



**INDIRA COLLEGE OF EN**  
**Approved By AICTE New Delhi, D**

**ACADEM**

**COUF**

**COURSE**

YEAR	COURSE CODE	COURSE NAME	COURSE OUTCOME NO.
	107001	Engineering Mathematics-I	107001.1
			107001.2
			107001.3
			107001.4
			107001.5
			107001.6
	107002	Engineering Physics	107002.1
			107002.2
			107002.3
			107002.4
			107002.5
			107002.6
	107009	Engineering Chemistry	107009.1
			107009.2
			107009.3
			107009.4
			107009.5
			107009.6

FE (SEM-I,TERM-I)	101005	Basic Civil and Environmental Engineering	101005.1
			101005.2
			101005.3
			101005.4
			101005.5
	102006	Engineering Graphics I	102006.1
			102006.2
			102006.3
			102006.4
			102006.5
			102006.6
	110003	Fundamentals of Programming languages I	110003.1
			110003.2
			110003.3
	103004	Basic Electrical Engineering	103004.1
			103004.2
			103004.3
			103004.4
			103004.5
			103004.6
	104012	Basic Electronics Engineering	104012.1
			104012.2
			104012.3
			104012.4
			104012.5
	111007	Workshop Practices	111007.1
			111007.2
			111007.3
			111007.4
			111007.5
			111007.6
	107008	Engineering Mathematics-II	107008.1
			107008.2
			107008.3
			107008.4
			107008.5

<b>FE (SEM-II,TERM-II)</b>			107008.6
	110010	Fundamentals of Programming languages II	110010.1
			110010.2
			110010.3
			110010.4
	101011	Engineering Mechanics	101011.1
			101011.2
			101011.3
			101011.4
			101011.5
	102013	Basic Mechanical Engineering	102013.1
			102013.2
			102013.3
			102013.4
			102013.5
			102013.6
	102014	Engineering Graphics II	102014.1
			102014.2
			102014.3
			102014.4
			102014.5

# ENGINEERING AND MANAGEMENT

## TE (MS) and Affiliated to Pune University

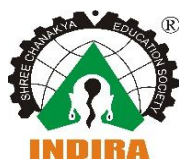
11IC YEAR 2019-20

### COURSE OUTCOMES

PATTERN 2015 ( FE)
COURSE OUTCOMES
System of linear equation arising in all engineering fields, using matrix methods, stability of engineering system where knowledge of Eigen values and Eigen vectors are essentials.
Solving algebraic and transcendental equations using Complex Numbers, applications of Hyperbolic & logarithmic functions.
Use Successive Differentiation and Integral Calculus to solve engineering problems.
Engineering applications of Expansion of function and indeterminate form
Solve engineering problems using Partial differentiation
Jacobian, Stationary values of functions (Maxima & Minima), arising in optimization problems. Estimate the maxima & minima of multivariable functions
Educate in the principles of optical science and engineering necessary to understand optical systems, The study of sound waves & Applications of acoustic technology include music.
The advanced Application of High frequency sound waves.
Study various methods to produce Polarised light & Application ,Advance applications of Laser & the different types of Laser
The initial parts of the Topic will be used to establish solid understanding of aspects of electrical conduction in semiconductors, The Topic is useful to understand the physics of semiconductor devices and the principals of their operation.
Be familiar with the time-independent and time-dependent Schrodinger equations, and be able to solve them in simple examples and It will accurately Explain the fundamental structure of quantum mechanics as simple as possible
Provide basic knowledge of superconductivity & their applications in Technology, Basic Things about Nano & cost effective methods to synthesize Nanoparticles. & their applications in Technology.
Analyse the quality of water & to develop innovative methods to produce soft water for industrial use and potable water. Realize the basic concept of Green chemistry.
Analyse materials quantitatively using different electroanalytical techniques (Potentiometry, pH-metry, conductometry, spectrophotometry) for quick and accurate results
Integrate knowledge of synthesis of commercially important polymer.
Evaluate the quality of fossil fuel & Develop a systematic approach to calculate stoichiometric amount of air as required for combustion.
Understand various techniques used for the production of hydrogen & problems in using hydrogen as future fuel. List main allotropes of carbon & discuss structure, properties and applications of carbon allotropes.
Identify the type of Corrosion & Apply their knowledge for protection of metals from corrosion.

