Board of Studies of Mechanical Engineering Dept.
Attendance Sheet

S.NO	NAME	DESIGNATION	DESIGNATION IN BOS	Signature
1	Dr. P. Ravikanth Raju	Professor & Head Dept. of ME, ECET	Chairman	
2	Dr. J. Suresh Kumar	Sr. Prof. of ME, JNTUH UCESTH	JNTUH-Nominee	
3	Dr. L. Suresh Kumar	Associate Professor, CBIT	Member-other College	
4	Dr. M. Krishna	Associate Professor, Matrusri Engg. College	Member-other College	
5	Mr. MMVR Ravindranath	Manager-Materials, JK Fenner India Limited	Member-Industry	
6	Dr. K. Sammaiah	Professor, ECET	Member-College	
7	Mr. K. Mothilal	Asst. Prof., ECET	Member-College	
8	Mrs. B. Sandhya Rani	Asst. Prof., ECET	Member-College	
9	Ms. K. Mounika	M. Tech, Alumni	Member-Alumini	
10	Prof. P. John Paul	Principal, ECET	Special Invitee	

ELLENKI COLLEGE OF ENGINEERING AND TECHNOLOGY

ECET

(Autonomous Institution - UGC, Govt. of India)
(Sponsored by Ellenki Educational Society)
(Approved by AICTE, New Delhi, Affiliated to JNTUH Hyderabad, MSME - HI Govt. of India,
Accredited by NAAC, Recognisation of 2(f) by UGC, ISO 9001:2015 Certified)

UGC AUTONOMOUS

Date: 01-11-2023

Board of Studies of Mechanical Engineering Dept.

On behalf of ELLENKI COLLEGE OF ENGINEERING AND TECHNOLOGY (Autonomous), Patelguda, Sangareddy-502319. I am pleased to constitute the Board of Studies in the Department of Mechanical Engineering for B.Tech and M.Tech Courses as per details given below:

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- The above staff members of the Board of Studies in Mechanical Engineering shall hold the office for a period of three years with effect from the date of issue of this order.
- The members attending the meeting of the Board of Studies are eligible for T.A. and D.A as per rules of the Institution in force.
- The members are also requested to intimate this office in case of any changes in their address and designations.
- We request you to kindly consent your willingness to the member of this BOS.

Principal
Prof. P. John Paul

PRINCIPAL
Ellenki College of Engg. & Tech.

Patelguda (V), Near BHEL, Ameenpur (M), Sangareddy (Dist) 502 319, T.S.
Cell : 93910 04464, 9000733858, 93925 00124, E-mail : ellenkienggcollege@gmail.com
Website : www.ellenkicet.ac.in

Department of Mechanical Engineering

Minutes of Board of Studies Meeting

Date: 22/11/2023

Ellenki College of Engineering & Technology was founded in the year 1999 with a vision to achieve excellence in providing all round education. Established for over two decades, ELLENKI College of Engineering & Technology is one of the premier private engineering colleges in Hyderabad. The College has got Autonomous Status from the A.Y. 2023-24 for a period of 5 years.

The first BOS meeting of Mechanical Engineering Department was held on 22nd November, 2023 in dual mode. The minutes of meeting are as follows.

The Chairman welcomed all the members for the 1st Board of Studies meeting of the Mechanical Engineering Department.

1. Academic course structure for B. Tech (I, II, III & IV year) has been discussed and drafted for ER23 Regulations.
2. Detailed syllabi for B. Tech (I Year) program have been discussed at length. The proposed syllabus has been agreed and no changes were suggested by the BOS members.
3. The proposed syllabus for Applied Mechanics offering to Civil Engineering in I B. Tech II Semester has been approved.
4. The proposed syllabus for Computer Aided Engineering Graphics offering to EEE, CSE, CSE (DS), and CSE (CS) in I B. Tech II Semester and for ME, CE, ECE, CSE (AI&ML) in I B. Tech II Semester respectively has been approved.
5. The proposed syllabus for Engineering Workshop offering to ME, CE, ECE, CSE (AI&ML) in I B. Tech II Semester and EEE, CSE, CSE (DS), and CSE (CS) for in I B. Tech II Semester respectively has been approved.
6. Academic course structure for M. Tech (CAD/CAM), I & II year has been discussed and drafted for ER23 Regulations.
7. Detailed syllabi for M. Tech (CAD/CAM), I Year program have been discussed at length. The proposed syllabus has been agreed by the BOS Members.

Finally the Chairman thanked to all the members for their presence and also for their valuable suggestions towards the important of the Curriculum and Syllabus of the Mechanical Engineering.

Chairman
Board of Studies

ELLENKI COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
B.Tech. in MECHANICAL ENGINEERING
PROPOSED COURSE STRUCTURE (ER23 Regulations)
Applicable from AY 2023-24 Batch

I YEAR I SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1.		Matrices and Calculus	3	1	0	4
2.		Applied Physics	3	1	0	4
3.		C Programming and Data Structures	3	0	0	3
4.		Engineering Workshop	0	1	3	2.5
5.		English for Skill Enhancement	2	0	0	2
6.		Elements of Mechanical Engineering	0	0	2	1
7.		Applied Physics Laboratory	0	0	3	1.5
8.		English Language and Communication Skills Laboratory	0	0	2	1
9.		C Programming and Data Structures Laboratory	0	0	2	1
10.		Environmental Science	3	0	0	0
11.		Induction Programme				
		Total	**14**	**3**	**12**	**20**

I YEAR II SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1.		Ordinary Differential Equations and Vector Calculus	3	1	0	4
2.		Engineering Chemistry	3	1	0	4
3.		Computer Aided Engineering Graphics	1	0	4	3
4.		Engineering Mechanics	3	0	0	3
5.		Engineering Materials	2	0	0	2
6.		Python Programming Laboratory	0	1	2	2
7.		Engineering Chemistry Laboratory	0	0	2	1
8.		Fuels & Lubricants Laboratory	0	0	2	1
		Total	**12**	**3**	**10**	**20**

II YEAR I SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1.		Probability, Statistics & Complex Variables	3	1	0	4
2.		Mechanics of Solids	3	0	0	3
3.		Metallurgy & Material Science	3	0	0	3
4.		Production Technology	3	0	0	3
5.		Thermodynamics	3	1	0	4
6.		Production Technology Laboratory	0	0	2	1
7.		Material Science & Mechanics of Solids Laboratory	0	0	2	1
8.		Computer Aided Machine Drawing	0	0	2	1
9.		Constitution of India	3	0	0	0
		Total Credits	**18**	**2**	**6**	**20**

(BOS chairman)

II YEAR II SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1.		Basic Electrical and Electronics Engineering	3	0	0	3
2.		Kinematics of Machinery	3	0	0	3
3.		Fluid Mechanics & Hydraulic Machines	3	0	0	3
4.		IC Engines & Gas Turbines	3	0	0	3
5.		Instrumentation and Control Systems	3	0	0	3
6.		Basic Electrical and Electronics Engineering Laboratory	0	0	2	1
7.		Fluid Mechanics & Hydraulic Machines Laboratory	0	0	2	1
8.		Instrumentation and Control Systems Laboratory	0	0	2	1
9.		Real-time Research Project/ Field-Based Project	0	0	4	2
10.		Gender Sensitization Lab	0	0	2	0
		Total Credits	**15**	**0**	**12**	**20**

III YEAR I SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1.		Dynamics of Machinery	3	0	0	3
2.		Design of Machine Elements	3	0	0	3
3.		Metrology & Machine Tools	3	0	0	3
4.		Business Economics & Financial Analysis	3	0	0	3
5.		Steam Power & Jet Propulsion	3	0	0	3
6.		CAD/CAM	2	0	0	2
7.		Thermal Engineering Laboratory	0	0	2	1
8.		Metrology & Machine Tools Laboratory	0	0	2	1
9.		Kinematics & Dynamics Laboratory	0	0	2	1
10.		Intellectual Property Rights	3	0	0	0
		Total Credits	**20**	**0**	**6**	**20**

III YEAR II SEMESTER

S. No	Course Code	Course Title	L	T	P	Credits
1.		Machine Design	3	0	0	3
2.		Heat Transfer	3	0	0	3
3.		Finite Element Methods	3	0	0	3
4.		Professional Elective - I	3	0	0	3
5.		Open Elective - I	3	0	0	3
6.		Heat Transfer Lab	0	0	2	1
7.		Computer Aided Engineering Laboratory	0	0	2	1
8.		Advanced English Communication Skills Laboratory	0	0	2	1
9.		Industry Oriented Mini Project/ Internship	0	0	4	2
10.		Environmental Science	3	0	0	0
		Total Credits	**18**	**0**	**10**	**20**

Environmental Science in III Yr II Sem Should be Registered by Lateral Entry Students Only.

IV YEAR I SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1.		Industrial Management	2	0	0	2
2.		Refrigeration & Air Conditioning	3	0	0	3
3.		Professional Elective – II	3	0	0	3
4.		Professional Elective – III	3	0	0	3
5.		Professional Elective - IV	3	0	0	3
6.		Open Elective - II	3	0	0	3
7.		Project Stage - I	0	0	6	3
		Total Credits	**17**	**0**	**6**	**20**

IV YEAR II SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1.		Professional Elective – V	3	0	0	3
2.		Professional Elective - VI	3	0	0	3
3.		Open Elective - III	3	0	0	3
4.		Project Stage – II including seminar	0	0	22	9+2
		Total Credits	**9**	**0**	**22**	**20**

***MC – Satisfactory/Unsatisfactory**

PROFESSIONAL ELECTIVES OFFERED IN ER223

Professional Elective - I

	Unconventional Machining Processes
	Power Plant Engineering
	Mechanical Vibrations
	Microprocessors in Automation

Professional Elective – II

	Artificial Intelligence in Mechanical Engineering
	Automobile Engineering
	Industrial Robotics
	Mechatronics

Professional Elective – III

	Production Planning & Control
	Computational Fluid Dynamics
	Composite Materials
	Solar energy technology

Professional Elective – IV

	Re-Engineering
	Non-Conventional Energy Sources
	Operations Research
	Electric and Hybrid Vehicles

Professional Elective – V

	Automation in Manufacturing
	Turbo Machinery
	Additive Manufacturing
	Energy Conservation and Management

Professional Elective – VI

	Industry 4.0
	Fluid Power System
	Fuzzy Logic and ANN
	Total Quality Management

List of Open Electives

Open Elective (OE – I)

1. Basic Mechanical Engineering
2. Renewable energy Sources

Open Elective (OE – II)

1. Quantitative Analysis for Business Decisions
2. Industrial Engineering &Management

Open Elective (OE – III)

1. Entrepreneurship Development
2. Elements of Electric

ELLENKI COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

PROPOSED SYLLABUS

COMPUTER AIDED ENGINEERING GRAPHICS

B.Tech. I Year I Sem. (Common to EEE, CSE, CSE (DS), CSE (CS))
B.Tech. I Year II Sem. (Common to ME, CE, ECE, CSE (AI&ML))

L	T	P	C
1	0	4	3

Course Objectives:

- To develop the ability of visualization of different objects through technical drawings
- To acquire computer drafting skill for communication of concepts, ideas in the design of engineering products

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

- Apply computer aided drafting tools to create 2D and 3D objects
- sketch conics and different types of solids
- Appreciate the need of Sectional views of solids and Development of surfaces of solids
- Read and interpret engineering drawings
- Conversion of orthographic projection into isometric view and vice versa manually and by using computer aided drafting

UNIT – I:

Introduction to Engineering Graphics: Principles of Engineering Graphics and their Significance, Scales – Plain & Diagonal, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid, Introduction to Computer aided drafting – views, commands and conics

UNIT- II:

Orthographic Projections: Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures. Auxiliary Planes. Computer aided orthographic projections – points, lines and planes

UNIT – III:

Projections of Regular Solids – Auxiliary Views - Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views, Computer aided projections of solids – sectional views

UNIT – IV:

Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone, Development of surfaces using computer aided drafting

UNIT – V:

Isometric Projections: Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts. Conversion of Isometric Views to Orthographic Views and Vice-versa –Conventions. Conversion of orthographic projection into isometric view using computer aided drafting.

TEXT BOOKS:

1. Engineering Drawing N.D. Bhatt / Charotar
2. Engineering Drawing and graphics Using AutoCAD Third Edition, T. Jeyapoovan, Vikas: S. Chand and company Ltd.

REFERENCE BOOKS:

1. Engineering Drawing, Basant Agrawal and C M Agrawal, Third Edition McGraw Hill
2. Engineering Graphics and Design, WILEY, Edition 2020
3. Engineering Drawing, M. B. Shah, B.C. Rane / Pearson.
4. Engineering Drawing, N. S. Parthasarathy and Vela Murali, Oxford
5. Computer Aided Engineering Drawing – K Balaveera Reddy et al – CBS Publishers

Note: - External examination is conducted in conventional mode and internal evaluation to be done by both conventional as well as using computer aided drafting.

