marks for external evaluation. The concerned teacher shall evaluate students and distribute the marks

Evaluation Scheme

The students' performance in the course will be evaluated through the different components as decided by faculty members

Component		Marks
Internal	Assignment/ Individual Activity Participation/ Quiz/ any other activities decided by teacher, etc.	25
External	Viva/ Oral Examination	25
	Total	50

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	-	-	-	-	-	-	-	-	-	-	-	-	3
CO2	-	-	-	-	-	-	3	-	-	-	-	-	-	3

CO3	-	-	-	-	-	2	3	-	-	-	-	-	-	3
CO4	-	-	2	-	-	-	3	-	-	-	-	-	2	-
CO5	-	-	-	-	-	-	-	-	-	2	-	-	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:**

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

MEUS101 : WORKSHOP PRACTICES

Credits and Hours:

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

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 (Theory):	**00**
	Total Hours (Lab):	**30**
	Total Hours:	**30**

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**	**06 hours**	**20%**
	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.		
3.	**Fitting Shop**	**08 hours**	**27%**
	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		
4.	**Different Metal Joining Processes**	**02 hours**	**14%**
	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		
5.	**Smithy Shop.**	**04 hours**	**07%**
	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		
6.	**Sheet Metal Working.**	**02 hours**	**06%**
	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		
7.	**Plumbing Shop.**	**02 hours**	**06%**
	Introduction to all plumbing tools, Demonstration of plumbing on the piping model		
8.	**Introduction to Machine Tools.**	**02 hours**	**07%**
	Detailed introduction to Lathe machine, Shaping machine, Drilling machine, Grinding machine, Milling machine, Bending machine, Mechanical press.		
9.	**Injection molding process.**	**02 hours**	**06%**
	Introduction and demonstration to Injection Molding Process for making job out of plastic material		

Course Outcome (COs):

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

1. Recognize essential tools and process of carpentry.
2. Understand the joining process like welding, soldering and brazing.
3. Recognize essential tools and process of fitting.
4. Recognize various forging and forming processes with the aid of smithy process.
5. Understand different types of sheet metal joints which are useful in working.
6. Recognize different types of fittings and plumbing tools.
7. Identify different machines in workshops along with use.
8. Recognize plastic molding processes.

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO7	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO8	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

FTUCI01: FOUNDATION COURSE ON MATHEMATICS AND PHYSICS

Hours:

Teaching Scheme	Practical	Total
Hours/week	2	2
Marks	50	50

Examination Scheme:

Quiz: 50 Marks

Objective of the Course:

- The major objective of the course is to strengthen the foundation knowledge of mathematics and physics, which are prerequisites in engineering.
- To clear the concepts of mathematics and physics with interactive modules.

Detailed Syllabus:

Modules of Mathematics

11th GRADE		
Sr. No.	Topics	Subtopics
1	Complex numbers and quadratic equations	1. Complex numbers 2. De Moivre's theorem and rotation of complex number
2	Sequences and Series	1. Sequences and series 2. Arithmetic progression 3. Geometric progression 4. Sum of some special series
3	Probability	Probability
12th GRADE		
4	Matrices	1. Types of matrices 2. Operation on Matrices 3. Inverse of matrix elementary operations 4. Special types of matrices 5. Properties of Matrices
5	Continuity and differentiability	1. Differentiability 2. Differentiation of composite function

		3. Mean value theorem
6	Application of derivatives	1. Rate of change of quantities 2. Increasing and decreasing functions 3. Tangents and Normals 4. Maxima and minima
7	Integrals	Integration by parts
8	Applications of integral	1. Area under simple curve 2. Area between two curves
9	Probability	1. Conditional probability 2. Baye's theorem 3. Binomial distribution

Modules of Physics

Sr. No.	Topic	Content
	11th GRADE	
1	**Mechanical Properties of Solids**	1. Elastic behavior of materials
		2. Elastic moduli
2	**Mechanical Properties of Fluids**	3. Hydrostatics and Bernoulli's principle
		4. Viscosity
		5. Surface tension
3	**Thermal Properties of Matter**	6. Heat and temperature
		7. Change of state and Newton's law of cooling
4	**Oscillators**	8. Introduction to Simple Harmonic Motion (Solution of second order differential order)
		9. Dynamics of simple harmonic motion
		10. Damped forced and resonant oscillators
5	**Thermodynamics**	11. Zeroth and the first law of thermodynamics
		12. Isothermal and adiabatic process
		13. Heat engine and the second law of thermodynamics
	12th GRADE	
6	**Ray Optics**	14. Reflection of light by spherical mirrors
		15. Refraction, total internal reflection (TIR), refraction at spherical surfaces, and refraction through a prism.
		16. Dispersion by a prism, Rainbow, and scattering of light
		17. Eye, microscope, and telescope
7		18. Band model of metal, semiconductors, and insulators

	Semiconductor Electronics Material Devices and Simple Circuits	19. Semiconductor diodes and their application
		20. Transistor action and characteristics
		21. Transistor as an amplifier and oscillator
		22. Transistor as a switch and logic gates
8	**Communication Systems**	23. Basics elements of communication systems
		24. Propagation of electromagnetic waves
		25. Modulation

Total hours: 30

Instructional Methods and Pedagogy

- The contents of the course will be installed on the student's device (Mobile/Laptop).
- Students have to explore the contents by his/her self on SARAS-3D.
- Students can check the self-paced learning outcome by attending the quiz available after the topic/chapter.
- Course mentors will be assigned to clear any difficulty in understanding the topic
- One external exam (Quiz based) will be conducted. The students have to secure a minimum 45% of marks in the quiz to clear the course.

Student Learning Outcomes:

- At the end of the course, the students will acquire fundamental knowledge regarding Mathematics and Physics. This will be a stepping stone for the technical uplift of knowledge and skill of the student.

Recommended Study Material:

❖ **Textbooks:**

1. NCERT Book of Mathematics for 11th and 12th standard.
2. NCERT Book of Physics for 11th and 12th standard.

SYLLABI (SEMESTER-2)

MSUD102: ENGINEERING MATHEMATICS-II

Credits and Hours:

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

Prerequisites: Basic calculus, mean, median, mode, standard deviation, combinatorial probability

Outline of the course:

Sr. No.	Title of the unit	Minimum number of hours
1	First order and First degree Ordinary Differential Equations	10
2	Higher Order Ordinary Linear Differential Equations	12
3	Partial Differential Equations and Applications	08
4	Matrix Algebra –II	10
5	Improper and Multiple Integrals	12
6	Probability and Statistics	08
	Total hours (Theory):	**60**
	Total hours (Lab):	**00**
	Total hours:	**60**

Detailed Syllabus:

1	**First order and First degree Ordinary Differential Equations**	**10 Hrs**	**17%**
Formation of Ordinary Differential Equation, Concept of general and particular solution, Initial value problems, Solutions of first order and first degree differential equations: Linear, Bernoulli, Exact and non-exact differential equations			
2	**Higher Order Ordinary Linear Differential Equations**	**12 Hrs**	**20%**
General Solution of Higher Order Ordinary Linear Differential Equations with Constant coefficients, Methods for finding particular integrals viz. variation of parameters and undetermined coefficients, Linear Differential Equation of higher order with variable			

coefficients: Legendre's Equations (Special case: Cauchy-Euler equation), System of simultaneous first order linear differential equations			
3	**Partial Differential Equations**	**08 Hrs**	**13%**
Formation of Partial Differential Equation, Lagrange's Linear Differential Equations, Special types of Nonlinear First Order Partial Differential Equation			
4	**Matrix Algebra –II**	**10 Hrs**	**17%**
Revision of matrices and determinant, Eigenvalues and Eigenvectors of matrices, Eigenvalues and Eigenvectors of special matrices, Cayley-Hamilton's Theorem and its applications, Crout's method of LU decomposition			
5	**Improper and Multiple Integrals**	**12 Hrs**	**20%**
Introduction to Improper integrals, Definitions and properties of Gamma, Beta and Error functions, Evaluation of double integrals, Change of order of double integration, Transformation to polar coordinates, Applications of double integrals: Area, Evaluation of triple integrals, Transformation cylindrical coordinates, Applications of triple integrals: Volume			
6	**Probability and Statistics**	**08 Hrs**	**13%**
Elementary Probability: Joint and Conditional probability and Bayes theorem, Discrete Probability Distributions: Binomial and Poisson, Continuous Probability Distributions: Exponential and Normal			

Course Outcome (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 and volume in engineering field.
CO5	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	-	-	-	-	-	-	-	-	-	-	-	-
CO 4	3	1	-	-	-	-	-	-	-	-	-	-	-	-

CO5	2	2	1	2	1	1	1	-	-	-	-	-	-	-

Correlation levels 1, 2 or 3 as defined below:
1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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/

ITUDI01: INTRODUCTION TO COMPUTER PROGRAMMING

Credits and Hours:

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

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 'PYTHON' language	02
3	Applications - Environment Setup, Operators I/O – Control Statements, Looping.	05
4	Basic Data types	04
5	List and Dictionaries	04
6	Functions	04
7	Objects and Classes in Python	04
8	File I/O	04
	Total hours (Theory):	**30**
	Total hours (Lab):	**30**
	Total hours:	**60**

Detailed Syllabus:

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

1 Introduction to Computation and Algorithm Various number systems: Decimal, Binary, Octal, Hexadecimal, conversion from one number system to another, what is a computer, Algorithms, Flowcharts. Solve Various types of algorithms like Exchanging values of two variables, (using 3 variables & 2 variables), Arrange numbers in ascending order,	**03 Hours**	**10%**

2 **Introduction to Programming and 'C' language** What is program & programming, programming languages and it's types, compiler, and interpreter, Basic structure of a program, Compiling and Interpreting the process of Program	**02 Hours**	**9%**
3 **Applications - Environment Setup, Operators I/O – Control Statements, Looping.** Python Features, Installing Python, Local Environment Setup, Python Environment Variables, Types of Operators, Input function, If, If. Else and nested if., For loop, while loop, Break, Continue, Else with Loop	**05 Hours**	**16%**
4 **Basic Data types** Numbers, Strings, Tuples, Sets, Frozen Sets, Type Casting	**04 Hours**	**13%**
5 **List and Dictionaries** Accessing Values in Lists – Dictionaries, Updating Lists – Dictionaries, Delete List Elements, Basic List Operations	**04 Hours**	**13%**
6 **Functions** Introduction to Annotation, Byte streams, and character streams, Wrapper classes, Why Lambda Expression, Lambda Expression Syntax, Where to use a lambda expression, Adopting Patterns like matching, finding and filtering	**04 Hours**	**13%**
7 **Objects and Classes in Python** Overview of OOP Terminology, Creating Classes, Creating Instance Objects, Destroying Objects, Overriding Methods	**04 Hours**	**13%**
8 **File I/O** Type of file formats and their significance, File Creation and writing data to files, Reading and Writing Files, overwriting files, Dealing with Excel sheets, CSV files, making data persistent to create real-life projects, Introduction to Numpy and Pandas	**04 Hours**	**13%**

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 apart of internal theory evaluation.
- The course includes a laboratory, where students have an opportunity to build anappreciation 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 applied 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 aspects.
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 Books:**

1. Programming Python: Powerful Object-Oriented Programming Fourth Edition by Mark Lutz
2. The Quick Python Book, Second Edition 2nd Edition by Vernon L. Ced

- **Reference Books:**

1. Python Essential Reference (4th Edition) 4th Edition by David Beazley

- **Web Materials:**

1. Python.org - Official Python site. Find a complete list of all documentation, installation, tutorials, news, etc.
2. Web Programming in Python - This topic guide attempts to cover every aspect of
3. Programming web applications (both clients and servers) using Python.

MEUC102: BASICS OF CIVIL AND MECHANICAL ENGINEERING

Credits and Hours:

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

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**
	Total hours (Lab):	**30**
	Total hours:	**75**

Detailed Syllabus:

PART A:			
1.	**Introduction of Mechanical Engineering**	**Hours**	**14%**
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**	**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		

Course Outcome (COs):

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

CO1	Apply fundamental principles of mechanical engineering.
CO2	Demonstrate different types of the boilers and compare various mounting and accessories
CO3	Evaluate the performance of internal combustion engine and pumps & compressors
CO4	Evaluate the performance of refrigeration and air conditioning system and demonstrate various power & motion transmission systems

CO5	Demonstrate the applications of civil engineering and to perform linear and angular measurements using basic survey instruments.
CO6	Demonstrate building planning and to draw different building components.