Understand the role of civil engineer and the various areas in civil engineering
Identify the various material used in constrution with specifications
Explain requirement of town planning and various building planning principals
Describe impact of construction on environment Explain different materials especially eco-friendly materials and safety measures to be adopted at any construction site
identify various types of energy sources and pollution
Ability to Imagine and Sketch Engineering Objects with better understanding of planes.
Ability to perform basic sketching technique will improve.
Students will be able to sketch solid objects.
Geometric construction of engineering curves with hand tools along with development of solids.
Sketch orthographic projections along with sectional views for engineering communication.
Sketch isometric projections of 3D objects along with the realisation of dimensions.
Use modular programming approach in diversified problem domains
Apply programming logic to solve real world problems
Decide effectiveness of computer based solutions
Prerequisite: Knowledge about I, V, R ,RTC, Insulation Resistance, Conversion of one system of energy to other system
Ability to identify electric and magnetic circuits.
Understand Fundamentals of single phase transformers and Electrostatics.
Understand the concept of effective, or rms value, Average value, relationship between sinusoids and phasors.
Ability to analyze circuits in the frequency domain, concepts of impedance and admittance, relationships between real, reactive, and apparent power, analyze balanced three phase circuits.
Provide solution for the network by applying various laws and theorems.
To acquire the basics of Diodes and Transistor circuits .
To understand working of some IC based circuits.
To get knowledge of logic gates and their usage in digital circuits.
To expose the students to working of some power electronic devices, transducers and applications of transducers.
To introduce basic aspects of electronic communication systems.
acquire skills in basic engineering practice
acquire measuring skills
acquire practical skills in the trades.
identification of the hand tools and instruments
knowledge of core technical subjects for making and working of any type of project
recognize the importance of safety while dealing with equipments
Formation and solving of differential equation for formation of mathematical modeling.
Solve engineering problems using differential equations and develop mathematical models for varied engineering applications
Expansion of Fourier series. Use of multiple integral to formulate various engineering problems
Ability to trace the curve – Cartesian, Polar, Rose curve
Understand and visualization of solid geometry.

Ability to solve multivariate integral and applying it to finding MI, CG etc.
Develope programs using object oriented concepts
Design and develope web pages
Design and develope mobile application
Design and develope simple application using Embedded Programming
Classify various force systems, employ composition and resolution of forces and Interpret and solve equilibrium equations to coplanar and concurrent space force system.
Able to find centre of gravity
Apply dynamics concepts – force, momentum, work and energy to solve problems.
Calculate the motion characteristics of a body subjected to a given force system
Analyze planar and spatial systems to determine the forces in members of trusses, frames and problems related to friction
identification and understanding of mechanical elements and power transmission devices
understanding of material properties, mechanisms and design procedures
Understanding and identification of different manufac turing processes
understanding conventional machine tool
Understand and evaluate basic concepts of thermodynamics and applied to industrial applications.
Understand laying pinciples of energy conversion sysytem and power plants
Students will understand and apply basic drawing skills using Computer Assisted Drafting
Students will get basic exposure to solid modeling software.
Students will become familiar with AutoCAD 2 dimensional drawing.
Student's ability to understand and provide dimensions to objects will increase.
Students will be able to generate orthographic and isometric views of 3 dimensional components using AutoCAD software.