ELLENKI COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

PROPOSED SYLLABUS

ELEMENTS OF MECHANICAL ENGINEERING

B.Tech. I Year I Sem.

L	T	P	C
0	0	2	1

Course Objectives: The objectives of this course are to

1. Make the student to experimentally measure the common geometric properties like length, diameter, flatness, curvature, volume and moment of inertia etc.
2. Give a practical knowledge to evaluate the friction between surfaces and also to evaluate the natural frequency of the system.
3. Correlate between theory and experimental results, directly observe the proof of principles and theories through practical knowledge
4. Introduce students to the basic concepts of manufacturing through the demonstration of various processes.
5. Understand the commonly used mechanical components like gear box, working of boilers and IC engine etc.

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

1. CO 1: Understand the operation, usage and applications of different measuring instruments and tools.
2. CO 2: Examine the different characteristics of instruments like accuracy, precision etc
3. CO 3: Prepare simple composite components and joining different materials using soldering process.
4. CO 4: Identify tools & learn practically the process of turning, milling, grinding on mild steel pieces.
5. CO 5: Understand the basic components of IC engine, Gear box and boiler

List of Experiments to be performed:

1. Measurement of length, height, diameter by vernier calipers.
2. To measure diameter of a given wire and sphere, thickness of a given sheet and volume of an irregular lamina using micrometer screw gauge.
3. Use of straight edge and sprit level in finding the flatness of surface plate.
4. Determination of time period and natural frequency of simple pendulum.
5. Determination of time period and natural frequency of compound pendulum.
6. To measure the coefficients of static and kinetic friction between a block and a plane using various combination of materials.
7. To determine the radius of curvature of a given spherical surface.
8. The experimental determination of the Moment of Inertia of regular and irregular solids.
9. Metal joining process–soldering of metal alloys to any PCB board
10. A simple composite geometry preparation by hand layup method.
11. Grouping of Dry cells for a specified voltage and current and its measurement using ammeters and voltmeters etc.
12. Demonstration of lathe, milling, drilling, grinding machine operations.
13. Study of transmission system –gear box
14. Assembly /disassembly of Engines
15. Study of Boilers

Note: Perform any 10 out of the 15 Exercises.

ELLENKI COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

PROPOSED SYLLABUS

ENGINEERING WORKSHOP

B.Tech. I Year I Sem. (Common to ME, CE, ECE, CSE (AI&ML))

B.Tech. I Year II Sem. (Common to EEE, CSE, CSE (DS), CSE (CS))

L	T	P	C
0	1	3	2.5

Pre-requisites: Practical skill

Course Objectives:

- To Study of different hand operated power tools, uses and their demonstration.
- To gain a good basic working knowledge required for the production of various engineering products.
- To provide hands on experience about use of different engineering materials, tools, equipments and processes those are common in the engineering field.
- To develop a right attitude, team working, precision and safety at work place.
- It explains the construction, function, use and application of different working tools, equipment and machines.
- To study commonly used carpentry joints.
- To have practical exposure to various welding and joining processes.
- Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.

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

- CO 1: Study and practice on machine tools and their operations
- CO 2: Practice on manufacturing of components using workshop trades including pluming, fitting, carpentry, foundry, house wiring and welding.
- CO 3: Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
- CO 4: Apply basic electrical engineering knowledge for house wiring practice.

1. TRADES FOR EXERCISES:

At least two exercises from each trade:

I. Carpentry – (T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint)
II. Fitting – (V-Fit, Dovetail Fit & Semi-circular fit)
III. Tin-Smithy – (Square Tin, Rectangular Tray & Conical Funnel)
IV. Foundry – (Preparation of Green Sand Mould using Single Piece and Split Pattern)
V. Welding Practice – (Arc Welding & Gas Welding)
VI. House-wiring – (Parallel & Series, Two-way Switch and Tube Light)
VII. Black Smithy – (Round to Square, Fan Hook and S-Hook)

2. TRADES FOR DEMONSTRATION & EXPOSURE:

Plumbing, Machine Shop, Metal Cutting (Water Plasma), Power tools in construction and Wood Working

TEXT BOOKS:

1. Workshop Practice /B. L. Juneja / Cengage
2. Workshop Manual / K. Venugopal / Anuradha.

REFERENCE BOOKS:

1. Work shop Manual - P. Kannaiah/ K.L. Narayana/ Scitech
2. Workshop Manual / Venkat Reddy/ BSP

ELLENKI COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

PROPOSED SYLLABUS

ENGINEERING MATERIALS

B.Tech. I Year II Sem.

L	T	P	C
2	0	0	2

Course Objectives: The objectives of this course are to

1. Provide basic understanding of engineering materials, their structure, classification and usage.
2. Introduce the testing methods for various material properties and ASTM standards used in testing.
3. Understand the various materials used in mechanical engineering like metals, ceramics, polymers, composite materials and other new materials.

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

1. Classify the various materials that will be essential for the mechanical engineering applications.
2. Express the mechanical properties of metals and their testing procedures.
3. Understand the application of materials and their processing
4. Understand the requirement and need for the development of the new materials.

UNIT-I:

Classification of Engineering Materials, Ashby chart, Mechanical Properties of Metals and their testing equipment/procedures, ASTM standards for testing, Stress–Strain Behavior of various materials, Sources of Material Data

UNIT –II:

Metals and Metal Alloys, Classification of Metal Alloys, Classification, composition, properties and usage of Ferrous alloys, steel, HSS, grey cast iron, white cast iron; Classification, composition, properties and usage of Non-ferrous materials, Aluminum, Titanium, Zinc, Copper, Nickel, Cobalt and their alloys

UNIT –III:

Composites: Definitions, Reinforcements and matrices, Types of reinforcements, Types of matrices, Classification of composites, Properties of composites in comparison with standard materials Manufacturing methods: Hand and spray lay - up, injection molding, resin injection, filament winding, pultrusion, centrifugal casting and prepregs.

UNIT – IV:

Ceramics, Classification of ceramic materials, Crystal Structure, Applications and Properties of Ceramics, Ceramic fabrication techniques, Carbon: Diamond and Graphite.

Polymer Structures, Chemistry of Polymer Molecules, Classification scheme of polymer molecules, Thermoplastic and Thermosetting Polymers, Characteristics, Applications, and Processing of Polymers, Elastomers.

UNIT – V:

Materials in nano technology: Semiconductor Nanomaterials (Zinc oxide nano materials, titanium dioxide nanoparticles, Metal nanoparticles, ceramic nano materials metal nano particles (Silver, gold, iron and copper), applications, bio materials and other recent materials

TEXT BOOKS:

1. George Murray, Charles V. White, Wolfgang Weise, "Introduction to Engineering Materials", CRC Press, 2007.
2. William. D. Callister, David G. Rethwisch, "Materials Science and Engineering: An Introduction", John Wiley & Sons, 2018.

REFERENCE BOOKS:

1. Myer Kutz, "Mechanical Engineers' Handbook", John Wiley & Sons, 2015.
2. M.A. Shah, K.A.Shah, Nano technology, the science of Small, WILEY, Second Edition, 2019.
3. E. Paul De Garmo, J.T. Black, R.A. Kohler. Materials and Processes in Manufacturing, John Wiley and Sons, Inc., NY, 11 th Edition, 2012.
4. R.J. Crawford, plastics engineering, Pergamon Presss, 2013.
5. Donald R Askland and Pradeep P Phule "Essentials of Materials Science and Engineering", by Pradeep P. Fulay (Author), Donald R. Askeland, 2013.
6. K. K. Chawala, Cermic Matrix composite Materials, Kluwer Academic Publishers, 2002.

ELLENKI COLLEGE OF ENGINEERING AND TECHNOLOGY
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PROPOSED SYLLABUS

ENGINEERING MECHANICS

B.Tech. I Year II Sem.

L	T	P	C
3	0	0	3

Course Objectives: The objectives of this course are to

- Explain the resolution of a system of forces, compute their resultant and solve problems using equations of equilibrium
- Perform analysis of bodies lying on rough surfaces.
- Locate the centroid of a body and compute the area moment of inertia and mass moment of inertia of standard and composite sections
- Explain kinetics and kinematics of particles, projectiles, curvilinear motion, centroidal motion and plane motion of rigid bodies.
- Explain the concepts of work-energy method and its applications to translation, rotation and plane motion and the concept of vibrations

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

- CO 1: Determine resultant of forces acting on a body and analyse equilibrium of a body subjected to a system of forces.
- CO 2: Solve problem of bodies subjected to friction.
- CO 3: Find the location of centroid and calculate moment of inertia of a given section.
- CO 4: Understand the kinetics and kinematics of a body undergoing rectilinear, curvilinear, rotatory motion and rigid body motion.
- CO 5: Solve problems using work energy equations for translation, fixed axis rotation and plane motion and solve problems of vibration.

UNIT - I:

Introduction to Engineering Mechanics - Force Systems: Basic concepts, Particle equilibrium in 2-D & 3-D; Rigid Body equilibrium; System of Forces, Coplanar Concurrent Forces, Components in Space – Resultant- Moment of Forces and its Application; Couples and Resultant of Force System, Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems; Static Indeterminacy

UNIT - II:

Friction: Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction; Motion of Bodies, wedge friction, screw jack & differential screw jack;

Centroid and Centre of Gravity -Centroid of Lines, Areas and Volumes from first principle, centroid of composite sections; Centre of Gravity and its implications. – Theorem of Pappus

UNIT - III:

Area moment of inertia- Definition, Moment of inertia of plane sections from first principles, Theorems of moment of inertia, Moment of inertia of standard sections and composite sections; Product of Inertia, Parallel Axis Theorem, Perpendicular Axis Theorem

Mass Moment of Inertia: Moment of Inertia of Masses - Transfer Formula for Mass Moments of Inertia – Mass moment of inertia of composite bodies.

UNIT - IV:

Review of particle dynamics- Rectilinear motion; Plane curvilinear motion (rectangular, path, and polar coordinates). 3-D curvilinear motion; Relative and constrained motion; Newton's 2nd law (rectangular, path, and polar coordinates). Work-kinetic energy, power, potential energy. Impulse-momentum (linear, angular); Impact (Direct and oblique).

UNIT - V:

Kinetics of Rigid Bodies -Basic terms, general principles in dynamics; Types of motion, Instantaneous centre of rotation in plane motion and simple problems; D' Alembert's principle and its applications in plane motion and connected bodies; Work Energy principle and its application in plane motion of connected bodies; Kinetics of rigid body rotation

TEXT BOOKS:

1. Shames and Rao (2006), Engineering Mechanics, Pearson Education
2. Reddy Vijay Kumar K. and J. Suresh Kumar (2010), Singer's Engineering Mechanics – Statics & Dynamics

REFERENCE BOOKS:

1. Beer F.P & Johnston E.R Jr., Vector Mechanics for Engineers – Statics and Dynamics, Mc Graw Hill, 12th Edition.
2. Dumir P.C, Sengupta, Srinivas, Engineering Mechanics- Universities Press, 2020.
3. Hibbeler R.C, Engineering Mechanics, Pearson, 14th Edition.
4. Arshad Noor, Zahid & Goel, Engineering Mechanics, Cambridge University Press, 2018.
5. Khurmi R.S, Khurmi N., Engineering Mechanics, S. Chand, 2020.
6. Basudeb Bhattacharyya, "Engineering Mechanics", Oxford University Press

ELLENKI COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

PROPOSED SYLLABUS

FUELS AND LUBRICANTS LABORATORY

B.Tech. I Year II Sem.

L	T	P	C
0	0	2	1

Prerequisite: Chemistry

Course Objectives: To Understand the fuel and lubricants properties.

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

- Find the kinematic viscosity of lubricants and its variation with temperature
- Determine the flash point, fire point, cloud point and pour point of liquid fuels
- Determine the calorific value of solid, liquid and gaseous fuels
- Determination of the dropping point of lubricating grease
- Determination of distillation characteristics of petroleum products

List of Experiments:

1. Determination of Flash and Fire points of Liquid fuels/Lubricants using: Abels Apparatus
2. Determination of Flash and Fire points of Liquid fuels/Lubricants using: Pensky Martens Apparatus
3. Carbon residue test: Liquid fuels.
4. Determination of Viscosity of Liquid lubricants and Fuels using: Saybolt Viscometer
5. Determination of Viscosity of Liquid lubricants and Fuels using: Redwood Viscometer
6. Determination of Viscosity of Liquid lubricants and Fuels using: Engler Viscometer
7. Determination of Calorific value: of Gaseous fuels using: Junkers Gas Calorimeter.
8. Determination of Calorific value: Solid/Liquid/ fuels using: Bomb Calorimeter.
9. Drop point and Penetration Apparatus for Grease.
10. ASTM Distillation Test Apparatus.
11. Cloud and Pour Point Apparatus.

