DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

B.TECH (CSE –AI & DL(IBM) –SPECIALIZATION PROGRAMS)

FOUR YEAR PROGRAM

CURRICULUM STRUCTURE & SYLLABI (2025-2029 BATCH ONWARDS)

SCHOOL OF ENGINEERING AND TECHNOLOGY
MODY UNIVERSITY OF SCIENCE AND TECHNOLOGY
LAKSHMANGARH

B.Tech (CSE–AI & DL)
(Collaboration with IBM)
Four Year Program
Academic Curriculum (2025-2029 Batch Onwards)

Curriculum Components

Component	Credits
1. University Core (3 Courses)	6
2. University Elective (2 Courses)	6
3. Basic Science (9 Courses)	24
4. Engineering Science (9 Courses)	18
5. Program Core (35 Courses)	62
6. Program Elective / MOOCs (9 Courses)	27
7. Project / Summer Internship Project (10 Courses)	20
8. Proficiency (Non-Graded) (6 Courses)	6
Total	163

First Year - Autumn Semester

Course Code	Course Title	Contact Hours Per Week			Credits	ETE Duration (Hours)	Weightage			
		L	T	P			CW	MTE		ETE
UC 23.101	Human Values & Professional Ethics	2	0	0	2	3	10	40		50
MA 23.101	Mathematics I	3	1	0	4	3	10	40		50
ME 25.101	**Applied Mechanics**	**3**	**0**	**0**	**3**	**3**	10	40		50
EC 25.101	**Basics of Electronics Engineering**	**3**	**0**	**0**	**3**	**3**	10	40		50
CY 23.102	Environmental Sciences	2	0	0	2	3	10	40		50
CS 23.101	Programming for problem solving	3	0	0	3	3	10	40		50
CS23.107	Design Thinking	3	0	0	3	3	10	40		50
CS 23.111	Programming laboratory	0	0	4	2	2	50			50
ME 23.112	Mechanical Workshop	0	0	2	1	2	50			50
EC 23.111	Electronics Lab	0	0	2	1	2	**50**			**50**
PB 25.101	**Project Based Learning**	**0**	**0**	**2**	**1**		**50**			**50**
SF 101	Personal Grooming and Fine Dining(Non Grade)	0	0	2	1	2	50			50
	Total				**25**		100			

First Year -Spring Semester

Course Code	Course Title	Contact Hours Per Week			Credits	ETE Duration (Hours)	Weightage			
		L	T	P			CW	MTE		ETE
UC 23.102	Pragmatic English Communication	2	0	0	2	3	10	40		50
MA 23.102	Mathematics-II	3	1	0	4	3	10	40		50
CY 23.101	Engineering Chemistry	3	0	0	3	3	10	40		50
PY 23.101	Engineering Physics	3	0	0	3	3	10	40		50
EE 25.101	**Basics of Electrical Engineering**	**3**	**0**	**0**	**3**	3	10	40		50
CS 23.207	**Application Development for Cloud**	**3**	**0**	**0**	**3**	**3**	**10**	**40**		**50**
ME 23.111	Computer aided Engineering Drawing	0	0	4	2	2	**50**			**50**
CY 23.111	Chemistry Lab	0	0	2	1	2	**50**			**50**
EE 23.111	Electrical Laboratory	0	0	2	1	2	50			50
PY 23.111	Physics laboratory	0	0	2	1	2	50			50
PB 25.102	**Project Based Learning**	**0**	**0**	**2**	**1**		**50**			**50**
SF 102	Social Grooming, Home & Decor and Business Communication (Non Grade)	0	0	2	1	2	50			50
	Total				**24**		100			