**INDIRA COLLEGE OF ENGINEERING**  
**Approved By AICTE New Delhi, DTE (MS) and A**

**ACADEMIC YEAR 2019**

**COURSE OUTCOMES**

COURSE PATTERN 2015 ( SI			
SE(CIVIL)			
YEAR	COURSE CODE	COURSE NAME	COURSE OUTCOME NO.
SE (SEM-III,TERM-I)	201001	Building Technology and Materials	201001.1
			201001.2
			201001.3
			201001.4
			201001.5
			201001.6
	207001	Engineering Mathematics III	207001.1
			207001.2
			207001.3
			207001.4
			207001.5
			201002.1
			201002.2
			201002.3

	201002	Strength of Materials	201002.4
			201002.5
			201002.6
	201003	Geotechnical Engineering	201003.1
			201003.2
			201003.3
			201003.4
			201003.5
			201003.6
			201003.7
	201006	Surveying	201006.1
			201006.2
			201006.3
			201006.4
	201004	Fluid Mechanics-I	201004.1
			201004.2
			201004.3
			201004.4
			201004.5
			201004.6
	201005	Structural Planning and Design of Bu	201005.1
			201005.2
			201005.3
			201005.4

SE (SEM-IV,TERM-II)			201005.5
	201008	Structural Analysis I	201008.1
			201008.2
			201008.3
			201008.4
			201008.5
			201008.6
	207009	Engineering Geology	207009.1
			207009.2
			207009.3
			207009.4
			207009.5
			207009.6
			207009.7
			207009.8
	201007	Concrete Technology	201007.1
			201007.2
			201007.3
			201007.4
			201007.5
			201007.6
COURSE PATTERN 2015 ( T			
TE(CIVIL)			
YEAR	COURSE CODE	COURSE NAME	COURSE OUTCOME NO.

			301004.01
			301004.02
	301004	Structural Analysis II	301004.03
			301004.04
			301004.05
TE (SEM-V, TERM-I)	301002	Infrastructure Engineering	301002.01
			301002.02
			301002.03
			301002.04
			301002.05
	301003	Structural Design I	301003.01
			301003.02
			301003.03
			301003.04
			301003.05
			301003.06
	301004	Fluid Mechanics II	301004.01
			301004.02
			301004.03
			301005.04
			301004.05
			301004.06
			301005.01
			301005.02

	301005	Technology and Water Resources Engineering	301005.03
			301005.04
			301005.05
			301005.06
			301005.07
	301006	Employable Skill Development	301006.01
			301006.02
			301006.03
			301006.04
			301006.05
			301006.06
	301007	Advanced Surveying	301007.01
			301007.02
			301007.03
			301007.04
			301007.05
	301008	Project Management and Engineering Economics	301008.01
			301008.02
			301008.03
			301008.04
			301008.05
			301010.01

<b>TE (SEM-VI,TERM-II)</b>	301010	Structural Design II	301010.02
			301010.03
			301010.04
			301010.05
			301010.06
	301011	Enviromental Engineering	301011.01
			301011.02
			301011.03
			301011.04
			301011.05
			301011.06
	301009	Foundation Engineering	301009.01
			301009.02
			301009.03
			301009.04
			301009.05
			301009.06
	301012	inar & amp; Technical communica	301012.01
			301012.02
			301012.03

			301012.04
			301012.05
			301012.06
<b>COURSE PATTERN 2015 ( B</b>			
<b>BE(CIVIL)</b>			
<b>YEAR</b>	<b>COURSE CODE</b>	<b>COURSE NAME</b>	<b>COURSE OUTCOME NO.</b>
<b>BE(SEM-VII,TERM-I)</b>	401001	Environmental Engineering – II	401001.01
			401001.02
			401001.03
			401001.04
			401001.05
			401001.06
	401002	Transportation Engineering	401 002.1
			401 002.2
			401 002.3
			401 002.4
			401 002.5
			401 002.6
	401003	Structural Design III	401003.01
			401003.02
			401003.03
			401003.04
			401003.05
			401003.06
			401 004.1