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2
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

EEUC101: BASICS OF ELECTRONICS AND ELECTRICAL ENGINEERING

Credit Hours:

Teaching Scheme	Theory	Practical	Total	Credit
Hours/week	4	2	6	5
Marks	100	50	150	

Examination Scheme:

Theory Marks		Practical Marks		Total Marks
Internal	External	Internal	External	
50	50	25	25	150

Outline of the Course:

Sr. No.	Title of Units	Number of Hours
1	Basic Electrical Terms and Units	06
2	Electrical Circuit Analysis	08
3	Electrostatic	08
4	Electromagnetism	08
5	AC and DC Fundamentals	06
6	Single Phase AC Series and Parallel Circuits	07
7	Polyphase Circuits	05
8	Basic of Electronics	12
	Total hours (Theory):	**60**
	Total hours (Lab):	**30**
	Total hours:	**90**

Detailed Syllabus:

1	Basic Electrical Terms and Units	10%	06 Hrs
	Basic terms related to electrical engineering, their definition, units and symbols, equations Ohm's law, resistor and its coding, properties, temperature co- efficient of resistance, resistance variation with temperature, examples		
2	Electrical Circuit Analysis	13%	08 Hrs
	Kirchoff's current and voltage law, mesh and nodal analysis, Examples. Series-parallel network, Star-Delta transformations, potential divider		
3	Electrostatic	13%	08 Hrs
	Capacitors, charge and voltage, capacitance, electric fields, electric field strength and electric flux density, relative permittivity, dielectric strength, Examples Capacitors in parallel and series, Calculation of capacitance of parallel plate and multi plate capacitor, examples. Energy stored in capacitors, types of capacitor, charging and discharging of capacitors on DC, examples		
4	Electromagnetism	13%	08 Hrs
	Magnetic field, its direction and characteristics, magnetic flux and flux density, magneto motive force and magnetic field strength, examples Faraday's law of electromagnetic induction, Fleming's left hand and right hand rule, Lenz law, force on a current carrying conductor, examples Self and mutual inductance, coefficient of coupling, series and parallel combination of inductances, rise and decay of current in an inductive circuit in DC, examples Comparison between electrical & magnetic circuits		
5	AC and DC Fundamentals	10%	06 Hrs
	Generation of AC and DC voltage, Waveform and definition of its terms, relation between speed, frequency and pole Average and RMS value and its determination for sinusoidal and non-sinusoidal wave shapes, examples Phasor representation of alternating quantities		
6	Single Phase AC Series and Parallel Circuits	13%	07 Hrs.
	R-L and R-C series circuit, power in ac circuits, examples R-L-C series circuit, resonance in R-L-C series and parallel circuit, Q factor and bandwidth, examples Solution of series and parallel circuits, phasor method, admittance method, complex algebra method, examples.		
7	Polyphase Circuits	08%	05 Hrs.
	Generation of three phase emf, phase sequence, Definitions Star and delta connection of three phase system, voltage and current relations in star and delta connected system, Examples		
8	Basics of Electronics	20%	12 Hrs.
	Electronic Systems: Basic amplifier, voltage, current and power gain, Basic attenuators, CRO Transmission and Signals: Analog and digital signals, bandwidth, modulation and demodulation, Filters Forward and reverse bias of PN junction diode, Zener diode,		

	Rectifiers: Half Wave, Full Wave - Centre Tap, Bridge Transistor: Bipolar junction transistor, construction and biasing, configuration

Course Outcomes (Learning Outcomes):

Upon successful completion of this course, a student will 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

Mapping of course outcomes with program outcomes

Course Articulation Matrix

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

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

Recommended Study Material:

- **Text Book:**
  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 Book:**

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/

PSUDI02: ENGINEERING PHYSICS - 2

Credits and Hours:

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

Outline of the Course:

Unit No.	Title of the Unit	Minimum number of Hours
Unit 1	Electricity and magnetism Lab	12
Unit 2	Light and Optics Lab	8
Unit 3	Modern Physics Lab	10
	Total hours (Theory):	**00**
	Total hours (Lab):	**30**
	Total hours:	**30**

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 Measurement of capacitance by the bridge method Induction and LR, LC, and LRC Circuits Magnetic field along the axis of a coil Time Constant of RC Circuit Measurement of susceptibility of paramagnetic solution (Quinck`sTube 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 electromagneticwaves	
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 The wavelength of light, LASER, and Diffraction Numerical Aperture and Bending Losses in Optical fiber 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-particleduality, Heisenberg uncertainty principle-impossibility of a particlefollowing a trajectory	
3.4	Two slit interference experiment with photons, atoms and particles; Radioactivity: stability of nucleus; Law of radioactivedecay	
No. of Experiment The Photoelectric Effect; photo current versus intensity and wavelength of light; maximum energy of photo-electrons versus frequency of light Frank hertz experiment; To determine the ionization potential of mercury To determine value of Planck's constant using LEDs of at least 4 different colours		

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	-	-	-	-	-	-	-	-	-	-
PSUD102	3.00	3.00	2.00	1.67	1.00	-	-	-	-	-	-	-	-	-	-

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 McGrawHill
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

CHAROTAR UNIVERSITY OF SCIENCE AND TECHNOLOGY

B.Tech (CL/ME/EE) Programme

COURSES ON LIBERAL ARTS (SEMESTER-2)

HSUSI0I: PAINTING

Credits and Schemes

Sem	Course Code	Course Name	Credits	Teaching Scheme	Evaluation Scheme				
				Contact Hours/Week	Theory		Practical		Total
					Internal	External	Internal	External	
II	HSUS101	Painting	02	02	--	--	25	25	50

Course Objectives

- To encourage/ foster creativity among the students
- To introduce students to the fundamental processes of visual perception and artistic expression
- To cultivate / spawn awareness among students about the significance of arthistory, art criticism and aesthetics
- To help the students understand the meanings of concept, designs, shapes, colors, medium, and format
- To give the students the firsthand experience of design, painting, colors, light,shapes, shades and other important aspects of painting
- To develop in students an understanding of major styles and contemporary issues in painting

Course Outline

ModuleNo.	Title/Topic	Classroom Contact Sessions
1	An Introduction to Painting 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

2	Drawing from Nature and Object Objects of Drawing: Nature and Manmade /Artificial Objects Drawing Still / Live Objects Drawing from Memory Drawing from Life	4
3	Colour Design and Colour Value Color Theory:	6
	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 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	6
5	Figure Drawing and Proportion Proportions of the Human Body Three views – Anterior (front), Lateral (side) and Posterior (back) Fundamental Proportion – The Big Three	4
6	Sketching Sketching and Freehand Sketching Techniques Sketch and Drawing Medium	4
7	Contemporary Issues in Painting Contemporary Indian Art Pioneers of Contemporary Indian Art Contemporary Issues in Painting	4
Total Hours		30

Instruction Method 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 Scheme

- The evaluation scheme for the course will comprise the following components:

- Formative: Internal / Continuous and Comprehensive Evaluation (CCE) – 25 Marks
- Summative: External / Semester End Evaluation (SEE) – 25 Marks

Internal / Continuous and Comprehensive Evaluation (CCE) – 25 Marks	
Exam Pattern	Marks
Lab Work Assessment (Best 3 out of 4)	45
Viva voce/ Lab Quiz (Best 3 out of 4) (Note: Quiz Number 1 and 3 will be administered as lab quizzes, while Quiz Number 2 and/or 4 shall serve as part of the mid-term evaluation.)	45
Attendance	10
Total	100* (scaled to 25 marks)

*Note: The total Internal / CCE score out of 100 marks will be converted to 25 marks.

External / Semester End Evaluation (SEE) – 25 Marks	
Exam Pattern	Marks
Quiz	40
Viva-voce	30
Presentation/Task/GD/Case Analysis etc. (The Course Convenor / Faculty will brief the students about the examination components and weightage)	30
Total	100* (scaled to 25 marks)

*Note: The total External / SEE score out of 100 marks will be converted to 25 marks.

Major Learning Outcomes

- At the end of the course, a student will
- have cultivated a sense of creativity.
- be appreciative of art history, art criticism and aesthetics.
- be able to recognize the elements of arts in painting.
- have better cognizance and association of meaning of colors, shapes, andcomposition.
- be able to acknowledge the principles of painting as in design and colors,concept, medium and formats.
- have instantaneous painting experience about designing, lights, shades andcolors and such other important aspects.

HSUS102: PHOTOGRAPHY

Credits and Schemes

Sem	Course Code	Course Name	Credits	Teaching Scheme	Evaluation Scheme				
				Contact Hours/Week	Theory		Practical		Total
					Internal	External	Internal	External	
II	HSUS102	Photography	02	02	--	--	25	25	50

Course Objectives

- To introduce students to the tools and techniques of photography
- To provide students a thorough understanding of the mechanism and operations of a camera and help them understand the importance of aperture, shutter speed, film speed, depth of field, movement, and light meters to create a master shot
- To enable students to come out with a final project that demonstrates a single or a unified photographic idea or technique
- To explain students varied types of photographic representation including appropriation, persona, mixed media, non-objective images and engage them into experimentation using digital media
- To make students create a portfolio demonstrating creative uses of artificial and mixed lighting situations

Course Outline

Module No.	Title/Topic	Classroom Contact Sessions
1	**An Introduction to Photography** • Art, Design and Visualization • Basics of Photography and Various Types ofPhotography • Basics of Post Production • A Brief History of Photography:	03

	Early Experiments and Later Developments	
2	**Camera and Operating System** • 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 lensshutter, 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 andOperating Systems • Camera and Size of the Image, Speed and Power of Lens	**05**
3	**Light and Shade** • Reflection and refraction of light • Dispersion of light through a glass prism, lenses • Colour Filters: Different kinds, Red, yellow, green, neutral density, halffilters, 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 weatherconditions • Artificial light sources: Nature, intensity of different types of light sources usedin photography namely; (i) Photo flood lamp, (ii) Spot light, (iii) Halogen lamp, Barn doors and snoot, lightingstands • Flash unit: Bulb flash and Electronic flash, main components, electronic flash units, studio flash, slave unit, multiple flash, computer flash, x-contact, exposure table	**10**
4	**Composition** • 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	**09**
5	**Contemporary Issues in Photography** • Present Day Photography • Contemporary Photographers and their Contributions • Major Issues in Contemporary Photography	**03**
	Total Hours	**30**

Instruction Method 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 Scheme

- The evaluation scheme for the course will comprise the following components:
- Formative: Internal / Continuous and Comprehensive Evaluation (CCE) – 25 Marks
- Summative: External / Semester End Evaluation (SEE) – 25 Marks

Internal / Continuous and Comprehensive Evaluation (CCE) – 25 Marks	
Exam Pattern	**Marks**
Lab Work Assessment (Best 3 out of 4)	45
Viva voce/ Lab Quiz (Best 3 out of 4) (Note: Quiz Number 1 and 3 will be administered as lab quizzes, while Quiz Number 2 and/or 4 shall serve as part of the mid-term evaluation.)	45
Attendance	10
Total	**100* (scaled to 25 marks)**

*Note: The total Internal / CCE score out of 100 marks will be converted to 25 marks.

External / Semester End Evaluation (SEE) – 25 Marks	
Exam Pattern	**Marks**
Quiz	40
Viva-voce	30
Presentation/Task/GD/Case Analysis etc. (The Course Convenor / Faculty will brief the students about the examination components and weightage)	30
Total	**100* (scaled to 25 marks)**

*Note: The total External / SEE score out of 100 marks will be converted to 25 marks.

Learning Outcomes

- At the end of the course, students will be able to Understand, appreciate and demonstrate innovative approach, beauty and acuteacumen in the area of photography
- Develop photography skills and become familiar with the functions and importanceof the visual elements of nature and artificial objects
- Become independent thinkers who will contribute inventively and critically toculture through the making of art photography
- Have thorough understanding and acute sense of light and shade, composition, andpresentation of a piece of an art
- Experiment and Represent the cultivated sense and skills in Photography to themass
- Prepare an impressive portfolio encompassing holistic approach to art and other theareas of study.

HSUS103: SCULPTING

Credits and Schemes

Sem	Course Code	Course Name	Credits	Teaching Scheme	Evaluation Scheme				
				Contact Hours/Week	Theory		Practical		Total
					Internal	External	Internal	External	
II	HSUS103	Sculpting	02	02	--	--	25	25	50

Course Objectives

- To promote creativity and aesthetic sense pertaining to Sculpting by introducing them to the history of sculpting, its basic concepts and contemporary techniquesand issues
- To help the students understand and develop the skill of sketching and drawing from life, natural and manmade objects and structures using various means like pencil, pen, ink, crayon, chalk, colour etc.
- To help them understand methods and materials of sculpture i.e. clay, plaster, cement, wood, stone, bronze, enlarging and reducing devises, welding torch etc.
- To help the students develop the sense of structure, and understand how forms achieve their structural unity through adherence to principles of physical nature of material being observed and studied (e.g. Plants, insects, minerals etc)
- To introduce the basic visual elements of 2-D and 3-D designs with emphasis on fundamentals of two and three-dimensional designs
- To acquaint the learners with various perspectives to draw and mould a sculpture
- To make the learners understand the colour theory and its practical usages
- To provide the students a sound background of the traditional and representational form in sculpture and enable them to develop their own vision

Course Outline

Module No.	Title/Topic	Classroom Contact Sessions
1	**An Introduction to Sculpture** What Sculpture is and how it is different fromother Arts Basic elements, techniques, and history ofsculpture Form, Space and Basic Shapes in Sculpture Casting materials, moldmaking, basic wood cutting and shaping, metal work, Welding,assembling, adhesives, plaster, mixing	06
2	**Fundamental Principles of Sculpture** Basic Principles of Aesthetics in Sculpture Visual Principles – balance, sequence, weight, and structural dynamics in sculpture Structural Principles and communicativepossibilities of sculpture	10
3	**Process of Modeling** Additive and reductive processes Major Techniques of Sculpture: Modeling, Carving, Pointing Materials used in Modeling Clay Modeling and Carving	11
4	**Contemporary Issues in Sculpture** Sculpture and Present Day Context Contemporary Sculptors and their Contribution Major Contemporary Issues in Sculpture	03
Total Hours		30

Instruction Method 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 organized during the semester.

Evaluation Scheme

- The evaluation scheme for the course will comprise the following components:
- Formative: Internal / Continuous and Comprehensive Evaluation (CCE) – 25 Marks
- Summative: External / Semester End Evaluation (SEE) – 25 Marks

Internal / Continuous and Comprehensive Evaluation (CCE) – 25 Marks	
Exam Pattern	**Marks**
Lab Work Assessment (Best 3 out of 4)	45
Viva voce/ Lab Quiz (Best 3 out of 4) (Note: Quiz Number 1 and 3 will be administered as lab quizzes, while Quiz Number 2 and/or 4 shall serve as part of the mid-term evaluation.)	45
Attendance	10
Total	**100*** **(scaled to 25 marks)**

*Note: The total Internal / CCE score out of 100 marks will be converted to 25 marks.