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Second Year - Autumn Semester										
Course Code	Course Title	Contact Hours Per Week			Credits	ETE Duration (Hours)	Weightage			
		L	T	P			CW	MTE	PBL	ETE
MA 23.201	Mathematics-III	3	1	0	4	3	10	40		50
CS 25.201	Discrete Mathematics	3	0	0	3	3	10	40		50
CS 23.203	Data Structures	3	0	0	3	3	10	40		50
CS23.205	General Purpose Programming	3	0	0	3	3	10	40		50
EC 23.202	Digital Electronics	3	0	0	3	3	10	40		50
	Program Elective-1 (Industry Track)	3	0	0	3	3	10	40		50
CS 23.253	Data Structures Lab	0	0	2	1	2	50			50
CS 23.255	General Purpose Programming laboratory	0	0	2	1	2	50			50
EC 23.224	Digital Electronics Laboratory	0	0	2	1	2	50			50
PB 25.201	**Project Based Learning**	**0**	**0**	**2**	**1**			**50**		**50**
SF 201	Personal Grooming Fine Dining and Home Safety (Non Grade)	0	0	2	1	2	50			50
	Total				**23**		100			

Second Year -Spring Semester										
Course Code	Course Title	Contact Hours Per Week			Credits	ETE Duration (Hours)	Weightage			
		L	T	P			CW	MTE	PBL	ETE
UC 25.201	Management and Entrepreneurship	2	0	0	2	2	10	40		50
	University Elective-I	3	0	0	3	3	20			80
CS23.204	Database Management Systems	3	0	0	3	3	10	40		50
CS 25.202	Advanced Programming	3	0	0	3	3	10	40		50
CS23.206	Theory of Computation	3	0	0	3	3	10	40		50
CS23.208	Computer Organization and Architecture	3	0	0	3	3	10	40		50
CS 23.211	Software Engineering	**3**	**0**	**0**	**3**	**3**	**10**	**40**		**50**
	Program Elective-2 (Industry Track)	3	0	0	3	3	10	40	50	
CS23.252	Advanced Programming Laboratory	0	0	2	1	2	50			50
CS23.254	Database Management Systems Laboratory	0	0	2	1	2	50			50
PB 25.202	**Project Based Learning**	**0**	**0**	**2**	**1**			**50**		**50**
SF 202	Social Grooming and Professional Skills(Non Grade)	0	0	2	1	2	50			50
	Total				**26**		100			

Project Based Learning (PBL) in Group of 3-5 Students

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Third Year - Autumn Semester									
Course Code	Course Title	Contact Hours Per Week			Credits	ETE Duration (Hours)	Weightage		
		L	T	P			CW	MTE	ETE
RM 23.101	Research Methodology	2	0	0	2	3	10	40	50
CS23.301	Design and Analysis of Algorithms	3	1	0	4	3	10	40	50
CS23.303	Operating System	3	0	0	3	3	10	40	50
	Program Elective 1*(MOOC)	0	0	0	3		Based on NPTEL exam		
	Program Elective-3 (Industry Track)	3	0	0	3	3	10	40	50
CS23.351	Design and Analysis of Algorithms Laboratory	0	0	2	1	2	50		50
CS23.353	Operating System Laboratory	0	0	2	1	2	50		50
CS 23.373	Summer Internship-I**	0	0	0	2		100		
CS 23.371	Project-1	0	0	4	2	2	-	50	50
GE 25.301	Proficiency (Non Credit, Non Grade)	-	-	-	1		100		
	Total				**21**		100		

Third Year -Spring Semester									
Course Code	Course Title	Contact Hours Per Week			Credits	ETE Duration (Hours)	Weightage		
		L	T	P			CW	MTE	ETE
CS23.304	Compiler Design	3	0	0	3	3	10	40	50
CS23.306	Computer Networks	3	0	0	3	3	10	40	50
CS 25.308	Digital Image Processing	3	1	0	4	3	10	40	50
	Program Elective-4 (Industry Track)	3	0	0	3	3	10	40	50
CS 23.392	Colloquium	0	0	2	1	-	100		
CS 23.354	Compiler Design Laboratory	0	0	2	1	2	50		50
CS 23.356	Computer Networks Laboratory	0	0	2	1	2	50		50
CS 25.358	Digital Image Processing Laboratory	0	0	2	1	2	50		
CS 23.372	Project-2	0	0	4	2	2	-	50	50
GE 25.302	Proficiency (Non Credit, Non Grade)	-	-	-	1		100		
	Total				**19**		100		

*The course may be taken through MOOC. NPTEL/SWAYAM/Coursera will be the authorized platform for this MOOC course. Minimum 8 weeks course is required for a 3 credit.After successful completion of these MOOC courses the students, shall, provide their successful completion NPTEL status/certificates to the University (COE) through HOD/NPTEL coordinator. The Course code of MOOC courses will be same as the course code given in NPTEL Certificate.