	401 004 (ELE-I)	Advanced Concrete Technology	401 004.2
			401 004.3
			401 004.4
			401 004.5
	401 004 (ELE-I)	Systems Approach in Civil Engineering	401 004.1
			401 004.2
			401 004.3
			401 004.4
			401 004.5
	401 005 (ELE-II)	TQM & MIS in Civil Engineering	401 005.1
			401 005.2
			401 005.3
			401 005.4
			401 005.5
	401007	Dams and Hydraulics Structures	401007.01
			401007.02
			401007.03
			401007.04
			401007.05
	401 008	Quantity Surveying, Contracts and Tenders	401 008.1
			401 008.2
			401 008.3
			401 008.4
			401 008.5
			401 008.6
			401 009.1
			401 009.2

BE (SEM-VIII,TERM-II)	401 009 (ELE-III)	Air Pollution and control	401009.3
			401 009.4
			401009.5
			401 009.6
	401 010 (ELE-IV)	Construction Management	401 010.1
			401 010.2
			401 010.3
			401 010.4
	401 006	Project	401 006.1
			401 006.2
			401 006.3
			401 006.4
			401 006.5
			401 006.6
			401 006.7

# AND MANAGEMENT

Affiliated to Pune University

1-20

E)
<b>COURSE OUTCOMES</b>
Identify types of building and basic requirements of building components.
Explain types of masonry, formwork, casting procedure and necessity of underpinning and scaffolding
Elucidate different types of flooring and roofing materials
Describe types of doors, windows, arches and lintel
Illuminate means of vertical circulation and protective coatings
Explain different materials especially eco-friendly materials and safety measures to be adopted at any construction site.
Solve higher order linear differential equations and apply to civil engineering problems such as bending of beams and whirling of shafts
Solve system of linear equations using direct and iterative numerical techniques and develop solutions to ordinary differential equations using single step and multistep methods applied to structural systems
Apply statistical methods like correlation, regression analysis in analyzing and interpreting experimental data and probability theory applied to construction management.
Perform vector differentiation and integration, analyze the vector fields and apply to fluid flow problems
Solve various partial differential equations such as wave equation, one and two dimensional heat flow equations.
Compute different type of stresses in determinate, indeterminate, homogeneous and composite structures
Develop bending and shear stress diagram.
Determine the torsional stresses and stresses due to strain energy for different loading conditions

Explain the concept of principal stresses due to combined loading and able to compare the values of analytical and graphical (Mohr's circle) method
Plot loading diagram, Shear Force Diagram (SFD) and Bending Moment Diagram (BMD).
Analyze axially and eccentrically loaded column.
Differentiate the different types of soil and their engineering properties and classify them
Determine the soil properties in laboratory and develop a proficiency in handling experimental data
Understand of the concept of effective stress and its influence on soil behavior.
Develop an understanding of the influence of water flow on the engineering behaviour of soils
Analyze engineering properties like compaction, permeability, soil shear strength
Compute the lateral thrust due to backfill on the retaining walls.
Classify soil slopes and identify their modes of failure
Operate and use surveying equipment
Draw plan or map of the existing permanent features on the ground
Classify the ground features from the map or plan
Analyze temporary adjustments and check permanent adjustments of the Theodolite
Use fluid properties, dimensional analysis for solving problems of fluid flow.
Solve fluid statics problems
Measure fluid pressure
Calibrate discharge measuring instrument like venturimeter, orifice meter
Distinguish between various types of fluid flows and find the fluid velocity using principles of Kinematics and Dynamics.
Design pipes to carry particular amount of discharge
Make use of principles of planning and principles of architectural Planning
Analyze the available primary or secondary data and plan different types of structures considering futuristic need of an area
Improve the status of existing structures by proposing appropriate green measures
Plan effectively various types of buildings according to their utility with reference to different codes