External / Semester End Evaluation (SEE) – 25 Marks	
Exam Pattern	**Marks**
Quiz	40
Viva-voce	30
Presentation/Task/GD/Case Analysis etc. (The Course Convenor / Faculty will brief the students about the examination components and weightage)	30
Total	**100*** **(scaled to 25 marks)**

*Note: The total External / SEE score out of 100 marks will be converted to 25 marks.

Learning Outcomes

Upon successful completion of this course, students will be able to:

- Incorporate basic principles of aesthetics into sculpture
- Understand and apply basic concepts, styles and latest techniques of sculpting
- Explore traditional and experimental materials and design for sculpture
- Maintain a sketchbook of ideas and drawings to work out art project and to document coursework and discussions
- Understand the latest jargons, and develop collaborative skills to exhilarate thespeed of accomplishing the piece of art
- Make their portfolio rich by accomplishing projects given during course
- Become familiar with varied key sculptural techniques and formal ideas through hands-on workshops and experimentation with a variety of materials and three-dimensional assignments
- Present their work with greater impact and confidence for future prospects
- Get benefitted into other subjects of their study by developing broader and all-inclusive approach to learning.

HSUS104: POTTERY AND CERAMIC ART

Credits and Schemes

Sem	Course Code	Course Name	Credits	Teaching Scheme	Evaluation Scheme				
				Contact Hours/Week	Theory		Practical		Total
					Internal	External	Internal	External	
II	HSUS104	Pottery and Ceramic Art	02	02	--	--	25	25	50

Course Objectives

- To encourage/ foster creativity among the students
- To introduce students to the craft of clay working
- To make the students able to create as well as appreciate expressive, beautiful three dimensional clay forms
- To recognize and realize the physical, emotional, and spiritual benefits of working with clay, and to except and come to terms with clays humbling qualities
- To build a higher-level understanding of the ceramic process, creating an awarenessof the benefits of clay as a useful tool in their art therapy studies and practices
- To develop a deeper knowledge of the ceramic process, and become more confident with their hand building and glazing techniques
- To help them communicate an idea or emotion through their artwork

Course Outline

ModuleNo.	Title/Topic	Classroom Contact Sessions
1	An Introduction to Clay Elements and Materials of Ceramic Art andShape Prehistoric Cultures Basics of Pinching, Slabbing and Coiling Potter's wheel, centring the clay, forming bowls and cylinders Trimming and burnishing on the wheel Sketching the Pottery Models	5
2	Types and Techniques of Making Pottery Types of Pottery: Porcelain Pottery, Earthenware Pottery, Stoneware Pottery Techniques of Pottery: Hand-Built Pottery: Pinch, Coil, Slab Wheel-Thrown Pottery	7
3	Methods of Making Pottery Coil Method Pinch Method Slab Method	8
4	Decorating the Clays Different Methods of Decoration Textures in Pottery Colours, Painting, Carving, Glazing etc. inPottery	7
5	Contemporary Issues in Pottery and Ceramic Art Present Day Pottery and Ceramic Art Place of Pottery and Ceramic Art inContemporary Art Society Major Practitioners of Contemporary Pottery and Ceramic Art and their Contributions	3
Total Hours		30

Instruction Method 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 25 marks forinternal evaluation and 25 marks for external evaluation.

Evaluation Scheme

- The evaluation scheme for the course will comprise the following components:
- Formative: Internal / Continuous and Comprehensive Evaluation (CCE) – 25 Marks
- Summative: External / Semester End Evaluation (SEE) – 25 Marks

Internal / Continuous and Comprehensive Evaluation (CCE) – 25 Marks	
Exam Pattern	Marks
Lab Work Assessment (Best 3 out of 4)	45
Viva voce/ Lab Quiz (Best 3 out of 4) (Note: Quiz Number 1 and 3 will be administered as lab quizzes, while Quiz Number 2 and/or 4 shall serve as part of the mid-term evaluation.)	45
Attendance	10
Total	100* (scaled to 25 marks)

*Note: The total Internal / CCE score out of 100 marks will be converted to 25 marks.

External / Semester End Evaluation (SEE) – 25 Marks	
Exam Pattern	Marks
Quiz	40
Viva-voce	30
Presentation/Task/GD/Case Analysis etc. (The Course Convenor / Faculty will brief the students about the examination components and weightage)	30
Total	100* (scaled to 25 marks)

*Note: The total External / SEE score out of 100 marks will be converted to 25 marks.

Learning Outcomes

At the end of the course, the learners will

- Have basic understanding of clay and glaze composition and formulation with emphasis on hand built ceramic forms.
- Have explored a variety of hand building methods including extended pinch, slab built and extruded forms
- have learned firing and glazing methods for stoneware clay
- have learned how finishing and decorating contribute or detract from the intentionas an artist
- Finally, a student will also have developed a sense of appreciation regarding how a unified, coherent form that is finely crafted is beautiful in its own right.

HSUSI05: MEDIA AND GRAPHIC DESIGN

Credits and Schemes

Sem	Course Code	Course Name	Credits	Teaching Scheme	Evaluation Scheme				
				Contact Hours/Week	Theory		Practical		Total
					Internal	External	Internal	External	
II	HSUSI105	Media and Graphic Design	02	02	--	--	25	25	50

Course Objectives

- To encourage/ foster creativity among the students
- To introduce students to the fundamentals of graphic designs
- To cultivate / spawn awareness among students about the significance of art and designs, art criticism and aesthetics
- To help the students understand the meanings of concept, designs, shapes, colors, print and medium
- To give the students first-hand experience of working on Graphic Software
- To develop in students an understanding of major issues, techniques and aspects of designs and print

Course Outline

ModuleNo.	Title/Topic	Classroom Contact Sessions
1	An Introduction to Media and Graphic Design Creating Art, Art in Context and Art as Inquiry History of Graphic Design Constructional, Representational, and Simplification Drawing	03

2	Layout and Design 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	07
3	Form and Space Types of Forms: Man-made, Nature Types of Space: Negative and Positive Composition of Form and Space to create Layout Exploring Creativity	06
4	Computer Graphics An Introduction to Graphic Software Flash, Coreldraw, Illustrator and Photoshop Pre-press Process	04
5	Fonts Construction of Type Anatomy of Type Visual Language Creating Logo and Symbol	04
6	Basic Print Media An Introduction to Press and its Development Phases Types of Press Types of Printing Technologies Post-press Processes	03
7	Contemporary Issues in Graphic Design Present Day Graphic Designs Contemporary Designers and their Contribution Major Contemporary Issues in Graphic Design	03
Total Hours		30

Instruction Method 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 25 marks forinternal evaluation and 25 marks for external evaluation.

Evaluation Scheme

- The evaluation scheme for the course will comprise the following components:
- Formative: Internal / Continuous and Comprehensive Evaluation (CCE) – 25 Marks
- Summative: External / Semester End Evaluation (SEE) – 25 Marks

Internal / Continuous and Comprehensive Evaluation (CCE) – 25 Marks	
Exam Pattern	Marks
Lab Work Assessment (Best 3 out of 4)	45
Viva voce/ Lab Quiz (Best 3 out of 4) (Note: Quiz Number 1 and 3 will be administered as lab quizzes, while Quiz Number 2 and/or 4 shall serve as part of the mid-term evaluation.)	45
Attendance	10
Total	100* (scaled to 25 marks)

*Note: The total Internal / CCE score out of 100 marks will be converted to 25 marks.

External / Semester End Evaluation (SEE) – 25 Marks	
Exam Pattern	Marks
Quiz	40
Viva-voce	30
Presentation/Task/GD/Case Analysis etc.	30

(The Course Convenor / Faculty will brief the students about the examination components and weightage)	
Total	100* (scaled to 25 marks)

*Note: The total External / SEE score out of 100 marks will be converted to 25 marks.

Learning Outcomes

At the end of the course, a student will

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

HSUS106: ART AND CRAFT

Credits and Schemes

Sem	Course Code	Course Name	Credits	Teaching Scheme	Evaluation Scheme				
				Contact Hours/Week	Theory		Practical		Total
					Internal	External	Internal	External	
II	HSUS106	Art and Craft	02	02	--	--	25	25	50

Course Objectives

- To encourage / foster creativity among the students
- To enable the students to work through the process of bringing an idea from conception to realization
- To enable students to create artifacts that are visually expressive
- To cultivate / spawn awareness among students about the significance of art, craftand aesthetics
- To develop students' graphic skills which may work towards the realization of ideas in the creation of 2D and 3D
- To provide opportunities to students to be conversant with the use of a variety of materials, media, tools and equipments for Art and Craft

Course Outline

Module No.	Title/Topic	Classroom Contact Sessions
1	**An Introduction to Art and Craft** Basic Design and Forms Space and Geometry Elements of Nature and Object	**03**

2	**Paper Cutting** Study of Designs Context of Space and Form Types of Textures and Papers Principles of Paper Cutting	**05**
3	**Design from Nature** Nature as a Source of Design Principles of Designing Natural Object Decorative Forms Cutting, Collaging, Embossing and Itching	**08**
4	**Card Board Modeling** Principles of Form and Space Dimensions of Space and Shape Process of Modeling and Decoration	**06**
5	**Print Making** An Introduction to Print Making A Brief History of Print Making Types of Print Making Processing of Print Making Sketching and Drawing	**05**
6	**Contemporary Issues in Art and Craft** Present-day Art and Craft Using the Waste for making the Best Contemporary Issues in Art and Craft	**03**
Total Hours		**30**

Instruction Method 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 25 marks forinternal evaluation and 25 marks for external evaluation.

Evaluation Scheme

- The evaluation scheme for the course will comprise the following components:
- Formative: Internal / Continuous and Comprehensive Evaluation (CCE) – 25 Marks
- Summative: External / Semester End Evaluation (SEE) – 25 Marks

Internal / Continuous and Comprehensive Evaluation (CCE) – 25 Marks	
Exam Pattern	**Marks**
Lab Work Assessment (Best 3 out of 4)	45
Viva voce/ Lab Quiz (Best 3 out of 4) (Note: Quiz Number 1 and 3 will be administered as lab quizzes, while Quiz Number 2 and/or 4 shall serve as part of the mid-term evaluation.)	45
Attendance	10
Total	**100*** **(scaled to 25 marks)**

*Note: The total Internal / CCE score out of 100 marks will be converted to 25 marks.

External / Semester End Evaluation (SEE) – 25 Marks	
Exam Pattern	**Marks**
Quiz	40
Viva-voce	30
Presentation/Task/GD/Case Analysis etc. (The Course Convenor / Faculty will brief the students about the examination components and weightage)	30
Total	**100*** **(scaled to 25 marks)**

*Note: The total External / SEE score out of 100 marks will be converted to 25 marks.

Learning Outcomes

At the end of the course, students will be

- aware about the significance of art, craft and aesthetics.
- able to create artifacts that are visually expressive.

- able to lead the ideas from conceptualization with reference to the 2D and 3Dmodel making.
- conversant with the use of a variety of materials, media, tools and equipments for creative Art and Craft.

HSUS109: DRAMATICS

Credits and Schemes

Sem.	CourseCode	Course Name	Credits	TeachingScheme	Evaluation Scheme				
				Contact Hours / Week	Theory		Practical		Total
					Internal	External	Internal	External	
II	HSUS109	Dramatics	02	02	--	--	25	25	50

Course Objectives:

- To acquaint students with the concept of performing arts
- To teach professional acting skills to the students
- To offer training in the key areas of performance
- To acquaint students with the history, theory, and aesthetic value of theatre
- To provide students extensive training in acting skills (monologues, dialogues, and group scenes from a variety of sources), dance, voice, theatre production, and rehearsal techniques, which culminates in a performance before a live audience

Couse Outline

Module	TITLE / TOPIC	Classroom Contact Sessions
1	**Introduction to Drama** Introduction to performing arts Drama - An art, a socializing activity, & a way of learning Form of Drama Elements of Drama Types of Drama	06
2	**History of Drama and Contemporary Theatre** Important world dramatists & drama–from Greek to modern Evolution of contemporary theatre in the contextof developments in Indian theatre Major Movements in Drama	06

3	**Theatre Design and Techniques** Theatre Architecture Stage craft: Set, light, costume, make up, sound, props Theatre techniques: from selection of script to finalperformance	**06**
4	**Technicalities of Stage Performance** Selection of plot and character Improvisation Movement Voice, Speech, Imagination Character Development Scene Enactment	**08**
5	**Contemporary Trends in Drama** New Tendencies in theatre Drama and Society Using drama for Social Change and Education	**04**

Instruction Method 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.

Evaluation Scheme

- The evaluation scheme for the course will comprise the following components:
- Formative: Internal / Continuous and Comprehensive Evaluation (CCE) – 25 Marks
- Summative: External / Semester End Evaluation (SEE) – 25 Marks

Internal / Continuous and Comprehensive Evaluation (CCE) – 25 Marks	
Exam Pattern	**Marks**
Lab Work Assessment (Best 3 out of 4)	45
Viva voce/ Lab Quiz (Best 3 out of 4) (Note: Quiz Number 1 and 3 will be administered as lab quizzes, while Quiz Number 2 and/or 4 shall serve as part of the mid-term evaluation.)	45
Attendance	10
Total	**100*** **(scaled to 25 marks)**

*Note: The total Internal / CCE score out of 100 marks will be converted to 25 marks.