ELLENKI COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

PROPOSED SYLLABUS

APPLIED MECHANICS

(For CE)

B.Tech. I Year II Sem.

L	T	P	C
3	0	0	3

Course Objectives: The objectives of this course are to

- Explain the resolution of a system of forces, compute their resultant and solve problems using equations of equilibrium
- Perform analysis of bodies lying on rough surfaces.
- Locate the centroid of a body and compute the area moment of inertia and mass moment of inertia of standard and composite sections
- Explain kinetics and kinematics of particles, projectiles, curvilinear motion, centroidal motion and plane motion of rigid bodies.
- Explain the concepts of work-energy method and its applications to translation, rotation and plane motion and the concept of vibrations

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

- Determine resultant of forces acting on a body and analyse equilibrium of a body subjected to a system of forces.
- Solve problem of bodies subjected to friction.
- Find the location of centroid and calculate moment of inertia of a given section.
- Understand the kinetics and kinematics of a body undergoing rectilinear, curvilinear, rotatory motion and rigid body motion.

UNIT - I

Introduction to Engineering Mechanics - Force Systems: Basic concepts, Particle equilibrium in 2-D & 3-D; Rigid Body equilibrium; System of Forces, Coplanar Concurrent Forces, Components in Space – Resultant-Moment of Forces and its Application; Couples and Resultant of Force System, Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems; Static Indeterminacy.

UNIT - II

Friction: Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction; Motion of Bodies, ladder friction

Centroid and Centre of Gravity -Centroid of Lines, Areas and Volumes from first principle, centroid of composite sections; Centre of Gravity and its implications. – Theorem of Pappus.

UNIT - III

Area moment of inertia- Definition, Moment of inertia of plane sections from first principles, Theorems of moment of inertia, Moment of inertia of standard sections and composite sections; Product of Inertia, Parallel Axis Theorem, Perpendicular Axis Theorem.

Mass Moment of Inertia: Moment of Inertia of Masses - Transfer Formula for Mass Moments of Inertia – Mass moment of inertia of composite bodies.

UNIT - IV

Kinematics of Particles: Kinematics of particles – Rectilinear motion – Curvilinear motion – Projectiles. Kinetics of Particles: Kinetics of particles – Newton's Second Law – Differential equations of rectilinear and curvilinear motion – Dynamic equilibrium – Inertia force – D. Alembert's Principle applied for rectilinear and curvilinear motion.

UNIT - V

Work - Energy Principle: Equation of translation, principle of conservation of energy, work - energy principle applied to particle motion and connected systems, fixed axis rotation. Impulse – Momentum

Principle: Introduction, linear impulse momentum, principle of conservation of linear momentum, elastic impact and types of impact, loss of kinetic energy, co efficient of restitution.

TEXT BOOKS:

1. Shames and Rao (2006), Engineering Mechanics, Pearson Education
2. Reddy Vijay Kumar K. and J. Suresh Kumar (2010), Singer's Engineering Mechanics – Statics & Dynamics

REFERENCE BOOKS:

1. Timoshenko S.P and Young D.H., "Engineering Mechanics", McGraw Hill International Edition, 1983.
2. Andrew Pytel, Jaan Kiusalaas, "Engineering Mechanics", Cengage Learning, 2014.
3. Beer F.P& Johnston E.R Jr. Vector, "Mechanics for Engineers", TMH, 2004.
4. Hibbeler R. C & Ashok Gupta, "Engineering Mechanics", Pearson Education, 2010.
5. Tayal A.K., "Engineering Mechanics – Statics & Dynamics", Umesh Publications, 2011.
6. Basudeb Bhattacharyya, "Engineering Mechanics", Oxford University Press, 2008.
7. Meriam. J. L., "Engineering Mechanics", Volume-II Dynamics, John Wiley & Sons, 2008.
8. P.C Dumir et al. "Engineering Mechanics", University press

ELLENKI COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

M.Tech. CAD/CAM
PROPOSED COURSE STRUCTURE (ER23 Regulations)
Applicable from AY 2023-24 Batch

I YEAR I SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1.	Professional Core – I	Advanced CAD	3	0	0	3
2.	Professional Core – II	Additive Manufacturing	3	0	0	3
3.	Professional Elective – I	1. Finite Element and Boundary Element Methods 2. Experimental Stress Analysis 3. Green Manufacturing	3	0	0	3
4.	Professional Elective – II	1. Automation in Manufacturing 2. Computer Aided Process Planning 3. Industrial Robotics	3	0	0	3
5.		Research Methodology & IPR	2	0	0	2
6.	Lab – I	Advanced Computer Aided Design Lab	0	0	4	2
7.	Lab – II	3D Printing Lab	0	0	4	2
8.	Audit – I	Audit Course- I	2	0	0	0
		Total	**16**	**0**	**8**	**18**

I YEAR II SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1.	Professional Core – III	Computer Integrated Manufacturing	3	0	0	3
2.	Professional Core – IV	Manufacturing Systems: Simulation Modelling & Analysis	3	0	0	3
3.	Professional Elective – III	1. Intelligent Manufacturing Systems 2. IOT & Industry 4.0 3. Optimization Techniques & Applications	3	0	0	3
4.	Professional Elective – IV	1. Mechatronics 2. MEMS: Design and Manufacturing 3. Fuzzy Logic & Neural Networks	3	0	0	3
5.		Mini Project with Seminar	0	0	4	2
6.	Lab – III	Simulation of Manufacturing Systems Lab	0	0	4	2
7.	Lab – IV	Computer Aided Manufacturing Lab	0	0	4	2
8.	Audit – II	Audit Course- II	2	0	0	0
		Total	**14**	**0**	**12**	**18**

II YEAR I SEMESTER

Course Code	Course Title	L	T	P	Credits
Professional Elective – V	1. Design for Manufacturing & Assembly 2. Composite Materials 3. Artificial Intelligence Manufacturing	3	0	0	3
Open Elective	Open Elective	3	0	0	3
Dissertation	Dissertation Work Review - II	0	0	12	6
	Total	**6**	**0**	**12**	**12**

II YEAR II SEMESTER

Course Code	Course Title	L	T	P	Credits
Dissertation	Dissertation Work Review - III	0	0	12	6
Dissertation	Dissertation Viva-Voce	0	0	28	14
	Total	**0**	**0**	**40**	**20**

***For Dissertation Work Review - I, Please refer 7.10 in R22 Academic**

Regulations.Audit Course I & II:

1. English for Research Paper Writing
2. Disaster Management
3. Sanskrit for Technical Knowledge
4. Value Education
5. Constitution of India
6. Pedagogy Studies
7. Stress Management by Yoga
8. Personality Development through Life Enlightenment Skills

Open Elective:

1. Business Analytics
2. Waste to Energy
3. Concurrent Engineering
4. Industrial Safety

ELLENKI COLLEGE OF ENGINEERING AND TECHNOLOGY
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PROPOSED SYLLABUS

ADVANCED CAD (Professional Core- I)

M. TECH. I Year I Sem. (CAD/CAM)

L	T	P	C
3	0	0	3

Course Objectives

1. To study about the CAD process and concept of geometric modelling
2. To study the concepts of wireframe modelling
3. To study the concepts related to surface modelling
4. To study the concepts of solid modelling
5. To study about geometric transformations techniques, data exchange formats and mechanical tolerance

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

1. Understand the CAD process and geometric modelling concepts
2. Analyse the utility and application of wire frame modelling
3. Understand the concepts of surface modelling
4. Understand and apply the concepts of solid modelling techniques.
5. Understand graphics by using transformations and analyse the utility of data exchange formats with dimensioning and tolerances.

UNIT- I:

CAD Tools: Definition of CAD Tools, Graphics standards, Graphics software: requirements of graphics software, Functional areas of CAD, Efficient use of CAD software.

Basics of Geometric Modelling: Requirement of geometric 3D Modeling, Geometric models, Geometric construction methods, Modelling facilities desired.

UNIT- II:

Geometric Modeling: Classification of wireframe entities, Curve representation methods, Parametric representation of analytic curves: line, circle, arc, conics, Parametric representation of synthetic curves: Hermite cubic curve, Bezier curve, B-Spline curvewire, NURBS, Curve manipulations.

UNIT- III:

Surface Modeling: Classification of surface entities, Surface representation methods, Parametric representation of analytic surfaces: plane surface, ruled surface, surface of revolution, tabulated cylinder, Parametric representation of synthetic curves: Hermite cubic surface, Bezier surface, B-Spline surface, Blending surface, Surface manipulations.

UNIT- IV:

Solid Modelling: Geometry and topology, Boundary representation, The Euler-Poincare formula, Euler operators, Constructive solid geometry: CSG primitives, Boolean operators, CSG expressions, Interior, Exterior, closure, Sweeping: linear and non-linear, Solid manipulations, feature modeling.

UNIT- V:

Transformations:2-D and 3-D transformations: translation, scaling, rotation, reflection, concatenation, homogeneous coordinates, Perspective projection, orthotropic projection, isometric projection, Hidden surface removal, shading, rendering.

Evaluation Criteria: Evaluation criteria of CAD software, Data exchange formats: GKS, IGES, PHIGS,

CGM, STEP

Dimensioning and tolerances: Linear, angular, angular dimensions, maximum material condition (MMC), Least material condition (LMC), Regardless of feature size (RFS).

TEXT BOOKS:

1. CAD/CAM Concepts and Applications/ Alavala/ PHI.
2. Mastering CAD/CAM / IbrhimZeid / McGraw Hill International.
3. CAD/CAM Principles and Applications/ P.N. Rao/TMH/3rd Edition

REFERENCES BOOKS:

1. CAD/CAM /Groover M.P./ Pearson education
2. CAD / CAM / CIM, Radhakrishnan and Subramanian/ New Age
3. Principles of Computer Aided Design and Manufacturing/ Farid Amirouche/ Pearson
4. Computer Numerical Control Concepts and programming/ Warren S Seames/ Thomson.

ELLENKI COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

PROPOSED SYLLABUS

ADDITIVE MANUFACTURING (Professional Core- II)

M. TECH. I Year I Sem. (CAD/CAM)

L	T	P	C
3	0	0	3

Prerequisites: Basics of Manufacturing, Basic knowledge in Calculus, Physics, Thermodynamics, andChemistry

Course Objectives: The objective of the Course is

1. To understand the fundamentals for additive manufacturing and its terms.
2. To know various types of liquid based and solid based AM technologies.
3. To know various types of powder based AM technologies with LENS and rapid tooling.
4. To understand the various types of Pre-processing, processing, post-processing errors in AM.Also to know the various types of data formats and software's used in AM.
5. To know the various applications of AM in design analysis, aerospace, automotive, biomedicaland other fields

Course outcomes:

1. Understand the fundamentals of prototyping and automated processes
2. Analyse the utility and application of liquid and solid based AM systems
3. Understand the concepts of powder based AM systems and Rapid tooling
4. Utilize the AM Data formats and software's
5. Utilize the AM for various practical applications

UNIT–I:

Introduction: Prototyping fundamentals: Need for time compression in product development, Need for Additive Manufacturing, Historical development, Fundamentals of Additive Manufacturing, AM Process Chain, Advantages and Limitations of AM, Commonly used Terms, Classification of AM process, Fundamental Automated Processes: Distinction between AM and CNC, other related technologies.

UNIT–II:

Liquid-based AM Systems: Stereo lithography Apparatus (SLA): Models and specifications, Process, working principle, photopolymers, photo polymerization, Layering technology, laser and laser scanning, Applications, Advantages and Disadvantages, Case studies. Solid ground curing (SGC): Models and specifications, Process, working principle, Applications, Advantages and Disadvantages, Case studies. Poly jet: Process, Principle, working principle, Applications, Advantages and Disadvantages, Case studies. Micro fabrication.

Solid-based AM Systems: Laminated Object Manufacturing (LOM): Models and specifications, Process, working principle, Applications, Advantages and Disadvantages, Case studies. Fused Deposition Modeling (FDM): Models and specifications, Process, working principle, Applications, Advantages and Disadvantages, Case studies. Multi-Jet Modelling (MJM): Models and specifications, Process, working principle, Applications, Advantages and Disadvantages, Case studies.

UNIT–III:

Powder Based AM Systems: Selective laser sintering (SLS): Models and specifications, Process, working principle, Applications, Advantages and Disadvantages, Case studies. Three-dimensional Printing (3DP): Models and specifications, Process, working principle, Applications, Advantages and Disadvantages, Case studies.