Proficiency (Non-Credit/Non Grade) shall be measured through level of participation in skill development programs i.e., sports, Yoga, Life skills, Music, Fine Arts,SEFS or decided by Departmental academic Committee

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Fourth Year - Autumn Semester									
Course Code	Course Title	Contact Hours Per Week			Credits	ETE Duration (Hours)	Weightage		
		L	T	P			CW	MTE	ETE
UE	University Elective-II	3	0	0	3	3	20		80
	Program Elective-5 (Industry Track)	3	0	0	3	3	10	40	50
	Program Elective-6 (Common to All Tracks)	3	0	0	3	3	10	40	50
CS 23.473	Summer Internship-II**	0	0	0	2	-	100		
CS 23.471	Capstone Project-1	0	0	4	2	-	100		
	Total				**13**				

Fourth Year -Spring Semester									
Course Code	Course Title	Contact Hours Per Week			Credits	ETE Duration (Hours)	Weightage		
		L	T	P			CW	MTE	ETE
	Program Elective-7	3	0	0	3	3	10	40	50
	Program Elective-8	3	0	0	3	3	10	40	50
CS23.472	Capstone Project-2	0	0	12	6			50	50
	Total				**12**		100		

** Summer Internship-I & II must be performed in an Industry between summer vacation of end of Second Year and end of Third Year.

Credit Distribution across all Components								
Semester	**UC**	**UE**	**BS**	**ES**	**PC**	**PE**	**Proj/SIP**	**Total**
First	**2**	**0**	**6**	**8**	**8**	**0**	**1**	**25**
Second	**2**	**0**	**12**	**6**	**3**	**0**	**1**	**24**
Third	**0**	**0**	**4**	**4**	**11**	**3**	**1**	**23**
Fourth	**2**	**3**	**0**	**0**	**17**	**3**	**1**	**26**
Fifth	**0**	**0**	**2**	**0**	**09**	**6**	**4**	**21**
Sixth	**0**	**0**	**0**	**0**	**14**	**3**	**2**	**19**
Seventh	**0**	**3**	**0**	**0**	**0**	**6**	**4**	**13**
Eighth	**0**	**0**	**0**	**0**	**0**	**6**	**6**	**12**
Total	**6**	**6**	**24**	**18**	**62**	**27**	**20**	**163**

UC	**University Core**
UE	**University Elective**
BS	**Basic Science**
ES	**Engineering Science**
PC	**Program Core**
PE	**Program Elective / MOOC**
Proj/SIP	**Project/Summer Internship**

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CODE	Program Elective Tracks - Industry
Big Data (IBM) - Industry Track	
CS 23.212	Business Intelligence
CS 23.311	Big Data Programming
CS 23.316	Artificial Intelligence
CS 23.416	Predictive Modeling Analytics
Cloud Computing (IBM) - Industry Track	
CS 23.292	Application Security
CS 23.311	Big Data Programming
CS 23.316	Artificial Intelligence
CS 23.496	Block Chain
AI & Deep Learning (IBM)-Industry Track	
CS 23.282	Machine Learning with Python
CS 23.316	Artificial Intelligence
CS 23.416	Predictive Modeling Analytics
CS 25.318	Generative AI
CS 23.381	Deep Learning