Understand and resolve contemporary issues at multi-dimensional functional levels.
Understand the basic concept of static and kinematic indeterminacy, slope and deflection of determinate and indeterminate beams for analysis of structures
Analyze indeterminate beams structures and frames
Evaluate determinate and indeterminate trusses and its application in the field.
Apply influence line diagrams for the analysis of structures under moving load
Analyze two and three hinged arches and its application
Apply plastic analysis for indeterminate steel structures by limits state method
Explain the basic concepts of engineering geology
Differentiate between the different rock types, their inherent characteristics and their application in civil engineering
Understand physical properties, mechanical properties of the minerals and their application in civil engineering.
Identify favourable and unfavourable conditions for the buildings, roads, dam, tunneling etc through the rocks
Explain mass wasting processes, effects of mass wasting process on the civil engineering structures and remedial measures
Interpret geohydrological characters of the rocks present at the foundations of the dams, percolation tanks, tunnels.
Understand Seismic activities and its effect on the civil engineering construction
Identify geological hazards and presence of ground water
Understand chemistry, properties, and classification of cement, fly ash, aggregates and admixtures, and hydration of cement in concrete
Prepare and test the fresh concrete
Predict deteriorations in concrete and repair it with appropriate methods and techniques
Design concrete mix of desired grade
Get acquainted to concrete handling equipments and different special concrete types
Test hardened concrete with destructive and nondestructive testing instruments
E)
<b>COURSE OUTCOMES</b>

Analyse static indeterminate structures by classical displacement methods
Analyse static indeterminate structures by flexibility matrix method
Analyse static indeterminate structures by stiffness matrix method
Analyse statically determinate beams by finite difference method and describe applications of finite element method to one and two dimensional problems.
Analyse multistory frames for gravity loads and lateral loads by approximate methods
Able to explain the provisions made for infrastructural sectors in the five year plan
Able to describe the components of permanent way of railways
Able to explain the techniques and equipment used for dredging, dewatering and formwork
Able to illustrate types of tunnels and their construction techniques
Able to explain docks and harbors 6. Able to describe and analyze different types of earth moving equipment
Able to determine the ultimate tensile capacity of steel members and design tension members
Able to analyze and design compression members
Able to find flexural strength of steel beams and to design the beams for given loading
Able to analyze the loads and their effects on plate girder and design of the plate girder
Able to analyze the loads and their effects on gantry girder and design of the gantry girder
Able to design an industrial steel building using I.S 800;2007
Able to analyze flow around object and apply it to civil engineering problems
Able to explain unsteady flow.
Able to describe open channel flow and its application in depth - discharge relationship in various types of flow
Able to demonstrate GVF and RVF in open channel.
Able to analyze the flow of jet and its application.
Able to explain terms related to hydropower plants
Able to describe the hydrologic cycle and analyze the precipitation data.
Able to explain the stream gauging.

Able to explain the methods of irrigation and assess the canal revenue.
Able to describe the ground water hydrology
Able to analyze the flood frequency and runoff hydrograph.
Able to characterize the various terms related to reservoir planning.
Able to explain the lift irrigation schemes and process of water logging
Able to exhibit critical thinking & assertiveness while speaking on both technical and non-technical topics.
Able to confidently participate in and lead group discussions and contribute significantly to the outcomes.
Able to analyze a project under execution or already
Able to develop self-learning habits through uses of available resources and improve Employability of self.
Able to be a member as well as a leader of project teams
Able to compile data and write effective reports
Able to carry out field geodetic survey and apply triangulation adjustment with modern equipment's
Able to perform Geodetic trigonometric leveling
Able to perform hydrographic survey and get solution for problems related to it
Able to describe aerial photography and applications in civil engineering
Able to explain Remote sensing and GIS and its application in civil engineering field
Able to explain the importance, objective, and functions of project management
Able to analyze the network for planning and scheduling of project.
Able to apply project monitoring, resource allocation using project management software's
Able to apply a engineering economics in construction industry
Able to apply concept of material management and implement safety norms Able to evaluate project appraisal and prepare project feasibility report and Detailed Project report
Able to distinguish different design philosophies of design of R.C structures and analyze the limitations and advantages of each