External / Semester End Evaluation (SEE) – 25 Marks	
Exam Pattern	**Marks**
Quiz	40
Viva-voce	30
Presentation/Task/GD/Case Analysis etc. (The Course Convenor / Faculty will brief the students about the examination components and weightage)	30
Total	**100*** **(scaled to 25 marks)**

*Note: The total External / SEE score out of 100 marks will be converted to 25 marks.

Major Learning Outcomes

At the end of the course, a student will

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

HSUSI10: CONTEMPORARY DANCE

Credits and Schemes

Sem	Course Code	Course Name	Credits	Teaching Scheme	Evaluation Scheme				
				Contact Hours/Week	Theory		Practical		Total
					Internal	External	Internal	External	
II	HSUSI10	Contemporary Dance	02	02	--	--	25	25	50

Course Objectives

- To introduce students to the concept of performing arts
- To develop in students the ability to express through the form of dance
- To foster creativity and innovativeness in students
- To enhance the aesthetic sensitivity among the students
- To inculcate in students contemporary dance techniques, philosophies,approaches, improvisation and performance disciplines
- To help students improve concentration, mental alertness, quick reflex action, physical agility and stress relief capacities
- To provide the students with complete awareness of one's own body
- To guide the students express themselves a natural way human feelings and expressions by creating harmony

Course Outline

ModuleNo.	Title / Topic	Classroom Contact Sessions
1.	**Introduction to dance** Dance as a Performing Art Dance as a Medium of Expression History and Development of Dance	4

2.	**Types of Dance** 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	**6**
3.	**Basic Elements of Dance** Movements of different parts of a body for Expression Concepts of: Nritya, Laya and Taal	**4**
4.	**Technical Skills in Professional Contemporary Dance** Dance technique: alignment, balance, co-ordination, flexibility and control Expressive / presentation skills: Dynamic energy, physicalengagement with the given material and stage, etc. Skills and processes of rehearsal and production: physical energy, stamina and athleticism Musicality: clarity of timing and phrasing	**6**
5.	**Contemporary Trends in Dance :** Prevalent trends and techniques in contemporary dance Future trends in contemporary dance form On Stage Performance	**10**
Total Hours		**30**

Instruction Method 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 Scheme

- The evaluation scheme for the course will comprise the following components:
- Formative: Internal / Continuous and Comprehensive Evaluation (CCE) – 25 Marks
- Summative: External / Semester End Evaluation (SEE) – 25 Marks

Internal / Continuous and Comprehensive Evaluation (CCE) – 25 Marks	
Exam Pattern	**Marks**
Lab Work Assessment (Best 3 out of 4)	45
Viva voce/ Lab Quiz (Best 3 out of 4) (Note: Quiz Number 1 and 3 will be administered as lab quizzes, while Quiz Number 2 and/or 4 shall serve as part of the mid-term evaluation.)	45
Attendance	10
Total	**100* (scaled to 25 marks)**

*Note: The total Internal / CCE score out of 100 marks will be converted to 25 marks.

External / Semester End Evaluation (SEE) – 25 Marks	
Exam Pattern	**Marks**
Quiz	40
Viva-voce	**30**
Presentation/Task/GD/Case Analysis etc. (The Course Convenor / Faculty will brief the students about the examination components and weightage)	30
Total	**100*** **(scaled to 25 marks)**

*Note: The total External / SEE score out of 100 marks will be converted to 25 marks.

Major Learning Outcomes

At the end of the course, a student will

- be able to develop ability to express through the form of dance.
- have enhanced aesthetic sensitivity.
- have improved concentration, mental alertness, quick reflex action, and physicalagility.
- be able to express a natural way human feelings and expressions by creatingharmony.
- be able to deliver contemporary dance performance.

HSUSIII: MUSIC (VOCAL)

Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	--	02	--	30	02
Marks	--	50	--	50	

Pre-requisite courses:

- No pre-requisites for this course

Objectives of the Course:

To facilitate the learners:

- To explore and understand Vocal Music
- with an opportunity to pursue the hobby of music on the campus
- to reduce stress and get energised to study better
- to explore and understanding about the Indian Music (Vocal), and its basic terms

Outline of the Course:

Sr. No.	Title of the Unit	Minimum Number of Hours
1	Introduction to Vocal Music	05
2	Elements of Indian Vocal Music	08
3	Introduction to Ragas and Taals	08
4	A study of forms of Indian Vocal Music	05
5	Contemporary Trends in Indian Vocal Music	04
	Total hours (Theory):	--
	Total hours (Practical):	**30**
	Total hours:	**30**

Detailed Syllabus:

1.	Introduction to Vocal Music	05 Hours	18 %
	Definition of Music; Concept of Vocal Music; Basic history and evolution of Indian music; Understanding the basic concepts of Indian music, including Swara, Raga, and Tala		
2.	Elements of Indian Vocal Music	07 Hours	26%
	Sound (Dhwani) and its origin; Andolan and its types; Naad and its quality; Vibration and Frequency; Sahayak Naad, 10 Thhats of Bhatkhande Ji, Saptak, Poorvang, Uttarang, Varna, Alankar, Vadi, Samvadi, Anuvadi, Vivadi, Gamak, Meend, knowledge of Taanpoora and its parts.		
3.	Introduction to Ragas and Taals	07 Hours	26%
	Learning basic ragas like Yaman and Bhupali; Understanding aroha (ascent) and avaroha (descent) of ragas; Introduction to the concept of tala (rhythm); Learning common talas like Teentaal and Ektaal; Basic tala exercises and rhythmic patterns.		
4.	A study of forms of Indian Vocal Music	05 Hours	16%
	Various forms of Indian Vocal Music: Carnatic Music, Thumari, Drupad etc; Study of Western Music and Style of Indian Music; Study of Regional Folk Music; Study of Gharana, Ravindra Sangeet and Carnatic Music		
5.	Contemporary Trends in Indian Vocal Music	04 Hours	14%
	Fusion Music; Indian Folk and Fusion; Sufi Revival; Cultural Fusion; Indian Vocal Music Festivals, Famous Indian Vocal Artists		

Course Outcome (COs):

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

CO1	Understand the concept and elements of Vocal Music
CO2	develop a clear and controlled singing voice with proper breath control and posture.

CO3	acquire the ability to sing basic scales, patterns, and simple compositions with accuracy and clarity.
CO4	understand and perform basic ragas and talas, including common rhythmic patterns.
CO5	appreciate and celebrate rich heritage of Indian Vocal Music

Evaluation Scheme

- The evaluation scheme for the course will comprise the following components:
- Formative: Internal / Continuous and Comprehensive Evaluation (CCE) – 25 Marks
- Summative: External / Semester End Evaluation (SEE) – 25 Marks

Internal / Continuous and Comprehensive Evaluation (CCE) – 25 Marks	
Exam Pattern	Marks
Lab Work Assessment (Best 3 out of 4)	45
Viva voce/ Lab Quiz (Best 3 out of 4) (Note: Quiz Number 1 and 3 will be administered as lab quizzes, while Quiz Number 2 and/or 4 shall serve as part of the mid-term evaluation.)	45
Attendance	10
Total	100* (scaled to 25 marks)

*Note: The total Internal / CCE score out of 100 marks will be converted to 25 marks.

External / Semester End Evaluation (SEE) – 25 Marks	
Exam Pattern	Marks
Quiz	40
Viva-voce	30
Presentation/Task/GD/Case Analysis etc. (The Course Convenor / Faculty will brief the students about the examination components and weightage)	30
Total	100* (scaled to 25 marks)

*Note: The total External / SEE score out of 100 marks will be converted to 25 marks.

Recommended study Material:

❖ **Reference Books:**

- "Ragas in Indian Music: A Complete Reference Source for Carnatic Ragas" by Dr. Rajan P. Parrikar - A comprehensive guide to Carnatic music ragas with historical context and audio samples.
- "Ragas of Indian Music: Their Structure and Evolution" by Nazir Ali Jairazbhoy - An exploration of the structure and evolution of ragas in Hindustani music.
- "The Raga Guide: A Survey of 74 Hindustani Ragas" by Joep Bor and others - A reference book with CDs that provides in-depth information on various Hindustani ragas, including their characteristics and performances.
- "Indian Music and the West" by Gerry Farrell - A study of the impact of Indian music on Western music and culture.
- "The Oxford Illustrated Companion to South Indian Classical Music" by Ludwig Pesch - A comprehensive resource on South Indian classical music, including Carnatic vocal music.

❖ **Web Sources:**

- https://onlinecourses.swayam2.ac.in/cec20_as04/preview
- https://www.sharda.org/
- https://onlinecourses.swayam2.ac.in/cec22_as02/preview
- https://www.udemy.com/course/learn-indian-voice-music-from-the-scratch-to-advance/

HSUSI12: MUSIC (INSTRUMENTAL) – TABLA

Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	--	02/15	--	30	02
Marks	--	25/25	--	50	

Pre-requisite courses:

- No pre-requisites for this course

Objectives of the Course:

To facilitate the learners:

- with an opportunity to pursue the hobby of dance on the campus
- to reduce stress and get energised to study better
- to explore and understanding about the instrument – Tabla, and its basic terms
- to play basic tals on Tabla and learn improvisation

Outline of the Course:

Sr. No.	Title of the Unit	Minimum Number of Hours
	Introduction to Music (Tabla)	04
	Basic Terms	06
	Main Varnas of Playing Tabla	08
	Basic Taals	08
	Improvisation in Tritaal	04
	Total hours (Theory):	--
	Total hours (Practical):	30
	Total hours:	30

Detailed Syllabus:

1.	Introduction to Music (Tabla)	04 Hours	13.33%
	Explanation of the various parts of Tabla Vilambit, Madhya and Dhrut Laya Different Bols/Syllables played on Tabla		

	Introduction of the procedure of playing Tabla		
2.	Basic Terms	06 Hours	20%
	Matra, Tal, Sam, Tali, Khali, Vibhag, Dugun, Avartan Sangeet, Nad, Swar, Laya, Bol, Kisme, Kayda, Mukhda, Thai, Tigun, Chaugun, Tukda		
3.	Main Varnas of Playing Tabla	08 Hours	26.66%
	Dhet, Gadi, Gana Kraan, KaRaan, Ghraan, GhaRaan, DhumakiTa, DhirDhir, TeTedheTe		
4.	Basic Taals	08 Hours	26.66%
	Trital, Jhaptal, Dadra Kaherva Rupak/Tewra Ektal/Adital		
5.	Improvisation in Tritaal	04 Hours	13.33%
	Tita and Tirkita kayda		

Evaluation Scheme:

The evaluation scheme for the course will comprise the following components:

Formative: Internal / Continuous and Comprehensive Evaluation (CCE) – 25 Marks

Summative: External / Semester End Evaluation (SEE) – 25 Marks

Internal / Continuous and Comprehensive Evaluation (CCE) – 25 Marks	
Exam Pattern	Marks
Lab Work Assessment (Best 3 out of 4)	45
Viva voce/ Lab Quiz (Best 3 out of 4) (Note: Quiz Number 1 and 3 will be administered as lab quizzes, while Quiz Number 2 and/or 4 shall serve as part of the mid-term evaluation.)	45
Attendance	10
Total	100* (scaled to 25 marks)

*Note: The total Internal / CCE score out of 100 marks will be converted to 25 marks.

External / Semester End Evaluation (SEE) – 25 Marks	
Exam Pattern	Marks
Quiz	40
Viva-voce	30
Presentation/Task/GD/Case Analysis etc. (The Course Convenor / Faculty will brief the students about the examination components and weightage)	30
Total	100* (scaled to 25 marks)

*Note: The total External / SEE score out of 100 marks will be converted to 25 marks.

HSUSI13: MUSIC (INSTRUMENTAL) – GUITAR

Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	--	02/15	--	30	02
Marks	--	50	--	50	

Pre-requisite:

- Correct posture for holding the guitar and plectrum

Objectives of the Course:

Students will be able to:

- Identify the different parts of a guitar song, such as the melody, harmony, and rhythm.
- Play a variety of strumming patterns and techniques.
- Understand the different types of scales and chords.
- Analyse arpeggios and riffs in different keys.
- Learn and perform contemporary guitar techniques and blues solos using a variety of scales and chords.
- Comprehend play guitar in a variety of styles, including acoustic, rock, blues, and country.

Outline of the Course:

Sr. No.	Title of the Unit	Minimum Number of Hours
1.	Introduction to Structure, Tunes & Strumming	06
2.	Relation of Scales & Chords	06
3.	Arpeggios and Introduction to Riffs	07
4.	Contemporary Techniques and Blues Soloing	05
5.	Acoustic to Advance Style	06
	Total hours (Theory):	--
	Total hours (Practical):	30
	Total hours:	30

Detailed Syllabus:

1.	**Introduction to Structure, Tunes & Strumming**	**06 hours**	**20%**
	• Basic chord progressions and strumming, Counting the beats along with strumming, Playing along with the metronome. • Introduction to the notes on the guitar and tuning procedures, Different strumming patters and how you can create your own strumming patterns.		
2.	**Relation of Scales & Chords**	**06 hours**	**20%**
	• Sequencing patterns (Minor & Major), 3 notes per string patterns, practicing scales using backing tracks, Formation of minor scales, Minor scale relation with major scale and visualization of the shapes. • Harmonized major scale, Chord formation theory, Introduction to CAGED system., CAGED Barre chord shapes, Extended chord formation, Some basic shapes of extended chords.		
3.	**Arpeggios and Introduction to Riffs**	**07 hours**	**22%**
	• Arpeggios shapes using CAGED system, Arpeggio exercises with sweep picking. • Power chords, Power chord rhythm study using down strokes and accents, Palm Muting, Popular riffs.		
4.	**Contemporary techniques and Blues Soloing**	**05 hours**	**18%**
	• Slides, Hammer-on, Pull-off, Vibrato, Legato exercises, introduction to Bending • How 12 bar blues chord progressions are formed, Types of Blues chord progressions, Swing rhythm in 12 bar blues, Basic Blues riffs. • Pentatonic scale shapes, Pentatonic scale sequencing Patterns, How to use pentatonic scale in blues soloing.		
5.	**Acoustic to Advance Style**	**06 hours**	**20%**
	• Basic finger picking exercises, Etudes and popular song riffs, Fingerstyle rhythm. • Detailed study of modes and improvisation using modes, Extended arpeggios and application, more extended chords (used in Jazz)		

	• Advanced blues soloing, Funk rhythm study, Advanced finger style grooves, Metal riffs and scale sequences.		