List of Program Elective Options

Code	Industry Electives (Common to All Tracks)
CS 23.461	Cloud Computing (Infosys)
CS 23.462	Mobile App Development (Infosys)
	MOOC-1*
	MOOC-2*
	***Mooc-1 and Mooc-2 should be selected only in 7th and 8th Semester respectively from NPTEL with prior permission from Department** **#Courses included from 2021-22 session onwards**

Program Elective 6	
CS 23.493	Foundations and Applications of IoT
CS 23.495	Principles and Practices of Secure Computing
CS 23.463	Agile Software Development (Infosys) **#**

Program Elective 7	
CS 23.494	Software Defined Networking
CS 23.464	Business Intelligence and its application (Infosys) **#**
CS 23.465	Machine Learning using R (Infosys) **#**

CS 25.202 **Advanced Programming** **Total Lectures: 40**

Credit: 3-0-0-3

Prerequisite(s) CS 23.101(Programming for Problem Solving)

Objective(s) The objective of this course is to:

- Cover issues related to the definition, creation and usage of classes, objects and methods.
- Discuss the principles of inheritance and polymorphism.
- Provide the foundation of good programming skills by discussing key issues of the design of object- oriented software, including programming design and documentation.
- Cover the basics of API and to explore the java abstract programming interface.

1	***Basics:*** Introduction to OOP, OOP concepts, Integrated Development Environments, Java Primitive data types, type casting, operators and control structures, identifiers, constants and literals, Class fundamentals, objects, constructors, *this* keyword, garbage collection, the *finalize()*method.	[8]
2	***Classes and Inheritance****:* Method overloading, understanding static & final, exploring the string class. Inheritance basics, using *super*, multi-level hierarchy, constructor in hierarchy, method overriding, dynamic method dispatch, the object class, using abstract classes, interface, nested and anonymous classes, Enums, Lambda expressions.	[8]
3	***Package, I/O, File and Exception Handling:*** Packages, access protection, importing packages, package management, interfaces, exception-handling fundamentals, exception types, using *try* and *catch*, multiple *catch* clauses, nested *try* statements, *throw*, *throws*, *finally*, Java's built-in exceptions, user defined exception, assertions. Reading / writing text and binary files, I/O with different types of streams (Character, byte and primitive data type), string handling with String and String Buffer.	[8]
4	***GUI and Multi-threaded Programming and JDBC***: Swing Introduction and GUI Widget, form design with swing, Runnable Vs. Thread, synchronization and deadlocks, inter-thread communication, graphics with swing, Java thread model, the main thread, creating multiple threads, threads priorities, managing threads, thread class built-in functions. JDBC architecture and drivers, Connection to *MySQL*.	[8]
5	***Java Collections:*** Introduction, types of Collections, dynamic arrays, Linked list, Abstract List, Abstract Sequential List, Set, TreeSet, HashSet, Linked Hash Set, Map, HashMap, HashTable, Stack, Queue, Priority queue, Double-ended queue with applications and operations.	[8]

Outcome(s): Upon completion of this course, students are able to:

- Understand the concepts of OOP as well as the purpose and usage principles of inheritance, polymorphism, encapsulation and method overloading.
- Identify classes, objects, members of a class and the relationships among them needed for a specific problem.
- Develop programs using the in-built Java API and the Java standard class library. Programming implementing Data Structure, Graphics and CURD operations.
- Create Java application programs using sound OOP practices (e.g., interfaces and APIs) and proper program structuring (e.g., by using access control identifiers, automatic documentation through comments, error exception handling).

- Use of development environment like Eclipse/NetBeans/InttelliJ for collaborative programming

Text Books:

1. Herbert Schildt, Java The Complete Reference, Herbert Schildt, 8th edition, 2011.
2. Bert Bates and Kathy Sierra, Head First Java, O'Reilly,2005

Reference Books:

1. Allen B. Downey, Think Java:Howto ThinkLikeaComputer Scientist, 2011.
2. Paul Deitel, HarveyDeitel,JavaHowTo Program (EarlyObjects),10th Edition, 2014.
3. E. Balaguruswamy, Programing with Java A Primer, Tata Mc. Graw Hill, 2007