Able to apply different limit states for singly and doubly reinforced, balanced beam section and to design one way slabs
Able to design two way slabs and staircases
Able to design flexural members.
Able to design flexural members for shear, bond, torsion and design continuous beam with concept of redistribution of moments
Able to design column and column footing
Able to describe sources and effects of noise and air pollution, evaluate its quality as per BIS.
Able to identify a suitable water intake structure, describe water supply scheme and define water demand for a community.
Able to design Aeration and Sedimentation processes with due importance to quality of water as per BIS.
Able to design Coagulation, Flocculation and Filtration processes used for raw water treatment
Able to describe disinfection, water softening methods, demineralization, adsorption along with fluoridation and defluoridation techniques.
Able to describe Rain water harvesting, packaged Water treatment plant and determine the capacity of ESR.
Able to execute soil exploration
Ability to calculate bearing capacity of all type of foundations with respect to soil conditions.
Proficient to analyze consolidation and time rate settlements and able to recognize basic consolidation theory
Able to classify piles and their uses, and calculate the load carrying capacity
Able to describe sheet piles and problems associated with BC soil
Able to evaluate liquefaction potential and explain Geosynthetics and its application
Perform close and critical readings of the literature of topic of interest
Evaluate, credit, and synthesize sources of the selected seminar topic
Identify the disciplinary context for different kinds of writing, including both informal writing (like scientific note taking) and formal writing (like report writing)

Draft a report consistent with expectations of the discipline, including an appropriate organization, style, voice and tone

Perform critical readings of their own writing and proofreading

Demonstrate an understanding of the unique demands

E)

## **COURSE OUTCOMES**

Able to characterize sewage and design a sewage collection system.

Able to describe stream sanitation and design of primary treatment of sewage

Able to analyze and design secondary (biological) sewage treatment units for STP.

Able to analyze and design low cost sewage treatment methods

Able to analyze and design anaerobic treatment units

Able to explain different industrial waste water treatment methods

Able to explain necessity of highway planning, classification of roads and to determine length of different category roads.

Able to describe traffic characteristics and traffic studies.

Able to design geometric elements and structural design of rigid and flexible pavement.

Able to perform test on aggregate, bitumen as per IRC standards and explain the construction procedure of various types of roads.

Able to explain airport planning layout, orientation and to calculate basic runway length.

Able to calculate hydraulic parameters related to bridge, explain types of bridge and their components.

Able to describe various systems of prestressing and analyze member strength

Able to design Prestressed member for flexure and shear

Able to do load calculations and load transfer phenomenon

Able to analyze the frame structure for different load combinations

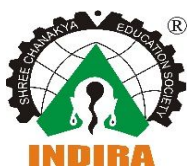
Able to design and detailing of floor beam in a frame

Able to design and detailing of different elements of special structures like retaining walls, liquid retaining structures, combined footings and their behavior under load

Able to describe types of cement and aggregate to be used as a concrete and explain properties of concrete.

Able to explain special types of concrete and their properties.
Able to design special types of concrete mix of specified strength and able to describe various nondestructive test.
Able to know properties of concrete fiber like GFRC, SFRC and SIFCON.
Able to describe ferrocement analysis and design of prefabricated concrete structural element.
Able to formulate civil engineering problems in linear programming.
Able to use concept of operation research for various engineering problems.
Able to apply dynamic programming for civil engineering.
Able to use nonlinear programming techniques for solving engineering problems.
Able to apply game theory .
Explain the concept of quality in construction along with various terms of evolution.
Application of six sigma in construction industry.
Understand concept of quality manual and quality circle.
Application of 5 S technique and zero defect
Explain importance of MIS in construction
Able to analyse and ,design gravity dam ,earthen dam and check its stability
Able to explain generalized information regarding dams
Able to design hydraulic structures
Able to explain river training methods and design of guide bund
Able to explain hydropower engineering with respect to its components and functions
Able to describe types of estimates and importance of approximate estimates.
Able to prepare detailed estimate for Civil Engg. Structures.
Able to choose suitable method of valuation of property and implement it.
Able to draft suitable specifications to meet expectations of client and prepare rate analysis.
Able to explain execution of works in PWD and Tendering.
Able to illustrate meaning, validity, conditions and laws of contract.
Understand meteorological aspects governing the air pollution.
Comprehend sampling and analysis of ambient air.