Course Outcome (COs):

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

CO1	play a variety of tunes on the guitar, using different strumming patterns and techniques
CO2	understand and apply the relationship between scales and chords
CO3	play arpeggios and riffs on the guitar
CO4	learn and perform contemporary guitar techniques and blues solos
CO5	play guitar in a variety of styles, from acoustic to advanced
CO6	develop their own unique guitar sound and style

Recommended Study Material:

- **Text book:**
  1. Alternate Picking – Handbook by Clifford Martin
  2. Guitar: For Beginners by Nicolas Crater

- **Web material:**
  1. https://www.youtube.com/watch?v=wAfbTvEeMmw&list=PLovStLXqoeZ1ncXap2csJ-FKgLuCyPQzY
  2. https://www.youtube.com/watch?v=rTMN8rCBWkw
  3. https://www.coursera.org/learn/guitar
  4. https://www.coursera.org/learn/guitar-scales-chord-progressions

Evaluation Scheme

The evaluation scheme for the course will comprise the following components:

- Formative: Internal / Continuous and Comprehensive Evaluation (CCE) – 25 Marks
- Summative: External / Semester End Evaluation (SEE) – 25 Marks

Internal / Continuous and Comprehensive Evaluation (CCE) – 25 Marks	
Exam Pattern	**Marks**
Lab Work Assessment (Best 3 out of 4)	45
Viva voce/ Lab Quiz (Best 3 out of 4)	45

(Note: Quiz Number 1 and 3 will be administered as lab quizzes, while Quiz Number 2 and/or 4 shall serve as part of the mid-term evaluation.)	
Attendance	10
Total	**100* (scaled to 25 marks)**

*Note: The total Internal / CCE score out of 100 marks will be converted to 25 marks.

External / Semester End Evaluation (SEE) – 25 Marks	
Exam Pattern	**Marks**
Quiz	40
Viva-voce	30
Presentation/Task/GD/Case Analysis etc. (The Course Convenor / Faculty will brief the students about the examination components and weightage)	30
Total	**100* (scaled to 25 marks)**

*Note: The total External / SEE score out of 100 marks will be converted to 25 marks.

HSUSI14: MUSIC (INSTRUMENTAL)- HARMONIUM

Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	--	02/15	--	30	02
Marks	--	50	--	50	

Pre-requisite courses:

- No pre-requisites for this course

Objectives of the Course:

To facilitate the learners:

- with an opportunity to pursue the hobby of dance on the campus
- to reduce stress and get energised to study better
- to explore and understanding about the instrument – Harmonium, and its basic terms
- to play basic Raags on Harmonium

Outline of the Course:

Sr. No.	Title of the Unit	Minimum Number of Hours
6.	Introduction to Harmonium	04
7.	Basic Terms	06
8.	Swar	08
9.	Raag	08
10.	Tal	04
	Total hours (Theory):	--
	Total hours (Practical):	30
	Total hours:	30

Detailed Syllabus:

1.	**Introduction to Harmonium**	**04 Hours**	**13.33%**
	• Understanding the parts of the harmonium • How to set up and maintain the harmonium • Basic hand positioning and posture • Introduction to the keyboard layout and finger numbering		
2.	**Basic Terms**	**06 Hours**	**20%**
	• Swar, Raag, Tal, Alankar, Bandish, Saptak • Sthai, Aroh, Avroh, Aalap and Bolaan		
3.	**Swar**	**08 Hours**	**26.66%**
	• Major Scale (Sa, Re, Ga, Ma, Pa, Dha, Ni, Sa) • Shuddha, Komal and Teevra Swars • Basic Compositions of Seven Surs		
4.	**Raag**	**08 Hours**	**26.66%**
	• Kalyan • Bageshri • Bhairav • Bihag • Chhayanat • Puriya Dhanashri • Bhimpalas • Jaijaiwanti • Asawari • Bibhas • Miya Malhar • Multani • Darbari Kanada • Bilawal		
5.	**Tal**	**04 Hours**	**13.33%**
	• Trital • Ektaal • Chautaal • Dadra • Kaherva • Rupak • Tewra • Surfakta (Sul taal) • Deepachandi • Tilwada		

Course Outcome (COs):

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

CO1	Identify the parts of Harmonium and basic positioning before playing
CO2	Use the basic terms with understanding when it is needed in Harmonium playing
CO3	Identify and play the basic Swars of Tabla playing
CO4	Play the basics of the Raags mentioned
CO5	Identify and play along with the Tals mentioned

Evaluation Scheme

The evaluation scheme for the course will comprise the following components:

- Formative: Internal / Continuous and Comprehensive Evaluation (CCE) – 25 Marks
- Summative: External / Semester End Evaluation (SEE) – 25 Marks

Internal / Continuous and Comprehensive Evaluation (CCE) – 25 Marks	
Exam Pattern	**Marks**
Lab Work Assessment (Best 3 out of 4)	45
Viva voce/ Lab Quiz (Best 3 out of 4) (Note: Quiz Number 1 and 3 will be administered as lab quizzes, while Quiz Number 2 and/or 4 shall serve as part of the mid-term evaluation.)	45
Attendance	10
Total	**100*** **(scaled to 25 marks)**

*Note: The total Internal / CCE score out of 100 marks will be converted to 25 marks.

External / Semester End Evaluation (SEE) – 25 Marks	
Exam Pattern	**Marks**
Quiz	40
Viva-voce	30
Presentation/Task/GD/Case Analysis etc. (The Course Convenor / Faculty will brief the students about the examination components and weightage)	30
Total	**100*** **(scaled to 25 marks)**

*Note: The total External / SEE score out of 100 marks will be converted to 25 marks.

HSUSI15: MUSIC (INSTRUMENTAL) - FLUTE

Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	--	02/15	--	30	02
Marks	--	50	--	50	

Objectives of the Course:

To facilitate the learners:

- To introduce students to the fundamental techniques and principles of playing the flute.
- To develop proficiency in basic flute playing skills, including tone production, finger technique, and breath control.
- To explore different musical styles and genres through flute repertoire.
- To foster an appreciation for the artistic and historical aspects of flute music.
- To encourage individual and ensemble performance experiences.

Outline of the Course:

Sr. No.	Title of the Unit	Minimum Number of Hours
1.	Introduction to the Flute	04
2.	Fundamentals of Sound Production	06
3.	Finger Technique and Scales	06
4.	Flute Repertoire	06
5.	Flute Styles and History	04
6.	Ensemble Playing	04
	Total hours (Theory):	--
	Total hours (Practical):	30
	Total hours:	30

Detailed Syllabus:

1.	**Introduction to the Flute**	**04 Hours**	**14%**
	• Course orientation and objectives • Overview of the flute: parts and types • Assembly and disassembly of the flute • Proper posture and hand positioning • Introduction to basic embouchure		
2.	**Fundamentals of Sound Production**	**06 Hours**	**20%**
	• Breath control and support		

	• Producing a clear and focused tone • Articulation techniques: tonguing and slurring • Dynamic control and expression • Tuning and intonation		
3.	**Finger Technique and Scales**	**06 Hours**	**20%**
	• Basic fingerings and hand coordination exercises • Major and minor scales • Arpeggios and scale patterns • Chromatic scale • Articulation exercises		
4.	**Flute Repertoire**	**06 Hours**	**20%**
	• Introduction to classical, folk, and popular flute repertoire • Selecting and preparing a solo piece • Interpretation and expression in music • Performance practice and stage presence		
5.	**Flute Styles and History**	**04 Hours**	**14%**
	• Historical overview of flute music • Major flute composers and their contributions • Exploring different styles: classical, jazz, world music, etc. • Listening and analysis of representative pieces		
6.	**Ensemble Playing**	**04 Hours**	**12%**
	• Introduction to flute ensembles • Collaborative rehearsal and performance • Role of the flute in chamber music • Developing ensemble communication skills		

Course Outcome (COs):

At the end of the course, the students will be

CO1	Demonstrate proper flute posture, hand position, and embouchure technique.
CO2	Produce a clear and controlled flute tone.
CO3	Execute basic fingering patterns and scales fluently.
CO4	Interpret and perform a variety of musical pieces on the flute.
CO5	Identify key historical and stylistic characteristics of flute music.
CO6	Participate in ensemble performances and collaborate effectively with other musicians.

Recommended Study Material:

- **Reference books:**
  1. The Flute Book: A Complete Guide for Students and Performers by Nancy Toff

2. Trevor Wye's Practice Books for the Flute by Trevor Wye
3. Flute Basics: A Method for Individual and Group Learning by Sally Adams and Tracey Rush
4. The Art of Flute Playing by Edwin Putnik
5. Selected Flute Solos: Everybody's Favorite Series, Volume 101
6. The Flute and Flute-Playing by Theobald Boehm
7. Flute Music by French Composers edited by Louis Moyse

❖ **Online Courses**

1. Coursera - Introduction to Classical Music (Offered by Yale University)
2. Udemy - Flute Lessons for Beginners
3. Udemy - Intermediate Flute Lessons
4. edX - The Science of Flute Playing (Offered by MIT)
5. Skillshare - Flute: Start Playing Songs in 7 Lessons

Evaluation Scheme

The evaluation scheme for the course will comprise the following components:

- Formative: Internal / Continuous and Comprehensive Evaluation (CCE) – 25 Marks
- Summative: External / Semester End Evaluation (SEE) – 25 Marks

Internal / Continuous and Comprehensive Evaluation (CCE) – 25 Marks	
Exam Pattern	**Marks**
Lab Work Assessment (Best 3 out of 4)	45
Viva voce/ Lab Quiz (Best 3 out of 4) (Note: Quiz Number 1 and 3 will be administered as lab quizzes, while Quiz Number 2 and/or 4 shall serve as part of the mid-term evaluation.)	45
Attendance	10
Total	**100*** **(scaled to 25 marks)**

*Note: The total Internal / CCE score out of 100 marks will be converted to 25 marks.

External / Semester End Evaluation (SEE) – 25 Marks	
Exam Pattern	**Marks**
Quiz	40
Viva-voce	30
Presentation/Task/GD/Case Analysis etc. (The Course Convenor / Faculty will brief the students about the examination components and weightage)	30
Total	**100*** **(scaled to 25 marks)**

*Note: The total External / SEE score out of 100 marks will be converted to 25 marks.

HSUSII6: INDIAN CLASSICAL DANCE – KATHAK

Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	--	02	--	30	02
Marks	--	50	--	50	

Pre-requisite courses:

- No pre-requisites for this course.

Objectives of the Course:

To facilitate the learners:

- with an opportunity to pursue the hobby of dance on the campus
- to develop a flair for performing arts.
- to acquaint students with Indian classical dance form, and its basic terms
- make them aware with basic mudras, abhinayas, and steps of the dance form.

Outline of the Course:

Sr. No.	Title of the Unit	Minimum Number of Hours
1.	Introduction to Kathak	06
2.	Footwork and Tatkar	06
3.	Abhinaya (Emotive Expressions)	06
4.	Toda and Tukda (Compositions)	06
5.	Ghungroo (Ankle Bells) and Rhythmic Patterns	06
	Total hours (Theory):	--
	Total hours (Practical):	30
	Total hours:	30

Detailed Syllabus:

1.	Introduction to Kathak	06 Hours	20%
	• Understand the historical and cultural significance of Kathak. • Learn the basic postures (Tal Poses) and their importance.		

	• Introduction to hand gestures (Mudras) and their meanings. • Develop a basic understanding of rhythm (Tala) in Kathak.		
2.	**Footwork and Tatkar**	**06 Hours**	**20%**
	• Learn and practice basic footwork patterns (Tatkar). • Develop proper foot placement and coordination. • Understand the importance of rhythm and synchronization in Kathak. • Explore the concept of Nritta (pure dance) in Kathak.		
3.	**Abhinaya (Emotive Expressions)**	**06 Hours**	**20%**
	• Understand the concept of Abhinaya in Kathak. • Learn and practice facial expressions (Bhava) and emotions. • Explore storytelling through dance.		
4.	**Toda and Tukda (Compositions)**	**06 Hours**	**20%**
	• Learn and perform basic Kathak compositions (Toda and Tukda). • Understand the structure of Kathak compositions. • Practice and refine the choreography.		
5.	**Ghungroo (Ankle Bells) and Rhythmic Patterns**	**06 Hours**	**20%**
	• Explore the significance of Ghungroo (ankle bells) in Kathak. • Learn to wear and produce rhythmic sounds with Ghungroo. • Practice and execute various rhythmic patterns (Bols). • Understand the importance of laya (tempo) in Kathak.		