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CS-25.308 **Digital Image Processing** **Total Lectures: 40**
Credit: 3-0-0-3

Prerequisite(s): CS-19.101 (Programming Language)

Objective(s):

- To study the image fundamentals and mathematical transforms necessary for Computer graphics
- To study the image enhancement techniques
- To study image restoration procedures.
- To study the image compression procedures.
- To study the image segmentation and representation techniques
- To study the image representation in form of features and descriptors

1. **Basics of Computer Graphics:** Types of computer graphics, Line drawing algorithms, Circle generating algorithms, **Transformations:** Basic transformation, Matrix representations and homogenous coordinates, Composite transformations, Reflections and shearing. Windowing and Clipping: Viewing pipeline, Viewing transformations, 2-D Clipping algorithms- Line clipping algorithms Polygon clipping [9]
2. **Digital Image Fundamentals and Image Enhancement:** Elements of digital image processing systems, elements of visual perception, Image Transformation Techniques: DFT, DCT, KLT, SVD, **Image Enhancement-** Histogram equalization and specification techniques, noise distributions, spatial averaging, directional smoothing, median, geometric mean, harmonic mean, contra harmonic mean filters, image restoration [12]
3. **Morphological Image Processing: S**tructuring element, erosion, dilation, opening, closing, hit-or-miss transform, boundary detection, hole filling, connected components, convex hull, thinning, thickening, skeletons, pruning. [7]
4. **Image Segmentation: T**hresholding , region based segmentation, region growing, region splitting and merging, and segmentation by morphological watersheds, basic concepts, dam construction, and watershed segmentation algorithm, Edge detection, edge linking via Hough transform, [6]
5. **Image Representation:** Boundary representation, chain code, polygonal approximation, signature, boundary segments, boundary description, shape number, Fourier descriptor, regional descriptors, and topological features. [6]

Outcome(s): On successful completion of this course, students will be able to

- To understand the various computer graphics hardware and display technologies
- Analyze the basic algorithms used for image processing &image compression with morphological image processing.
- Apply image enhancement and restoration techniques.
- Use image compression and segmentation Techniques.
- Represent features of images.

Text Books:

1. Rafael C. Gonzales, Richard E. Woods, “Digital Image Processing”, Third Edition, Pearson Education, 2010.
2. D.Hearn And P.Baker, Computer Graphics, - Pearson Education
3. Anil Jain K. “Fundamentals of Digital Image Processing”, PHI Learning Pvt. Ltd., 2011.

Reference Books:

1. Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, “Digital Image Processing Using MATLAB”, Third Edition Tata Mc Graw Hill Pvt. Ltd., 2011.
2. William K Pratt, “Introduction to Digital Image Processing”, CRC Press, 13-Sep-2013.
3. Bernd Jähne, Digital Image Processing, Springer Science & Business Media, 29-Jun-2013.

CS-25.358 **Digital Image Processing Laboratory** **Total Hours: 26**
Credit: 0-0-2-1

Prerequisite(s): CS 23.111 (Programming Laboratory.)

Objective(s): The aim of this course is to familiarize students with the implementation of

algorithms to draw basic geometric objects and their transformations in Computer Graphics

basic techniques for handling images and developing algorithms for image processing (quality enhancement, restoration, coding, compression).

Contents:

- Implementation of Scan conversion algorithms
- Introduction to MATLAB
- Implementation of Image Transformation Fourier, DCT etc.
- Implementation of Image Enhancement operations.
- Implementation of image degradation and restoration methods
- Implementation of image segmentation and morphological operations.

Outcome(s): On successful completion of this course, students will be able to

- Implement scan conversion algorithms of basic geometrical primitives
- Learn basic image processing techniques for solving real problems.
- Learn two-dimensional signal processing and its wide range of applications, for example, image restoration, image compression, and image analysis.