Describe and understand causes, sources, effects, measurement methods and control measures of indoor air pollution.
Understand various processes and equipments used for control of air pollution
Understand economics of air pollution control and legislations used for air pollution control.
Comprehend methodology of environmental impact assessment and management and know environmental impacts of various industries.
Able to understand concept of construction management by considering , risk management, material management & Human resource management.
Able to apply the basics of construction scheduling, work study & work measurement.
Able to understand Labour laws and financial aspects of construction projects Labour laws
Able to understand the basics of Artificial Intelligence Techniques in construction management.
convert an open ended problems statement into a statement of proposed work.
Decompose problem/task in to subtask and establish a methodology and process by which progress may be evaluated.
select and apply appropriate methods/models or mathematical simulation of the real world and analyze the data to provide information for decisions.
perform feasibility analysis and evaluates quality of solutions to select the best one.
Produce usable documents of record regarding the design process.
Colaborate with team members to achieve a common goal.
Enhance awareness and critical self examination of ones own values, and to appriciate the relavance of personal values in the business/work place and develop skills which recignizes and resolves ethical issues while working.



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**ACADEMIC YEAR 2019-20**

**COURSE OUTCOMES**

SE(COMPUTER)(2015 Pat.)			
YEAR	COURSE CODE	COURSE NAME	COURSE OUTCOME NO.
	210241	Discrete Mathematics	210241.1
			210241.2
	210242	Digital Electronics & Logic Design	210242.1
			210242.2
			210242.3
			210242.4
			210242.5
			210243.1
	210243	Data Structures and Algorithms	210243.2
			210243.3
			210243.4
			210243.5
			210243.6
	210244	Computer Organization and Architecture	210244.1
			210244.2
			210244.3
	210245	Object Oriented Programming	210245.1
			210245.2
			210245.3
			210245.4

SE (SEM-III, TERM-I)	210246	Digital Electronics Lab	210246.1
			210246.2
			210246.3
	210247	Data Structures Lab	210247.1
			210247.2
			210247.3
	210248	Object Oriented Programming Lab	210248.1
			210248.2
			210248.3
	210249	Soft Skills	210249.1
			210249.2
			210249.3
			210249.4
			210249.5
	210250	AC1-I: Road Safety	210250.1
			210250.2
	210250	AC1-II: Humanities and Social Sciences	210250.1
			210250.2
			210250.3
			210250.4
	210250	AC1-III: Environmental Studies	210250.1
			210250.2

	210250	AC1-IV: Smart Cities	210250.3
			210250.4
			210250.1
			210250.2
			210250.3
			210250.4
			210250.5
			210250.1
	210250	AC1-V: Foreign Language- Japanese (Module 1)	210250.2
			210250.3
			210250.4
			210250.1
	207003	Engineering Mathematics III	207003.1
			207003.2
			207003.3
			207003.4
			207003.5
			210251.1
	210251	Computer Graphics	210251.2
			210251.3
			210251.4
			210251.1

SE(SEM-IV,  
TERM-II)

210252	Advanced Data Structures	210252.1
		210252.2
		210252.3
		210252.4
		210252.5
210253	Microprocessor	210253.1
		210253.2
		210253.3
210254	Principles of Programming Languages	210254.1
		210254.2
		210254.3
		210254.4
210255	Computer Graphics Lab	210255.1
		210255.2
		210255.3
210256	Advanced Data Structures Lab	210256.1
		210256.2
		210256.3
210257	Microprocessors Lab	210257.1
		210257.2
		210257.3
		210258.1

	210258	AC2-I: Water Management	210258.2
			210258.3
			210258.4
	210258	AC2-II: Intellectual Property Rights and Patents	210258.1
			210258.2
			210258.3
	210258	AC2-III : The Science of Happiness	210258.1
			210258.2
			210258.3
			210258.4
	210258	AC2-IV: Stress Relief: Yoga and Meditation	210258.1
			210258.2
			210258.3
			210258.4