Course Outcome (COs):

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

CO1	remember basic postures and hand gestures of Kathak.
CO2	understand the concept of Nritta in Kathak.
CO3	design storytelling through dance and will grasp the concept of Abhinaya and its role in Kathak.
CO4	perform basic Kathak Toda and Tukda compositions.
CO5	apply and create rhythmic sounds effectively with Ghungroo executing various rhythmic patterns through laya in Kathak.

Evaluation Scheme

The evaluation scheme for the course will comprise the following components:

- Formative: Internal / Continuous and Comprehensive Evaluation (CCE) – 25 Marks
- Summative: External / Semester End Evaluation (SEE) – 25 Marks

Internal / Continuous and Comprehensive Evaluation (CCE) – 25 Marks	
Exam Pattern	**Marks**
Lab Work Assessment (Best 3 out of 4)	45
Viva voce/ Lab Quiz (Best 3 out of 4) (Note: Quiz Number 1 and 3 will be administered as lab quizzes, while Quiz Number 2 and/or 4 shall serve as part of the mid-term evaluation.)	45
Attendance	10
Total	**100* (scaled to 25 marks)**

*Note: The total Internal / CCE score out of 100 marks will be converted to 25 marks.

External / Semester End Evaluation (SEE) – 25 Marks	
Exam Pattern	**Marks**
Quiz	40
Viva-voce	30
Presentation/Task/GD/Case Analysis etc. (The Course Convenor / Faculty will brief the students about the examination components and weightage)	30
Total	**100* (scaled to 25 marks)**

*Note: The total External / SEE score out of 100 marks will be converted to 25 marks.

HSUSI17: INDIAN CLASSICAL DANCE – BHARATANATYAM

Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	--	02	--	30	02
Marks	--	50	--	50	

Pre-requisite courses:

- No pre-requisites for this course.

Objectives of the Course:

To facilitate the learners:

- with an opportunity to pursue the hobby of dance on the campus
- to develop a flair for performing arts.
- to acquaint students with Indian classical dance form, and its basic terms
- make them aware basic mudras, abhinayas, and steps of the dance form.

Outline of the Course:

Sr. No.	Title of the Unit	Minimum Number of Hours
1.	Introduction to Bharatanatyam	06
2.	Adavus and Footwork	06
3.	Abhinaya (Emotive Expressions)	06
4.	Rasa and Bhava	06
5.	Choreography and Performance	06
	Total hours (Theory):	--
	Total hours (Practical):	30
	Total hours:	30

Detailed Syllabus:

1.	Introduction to Bharatanatyam	06 Hours	20%
	• Understand the historical and cultural significance of Bharatanatyam.		

	• Learn the basic postures (Asanas) and their importance. • Introduction to hand gestures (Mudras) and their meanings. • Develop a basic understanding of rhythm (Tala) in Bharatanatyam.		
2.	**Adavus and Footwork**	**06 Hours**	**20%**
	• Learn and practice basic Adavus (fundamental dance steps). • Develop proper footwork and coordination. • Understand the importance of rhythm in Bharatanatyam. • Explore the concept of Nritta (pure dance) in Bharatanatyam.		
3.	**Abhinaya (Emotive Expressions)**	**06 Hours**	**20%**
	• Understand the concept of Abhinaya in Bharatanatyam. • Learn and practice facial expressions (Bhava) and emotions. • Explore storytelling through dance.		
4.	**Rasa and Bhava**	**06 Hours**	**20%**
	• Explore the nine Rasas (emotions) in Bharatanatyam. • Learn how to evoke different emotions through expressions and movements. • Understand the importance of emotional connectivity in dance.		
5.	**Choreography and Performance**	**06 Hours**	**20%**
	• Learn a simple Bharatanatyam composition. • Understand the structure of a dance performance. • Practice and refine the choreography. • Gain confidence in performing in front of an audience.		

Course Outcome (COs):

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

CO1	understand the historical and cultural significance of Bharatanatyam.
CO2	analyse proper footwork and coordination.
CO3	design storytelling through dance.
CO4	perform to evoke different emotions through expressions and movements.
CO5	remember the choreography and gain confidence in performing in front of an audience.

Evaluation Scheme

The evaluation scheme for the course will comprise the following components:

- Formative: Internal / Continuous and Comprehensive Evaluation (CCE) – 25 Marks
- Summative: External / Semester End Evaluation (SEE) – 25 Marks

Internal / Continuous and Comprehensive Evaluation (CCE) – 25 Marks	
Exam Pattern	**Marks**
Lab Work Assessment (Best 3 out of 4)	45
Viva voce/ Lab Quiz (Best 3 out of 4) (Note: Quiz Number 1 and 3 will be administered as lab quizzes, while Quiz Number 2 and/or 4 shall serve as part of the mid-term evaluation.)	45
Attendance	10
Total	**100*** **(scaled to 25 marks)**

*Note: The total Internal / CCE score out of 100 marks will be converted to 25 marks.

External / Semester End Evaluation (SEE) – 25 Marks	
Exam Pattern	**Marks**
Quiz	40
Viva-voce	30
Presentation/Task/GD/Case Analysis etc. (The Course Convenor / Faculty will brief the students about the examination components and weightage)	30
Total	**100*** **(scaled to 25 marks)**

*Note: The total External / SEE score out of 100 marks will be converted to 25 marks.

CHAROTAR UNIVERSITY OF SCIENCE AND TECHNOLOGY

B.Tech (CL/ME/EE) Programme

VALUE ADDED COURSES (SEMESTER 1 & 2)

CUUV101: COMMUNITY ENGAGEMENT AND SUSTAINABLE DEVOLVEMENT (CESD)

Credits	Course Duration (Hours)	Course Span
2	45	One semester (1st/ 3rd)

Mode	Week	Hours	sessions
Interactive Mode	15	30	15
Practical mode	1(2 Days)	10	-
Reflective Mode	5	5	-
Total	21	45	15

Session Planning for CESD in Three Modes

1. **Interactive Mode**
    - **Duration:** 30 hours
    - **Activities:**
        - Interactive dialogues
        - Group discussions
        - Role-playing scenarios
        - Expert lectures
    - **Objectives:**
        - Enhance understanding of SDGs and community engagement.
        - Develop communication and management skills.
2. **Practical Mode**
    - **Duration:** 10 hours
    - **Activities:**

- Fieldwork and community visits
- Civic, social, nature, health, and education awareness programs
- Research and surveys

- **Objectives:**
  - Apply theoretical knowledge to real-world scenarios.
  - Engage directly with communities and understand their needs.

3. **Reflective Mode**
   - **Duration:** 05 hours
   - **Activities:**
     - Case studies analysis
     - Report writing and submissions
     - Reflection sessions
   - **Objectives:**
     - Analyze and document experiences and learnings.
     - Reflect on the impact of community engagement activities.

This structured approach ensures comprehensive learning, practical experience, and reflective thinking, equipping students with the necessary skills for community engagement and sustainable development.

1. Interactive Mode

Students will participate in a variety of activities such as personal hygiene sessions, cleanliness drives, involvement in the Fit India Movement, awareness campaigns, creative tasks like poster making and slogan writing, essay competitions, discussions under the theme Let's Talk Green, organizing awareness rallies and others.

Sr.No	Week	List of Suggestive Activities	Duration
1	1 Week	Webinar on Personal Hygiene	2 Hours
2	2 Week	Seminar for fit India Movement	2 Hours
3	3 Week	Youth survey for National Youth Policy	2 Hours
4	4 Week	Expert Session on voters Awareness	2 Hours
5	5 Week	Seminar on water resources management	2 Hours

6	6 Week	Maths Science Model Training	2 Hours
7	7 Week	Poster Making , Slogan Writing, Essay Writing sessions	2 Hours
8	8 Week	Art & Craft Training to children of rural Area	2 Hours
9	9 Week	Webinar on 'Let's Talk Green'	2 Hours
10	10 Week	Webinar on Effective use of PPE Kit	2 Hours
11	11 Week	Cleanness Drive on Campus	2 Hours
12	12 Week	Expert lecture on Civic Awareness	2 Hours
13	13 Week	Awareness Rally on Addiction	2 Hours
14	14 Week	Street Play on Social Issues	2 Hours
15	15 Week	Tree Plantation	2 Hours

- Above mentioned are suggested topics , respective PO- CC may add upon as per their need and execute accordingly

2. Practical Mode

Sr.No	Two Days Workshop	Hours
1	Cleanness Drive in Villages, Education Amelioration Activities in Rural Schools, Awareness Drive on diseases	5 Hours
2	NO Plastic Use Awareness Drive –Rally etc. Education Awareness by door to door Campaign, Survey for government schemes	5 Hours

3. Reflective Mode

Sr.NO	Self-Development Skill	Hours

1	Assignments & Reports For All Above Activities , Self-guided Activities	05 Hours

Institute-Wise Semester Schedule for Offering CESD

Sr. No	Institute	Semester offered	Mode	Remarks
1	IIIM,CMPICA,PDPIAS,ARIP,MTIN,BDPIS	First	Three mode	
2	CSPIT and DEPSTAR	Second	Workshop mode	
3	RPCP	Third	To be decided	

Department / Institute wise Subject Coordinator Details 2025-26				
Sr. No.	**Name of Institute**	**Programme officer Name**	**Mobile Number**	**Email ID**
1	PDPIAS	Dr. Rajesh Savalia	9429222899	rajeshsavalia.maths@charusat.ac.in
2	ARIP	Shreya Swami	6353651313	shreyaswami.phy@charusat.ac.in
3	MTIN	Hetal Shah	9033404171	hetalshah.nur@charusat.ac.in
4	CMPICA	Hardik Pandit	9426561926	hardikpandit.mca@charusat.ac.in
5	RPCP	Hardik Koria	9731835384	hardikkoria.ph@charusat.ac.in
6	BDPIS	Parth Thakor	9998978550	parththakor.cips@charusat.ac.in
7	IIIM	Dr.Poonam Amrutiya	9429558484	poonamamrutia.mba@charusat.ac.in
8	DEPSTAR-IT	Hitesh Makwana	8460752501	hiteshmakwana.dit@charusat.ac.in
9	DEPSTAR-CE	Kashyap Patel	9974196044	kashyappatel.dce@charusat.ac.in

10	DEPSTAR-CSE	Gaurang Patel	9537433667	gaurangpatel.dcs@charusat.ac.in
11	CSPIT-CIVIL	Hemangi Oza	8780473646	hemangioza.cv@charusat.ac.in
12	CSPIT-ME	Satayu Travadi	9723833357	satayutravadi.me@charusat.ac.in
13	CSPIT-EE	Ankur Patel	9978782503	ankurpatel.ee@charusat.ac.in
14	CSPIT-EC	Dr. Sagar Patel	7874635764	sagarpatel.ec@charusat.ac.in
15	CSPIT-CE	Martin Parmar	8488065457	martinparmar.ce@charusat.ac.in
16	CSPIT-IT	Rajnik Katriya	9913617724	rajnikkatriya.it@charusat.ac.in
17	CSPIT-CSE + AIML	Pinal Hansora	9737174610	pinalhansora.cse@charusat.ac.in

CUUV102: PHYSICAL EDUCATION AND SPORTS

Credits	Course Duration (Hours)	Course Span
2	45	One semester

Mode	Week	Hours	sessions
Regular mode	15	30	15
Workshop mode	2 Days	10	-
Self-learning	1 day	05	-
Total	15 (3days)	45	15

- **TEACHING LEARNING STRATEGIES**

The content will be taught by using lecture, demonstration, explanation, presentation methods, videos, learning by doing, Whole part whole method, Drills

- **COURSE LEARNING OUTCOME**

After completing this course, the students will be able to

- Acquire, analyse and interpret basic skills
- Appraise the rules and regulation.
- Exhibit and assess a range of fundamental abilities, method and gaming strategies.
- Improve their physical fitness, including aspects such as strength, speed, agility, and endurance, to enhance their performance on the field.
- Enhance their ability to make effective decisions under pressure, including when to during the game.
- Understand the importance of sportsmanship, respect for opponents, referees, and teammates, and adherence to fair play principles.
- Learn mental preparation techniques to enhance focus, concentration, confidence, and resilience in competitive situations.
- Learn techniques for injury prevention, including proper warm-up, cool-down, and recovery strategies.