Laser Engineered Net Shaping (LENS): Models and specifications, Process, working principle, Applications, Advantages and Disadvantages, Case studies. Electron Beam Melting (EBM): Models and specifications, Process, working principle, Applications, Advantages and Disadvantages, Case studies

Rapid Tooling: Introduction to Rapid Tooling (RT), Conventional Tooling Vs RT, Need for RT. Rapid Tooling Classification: Indirect Rapid Tooling Methods: Arc Spray Metal Deposition, Investment Casting, Sand Casting, 3D Keltool process. Direct Rapid Tooling: Direct AIM, LOM Tools, DTM Rapid Tool Process, EOS Direct Tool Process and Direct Metal Tooling using 3DP.

UNIT–IV:

AM Data Formats: Reengineering for Digital Representation, STL Format, STL File Problems, Consequence of Building Valid and Invalid Tessellated Models, STL file Repairs: Generic Solution, Other Translators, Newly Proposed Formats. Mesh Refining by Sub division Techniques.

AM Software's: Need for AM software, Features of various AM software's like Magics, Mimics, Solid View, View Expert, 3 D View, Velocity 2, Rhino, STL View 3 Data Expert and 3 D doctor, Surgi Guide,3-matic, Simplant, Mesh Lab.

UNIT–V:

AM Applications: Application – Material Relationship, Application in Design, Application in Engineering, Analysis and Planning, Aerospace Industry, Automotive Industry, Jewelry Industry, Coin Industry, GIS application, Arts and Architecture. RP Medical and Bioengineering Applications: Planning and simulation of complex surgery, Customized Implants & Prosthesis, Design and Production of Medical Devices, Forensic Science and Anthropology, Visualization of Biomolecules. Web Based Rapid Prototyping Systems

TEXTBOOK:

1. Rapid prototyping: Principles and Applications by Chua C.K., Leong K.F. and LIM C.S,World Scientific publications, Third Edition, 2010.

REFERENCE BOOKS:

1. Rapid Manufacturing by D.T. Pham and S.S. Dimov, Springer, 2001.
2. Wholers Report 2000 by Terry Wohlers, Wohlers Associates, 2000.
3. Rapid Prototyping & Engineering Applications by Frank W.Liou, CRC Press, Taylor &Francis Group, 2011.

ELLENKI COLLEGE OF ENGINEERING AND TECHNOLOGY
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PROPOSED SYLLABUS

FINITE ELEMENT AND BOUNDARY ELEMENT METHODS
(Professional Elective - I)

M. TECH. I Year I Sem. (CAD/CAM)

L	T	P	C
3	0	0	3

Prerequisite: Strength of Materials, Mathematics, Heat Transfer and Vibrations.

Course Objectives:

- To Introduce the basic concepts of the finite element method, the boundary element method
- To discuss the advantages and limitations of each method
- To Demonstrate the capabilities of each method on a variety of problems

Course outcomes: After completing this course, the student should be able to

- Understand the background of mathematical equations used for development of modeling software modules to develop the various structural related applications
- Identify mathematical model for solution of common engineering problems of 2D & 3D.
- Solve structural, thermal, fluid flow problems.
- Know the application of plate bending and nonlinear finite element of solids.
- Use professional-level finite element software to solve engineering problems in boundary element method.

UNIT–I:

One Dimensional Problems: Formulation of Stiffness Matrix for a Bar Element by the Principle of Minimum Potential Energy, Properties of Stiffness Matrix, Characteristics of Shape Functions, Quadratic shape functions.

Analysis of Trusses: Derivation of Stiffness Matrix for Trusses, Stress and strain Calculations, Calculation of reaction forces and displacements.

Analysis of Beams: Derivation of Stiffness matrix for two noded, two degrees of freedom per node beam element, Load Vector, Deflection, Stresses, Shear force and Bending moment, Problems on uniform and stepped beams for different types of loads applied on beams.

UNIT–II:

Finite element – formulation of 2D Problems: Derivation of Element stiffness matrix for two- dimensional CST Element, Derivation of shape functions for CST Element, Elasticity Equations, constitutive matrix formulation, Formulation of Gradient matrix. Two dimensional Isoparametric Elements and Numerical integration.

Finite element – formulation of 3D problems: Derivation of Element stiffness matrix for Tetrahedron Element, Properties of Shape functions for 3D Tetrahedral Element, Stress-Strain Analysis for 3D Element, Strain Displacement for Relationship Formulation.

UNIT–III:

Steady state heat transfer analysis: One Dimensional Finite Element analysis of fin and composite slabs. **Two-dimensional steady state heat transfer problems:** Derivation of Thermal Stiffness matrix for 2D heat transfer problems-CST, Derivation of thermal force vector for 2D heat transfer problems.

Dynamic Analysis: Formulation of mass matrices for uniform bar and beam Elements using lumped and consistent mass methods, Evaluation of Eigen values and Eigen vectors for a stepped bar and beam Problems.

UNIT–IV:

Plate Bending: Introduction – Plate behavior – C^1(Kirchoff) Plate elements – C^0(Mindlin) Plate elements — Mindlin beam – More devices for C^0Plate elements – Boundary conditions - Analytical problems. **Nonlinear finite element of solids**: Material Nonlinearities, objective rates, nonlinear elasticity, Plasticity, viscoplasticity, viscoelasticity

UNIT–V:

Boundary Element Method: Potential Problems: Introduction, boundary Element Approach- Fundamental solution. Numerical Implementation - Determination of Ci, Final Relation, Three- dimensional analysis, tackling kernel singularity.

Boundary Element Formulation for Electrostatic Problems: Introduction, Basic Relation- Boundary condition, other relations. Discretization and Matrix Formulation — Determination of term C(p)m.

TEXT BOOKS:

1. Finite and Boundary Element Methods in Engineering by O.P. Gupta, Oxford &IBH Publishing Co. Pvt. Ltd
2. The finite element methods in Engineering by S.S. Rao, Elsevier, 4th edition

REFERENCE BOOKS:

1. Finite Element Methods by Alavala, PHI.
2. Introduction to Finite Elements in Engineering by Tirupathi K. Chandrupatla and Ashok D. Belagundu.
3. An Introduction to Finite Element Methods by J. N. Reddy, Mc Grawhill
4. The Finite element method in engineering science by O.C. Zienkowitz, Mc Graw hill.
5. Concepts and Applications of Finite Element Analysis by Robert Cook, Wiley

ELLENKI COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

PROPOSED SYLLABUS

EXPERIMENTAL STRESS ANALYSIS (Professional Elective - I)

M. TECH. I Year I Sem. (CAD/CAM)

L	T	P	C
3	0	0	3

Course Objectives:

- To understand two-dimensional elasticity.
- Expose the students with torsion of circular and non-circular sections.
- Impart knowledge on free and force vibrations.
- To study transient vibrations
- To know classical and energy methods for free and forced vibrations of strings bars.

Course Outcomes: Upon completion of this course the student will be able to:

- Explain two-dimensional elasticity.
- Identify the difference between torsion of circular and non-circular sections.
- Understand free and force vibrations and compute natural frequency.
- Solve problems on Transient vibrations
- understand classical and energy methods for free and forced vibrations of strings bars.

UNIT-I:

Two-dimensional elasticity theory in Cartesian coordinates, plane stress problem in polar coordinates Thickcylinders, Rotating discs - stress concentration.

UNIT- II:

Torsion of non-circular prismatic sections, rectangular and axisymmetric, Circular plates, introduction to shell theory
— contact stresses.

UNIT- III:

Single degree freedom, two-degree freedom system without and with damping - Free and forced vibrations,Transient vibrations.

UNIT- IV:

Transient vibrations of single- and two-degree freedom systems, multi-degree of freedom systems - applications ofmatrix methods, continuous systems.

UNIT -V:

Free and forced vibrations of strings bars and be CAD/CAM. Principle of orthogonality - classical and energymethods.

TEXT BOOKS:

1. Theory of Elasticity/Timoshenko S.P. and Goodier J. N./ Koakusha Publishers
2. Advanced strength of materials / Den Hortog J.P./Torrent
3. Mechanical Vibrations/ Den Ilartog J.P./ Dover Publications
4. Theory of Vibrations with Applications/ Thomson W.T./ CBS Publishing
5. Mechanical Vibrations/ Rao S.S./ Addison Wesley Longman

ELLENKI COLLEGE OF ENGINEERING AND TECHNOLOGY
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PROPOSED SYLLABUS

GREEN MANUFACTURING (Professional Elective - I)

M. TECH. I Year I Sem. (CAD/CAM)

L	T	P	C
3	0	0	3

Course Objectives:

1. Provide knowledge on Sustainable Manufacturing, its Scope, Need and Benefits.
2. Expose the students with various Tools and Techniques of Sustainable Manufacturing.
3. Impart knowledge on Environmental Impact Assessment towards sustainable manufacturing.
4. Design Eco friendly products and to have knowledge on various recycling methods.
5. Implement idea towards frameworks for measuring sustainability.

Course Outcomes: Upon completion of this course the student will be able to:

1. Explain the importance of sustainable development.
2. Identify the link between manufacturing process models and sustainable manufacturing metrics for product and process improvement
3. Understand the three pillars of sustainability and how they are manifested in sustainable manufacturing.
4. Incorporate economic, environmental, and social aspects into decision making processes using multi-criteria decision-making methods.
5. Exhibit competence on the usage and applicability of sustainability tools. Compute sustainability performance through the indicators.

UNIT-I:

Concepts of sustainability and sustainable development – Need for sustainable development - Components of sustainability- Social, Economic, Environmental dimensions - Linkages between technology and sustainability - Sustainable Manufacturing –Scope, Need and Benefits.

UNIT-II:

Tools and Techniques of Sustainable Manufacturing – Environmental Conscious Quality Function Deployment, Life cycle assessment, Design for Environment, R3 and R6 cycles, Design for Disassembly -Sustainable Product Development – Various Phases.

UNIT-III:

EIA Methods –CML, EI 95 and 99, ISO 14001 EMS and PAS 2050 standards, Environmental Impact parameters - Interactions between energy and technology and their implications for environment and sustainable development.

UNIT-IV:

Design for recycling – Eco friendly product design methods – Methods to infuse sustainability in early product design phases – Multi-Criteria Decision Making in Sustainability.

UNIT-V:

Frameworks for measuring sustainability- Indicators of sustainability – Environmental, Economic, Societal and Business indicators - Concept Models and

Various Approaches, Product Sustainability and Risk/Benefit assessment– Corporate Social Responsibility.

TEXT BOOK:

1. G. Atkinson, S. Dietz, E. Neumayer, — "Handbook of Sustainable Manufacturing". Edward Elgar Publishing Limited,2007.

REFERENCES BOOKS:

1. D. Rodick, "Industrial Development for the 21st Century: Sustainable Development Perspectives", UN New York,2007.

ELLENKI COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

PROPOSED SYLLABUS

AUTOMATION IN MANUFACTURING
(Professional Elective - II)

M. TECH. I Year I Sem. (CAD/CAM)

L	T	P	C
3	0	0	3

Prerequisites: Production Technology, Machine Tools, Operations Research

Course Objectives:

1. Understanding Automation.
2. To know Material handling.
3. Expose manual assembly lines.
4. Impart knowledge on transfer lines.
5. To study automated assembly systems.

Course Outcomes: Upon completion of this course the student will be able to:

1. Illustrate the basic concepts of automation in manufacturing.
2. Describe the importance of automated material handling and storage systems.
3. Explain manual assembly lines.
4. Analyze various transfer lines.
5. Interpret the importance of automated assembly systems.

UNIT- I:

Introduction to Automation: Automation in Production Systems-Automated Manufacturing Systems, Computerized Manufacturing Support Systems, Reasons for Automation, Automation Principles and Strategies. Manufacturing operations, Production Concepts and Mathematical Models. Costs of Manufacturing Operations, Basic Elements of an Automated Systems, Advanced Automation Functions, Levels of automation.

UNIT- II:

Introduction to Material Handling: Overview of Material Handling Equipment, Considerations in Material Handling System Design, the 10 Principles of Material Handling. Material Transport Systems, Automated Guided Vehicle Systems, Monorails and other Rail Guided Vehicles, Conveyor Systems, Analysis of Material Transport Systems. Storage Systems, Storage System Performance, Storage Location Strategies, Conventional Storage Methods and Equipment, Automated Storage Systems, Engineering Analysis of Storage Systems. Automatic data capture-overview of Automatic identificationmethods, bar code technology, other ADC technologies.