CS 25. 318 **Generative AI** **Total Lectures: 40**

Credit: 3-0-0-3

Objective:

- To provide fundamental knowledge of AI and ML
- To prepare the students with demanding industry skills
- To provide an opportunity to develop expertise in AI tools & technologies.
- To apply theoretical understanding to hands-on interdisciplinary projects, solving problems using Generative AI models

Pre-requisite: Basic of AI and Predictive modelling

Units

1	Foundation Models and LLM - Technology Overview AI Journey * Types of Machine Learning Models * Neural networks and Deep Learning * Examples - CNN, RNN * Foundation Models * Transformers * Large Language Models * Advantages and Challenges of LLMs	[7]
2	IBM WatsonX - Overview and setting up sandbox environment * watsonx overview * watsonx.ai demo * Setting up sandbox environment for watsonx.ai	[7]
3	Prompt Engineering * What is Prompt Engineering * Use cases * Types and Techniques for Prompt Engineering * Prompt Engineering Lab * Scenario 1 - Sentiment Analysis * Scenario 2 - Document Classification * Scenario 3 - Named Entity Extraction * Scenario 4 - Summarization	[7]
4	Fine Tuning * What is Fine Tuning for LLMs * Use cases * Demo of Fine Tuning * Fine Tuning Lab * Scenario 1 * Scenario 2 * Scenario 3	[7]
5	Building Chatbots powered by IBM Watson Assistant and IBM watsonx.ai * Overview of IBM Watson Assistant * Creating Actions in IBM Watson Assistant * Hands on Lab * Creating Integration from IBM Watson Assistant to IBM watsonx.ai	[12]

	* Hands on Lab * Creation custom Actions which will call IBM watsonx.ai for responses * Hands on Lab
Outcomes	Familiar with basic AI and ML pipeline. Generate innovative ideas, contents & outputs for industry applications.
Text Books:	1. Denis Rothman, “Transformers for Natural Language Processing and Computer Vision”, Third Edition , Packt Books, 2024 2. "Introduction to Generative AI”, Numa Dhamani, Kindle Edition, 2024.
Reference Books	1. “Generative AI in Software Development: Beyond the Limitations of Traditional Coding” Jesse Sprinter, 2024. 2. David Foster, ”Generative Deep Learning”, O’Reily Books, 2024

EC 25.101 **Basics of Electronics Engineering** **Total Lectures: 40**

3-0-0-3

Prerequisite Basic Knowledge of Engineering and Applied Physics

Objective: To learn the fundamental principle and applications of electronics and communication engineering and devices.

1. **Introduction:** Introduction to electronic components and testing equipment's, Colour coding of resistors, types and functions of capacitors, basic concepts and uses of inductors. **[3]**

2. **Semiconductors**: Material and its properties, Formation of energy band diagram, Currents in semiconductors, Fermi-Dirac energy distribution, Types of semiconductors – Intrinsic and Extrinsic, Mass action law, Hall effect. **[7]**

3. **Diodes**: Introduction, Characteristic of ideal and real diode, Current components in diode, load characteristics, Breakdown in diode, Zener diode, Varactor diode, Tunnel diode, Clippers and Clampers, Rectifiers – Half and Full-wave rectifiers. **[10]**

4. **Transistors:** Introduction to pnp and npn transistors, current components, active, cutoff and saturation regions, CC, CB and CE configuration, Operating point, Biasing circuits, Bias Stability, Thermal runway and thermal stability. **[10]**

5. **Introduction to Signals and Communication Systems**: Definition, Classification of signals – Analog and Digital, Deterministic and Random signals, Power and Energy of signals, Bandwidth, Bit and Baud rate. Block representation of communication system, Modulation – Definition, Need of modulation, Types of modulation. **[10]**

Outcome: After completion of this course, students would be able to :

1. Distinguish between conductors, semiconductors and insulators based on energy band theory and classify different types of semiconductors.
2. Employ the concept of Energy Band Theory and Fermi Levels to explain the operating principle of semiconductors.
3. Demonstrate the operating principle and characteristics of p-n junction diodes, different diode circuits and Transistors.
4. Understand various types of communication signals and its characteristics parameters.
5. Understand the basic concepts of communication system and modulation techniques..