One Semester Course
(Regular mode)

PLAN NO	SESSION TOPIC Football	SESSION TOPIC **Basketball**	SESSION TOPIC **Volleyball**	SESSION TOPIC **Kabaddi**
1	Fundamental of football & passing Basic overview of Technique	Basic Fundamental Basketball /Passing & Receiving	Volleyball basic information/ Underhand pass	Footwork And Agility Training
2	Dribbling	Dribbling & Ball Handling	Service training	Footwork drills / Simple Raid
3	Controlling	Ball Controlling & Dribbling	Upper hand pass (setting)- movement	Bonus Point
4	First touch	Passing & Receiving (Catching)	Blocking training	Hand touch (running hand touch)
5	Shooting & finishing	Shooting / Jump Shot	Attacking/spiking & footwork	Toe Touch
6	Set Piece (Free Kick, corner Kick, throw in, Penalty kick)	Lay ups Shot	Defensive / offensive training	Kick Training (Front Kick, Side Kick, Back Kick)
7	Linkup and coordination	Rebounding & Stealing	Footwork & agility training	Cover/Block (Chain Cover)
8	Passing And supporting	Defending (Defense)	Advanced digging training	Single Blocking
9	Dribbling	Attacking (Offense)	Position specific drill training	Ankle Hold
10	Controlling skill on pressure time	Off-ball Movements	W formation defence training	Back Hold
11	First touch	Two-on-Two and Three-on-Two	Team drills –communications rotational drill training	Knee Hold
12	Shooting & finishing	Blocking & Intercepting	Tactical training session	Double Thigh Hold
13	Friendly match	Inbounding the Ball	Combination drills	Team Drills – Communication Rotational
14	Over all session	Fast Break	Peak performance training	Kabaddi communication skills
15	Official match	Basketball Tactical & Technical Skills	Tournament preparation training	Game Like Drills Assessment

Workshop mode- Two Days

Workshop Duration	Football	Basketball	Volleyball	Kabaddi
Two Days	Official match	Official match	Official match	Official match
	Official match	Official match	Official match	Official match

Self-learning mode

Course Period	SELF -LEARNING MODE	Particulars
1 semester	Football	Case Studies or Project of Matches/ Players / World Tournaments /Book/Survey
	Basketball	
	Volleyball	
	Kabaddi	

A self-learning this course aims to develop a range of knowledge areas to improve students' understanding and performance in the sport. Here are the potential outcomes:

- Self-Paced Learning
- Resource Utilization
- Better Psychological Skills
- Enhanced Teamwork and Communication
- Knowledge of Rules and Regulations

This course execution Sports Faculty

Games	Football	Basketball	Volleyball	Kabaddi	Yoga
Faculty	Harsh Parmar	Ajay Raval	Pinkal Gamit	Tejal Gamit	External expert
Venue	Football Ground	Basketball court	Volleyball Ground ,New Sports Complex	Kabaddi Ground , New Sports Complex	

FTXXXX: SKILL AUGMENTATION

Preamble:

Industry needs professionals who can work successfully in teams, who have leadership qualities, who are alive to social and community needs and who can bring innovation and creativity to their work. Hence, to become successful professionals, students should have excellence soft skills, leadership qualities, team spirit, entrepreneurial capabilities and societal commitment besides expertise in their chosen fields.

Therefore, in order to prepare students to match these multifarious requirements, it is proposed to offer a 2 credit course on "Skill Augmentation" and implement evaluation system of the proposed course based on '**100 Activity Points**' for the award of engineering degrees in Faculty of Technology and Engineering, CHARUSAT. Under this system, engineering students will have to secure at least **100 minimum Activity Points** during the program duration to earn a B. Tech. degree over and above the academic grades. Each activity carries a specific number of points based on its significance and level of involvement. The students will be granted points on the basis of their participation in extra-curricular and co-curricular activities such as technical quizzes, tech-fest, paper presentation, rural internship, poster presentation and cultural activities, etc.

It is envisaged that the students will be able to reap benefits from these activities at their own pace and comfort. It is expected that by the time, students reach their Final Year, they would have developed themselves so well both through their studies in the respective technological field and through their active participation in the co-curricular and extra-curricular activities that they would be well-prepared for contributing to building the India and the world of their dreams.

It was emphasized that this course could help in fuller realization of the Graduate Attributes laid down by the university as well as could serve as an important ingredient facilitating the progression and recognition of the fast learners.

Mandatory Earning of Activity Points:

An Undergraduate Engineering student must earn the following minimum Activity Points as per the level of Entry in the B.Tech. Program as shown in **Table – 1**.

Table 1: Minimum Activity Points as per the level of Entry in the B.Tech. Program

Sr. No.	Students Category	tal Years for Points	imum Activity Points prescribed by AICTE
1	ar students admitted to the 4 years Degree program	to 4th Year	100
2	nts entering 4 years Degree program through lateral entry	to 4th Year	75
3	nts transferred from other Universities to the fifth semester	to 4th Year	50

These points must be earned based on active participation in co-curricular and extra-curricular activities spanning through all the semesters of study of UG Program. Every student may choose, as per his/her liking, activities to achieve the mandatory points before becoming eligible for award of the Degree. The activities can be spread over the years of the duration of the program, anytime during the semester weekends and holidays, as per the interest and convenience of the student from the year of entry to the program. Activities must be selected from prescribed activity point table given in **annexure 1**.

Minimum Earning of Activity Points

Regular students admitted to the 4 years Degree program is required to accumulate a minimum of 25 points annually in order to fulfil the criteria of attaining 100 points for the conferment of a B. Tech Degree.

Students entering 4 years Degree program through lateral entry (D2D Student) is required to accumulate a minimum of 25 points annually from 2nd year onwards to fulfil the criteria of attaining 75 points for the conferment of a B. Tech Degree.

Each student must earn a minimum of 30 points from each category (Categories 1, 2, and 3) and achieve a cumulative total of at least 100 points before graduation mention in **Activity Point Table** as per **Annexure 1.**

Students opted for early exit will be given Skill Augmentation certificate indicating number of activity points earned by the student.

Guidelines for the students:

Every student shall participate in the co-curricular and extra-curricular activities as prescribed in **Activity Point table** as per **annexure 1.**

Students will be provided a certificate duly signed by the endorsing authority of University as mention in **annexure 1**.

In every semester, every student is required to prepare an **Activity Point file** containing documentary proofs of activities, done by him/ her. Each student shall keep with him/her the **Activity Point file** duly signed by his/her counsellor and HOD.

Student is required to upload each activity with proof in CHARUSAT E – Governance system.

Students should earn the required points before appearing for 8th Semester examinations.

A student's result of his/ her Final Semester Examinations will be withheld until he/she completes the minimum Activity Points by the end of his/her B.Tech. Program.

In every semester, coordinator (s) shall conduct academic auditing of co-curricular and extra-curricular activities available for students, the monitoring mechanism of Activity Points to be earned by the students.

Evaluation Guidelines:

Course Coordinator will award the Activity Points for each student at the end of every Semester, after conducting the Viva Examination.

There will be neither grades nor marks for these points.

Absenteeism at the Viva examination for Activity Points at the end-semester examination will lead to zero accretion to the Activity Points, earned by the student.

All Activity Points have only Viva Component. Viva will be conducted to validate student claims. It is compulsory for every student to prepare five minutes of presentation for activities carried out during current semester.

The Exam fees is according to CHARUSAT norms for viva exam.

Two credits are given for this on a pass/ fail basis and is mandatory for getting the B. Tech Degree. As the Activity Points and credits are not based on marks, this won't be included in the Cumulative Grade Points Average (CGPA) but mandatory for the award of the Degree.

The credit earned shall be reflected on the student's eighth semester grade card.

In case students fail to earn the prescribed Activity Points, an eighth semester grade card shall be issued only after earning the required Activity Points.

Students shall be admitted for the award of degree only after the release of the eighth semester grade card.

Any concerns raised by the students regarding Activity Points shall be looked into in the combined meeting of HoD, Department Coordinator, Course Coordinator and the students concerned. The Principal/ HoD shall ensure the proper redressal of the concerns raised by the students regarding Activity Points. The Course Coordinator shall keep a hard copy of the consolidated statement of Activity Points of the students.

Teaching and Examination Scheme

Table 2: Teaching and Examination Schemes

Semester	Course Code	Course Title	Teaching Scheme		Examination Scheme			
			Contact Hours	Credit	Theory		Practical	
					Internal	External	Internal	External
8	FTXXX	Skill Augmentation	200	2	--	--	100 Activity Points	--

Best Achievers

The best 3 students will be selected from each department, who are doing thorough efforts, will be awarded/appreciated in a special function.

ANNEXURE-I: ACTIVITY POINT FRAMEWORK

Major category	Sub-category	Nature of Participation	Activity level and Points				Proposed Endorsing authority/ body @CHARUSAT	Valid Documentary Evidence
			U	S/ Z	N	IN		
Category -1 **Outstanding Contributions in Research/ Innovation/ Entrepr eneurship/IPR** **Graduate Attributes** **aligned:** **1) Academically Excellent** **2) nterdisciplinary knowledge**	**SSIP/Start-up/ Innovation ventures**	**Incubation at Proof-of-Concept Stage**	**30**				**CHARUSAT Start-up and Innovation Center (CSIC)**	**Certificiate/ Recognition Letter/Relevant Legal Document**
		Company Registered	**40**					
		Extramural fund received/ Revenue Generated	**50**					
	Patents/Copyrights	**Filed**	**20**				**IPR Cell**	
		Published	**50**					
		Granted	**75**					
	Product/Services development	**Prototype developed**	**50**				**CIVF**	
	Research Publications in WoS/Scopus listed journals)	**Main Author**	**-**	**-**	**30**	**40**	**Corresponding Author(Faculty) / URC**	**Manuscript and endorsement from corresponding**
		Co-Author	**-**	**-**	**15**	**20**		
	Participation in Technical/ Scientific Events	**Poster / Oral Paper Presentation in Scopus / WOS Index Conference online/offline**	**10**	**12**	**16**	**20**	**HoD/Principal; endorsed by Faculty coordinator/Convener of Event if University level**	**Certificate**
		Project Presentation /Innovation idea presentation / Model etc.)	**10**	**12**	**16**	**20**		
		Tech event participation (seminar, workshop, webinar, technical session etc.)	**4**	**6**	**8**	**10**		

Category 2 **Academic Skill & Ability Enhancement Initiatives** **Graduate Attributes aligned:** **1) Academically Excellent** **2) Individually Excellent and Committed**	**MOOCs (other than curriculum) (Swayam/NPTEL)**	**04 -08 weeks**	**20**				**HoD/Principal**	**Final assessment certificate**
		More than 08 weeks	**30**					
	MOOCs (other than curriculum) on Online Learning Platform like (Coursera)	**04 -08 weeks /Min. 30 Hrs**	**5**				**HoD/Principal**	**Final assessment certificate**
		More than 08 weeks / Min 50 hours	**10**					
	Industry Recognized Certification Courses	**-**	**30**				**HoD/Principal**	**Final assessment certificate**
	Summer/Winter Schools (other than curriculum)	**Minimum 1 Week**	**10**	**20**	**30**	**40**	**HoD/Principal**	**Certificate/Endorsement/Selection**
	Competitive Examinations (GATE/CAT/GMAT etc)	**Qualification**	**-**	**-**	**30**	**40**	**HoD/Principal**	**Recognition letter/Result document**
Category 3 **Leadership, Institutional Management and Value-additions:** **Graduate Attributes aligned:** **1) Attuned to cultural diversity** **2) Active Global Citizens** **3) Individually Excellent and Committed** **4) Leaders in**	**Institute/ University Organized Event Management**	**Coordinator**	**16**	**20**	**25**	**30**	**Central Council / HOD/ Principal**	**Nomination letter/ Authorization letter; Copy of Magazine**
		Co-coordinator(s)	**12**	**16**	**20**	**25**		
		Volunteers/Members	**8**	**12**	**16**	**20**		
	Department Organized Event Management	**Coordinator**	**12**	**20**	**25**	**30**	**Central Council / HOD/ Principal**	**Nomination letter/ Authorization letter; Copy of Magazine /**
		Co-coordinator(s)	**8**	**15**	**20**	**25**		
		Volunteers/Members	**5**	**10**	**15**	**20**		
	Representation in cultural/sports activities	**Player/Performer**	**10**	**20**	**30**	**40**	**Central Council / HOD/ Principal**	**Certificate**

General Note:	Point augmentation scheme for events					
Awards/Recognition/Outstanding contribution: points to augmented to the above	**Winner-3rd position (points to be augmented)**	**4**	**8**	**12**	**16**	**U - University S/Z - State/Zonal N - National IN - International**
	Winner-2nd position (points to be augmented)	**6**	**10**	**14**	**18**	
	Winner-1st position (points to be augmented)	**8**	**12**	**16**	**20**	
	top 5% in NPTEL	**-**	**-**	**12**	**-**	
	top 2% in NPTEL	**-**	**-**	**14**	**-**	
	top 1% in NPTEL	**-**	**-**	**16**	**-**	

1. Category-wise Participation Requirement:

Each student must earn a minimum of 30 points from each category (Categories 1, 2, and 3) and achieve a cumulative total of at least 100 points before graduation

CHAROTAR UNIVERSITY OF SCIENCE AND TECHNOLOGY

B.Tech (CL/ME/EE) Programme

EXIT COURSE

MEUSI02 :MACHINE DRAWING

2nd Semester and 1st Year
(For Exit Option after First Year)
B. Tech. (ME)

Credit and Hours:

Teaching Scheme	Total	Credit
Hours/week	30	4
Marks	100	

A Outline of the Course:

Sr. No.	Title of the Unit	Minimum number of hours
1.	Introduction to conventional engineering drawing	06
2.	Theory of Convectional tolerancing	04
3.	Geometric dimensioning and Tolerancing	06
4.	Machining symbol and surface texture	04
5.	Joint, Screw threads and threaded fasteners	08
6.	Pipe Joint and fittings	06
7	Industrial drawing	06
	Total hours (Theory):	**40**
	Total hours (Lab):	**80**
	Total:	**120**

B.	**Detailed Syllabus:**		
1	**Introduction to conventional engineering drawing**	**06Hours**	**15%**
1.1	Engineering drawing equipment, different type of lines, drawing sheets, lay out, title block, rules of dimensioning		
1.2	Orthographic projection, isometric projection, Missing views, sectional view, oblique projection, Auxiliary projection		
1.3	Assembly and detailed drawing		
2	**Theory of Convectional tolerancing**	**04Hours**	**10%**
2.1	Introduction of tolerances, symbols of tolerances, method of tolerancing, general tolerancing for linear and angular dimensions		
2.2	Introduction of limits, Unilateral and Bilateral limits, representation of limits in drawing		
2.3	Introduction to fits, classification of fits, guide for selection of fits.		
3	**Geometric dimensioning and Tolerancing**	**06Hours**	**15%**
3.1	Introduction of Geometric dimensioning and tolerancing, Use of Geometric dimensioning and tolerancing, Advantages of Geometric dimensioning and tolerancing.		
3.2	Principal and fundamental rules of Geometric dimensioning and tolerancing.		
3.3	Step to apply the Geometric dimensioning and tolerancing		

4	**Machining symbol and surface texture**	**04Hours**	**10%**
4.1	Introduction to Machining symbols and its important, Representation of machining symbols in drawings.		
4.2	Introduction of surface texture and its important, controlled and uncontrolled surfaces, Surface finish symbols, Representation of surface roughness in drawings.		
5	**Joint, Screw threads and threaded fasteners**	**08Hours**	**20%**
5.1	Introduction of Riveted joints and its types, representation of riveted joints in drawing.		
5.2	Introduction of welded joints, Types of welded joints, symbols of welded joints, dimension of welded joint and representation of welded joint in drawing.		
5.3	Introduction of screw threads and threaded fasteners, types of screw threads, Thread designation and profile of threads.		
6	**Pipe Joint and fittings**	**06Hours**	**15%**
6.1	Introduction of pipe joint, type of Pipes and pipe joints, pipe fitting, valves, standards for pipe		
6.2	Piping drawing, dimensioning of pipe drawing		
7	**Industrial drawing**	**06Hours**	**15%**
7.1	Introduction of industrial drawing, drawing,		
7.2	Reading and interpretation of industrial drawing,		
7.3	Preparation of industrial		

C. Instructional Methods and Pedagogy:

- At the starting of the course, delivery pattern, prerequisite of the subject will be discussed.
- Experiments to course content will be carried using drafting and modelling software in the laboratory.
- 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.
- In the lectures and laboratory discipline and behavior will be observed strictly.
- Experiments to course content will be carried using drafting and modelling software in the laboratory.