UNIT - III:

Manual Assembly Lines - Fundamentals of Manual Assembly Lines, Alternative Assembly Systems, Design for Assembly, Analysis of Single Model Assembly Lines, Line balancing problem, largest candidate rule, Kilbridge and Wester method, and Ranked Positional Weights Method, Mixed Model Assembly Lines, Considerations in assembly line design.

UNIT- IV:

Transfer lines, Fundamentals of Automated Production Lines, Storage Buffers, and Applications of Automated Production Lines. Analysis of Transfer Lines with no Internal Storage, Analysis of Transfer lines with Storage Buffers.

UNIT- V:

Automated Assembly Systems, Fundamentals of Automated Assembly Systems, Design for Automated Assembly, and Quantitative Analysis of Assembly Systems - Parts Delivery System at Work Stations, Multi- Station Assembly Machines, Single Station Assembly Machines, Partial Automation.

TEXT BOOKS:

1. Automation, Production systems and computer integrated manufacturing by Mikel P. Groover, Pearson Education.

REFERENCE BOOKS:

1. CAD CAM: Principles, Practice and Manufacturing Management by Chris Mc Mohan,Jimmie Browne, Pearson Edu. (LPE)
2. Automation by Buckinghsm W, Haper & Row Publishers, New York, 1961
3. Automation for Productivity by Luke H.D, John Wiley & Sons, New York, 1972.

ELLENKI COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

PROPOSED SYLLABUS

COMPUTER AIDED PROCESS PLANNING (Professional Elective - II)

M. TECH. I Year I Sem. (CAD/CAM)

L	T	P	C
3	0	0	3

Course Objectives:

1. Provide knowledge on process planning.
2. Expose the students with various part design representation.
3. Impart knowledge on process engineering and process planning.
4. To design a computer aided process planning systems.
5. Implement integrated process planning systems.

Course Outcomes: Upon completion of this course the student will be able to:

1. Explain the importance of process planning.
2. Identify the link between OPTIZ and MICLASS system
3. Understand process engineering and process planning.
4. Know different computer aided process planning systems.
5. Exhibit competence on the usage integrated process planning systems.

UNIT- I:

Introduction: The Place of Process Planning in the Manufacturing Cycle-Process planning and production Planning-Process planning and Concurrent Engineering, CAPP, Group Technology.

UNIT- II:

Part Design Representation: Design Drafting-Dimensioning-Conventional Tolerance-Geometric Tolerance-CAD-input/output devices -Topology - Geometric Transformation - Perspective Transformation-Data Structure-Geometric modelling for process planning--GT Coding-The OPITZ system-The MICLASS System.

UNIT- III:

Process Engineering and Process Planning: Experience based planning-Decision table and Decision Trees-Process capability analysis-Process Planning-Variant process planning-Generative Approach-Forward and backward planning, Input format, AI.

UNIT- IV:

Computer Aided Process Planning Systems: Logical Design of process planning-Implementation Considerations-Manufacturing system components, Production Volume, No. of production families - CAM-I, CAPP, MIPLAN, APPAS, AUTOPLAN and PRO, CPPP.

UNIT-V:

An Integrated Process Planning Systems: Totally integrated process planning systems- An Overview-Modulus Structure-Data Structure-Operation-Report Generation, Expert process planning

TEXT BOOKS:

1. Gideon Halevi and Roland D. Weill, "Principle of process planning- A Logical Approach", Chapman & Hall, 1995
2. Chang T. C. & Richard A. Wysk, "An Introduction to automated process planning systems", Prentice Hall 1985.

REFERENCES:

1. Chang, T.C., "An Expert Process Planning System", Prentice Hall,1985
2. Nanua Singh, "Systems Approach to Computer Integrated Design and Manufacturing", John Wiley &Sons,1996
3. Rao P.N., "Computer Aided Manufacturing", Tata McGraw Hill Publishing Co., 2000.

ELLENKI COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

PROPOSED SYLLABUS

INDUSTRIAL ROBOTICS (Professional Elective - II)

M. TECH. I Year I Sem. (CAD/CAM)

L	T	P	C
3	0	0	3

Prerequisites: Kinematics of machinery

Course Objectives:

1. To demonstrate knowledge of different types of actuators used in robotic systems.
2. To analyze the position and velocity kinematics of a robot arm, implement in 2D.
3. To analyze the dynamics of a robot arm, implement in 2D.
4. To analyze sensor signals to implement real-time control algorithms.
5. To demonstrate knowledge of error propagation in electrical, mechanical and computational systems.
6. To construct, program, and test the operation of a robotic system to perform a specified task.

Course Outcomes: After doing this course, the student will be able to,

- Understand the evolution, classification, structures and drives for robots.
- Perform motion analysis through kinematic approach of manipulators.
- Understand robot dynamics and machine vision for robotics.
- Learn and write robot programming languages.
- Expose the students to build a robot for any type of application.

UNIT-I:

Introduction: Automation and Robotics, Robot anatomy configuration, motions joint motion and notation, work volume, robot drive system, control system and dynamic performance, precision of movement.

Control System and Components: basic concept and modals controllers control system analysis, robot actuators and feedback components (sensors): Internal & External Sensors, Positions sensors, velocity sensors - Desirable features, tactile, proximity and range sensors, uses sensors in robotics, Power Transmission Systems.

UNIT-II:

Motion Analysis and Control: Manipulator kinematics, position representation Homogeneous transformation, D-H Notation, D-H Transformation Matrix, Forward & Inverse transformations, problems on planar & spatial manipulators, Differential Kinematics, Jacobian Formulation, problems, manipulator path control: Slew, Joint Interpolated &Straight line motions, trajectory planning: Joint space scheme, Cartesian space scheme, Cubic Polynomial fit without and with via point, blending.

UNIT-III:

Robot Dynamics: Lagrange – Euler & Newton - Euler formulations, problems on two link planar manipulators, configuration of robot controller.

End Effectors: Grippers-types, operation, mechanism, force analysis, tools as end effectors consideration in gripper selection and design.

Machine Vision: Functions, Sensing and Digitizing-imaging, Devices, Lighting techniques, Analog to digital single conversion, Image storage, Image processing and Analysis-image data reduction, Segmentation feature extraction. Object recognition, training the vision system, Robotics application.

UNIT-IV:

Robot Programming: Lead through programming, Robot programming as a path in space, Motion interpolation, WAIT, SINGNAL AND DELAY commands, Branching capabilities and Limitations.

Robot Languages: Textual robot languages, Generation, Robot language structures, Elements and functions.

UNIT-V:

Robot Cell Design and Control: Robot cell layouts-Robot centered cell, In-line robot cell, Considerations in work cell design, Work cell control, Inter locks, Error detection, Work cell controller. **Robot Applications:** Material transfer, Machine loading/unloading. Processing operations, Assembly and Inspection, Future Applications.

TEXT BOOKS:

1. Introduction to Robotics Mechanics & Control by John J.Craig, Pearson
2. Industrial robotics by Mikell P.Groover, McGraw Hill.

REFERENCE BOOKS:

1. Industrial robotics by Mikell P.Groover, McGraw Hill
2. Robotics by K.S.Fu, McGraw Hill.
3. Introduction to Robotics Mechanics & Control by John J.Craig, Pearson
4. Robot Analysis by Lung Wen Tsai, John Wiley & Sons
5. Robot Analysis and Control by Asada H. and J. E. Slotin, Wiley, New York

ELLENKI COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

PROPOSED SYLLABUS

ADVANCED COMPUTER AIDED DESIGN LAB
(Lab - I)

M. TECH. I Year I Sem. (CAD/CAM)

L	T	P	C
0	0	4	2

Note: Conduct any Ten exercises from the list given below:

1. Two- dimensional drawing using CAD software.
2. Three-dimensional drawing using CAD software.
3. Various Dimensioning and tolerancing techniques on typical products using CAD software.
4. Assembly and animation of simple assemblies like screw jack, bolt-nut mechanism, etc.
5. Truss analysis using FEA software.
6. Beam analysis using FEA software.
7. Frame analysis using FEA software.
8. Buckling analysis of columns using FEA software.
9. Harmonic analysis using FEA software.
10. Fracture analysis using FEA software.
11. Analysis of laminated composites using FEA software.
12. Couple-field analysis using FEA software.
13. Modal Analysis
14. Transient dynamic analysis.
15. Spectrum analysis.

ELLENKI COLLEGE OF ENGINEERING AND TECHNOLOGY
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PROPOSED SYLLABUS

3D PRINTING LAB (Lab - II)

M. TECH. I Year I Sem. (CAD/CAM)

L	T	P	C
0	0	4	2

PRE-REQUISITES: None

.

List of Experiments:

1. Review of CAD Modeling Techniques and Introduction to RP
2. Forming Groups & Assigning Creative Idea
3. Generating STL files from the CAD Models & Working on STL files
4. Modeling Creative Designs in CAD Software
5. Assembling Creative Designs in CAD Software
6. Processing the CAD data in Catalyst software (Selection of Orientation, Supportsgeneration, Slicing, Tool path generation)
7. Simulation in Catalyst Software
8. Sending the tool path data to FDM RP machine
9. Fabricating the physical part on FDM RP machine
10. Removing the supports & post processing (cleaning the surfaces)
11. Demonstrating Creative Working Models
12. Converting CT/MRI scan data into STL file using MIMICS software (Demo)

Note: Conduct any Ten exercises from the list given above.

ELLENKI COLLEGE OF ENGINEERING AND TECHNOLOGY
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PROPOSED SYLLABUS

COMPUTER INTEGRATED MANUFACTURING
(Professional Core – III)

M. TECH. I Year II Sem. (CAD/CAM)

L	T	P	C
3	0	0	3

Course Objectives:

1. To understand the role of computers in manufacturing
2. To provide an in-depth understanding of manufacturing and database systems
3. To provide an understanding of needs of the market and design the product
4. To design and develop material handling, storage and retrieval systems for specific cases ofmanufacturing
5. To develop CIM systems for current manufacturing scenario by using computer andnetworking tools.

Course outcomes: After completing this course, the student will be able to

1. Select the necessary computing tools for development of product
2. Use appropriate database systems for manufacturing a product and store the same forfuture use
3. Use modern manufacturing techniques and tools including principles of networking
4. Apply the concepts of lean manufacturing and agile manufacturing
5. Apply the latest technology of manufacturing systems and software for the development ofa product.

UNIT–I:

Basic Concepts of CIM: The meaning of Manufacturing, Types of Manufacturing; CIM Definition, Elements of CIM, CIM wheel, concept or technology, Evolution of CIM, Benefits of CIM, Needs of CIM: Hardware and software. Fundamentals of Communication: Communications Matrix. Product Development Cycle, Concurrent Engineering: Definition, Sequential Engineering Versus Concurrent Engineering, Benefits of Concurrent Engineering, Characteristics of concurrent Engineering, Framework for integration of Lifecycle phases in CE, Concurrent Engineering Techniques, Integrated Product Development (IPD), Product Life-Cycle Management (PLM), Collaborative Product Development.

UNIT–II:

Introduction, Manufacturing Data: Types, sources; Database Terminology, Database requirements, Database models, Database Management System, DBMS Architecture, Query Language, Structural Query Language (SQL): Basic structure, Data definition Language (Create, Alter, Drop, Truncate, View), Data Manipulation Language (store, retrieve, update, delete). Illustration of Creating and Manipulating a Manufacturing Database. SQL as a Knowledge Base Query Language. Features of commercial DBMS: Oracle, MySQL, SQL Access, Sybase, DB2. Product Data Management (PDM), Advantages ofPDM.

UNIT–III:

Product Design: Needs of the market, Design and Engineering, The design Process, Design for Manufacturability (DFM): Component Design, Design for Assembly. Computer-Aided Process Planning: Basic Steps in developing a process plan, Variant and Generative Process Planning, Feature Recognition in Computer-Aided Process Planning. Material Requirements Planning (MRP), Manufacturing Resource Planning (MRP –II), Cellular Manufacturing.

Design of Cellular Manufacturing Systems, Cell Formation Approaches: Machine–Component Group Analysis, Similarity Coefficients- Based Approaches. Evaluation of Cell Design. Shop-floor Control: Data Logging and Acquisition, Automated Data Collection, Programmable Logic Controllers, Sensor Technology. Flexible Manufacturing Systems: Physical Components of an FMS. Types of Flexibility, Layout Considerations:

Linear Single Machine Layout, Circular Machine Layout, Cluster Machine Layout, Loop Layout;Operational Problems of FMS. FMS benefits.