Text Books:

1. George Kennedy, Bernard Davis, "Electronics Communication Systems", Tata McGraw-Hill, 3rd Edition, 2007.
2. Behrouz Forouzan, "Data Communication and Networking", McGraw-Hill, 4th Edition, 2006.

Reference Books:

1. David A. Bell, "Electronics Devices and Circuits", PHI, 4th edition, 2008.
2. Wayne, Tomasi, "Advanced Electronic Communication Systems", PHI, 6th edition, 2013.
3. Robert L. Boylestad, Louis Nashelsky, "Electronics Devices and Circuits Theory", Prentice Hall, 10th Edition, 2009.

EE 25.101	Basics of Electrical Engineering	Total Lectures: 40
		3-0-0-3

Objective:	This course facilitates the students to get a comprehensive exposure to various concepts and devices of electrical networks and engineering.	
Pre-requisite:	Nil	
1.	**DC Circuits:** Electrical circuit elements (R, L and C), voltage and current sources, Ohm's law, Kirchhoff current and voltage laws, analysis of simple circuits with dc excitation using: Mesh and Nodal method, Network Theorems - Superposition, Thevenin, Norton and Maximum power transfer Theorems. Star-Delta Conversion.	[8]
2.	**AC Circuits:** Basic terminologies, representation of sinusoidal waveforms, average, rms and peak values of a.c. quantities, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel).	[8]
3.	**Three Phase A.C. Circuits:** Three phase supply, phase sequence, star connection, delta connection, relationship between phase and line quantities in 3-phase circuits, measurements of three phase power under balanced condition.	[6]
4.	**Transformers:** Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, Transformer testing: open circuit and short circuit test, losses in transformers, regulation and efficiency. Basics of auto-transformer and three-phase transformer connections.	[10]
5.	**Electrical Machines:** DC Machines – construction, functions of each part, working principle, EMF and torque equations, types of dc machines. Single Phase AC machines, AC machines – classification (Split phase machines, universal machines), construction, operating principles of ac machines.	[8]

Outcome:	At the end of this course, students will demonstrate the ability to • To understand and analyse basic electric and magnetic circuits. • To study the working principles of electrical machines.
Text Books:	1. Kothari, D. P., and I. J. Nagrath, "Theory and Problems of Basic Electrical Engineering," PHI Learning Pvt. Ltd., 1998. 2. Fitzgerald, Arthur Eugene, David E. Higginbotham, and Arvin Grabel, "Basic electrical engineering," McGraw-Hill Series in Electrical Engineering, Auckland: McGraw-Hill, 1981, 5th ed.(1981).
Reference Books:	1. H. Cotton, "Advanced Electrical Technology," CBS Publication. 1967. 2. Vincent Del Toro, "Electrical Engineering Fundamentals," 2ndEdition PHI Publication. 1972. 3. Smarajit Ghosh, "Fundamentals of Electrical and Electronics Engineering", PHI Publication, 1st Edition, 2007.

ME 25.101 **Applied Mechanics** **Total Lectures: 40**

Prerequisite Basic Mathematics and Physics **3-0-0-3**

Objectives:

- This course will help the student to acquire knowledge of basic engineering mechanics concepts and enhance their ability to solve open ended engineering problems.
- To provide the student with a clear and thorough understanding of the theory and applications of engineering mechanics, covering both statics and dynamics.

1. **Introduction:** Idealization of Mechanics, concept of Rigid Body, External Forces, Laws of Mechanics. Force systems, Moment of force, Moment of a couple, Equivalent system, Free Body Diagram, Equations of equilibrium and their applications to various systems of forces. **[12]**

2. **Distributed Forces and Moment Of Inertia:** Centroid of Composite figures, Area Moment of Inertia, Mass Moment of Inertia, and Principle Moment of Inertia. **[7]**

3. **Friction:** Introduction of friction, Laws of friction, wedge, screw, belt friction. **[7]**

4. **Tension, Compression and Shear:** Normal stress and strain, Hooke's Law and Poisson's Ratio, Stress-Strain diagram, Shear stress and shear strain. **[9]**

   Beams: Different support & load conditions, SFD and BMD of different beams with point and distributed load.