Evaluation	Marks	Evaluation Methodology
Practical	100	Quiz, Case study & Preparation of industrial drawing using software.

D. Course Outcomes (COs):

On successful completion of the course, the student will be able to:

CO1: Developed the assembly and part using software.

CO2: Apply Geometric dimensioning and tolerancing in drawing of mechanical components
CO3: Apply machining symbol and surface texture symbol in mechanical drawing.
CO4: Developed the software based model and drawing of different Joint, Screw threads and threaded fasteners
CO5: Developed the software based model and drawing of pipe joint and fitting.
CO6: Interpret the industrial drawing.

Course Articulation Matrix:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	3	3	3	-	3	2	1	2	2	-	2	1	2	-
CO 2	3	3	2	-	3	-	-	-	-	2	-	1	2	-
CO 3	3	3	2	-	3	-	-	-	-	2	-	1	2	-
CO 4	3	3	2	-	3	2	-	2	-	-	-	1	2	-
CO 5	3	1	2	-	3	1	-	2	-	-	-	1	2	-
CO 6	3	3	2	-	3	2	1	2	2	-	2	1	2	-

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

E. Recommended Study Material:

1. Gill P. S., "Machine Drawing", S K Kataria Publishers, New Delhi
2. Dhawan R. K., "Engineering Drawing", S. Chand & Co
3. Narayan K.L., Kannaiah P. and Reddy K.V.., "Machine Drawing", New age international Publishers
4. Simmons C. H., Maguire D. E., and Phelps N., "Manual of Engineering Drawing", Butterworth-Heinemann

web material:

1. https://onlinecourses.nptel.ac.in/noc22_me105/preview

Other materials

1. ISO standard of Mechanical engineering drawing (IE)
2. Solidwork Training materials and help
3. Solidwork Manuals

CLUSI01 : ELEMENTARY SURVEYING

2nd Semester and 1st Year
(For Exit Option after First Year)
B. Tech. (CL)

Credits and Hours:

Teaching Scheme	Total	Credit
Hours/week	30	4
Marks	100	

A. Outline of the Course:

Sr. No.	Title of the Unit	Minimum Number of Hours
1	Introduction	5
2	Linear Measurement	10
3	Elevation Measurement	10
4	Advanced Surveying Equipment	5
5	Total Station and GPS	10
	Total Hours (Theory):	**40**
	Total Hours (Lab):	**80**
	Total Hours:	**120**

B. Detailed Syllabus:

1	**Introduction**	05 Hours	12%
	Introduction: Surveying and levelling, Plane and geodetic survey, Control point, Different types of map, Conventional symbols, Map reading,		

	Classification of surveys and surveying methods, Surveying instruments, Errors and error propagation.		
2	**Linear Measurement**	10 Hours	25%
	Chains, bands, tapes, Accuracies, errors in measurement, corrections, Directions and Bearings: True meridian, magnetic meridian, Use of compass, local attraction errors, angular measurements,		
3	**Elevation Measurement**	10 Hours	25%
	Principles of different methods, Levelling instruments, contours and contour maps, Areas and volumes, Horizontal and vertical control for mapping, Basic idea of Preparation of Plans and Maps: Introduction to plane tabling		
4	**Advanced Surveying Equipment**	05 Hours	13%
	Digital theodolite, Electronic Distance Measurement, Total Station: Introduction, principle and uses		
5	**Application of Remote Sensing, GPS and GIS**	10 Hours	25%
	Remote sensing: Principle of Remote sensing, EMR, types, resolutions, types of satellites, type of sensors, visual and digital image processing and its applications Global Positioning System: Definition, Principles of GPS and applications		

	Introduction and principle of GIS, Applications of GIS - Water Resources, Intelligent Transport Systems, Land-use – Land cover – Urban planning		

Instructional Methods and Pedagogy:

- At the starting of the course, delivery pattern, prerequisite of the subject will be discussed.
- Practical to course content will be carried using surveying instruments in the laboratory.
- Lectures will be conducted with the aid of multi–media projector, black board, OHP etc.
- Attendance is compulsory in lectures and laboratories.
- 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.
- In the lectures and laboratory discipline and behavior will be observed strictly.

Evaluation	Marks	Evaluation Methodology
Practical	100	Quiz, practical performance with analysis

Course Outcomes:

On the successful completion of this course, the students will be able to:

CO1	Carry out Linear and Elevation measurement, and prepare contour maps.
CO2	perform the usage of various advanced instruments like theodolite, EDM and total station in surveying.
CO3	Apply use of the applications of remote sensing, GPS and GIS

C. Recommended Study Material:

Books:

1. B. Bhatta, Remote Sensing and GIS, 2nd Edition, Oxford University Press, New Delhi
2. Subramanian, R., Surveying & Levelling, Oxford University Press, New Delhi
3. Duggal, S. K., Surveying Vol. I & II, Tata Mcgraw Hill, New Delhi
4. George Joseph, Fundamentals of Remote Sensing, Universities Press, India, 2005
5. A.M. Chandra and S.K. Ghosh, Remote Sensing and Geographical Information System, Narosa Publishing House, New Delhi.

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO1	3	2	1	2	2	2	2	2	2	1	1	1	3	1	2
CO2	1	2	1	2	3	2	2	1	2	1	2	2	1	2	2
CO3	1	2	2	2	2	2	2	2	1	1	2	2	2	2	1

EEUS101: ELECTRICAL DRAWING

2nd Semester and 1st Year
(For Exit Option after First Year)
B. Tech. (EE)

Description:

This course EEUS101 – Electrical Drawing is to be offered as exit option after first year of B.Tech. (Electrical Engineering)

Credit and Week:

Teaching Scheme	Total	Credit
Hours/week	30	4
Marks	100	

Examination Scheme:

Theory Marks		Practical Marks		Total Marks
Internal	External	Internal	External	
0	0	50	50	100

About this course:

Electrical drawing has always been a great tool for engineers and designers to deliver professional work. It is the most popular software of choice for designing and developing professional electrical drawings, PLC diagrams, control and power circuits, and mechanical drawing in any industry.

In this comprehensive course, Student will get skill about the AutoCAD Electrical toolset and toolbar options which helps to design PLC modules, panels, control cabinets, wiring diagrams, and more. Students will learn how to create accurate and standards schematics and electrical drawings step by step.

Outline of the Course:

Sr. No.	Title of the Unit	Minimum number of hours
1.	Introduction to AutoCAD Electrical	06
2.	How to work with Project Manager	08
3.	Wire Management in AutoCAD Electrical	20

4.	Ladder and Ladder Logics in AutoCAD Electrical	08
5.	Drawing shape and Status bars on AutoCAD	08
6.	Components in AutoCAD Electrical	20
7	Creating Panels in AutoCAD Electrical	20
8	Connectors in AutoCAD	20
9	Circuits in AutoCAD Electrical	10

Total hours (Theory): 00
Total hours (Lab): 120
Total: 120

Detailed Syllabus:

1	**Introduction to AutoCAD Electrical**	**06Hours**	**5%**
1.1	Introduction to AutoCAD Electrical Course		
1.2	AutoCAD Electrical interface		
2	**How to work with Project Manager**	**08Hours**	**7%**
2.1	How to create a project in AutoCAD environment		
2.2	How to create a new drawing in AutoCAD electrical		
2.3	How to copy a project in AutoCAD?		
2.4	How to switch between drawings in AutoCAD and remove them if necessary		
3	**Wire Management in AutoCAD Electrical**	**20Hours**	**17%**
3.1	How to create and insert a wire in AutoCAD drawing		
3.2	Wire Angeles in AutoCAD Electrical		
3.3	Stretching wires in AutoCAD Electrical		
3.4	Trimming wires in AutoCAD Electrical		
3.5	Wire types in AutoCAD Electrical		
3.6	Wire Numbers		
3.7	Wire numbers and editing		
3.8	Wire markers in AutoCAD Electrical		
3.9	Cable Markers in AutoCAD Electrical		
3.10	Single Source and destination		
3.11	Wire numbers in 3 phase bus		
3.12	Fan in Fan out in AutoCAD Electrical		
3.13	Wire Gap		
3.14	Teemarker in AutoCAD Electrical		
3.14	Trace and Check wiring in AutoCAD		
4	**Ladder and Ladder Logics in AutoCAD Electrical**	**08Hours**	**6%**
4.1	Learning all about ladders in AutoCAD v		
4.2	How to add a rung on AutoCAD		
4.3	Scooting a ladder in AutoCAD		

5	**Drawing shape and Status bars on AutoCAD**	**08Hours**	**6%**
5.1	how to draw shapes and status bars in AutoCAD electrical		
5.2	Modifying Drawings in AutoCAD electrical		
6	**Components in AutoCAD Electrical**	**20Hours**	**17%**
6.1	inserting components into AutoCAD		
6.2	Edit Components in AutoCAD		
6.3	Pin numbers in AutoCAD		
6.4	Catalogs Browser		
6.5	Component move and scoot		
6.6	Multi inserting components		
6.7	Parent and Child in components		
6.8	Copy Components		
6.9	Align and delete component		
6.10	Editing attributes in AutoCAD		
6.11	Adding attributes in AutoCAD		
6.12	Creating Multiple buses		
7	**Creating Panels in AutoCAD Electrical**	**20Hours**	**17%**
7.1	Inserting footprints in AutoCAD Electrical		
7.2	Creating panel layout		
7.3	How to edit footprints in AutoCAD		
7.4	Adding balloons in AutoCAD		
7.5	Inserting din rail in AutoCAD Electrical		
7.6	Saving Circuits by using Wblock command		
7.7	Save Circuit to Icon menu		
7.8	inserting saved circuit		
8	**Connectors in AutoCAD**	**20Hours**	**17%**
8.1	Inserting connectors		
8.2	Insert a break of the connector		
8.3	Parent and child component		
8.4	Edit Connector		
8.5	Editing Connectors part 2		
8.6	Splitting a connector part2		
8.7	connectors using point to point		
9	**Circuits in AutoCAD Electrical**	**10Hours**	**8%**
9.1	saving circuits by using wblock		
9.2	Saving the icon menu		
9.3	inserting saved circuit		
9.4	using circuit builder to build and configure a circuit		

Instructional Methods and Pedagogy:

- At the starting of the course, delivery pattern, prerequisite of the subject will be discussed.
- Experiments to course content will be carried using software in the laboratory.
- Attendance is compulsory in laboratory.
- Internal exams/Unit tests/Surprise tests/Quizzes/Seminar/Assignments etc. will be conducted as a part of continuous internal theory evaluation.
- In the laboratory, discipline and behavior will be observed strictly.

Evaluation	Marks	Evaluation Methodology
Practical	100	Quiz, Case study & Preparation of industrial drawing using software.

Course Outcomes (COs):

CO1: Interpret the fundamental concepts and features of AutoCAD Electrical.
CO2: Present drawings in a detailed and visually impressive manner.
CO3: Create Electrical Circuit with Components.
CO4: Develop an AutoCAD drawing for wiring of residence, industrial application.

Course Articulation Matrix:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO 11	PO1 2	PS O1	PSO 2
CO 1	1	-	-	-	-	-	-	-	1	1	1	1	-	-
CO 2	1	-	-	-	2	-	-	-	1	1	1	1	-	-
CO 3	1	-	-	-	2	-	-	-	1	-	-	1	-	-
CO 4	2	-	1	-	2	-	-	-	1	-	-	1	-	-

Recommended Study Material:

1. James Richardson, Get started with AutoCAD Electrical". Musselburgh Press, ISBN-10: 0995749221, 2020.
2. Prof. Sham Tickoo, AutoCAD Electrical 2023 for Electrical Control Designers, 14th Edition, CADCIM Technologies.

web material:

1. https://www.youtube.com/watch?v=QLqST53MrVo