UNIT–IV:

Introduction to Networking: Principles of Networking, Network Terminology, Types of Networks: LAN, MAN, WAN; Selection of Network Technology: Communication medium, Network Topology, Medium access control Methods, Signaling methods; Network Architectures and Protocols: OSI Model, MAP &TOP, TCP/IP, Network Interconnection and Devices, Network Performance. Framework for Enterprise-wide Integration.
CIM Models: ESPRIT-CIM OSA Model, NIST-AMRF Model, Siemens Model of CIM, Digital EquipmentCorporation Model, IBM Concept of CIM.

UNIT–V:

Lean Manufacturing: Definition, Principles of Lean Manufacturing, Characteristics of Lean Manufacturing, Value of Product, Continuous Improvement, Focus on Waste, Relationship of Waste toProfit, Four Functions of Lean Production, Performance Measures, The Supply Chain, Benefits of LeanManufacturing. Introduction to Agile and Web Based Manufacturing systems.

TEXT BOOKS:

1. S.Kant Vajpayee: "Principles of Computer Integrated Manufacturing", Prentice Hall India
2. Nanua Singh: "Systems Approach to Computer Integrated Design and Manufacturing", John Wiley.

REFERENCE BOOKS:

1. P.Radhakrishnan, S.Subramanyam: "CAD/CAM/CIM", New Age International
2. Alavudeen, Venkateshwaran: "Computer Integrated Manufacturing", Prentice Hall India.

ELLENKI COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

PROPOSED SYLLABUS

MANUFACTURING SYSTEMS: SIMULATION MODELLING & ANALYSIS
(Professional Core – IV)

M. TECH. I Year II Sem. (CAD/CAM)

L	T	P	C
3	0	0	3

Prerequisites: Operations Research, Optimization Techniques and Applications and Probability Statistics

Course Objectives:

1. Learn way of analyzing the systems.
2. Classification of systems based nature of dynamics and knowledge of elements.
3. To develop simulation model for dynamic discrete – event stochastic system.
4. To run the model and collect the data.
5. To analyze the output data of simulation for specified for performance measures bases on type of simulation and method of output data analysis.

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

1. Define the state of system W.R.T specified performance measures.
2. Develop simulation model for the said system
3. Generate random variates and learn various simulation languages.
4. Analyze through simulation the model and present the results to specified confidence level.
5. Apply simulation for flow shop systems and job shop systems.

UNIT - I:

System – ways to analyze the system – Model - types of models – Simulation – Definition – Types of simulation models – steps involved in simulation – Advantages & Disadvantages. Parameter estimation – estimator – properties – estimate – point estimate – confidence interval estimates – independent – dependent – hypothesis – types of hypothesis- steps – types 1& 2 errors – Framing – strong law of large numbers.

UNIT - II:

Building of Simulation model – validation – verification – credibility – their timing – principles of valid simulation Modeling – Techniques for verification – statistical procedures for developing credible model. Modeling of stochastic input elements – importance – various procedures – theoretical distribution – continuous – discrete – their suitability in modeling.

UNIT - III:

Generation of random variates – factors for selection – methods – inverse transform – composition – convolution – acceptance – rejection – generation of random variables – exponential – uniform – weibull – normal Bernoullie – Binomial – uniform – poison. Simulation languages – comparison of simulation languages with general purpose languages – Simulation languages vs Simulators – software features – statistical capabilities – G P S S – SIMAN- SIMSCRIPT –Simulation of M/M/1 queue – comparison of simulation languages.

UNIT - IV:

Output data analysis – Types of Simulation with respect to output data analysis – warm up period- Welch algorithm – Approaches for Steady – State Analysis – replication – Batch means methods – comparisons

UNIT –V:

Applications of Simulation – flow shop system – job shop system – M/M/1 queues with infinite and finite capacities – Simple fixed period inventory system – New boy paper problem.

TEXT BOOKS:

1. Simulation Modelling and Analysis by Law, A.M. & Kelton, McGraw Hill, 2nd Edition, New York, 1991.
2. Discrete Event System Simulation by Banks J. & Carson J.S., PH, Englewood Cliffs, NJ, 1984.

REFERENCE BOOKS:

1. Simulation of Manufacturing Systems by Carrie A., Wiley, NY, 1990.
2. A Course in Simulation by Ross, S.M., McMillan, NY, 1990.
3. Simulation Modelling and SIMNET by Taha H.A., PH, Englewood Cliffs, NJ, 1987.

ELLENKI COLLEGE OF ENGINEERING AND TECHNOLOGY
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PROPOSED SYLLABUS
INTELLIGENT MANUFACTURING SYSTEMS
(Professional Elective – III)

M. TECH. I Year II Sem. (CAD/CAM)

L	T	P	C
3	0	0	3

Course Objectives:

1. To understand the computer integrated manufacturing systems
2. To provide an in-depth understanding of components of knowledge based systems
3. To provide an understanding of artificial intelligence
4. To design and develop automated process planning
5. To develop group technology for intelligent manufacturing systems.

Course outcomes: After completing this course, the student will be able to

1. Select the necessary tools for computer integrated manufacturing systems
2. Use appropriate knowledge of components of knowledge based systems
3. Use machine learning techniques for intelligent manufacturing systems
4. Apply the concepts of automated process planning
5. Apply the group technology for intelligent manufacturing systems.

UNIT - I:

Computer Integrated Manufacturing Systems Structure and functional areas of CIM system, - CAD, CAPP, **CAM,** CAQC, ASRS. Advantages of CIM. Manufacturing Communication Systems - MAP/TOP, OSI Model, Data Redundancy, Top- down and Bottom-up Approach, Volume of Information. Intelligent Manufacturing System Components, System Architecture and Data Flow, System Operation.

UNIT - II:

Components of Knowledge Based Systems - Basic Components of Knowledge Based Systems, Knowledge Representation, Comparison of Knowledge Representation Schemes, Interference Engine, Knowledge Acquisition.

UNIT - III:

Machine Learning - Concept of Artificial Intelligence, Conceptual Learning, Artificial Neural Networks - Biological Neuron, Artificial Neuron, Types of Neural Networks, Applications in Manufacturing.

UNIT - IV:

Automated Process Planning - Variant Approach, Generative Approach, Expert Systems for Process Planning, Feature Recognition, Phases of Process planning. Knowledge Based System for Equipment Selection (KBSES) - Manufacturing system design. Equipment Selection Problem, Modeling the Manufacturing Equipment Selection Problem, Problem Solving approach in KBSES, Structure of the KRSES.

UNIT - V:

Group Technology: Models and Algorithms Visual Method, Coding Method, Cluster Analysis Method, Matrix Formation - Similarity Coefficient Method, Sorting-based Algorithms, Bond Energy Algorithm, Cost Based method, Cluster Identification Method, Extended CI Method. Knowledge Based Group Technology - Group Technology in Automated Manufacturing System. Structure of Knowledge based system for group technology (KBSCIT) — Data Base, Knowledge Base, Clustering Algorithm.

REFERENCES:

1 Intelligent Manufacturing Systems/ Andrew Kusiak/Prentice Hall.

2 Artificial Neural Networks/ Yagna Narayana/PHI/2006

3 Automation, Production Systems and CIM / Groover M.P./PHI/2007

ELLENKI COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

PROPOSED SYLLABUS

IOT & INDUSTRY 4.0 (Professional Elective – III)

M. TECH. I Year II Sem. (CAD/CAM)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of this course are

1. To understand the basics of Industry 4.0
2. To understand the Business model and impact of IIoT
3. To understand the concepts of virtual reality, lean manufacturing
4. To gain knowledge of various sensors and actuators.
5. To understand various data transmission technologies.

Course Outcomes: After completion of the course the student will be able to

1. Explain Smart Business Perspective, Cyber security, Impacts of Industry 4.0.
2. Understand the basics of the Industrial Internet of Things.
3. Understand various key technologies.
4. Implement various sensors and actuators.
5. Understand different industrial transmission technologies and IIOT applications in real life

UNIT – I:

Industry 4.0 Basics: Industrial revolution: Phases, Evolution of Industry4.0, Environmental impacts ofindustrial revolution, Applications, Design requirements, Drivers of Industry4.0, Sustainability Assessment of industries, Smart Business Perspective, Cyber security, Impacts of Industry 4.0.

UNIT – II:

Industrial Internet of Things- Basics: IIoT and Industry 4.0, IIC, Industrial Internet Systems, Design of industrial internet systems, Impact of industrial internet, Benefits of industrial internet, Industrial sensing, Industrial Processes, Features of IIoT for industrial processes, Industrial plant–The future architecture, Digital Enterprise

Business Models and Reference Architecture of IIoT: Definition of a business model, Business models of IIoT, Industrial Internet Reference Architecture

UNIT –III:

Key Technologies: Off-site Technologies, Cloud Computing, Fog Computing

Key Technologies: On-site Technologies, Augmented Reality, Virtual Reality, Smart factories, Lean manufacturing system, Big Data and Advanced Analytics

UNIT –IV:

Sensors: Various sensor types and their underlying working principles, Characteristics of Sensors – Resolution, calibration, accuracy and others, Sensor Categories – Thermal, Mechanical, Electrical, Optical and Acoustic sensors.

Actuators: Thermal, Hydraulic, Pneumatic, Electro mechanical Actuator

UNIT – V:

Industrial Data Transmission and Acquisition: Architecture of various data transmission technologies like Foundation Fieldbus, Profibus, Highway Addressable Remote Transducer (HART), Interbus, Bitbus, DigitalSTROM, Controller Area Network, and other recent and upcoming Technologies. Distributed Control System, SCADA and PLC System.

IOT Applications: IoT Applications on Industrial automation, Factories and Assembly line, Plant Security and Safety, Transportation, Agriculture, Healthcare, Home Automation, Oil, Chemical and Pharmaceutical Industry and others.

TEXT BOOK:

1. Introduction to Industrial Internet of Things and Industry 4.0 by Sudip Misra, ChandanaRoy, Anandarup Mukherjee, CRC Press
2. Vijay Madisetti, Arshdeep Bahga, Internet of Things, "A Hands on Approach", University Press.
3. Dr. SRN Reddy, RachitThukral and Manasi Mishra, "Introduction to Internet of Things:A practical Approach", ETI Labs
4. Pethuru Raj and Anupama C. Raman, "The Internet of Things: EnablingTechnologies, Platforms, and Use Cases", CRC Press
5. Adrian McEwen, "Designing the Internet of Things", Wiley.
6. Raj Kamal, "Internet of Things: Architecture and Design", McGraw Hill.
7. Cuno Pfister, "Getting Started with the Internet of Things", O Reilly Media

ELLENKI COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

PROPOSED SYLLABUS

OPTIMIZATION TECHNIQUES AND APPLICATIONS
(Professional Elective – III)

M. TECH. I Year II Sem. (CAD/CAM)

L	T	P	C
3	0	0	3

Pre-requisites: Operations Research

Course Objectives:

1. To know Numerical optimization techniques for single variable non- linear optimizationproblems.
2. To know Numerical optimization techniques for multi variable non- linear optimization problems.
3. To understand Sensitivity analysis on LPP queuing
4. To know integer programming and stochastic planning
5. State of art nontraditional optimization technique, namely genetic algorithm simulatedannealing & particle swarm optimization.

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

1. Apply appropriate optimization techniques and solve for single variable
2. Apply appropriate optimization techniques and solve for multivariables.
3. Make sensitivity analysis to study effect of changes in parameters of LPP on the optimalsolution without reworking.
4. Apply chance constrained algorithm and solve stochastic linear programme.
5. Solve given optimization problem by genetic algorithm or simulated annealing or PSO.

UNIT - I:

Single Variable Non-Linear Unconstrained Optimization: Elimination methods: Uni-Model function- its importance, Fibonacci method & Golden section method. Interpolation methods: Quadratic & Cubicinterpolation methods.

UNIT - II:

Multi variable non-linear unconstrained optimization: Direct search methods – Univariant method, Pattern search methods – Powell's, Hook -Jeeves, Rosenbrock search methods. Gradient methods: Gradient of function& its importance, Steepest descent method, Conjugate direction methods: Fletcher-Reeves method & variable metric method.

UNIT - III:

Linear Programming: Formulation, Simplex method & Artificial variable optimization techniques: Big M &Two phase methods. Sensitivity analysis: Changes in the objective coefficients, constants& coefficients of the constraints. Addition of variables, constraints. Simulation – Introduction – Types- steps – applications: inventory & queuing – Advantages and disadvantages

UNIT - IV:

Integer Programming: Introduction – formulation – Geometry cutting plane algorithm – Zero or one algorithm, branch and bound method

Stochastic Programming: Basic concepts of probability theory, random variables-distributions- mean, variance, correlation, co variance, joint probability distribution. Stochastic linear programming: Chance constrained algorithm.