5. **Kinematics of Particles:** Introduction, Rectilinear motion, Plane curvilinear motion, Rectangular coordinates, Relative motion **[5]**

   Kinetics of Particles: Introduction, Force, Mass and acceleration, Newton's second law of motion, Equation of motion and solution of problems, Work and Energy, Impulse and Momentum.

Outcome:

1 Evaluate forces in various frames of structural members

2 Understand and Apply the concept of drawing free body diagram

3 Apply the concept of friction in engineering applications

4 Calculate the centroid and moment of inertia in various sectional components and apply this to real life examples

5 Understand and evaluate for internal forces

6 Understand the importance of kinetics and kinematics in mechanics and apply the principles to various frames

Text Books:

1. Hibbeler, Gupta R. C., "Engineering Mechanics," Pearson India, Latest Edition.

2.Merian, J.L, Kraige, L.G., "Engineering Mechanics Vol I & II," Wiley India Latest edition.

Reference Books:

1. Timoshenko, S, Young, D.H, Rao, J.V, "Engineering Mechanics," 4th edition TMH, 2010.

2. Irving. H. Shames, "Engineering Mechanics," Prentice Hall Book Company

UC 25.201 **Management and Entrepreneurship** **Contact Hours: 26**

2-0-0-2

Objectives: This course introduces students to the principles of Entrepreneurship and Management practices. It acquaints students with the methods managers use to: assess the environment in which the organization operates; design, build, and implement the organization's capacity to serve; make decisions; and evaluate the efficacy of those decisions. It also provides students with a solid foundation in terms of the vital role played by entrepreneurs and entrepreneurship in the 21st century global economy.

1 **Introduction to Management**: Meaning and importance, Concept of industrial management, Levels of management, Management theories-classical, neo-classical and modern, Managerial roles (Mintzberg), Managerial competencies, Managers and environment. **[5]**

2 **Management Functions**: ***Planning*** – Concept, types, Strategic planning, Types of strategy, Decision making, Techniques for individual and group decision-making; ***Organizing*** **–** Concept, Design of organization structures, Departmentalization, Power and authority, Conflict and coordination; ***Staffing*** – Concept, Human resource planning, Recruitment and selection. **[5]**

3 **Contemporary Issues in Management**: Management challenges of the 21st Century, Factors reshaping and redesigning management purpose, Performance and reward perceptions, Internationalization, Digitalization, Entrepreneurship, Values and Ethics. **[5]**

4 **Entrepreneurship**: Definition and concept of entrepreneurship, Entrepreneur Characteristics, Classification of Entrepreneurs, Role of Entrepreneurship in Economic Development, Start-ups. **[5]**

5 **Idea Generation and Project Formulation**: Ideas in entrepreneurships, Sources of new ideas, Techniques for generating ideas, Guidelines for report preparation, Project appraisal techniques, EDP organizations - MDI, EDII, Industrial Sickness and Role of BIFR, Meaning of project, project identification, formulation, feasibility analysis. **[6]**

Outcome Students will describe the various levels of management and applicability of management Principles, demonstrate various types of authority, delegation and decentralization in authority, demonstrate various types of leadership styles and identify the motivation techniques used by leaders, and discuss the impact of emerging issues in management.

Text Books

1. L.M. Parasad, "Principles & practice of management", Sultan Chand & Sons, New Delhi, (Latest edition).
2. Stephen P.Robbins "Organizational Behavior" Pearson Education, New Delhi (Latest edition).
3. Khanna, S. S., Entrepreneurial Development, S. Chand, New Delhi.

Reference Books

1. T.N. Chhabra, “Business Organization and Management”, Sun India Publications. New Delhi.
2. P.C. Tulsian, and V. Pandey, “Business Organization & Management”, Pearson Education, India.