UNIT - V:

Geometric Programming: Posynomials – Arithmetic - Geometric inequality – unconstrained G.P- constrained G.P ($\leq$ type only)

Non Traditional Optimization Algorithms: Genetics Algorithm-Working Principles, Similarities and Differences between Genetic Algorithm & Traditional Methods. Simulated Annealing-Working Principle- Simple Problems. Introduction to Particle Swarm Optimization (PSO) (very brief)

TEXT BOOKS:

1. Optimization theory & Applications by S.S.Rao, New Age International.
2. Optimization for Engineering Design by Kalyanmoy Deb, PHI

REFERENCE BOOKS:

1. Operations Research by S.D.Sharma
2. Operation Research by H.A.Taha, TMH
3. Optimization in operations research by R.LRardin
4. Optimization Techniques by Benugundu&Chandraputla, Pearson Asia.
5. Optimization Techniques theory and practice by M.C.Joshi, K.M.Moudgalya,Narosa Publications.

ELLENKI COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

PROPOSED SYLLABUS

MECHATRONICS (Professional Elective – IV)

M. TECH. I Year II Sem. (CAD/CAM)

L	T	P	C
3	0	0	3

Course Objectives:

1. To understand the mechatronics systems
2. To provide an in-depth understanding of components of knowledge based systems
3. To provide an understanding of artificial intelligence
4. To design and develop automated process planning
5. To develop group technology for intelligent manufacturing systems.

Course outcomes: After completing this course, the student will be able to

1. Understand and describe different mechatronics systems
2. Explain the principle of operation of various solid state devices.
3. Describe the working of hydraulic and pneumatic actuating systems and use themappropriately.
4. Use program logic controls effectively.
5. Design mechatronic systems.

UNIT – I:

Mechatronics systems, elements, levels of mechatronics system, Mechatronics design process, system, measurement systems, control systems, microprocessor-based controllers, advantages and disadvantages of mechatronics systems. Sensors and transducers, types, displacement, position, proximity, velocity, motion, force, acceleration, torque, fluid pressure, liquid flow, liquid level, temperature and light sensors.

UNIT – II:

Solid state electronic devices, PN junction diode, BJT, FET, DIA and TRIAC. Analog signal conditioning,amplifiers, filtering. Introduction to MEMS & typical applications.

UNIT – III:

Hydraulic and pneumatic actuating systems, Fluid systems, Hydraulic and pneumatic systems, components, control valves, electro-pneumatic, hydro-pneumatic, electro-hydraulic servo systems:Mechanical actuating systems and electrical actuating systems.

UNIT – IV:

Digital electronics and systems, digital logic control, micro processors and micro controllers, programming, process controllers, programmable logic controllers, PLCs versus computers, applicationof PLCs for control.

UNIT – V:

System and interfacing and data acquisition, DAQS, SCADA, A to D and D to a conversions; Dynamicmodels and analogies, System response. Design of mechatronics systems & future trends.

TEXT BOOKS:

1. MECHATRONICS Integrated Mechanical Electronics Systems/K P Ramachandran & GKVijaya Raghavan/WILEY India Edition/2008
2. Mechatronics Electronics Control Systems in Mechanical and Electrical Engineering by WBolton, Pearson Education Press, 3rd edition, 2005.

REFERENCES BOOKS:

1. Mechatronics Source Book by Newton C Braga, Thomson Publications, Chennai.
2. Mechatronics – N. Shanmugam / Anuradha Agencies Publishers.
3. Mechatronics System Design / Devdasshetty/Richard/Thomson.
4. Mechatronics/M. D. Singh/J. G. Joshi/PHI.
5. Mechatronics – Electronic Control Systems in Mechanical and Electrical Engg. 4thEdition, Pearson, 2012 W. Bolton
6. Mechatronics – Principles and Application Godfrey C. Onwubolu, Wlsevier, 2006 Indian print.

ELLENKI COLLEGE OF ENGINEERING AND TECHNOLOGY
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PROPOSED SYLLABUS

MEMS: DESIGN AND MANUFACTURING
(Professional Elective – IV)

M. TECH. I Year II Sem. (CAD/CAM)

L	T	P	C
3	0	0	3

Prerequisites: Electronic Circuits, Basic knowledge in material science

Course Objectives:

1. Basic knowledge on overview of MEMS (Micro electro Mechanical System) and variousfabrication techniques.
2. To design, analysis, fabrication and testing the MEMS based components.
3. To find various opportunities in the emerging field of MEMS.

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

1. Synthesize and characterize nanomaterials for engineering applications
2. Design and analyze methods and tools for micro and nano manufacturing.
3. Improve the quality of MEMS by analyzing the variables of the underlying micro and nanomanufacturing method.
4. Apply the concepts of thermo fluid engineering.
5. Select appropriate industrially-viable process, equipment and tools for a specific product.

UNIT-I:

Overview and working principles of MEMS and Microsystems: MEMS & Microsystems, Evolution of Micro fabrication, Microsystems & Microelectronics, Microsystems & miniaturization, Applications of MEMs in Industries, Micro sensors, Micro actuation, MEMS with Micro actuators Micro accelerometers, Micro fluidics

UNIT-II:

Engineering Science for Microsystems Design and Fabrication: Atomic structure of Matter, Ions and Ionization, Molecular Theory of Matter and Intermolecular Forces, Doping of Semiconductors, The Diffusion Process, Plasma Physics, Electrochemistry, Quantum Physics.

UNIT-III:

Engineering Mechanics for Microsystems Design: Static Bending of Thin plates, Mechanical Vibration, Thermomechanics, Fracture Mechanics, Thin- Film Mechanics, Overview of Finite Element Stress Analysis

UNIT-IV:

Thermo Fluid Engineering & Microsystems Design: Overview of Basics of Fluid Mechanics in Macro and Micro scales, Basic equations in Continuum Fluid Dynamics, Laminar Fluid Flow in Circular Conduits, Computational Fluid Dynamics, Incompressible Fluid Flow in Micro conduits, Fluid flow in Sub micrometer and Nano scale, Overview of Heat conduction in Solids, Heat Conduction in Multilayered Thin films and in solids in sub micrometer scale, Design Considerations, Process Design Mechanical Design, Mechanical design using FEM, Design of a Silicon Die for a Micro pressure sensor.

UNIT-V:

Materials for MEMS & Microsystems and their fabrication: Substrates and Wafers, Active substrate materials, Silicon as a substrate material, Silicon compounds, Silicon Piezo resistors, Gallium Arsenide, Quartz, Piezoelectric Crystals and Polymers, Photolithography, Ion implantation, Diffusion and oxidation, Chemical and Physical vapor deposition, etching, Bulk micro manufacturing, Surface Micromachining, The LIGA Process.

TEXT BOOKS:

1. Tia-Ran Hsu, MEMS & Microsystems. Design & Manufacturing, TMH 2002
2. Foundation of MEMS/ Chang Liu/Pearson, 2012

REFERENCE BOOKS:

1. An Introduction to Microelectromechanical Systems Engineering by Maluf M., Artech House,Boston 2000
2. Micro robots and Micromechanical Systems by Trimmer, W.S.N., Sensors & Actuators, Vol 19,1989.
3. Applied Partial Differential Equations by Trim, D.W., PWS-Kent Publishing, Boston, 1990.

ELLENKI COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

PROPOSED SYLLABUS

FUZZY LOGIC & NEURAL NETWORKS (Professional Elective – IV)

M. TECH. I Year II Sem. (CAD/CAM)

L	T	P	C
3	0	0	3

Course Objective:

1. To cater the knowledge of neural networks and fuzzy logic Control and use these for controlling real time systems.
2. To provide knowledge of adaptive fuzzy system.
3. To learn the concept of artificial neural networks.
4. To apply mapping and recurrent networks.
5. To know the cases studies of neural networks.

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

1. Expose the basic concepts of fuzzy logic control
2. Understand, describe and use adaptive fuzzy system.
3. Know the concept of artificial neural networks.
4. Interpret mapping and recurrent networks.
5. Provide adequate knowledge of application of fuzzy logic control to real time systems.

UNIT- I:

Fuzzy Set Theory and Fuzzy Logic Control: Basic concepts of fuzzy sets- Operations on fuzzy sets- Fuzzy relation equations- Fuzzy logic control- Fuzzification –Defuzzification- Knowledge base- Decision making logic- Membership functions – Rule base.

UNIT- II:

Adaptive Fuzzy Systems: Performance index- Modification of rule base0- Modification of membership functions- Simultaneous modification of rule base and membership functions- Genetic Algorithms- Adaptive fuzzy system- Neuro fuzzy systems.

UNIT- III:

Artificial Neural Networks: Introduction- History of neural networks- multilayer perceptions- Back propagation algorithm and its Variants- Different types of learning, examples.

UNIT- IV:

Mapping and Recurrent Networks: Counter propagation –Self organization Map- Congnitron and Neocognitron- Hopfield Net- Kohonnen Nets- Grossberg Nets- Art-I, Art-II reinforcement learning

UNIT- V:

Case Studies: Application of fuzzy logic and neural networks to Measurement- Control- Adaptive Neural Controllers – Signal Processing and Image Processing

TEXT BOOK:

1. Vallum B. R And Hayagriva V.R C++, Neural networks and Fuzzy logic, BPB Publications, New Delhi, 1996

REFERENCE BOOKS:

1. Fuzzy logic &Neural Networks/ Chennakesava R.Alavala/ New Age International, 2008.
2. Neural Networks for control, Millon W. T, Sutton R.S and Werbos P.J, MIT Press 1992.
3. Fuzzy sets Fuzzy logic, Klir, G.J anfd Yuan B.B Prentice Hall of India Pvt. Ltd., New Delhi.
4. Neural Networks and Fuzzy systems, Kosko. Prentice hall of India Pvt. Ltd., New Delhi 1994.
5. Introduction to Fuzzy control, Dirankov D. Hellendoorn H, Reinfrank M., Narosa Publications House, New Delhi 1996.
6. Introduction to Artificial Neural systems, Zurada J. M Jaico Publishing House, New Delhi, 1994.

ELLENKI COLLEGE OF ENGINEERING AND TECHNOLOGY
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PROPOSED SYLLABUS

SIMULATION OF MANUFACTURING SYSTEMS LAB (Lab - III)

M. TECH. I Year II Sem. (CAD/CAM)

L	T	P	C
0	0	4	2

A. MANUFACTURING SIMULATION

The students will be given training on the use and application of the following software to manufacturing problems:

1. Auto MOD Software.
2. PROMODEL
3. SLAM-II
4. CAFIMS
5. Flexsim

They also learn how to write sub routines in C-language and interlinking with the above packages. Problems for modelling and simulation experiments:

1. AGV planning
2. ASRS simulation and performance evaluation
3. Machines, AGVs and AS/RS integrated problems
4. JIT system
5. Kanban flow
6. Material handling systems
7. M.R.P. Problems
8. Shop floor scheduling etc.

B. PRECISION ENGINEERING

1. Hydraulic and Pneumatic circuits
2. Closed loop control systems
3. Study of the chip formation in turning process
4. Study of operation of tool and cutter grinder, twist drill grinder, Centreless grinder
5. Determination of cutting forces in turning
6. Experiments in unconventional manufacturing processes-AJM and study of USM, EDM, Laser Machining and Plasma spraying
7. Inspection of parts using tool makers microscope, roughness and form tester
8. Study of micro-controllers, programming on various CNC machine tools and also controllers
9. Studies on PLC programming
10. Study and programming of robots
11. Condition monitoring in machining process using acoustic emission.

ELLENKI COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

PROPOSED SYLLABUS

COMPUTER AIDED MANUFACTURING LAB (Lab - IV)

M. TECH. I Year II Sem. (CAD/CAM)

L	T	P	C
0	0	4	2

List of Experiments:

1. CNC programs for turning- 4 exercises
2. CNC programs for milling- 4 exercises
3. Robot programming- Lead through programming using teach product, forward kinematics, inversekinematics, trajectory planning

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PROPOSED SYLLABUS

ENGLISH FOR RESEARCH PAPER WRITING (Audit Course - I & II)

Prerequisite: None

L	T	P	C
2	0	0	0

Course objectives: Students will be able to:

- Understand that how to improve your writing skills and level of readability
- Learn about what to write in each section
- Understand the skills needed when writing a Title Ensure the good quality of paper at very first-time submission

UNIT-I:

Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs andSentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

UNIT-II:

Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising, Paraphrasing andPlagiarism, Sections of a Paper, Abstracts. Introduction

UNIT-III:

Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.

UNIT-IV:

key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature,

UNIT-V:

skills are needed when writing the Methods, skills needed when writing the Results, skills are neededwhen writing the Discussion, skills are needed when writing the Conclusions

UNIT-VI:

useful phrases, how to ensure paper is as good as it could possibly be the first- time submission

TEXT BOOKS/ REFERENCES:

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books).
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press.
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman's book.
4. Adrian Wallwork, English for Writing Research Papers, Springer New York Dordrecht HeidelbergLondon, 2011.

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PROPOSED SYLLABUS

DISASTER MANAGEMENT (Audit Course - I & II)

Prerequisite: None

L	T	P	C
2	0	0	0

Course Objectives: Students will be able to

- learn to demonstrate a critical understanding of key concepts in disaster risk reduction andhumanitarian response.
- critically evaluate disaster risk reduction and humanitarian response policy and practice frommultiple perspectives.
- develop an understanding of standards of humanitarian response and practical relevance inspecific types of disasters and conflict situations.
- critically understand the strengths and weaknesses of disaster management approaches,
- planning and programming in different countries, particularly their home country or the countriesthey work in

UNIT-I:

Introduction:

Disaster: Definition, Factors and Significance; Difference Between Hazard and Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude.

UNIT-II:

Repercussions of Disasters and Hazards:

Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills,Outbreaks Of Disease And Epidemics, War And Conflicts.

UNIT-III:

Disaster Prone Areas in India:

Study of Seismic Zones; Areas Prone To Floods and Droughts, Landslides and Avalanches; Areas Prone To Cyclonic and Coastal Hazards With Special Reference To Tsunami; Post-Disaster DiseasesAnd Epidemics

UNIT-IV:

Disaster Preparedness and Management:

Preparedness: Monitoring of Phenomena Triggering A Disaster or Hazard; Evaluation Of Risk: Application of Remote Sensing, Data From Meteorological and other Agencies, Media Reports: Governmental And Community Preparedness.

UNIT-V:

Risk Assessment Disaster Risk:

Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co-Operation In Risk Assessment and Warning, People's Participation In Risk Assessment. Strategies for Survival.

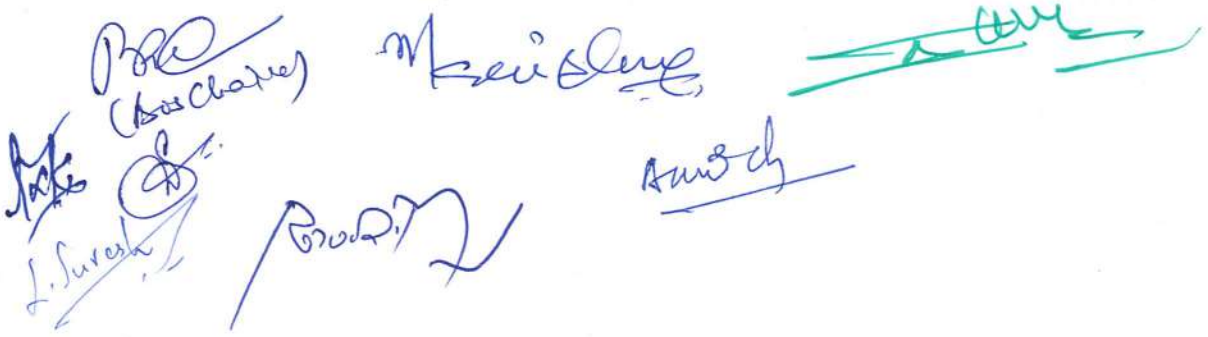
UNIT-VI:

Disaster Mitigation:

Meaning, Concept and Strategies of Disaster Mitigation, Emerging Trends In Mitigation. StructuralMitigation and Non-Structural Mitigation, Programs Of Disaster Mitigation In India.

TEXT BOOKS/ REFERENCES:

1. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies "'NewRoyal book Company.
2. Sahni, Pardeep et. al. (Eds.)," Disaster Mitigation Experiences and Reflections", Prentice Hall OfIndia, New Delhi.
3. Goel S. L, Disaster Administration and Management Text and Case Studies", Deep &DeepPublication Pvt. Ltd., New Delhi.



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PROPOSED SYLLABUS
SANSKRIT FOR TECHNICAL KNOWLEDGE (Audit Course - I & II)

Prerequisite: None

L	T	P	C
2	0	0	0

Course Objectives:

- To get a working knowledge in illustrious Sanskrit, the scientific language in the world
- Learning of Sanskrit to improve brain functioning
- Learning of Sanskrit to develop the logic in mathematics, science & other subjects enhancing thememory power
- The engineering scholars equipped with Sanskrit will be able to explore the huge knowledge fromancient literature

Course Outcomes: Students will be able to

- Understanding basic Sanskrit language
- Ancient Sanskrit literature about science & technology can be understood
- Being a logical language will help to develop logic in students

UNIT-I:
Alphabets in Sanskrit,

UNIT-II:
Past/Present/Future Tense, Simple Sentences

UNIT-III:
Order, Introduction of roots,

UNIT-IV:
Technical information about Sanskrit Literature

UNIT-V:
Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics

TEXT BOOKS/ REFERENCES:

1. "Abhyaspustakam" – Dr. Vishwas, Samskrita-Bharti Publication, New Delhi
2. "Teach Yourself Sanskrit" Prathama Deeksha-Vempati Kutumbshastri, Rashtriya SanskritSansthanam, New Delhi Publication
3. "India's Glorious Scientific Tradition" Suresh Soni, Ocean books (P) Ltd., New Delhi.

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PROPOSED SYLLABUS

VALUE EDUCATION (Audit Course - I & II)

Prerequisite: None

L	T	P	C
2	0	0	0

Course Objectives: Students will be able to

- Understand value of education and self- development
- Imbibe good values in students
- Let the should know about the importance of character

Course outcomes: Students will be able to

- Knowledge of self-development
- Learn the importance of Human values
- Developing the overall personality

UNIT-I:

Values and self-development –Social values and individual attitudes. Work ethics, Indian vision of humanism. Moral and non- moral valuation. Standards and principles. Value judgements

UNIT-II:

Importance of cultivation of values. Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness. Honesty, Humanity. Power of faith, National Unity. Patriotism. Love for nature, Discipline

UNIT-III:

Personality and Behavior Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline, Punctuality, Love and Kindness.

UNIT-IV:

Avoid fault Thinking. Free from anger, Dignity of labour. Universal brotherhood and religious tolerance. True friendship. Happiness Vs suffering, love for truth. Aware of self-destructive habits. Association andCooperation. Doing best for saving nature

UNIT-V:

Character and Competence –Holy books vs Blind faith. Self-management and Good health. Science ofreincarnation, Equality, Nonviolence, Humility, Role of Women. All religions and same message. Mindyour Mind, Self-control. Honesty, Studying effectively

TEXT BOOKS/ REFERENCES:

1. Chakroborty, S.K. "Values and Ethics for organizations Theory and practice", Oxford UniversityPress, New Delhi

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PROPOSED SYLLABUS

CONSTITUTION OF INDIA (Audit Course - I & II)

Prerequisite: None

L	T	P	C
2	0	0	0

Course Objectives: Students will be able to:

- Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
- To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

Course Outcomes: Students will be able to:

- Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
- Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
- Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] underthe leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
- Discuss the passage of the Hindu Code Bill of 1956.

UNIT-I:

History of Making of the Indian Constitution: History Drafting Committee, (Composition & Working)

UNIT-II:

Philosophy of the Indian Constitution: Preamble, Salient Features

UNIT-III:

Contours of Constitutional Rights & Duties: Fundamental Rights Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties.

UNIT-IV:

Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualification, Powers and Functions

UNIT-V:

Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation.Pachayati raj: Introduction, PRI: Zila Pachayat. Elected officials and their roles, CEO Zila Pachayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

UNIT-VI:

Election Commission: Election Commission: Role and Functioning. Chief Election Commissioner andElection Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for thewelfare of SC/ST/OBC and women.

TEXT BOOKS/ REFERENCES:

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

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PROPOSED SYLLABUS

PEDAGOGY STUDIES (Audit Course - I & II)

Prerequisite: None

L	T	P	C
2	0	0	0

Course Objectives: Students will be able to:

- Review existing evidence on the review topic to inform programme design and policy makingundertaken by the DfID, other agencies and researchers.
- Identify critical evidence gaps to guide the development.

Course Outcomes: Students will be able to understand:

- What pedagogical practices are being used by teachers in formal and informal classrooms indeveloping countries?
- What is the evidence on the effectiveness of these pedagogical practices, in what conditions, andwith what population of learners?
- How can teacher education (curriculum and practicum) and the school curriculum and guidancematerials best support effective pedagogy?

UNIT-I:

Introduction and Methodology: Aims and rationale, Policy background, Conceptual framework and terminology Theories of learning, Curriculum, Teacher education. Conceptual framework, Research questions. Overview of methodology and Searching.

UNIT-II:

Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. Curriculum, Teacher education.

UNIT-III:

Evidence on the effectiveness of pedagogical practices, Methodology for the indepth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the scho curriculum and guidance materials best support effective pedagogy? Theory of change. Strength and nature of the body of evidence for effective pedagogical practices. Pedagogic theory and pedagogical approaches. Teachers' attitudes and beliefs and Pedagogic strategies.

UNIT-IV:

Professional development: alignment with classroom practices and follow-up support, Peer support, Support from the head teacher and the community. Curriculum and assessment, Barriers to learning: limited resources and large class sizes

UNIT-V:

Research gaps and future directions: Research design, Contexts, Pedagogy, Teacher education, Curriculum and assessment, Dissemination and research impact.

TEXT BOOKS/ REFERENCES:

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31(2): 245-261.
2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal ofCurriculum Studies, 36 (3): 361-379.
3. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher educationresearch project (MUSTER) country report 1. London: DFID.
4. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282.
5. Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.
6. Chavan M (2003) Read India: A mass scale, rapid, 'learning to read' campaign.
7. www.pratham.org/images/resource%20working%20paper%202.pdf.

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PROPOSED SYLLABUS

STRESS MANAGEMENT BY YOGA (Audit Course - I & II)

Prerequisite: None

L	T	P	C
2	0	0	0

Course Objectives:

- To achieve overall health of body and mind
- To overcome stress

Course Outcomes: Students will be able to:

- Develop healthy mind in a healthy body thus improving social health also
- Improve efficiency

UNIT-I:

Definitions of Eight parts of yog. (Ashtanga)

UNIT-II:

Yam and Niyam.

UNIT-III:

Do`s and Don't's in life.

i) Ahinsa, satya, astheya, bramhacharya and aparigraha

ii) Shaucha, santosh, tapa, swadhyay, ishwarpranidhan

UNIT-IV:

Asan and Pranayam

UNIT-V:

i) Various yog poses and their benefits for mind & body

ii) Regularization of breathing techniques and its effects-Types of pranayam

TEXT BOOKS/ REFERENCES:

1. 'Yogic Asanas for Group Tarining-Part-I": Janardan Swami Yogabhyasi Mandal, Nagpur
2. "Rajayoga or conquering the Internal Nature" by Swami Vivekananda, Advaita Ashrama (Publication Department), Kolkata

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PROPOSED SYLLABUS

PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS (Audit Course - I & II)

Prerequisite: None

L	T	P	C
2	0	0	0

Course Objectives:

- To learn to achieve the highest goal happily
- To become a person with stable mind, pleasing personality and determination
- To awaken wisdom in students

Course Outcomes: Students will be able to

- Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality andachieve the highest goal in life
- The person who has studied Geeta will lead the nation and mankind to peace and prosperity
- Study of Neetishatakam will help in developing versatile personality of students

UNIT-I:

Neetisatakam-Holistic development of personality

- Verses- 19,20,21,22 (wisdom)
- Verses- 29,31,32 (pride & heroism)
- Verses- 26,28,63,65 (virtue)

UNIT-II:

Neetisatakam-Holistic development of personality

- Verses- 52,53,59 (dont's)
- Verses- 71,73,75,78 (do's)

UNIT-III:

Approach to day to day work and duties.

- Shrimad Bhagwad Geeta: Chapter 2-Verses 41, 47,48,
- Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23, 35,
- Chapter 18-Verses 45, 46, 48.

UNIT-IV:

Statements of basic knowledge.

- Shrimad Bhagwad Geeta: Chapter2-Verses 56, 62, 68
- Chapter 12 -Verses 13, 14, 15, 16,17, 18
- Personality of Role model. Shrimad Bhagwad Geeta:

UNIT-V:

- Chapter2-Verses 17, Chapter 3-Verses 36,37,42,
- Chapter 4-Verses 18, 38,39
- Chapter18 – Verses 37,38,63

TEXT BOOKS/ REFERENCES:

1. "Srimad Bhagavad Gita" by Swami Swarupananda Advaita Ashram (Publication Department),Kolkata.
2. Bhartrihari's Three Satakam (Niti-sringar-vairagya)by P.Gopinath, Rashtriya SanskritSansthanam, New Delhi.