**TE(COMPUTER)(2015 Pat.)**

YEAR	COURSE CODE	COURSE NAME	COURSE OUTCOME NO.
	310241	Theory of Computation	310241.1
			310241.2
			310241.3
	310242	Database Management Systems	310242.1
			310242.2
			310242.3
			310242.4
			310242.5
			310242.6
			310243.1

TE (SEM-V,TERM-I)	310243	Software Engineering and Project Management	310243.2
			310243.3
			310243.4
			310243.4
			310243.5
	310244	Information Systems and Engineering Economics	310244.1
			310244.2
			310244.3
			310244.4
			310244.5
			310244.6
	310245	Computer Networks	310245.1
			310245.2
			310245.3
			310245.4
			310245.5
			310245.6
	310246	Skill Development Lab	310246.1
			310246.2
			310246.3

		310246.4
		310246.5
310247	Database Management System Lab	310247.1
		310247.2
310248	Computer Networks Lab	310248.1
		310248.2
		310248.3
		310248.4
310249	Cyber Security(Audit Course 3)	310249.1
		310249.2
		310249.3
310249	Professional Ethics and Etiquettes (Audit Course 3)	310249.1
		310249.2
		310249.3
		310249.4
310249	Emotional Intelligence (Audit Course 3)	310249.1
		310249.2
		310249.3
		310249.4
		310249.5
		310249.6
310249	AC3 – IV: MOOC-learn New Skill	310249.1

TE (SEM-VI,TERM-II)	310249	AC3 – V: Foreign Language(Japanese Module 3)	310249.1
			310249.2
			310249.3
			310249.4
	310250	Design and Analysis of Algorithms	310250.1
			310250.2
			310250.3
			310250.4
	310251	Systems Programming and Operating System	310251.1
			310251.2
			310251.3
	310252	Embedded Systems and Internet of Things	310252.1
			310252.2
			310252.3
	310253	Software Modeling and Design	310253.1
			310253.2
			310253.3
			310253.4
			310253.5
			310253.6
	310254	Web Technology	310254.1
			310254.2
			310254.3
	310255	Seminar and Technical Communication	310255.1
			310255.2
			310255.3
			310256.1

	310256	Web Technology Lab	310256.2
	310257	System Programming & Operating System Lab	310257.1
			310257.2
			310257.3
			310257.4
	310258	Embedded Systems & Internet of Things Lab	310258.1
			310258.2
			310258.3
	310259	AC4 – I: Digital & Social Media Marketing	310259.1
			310259.2
			310259.3
	310259	AC4 – II: Green Computing	310259.1
			310259.2
			310259.3
			310259.4
	310259	AC4 – III: Sustainable Energy Systems	310259.1
			310259.2
	310259	AC4 – IV: Leadership and Personality Development	310259.1
	310259	AC4 – V: Foreign Language(Japanese Module 4)	310259.1
			310259.2
			310259.3
310259.4			
BE(COMPUTER)(2012 Pat.)			
YEAR	COURSE CODE	COURSE NAME	COURSE OUTCOME NO.
	410441	Design and Analysis of Algorithms	410441.1
			410441.2
			410441.3
			410442.1
			410442.2
			410442.3

**BE(SEM-  
VII,TERM-I)**

410442	Principles of Modern Compiler Design	410442.3
		410442.4
410443	Smart System Design and Applications	410443.1
		410443.2
		410443.3
410444AElective I	Image Processing	410444A.1
		410444A.2
410444BElective I	Computer Network Design and Modeling	410444B.1
		410444B.2
		410444B.3
410444CElective I	Advanced Computer Programming	410444C.1
		410444C.2
410444D Elective I	Data Mining Techniques and Applications	410444 D.1
		410444 D.2
		410444 D.3
410445A Elective-II	Problem Solving with Gamification	410445A.1
		410445A.2
		410445A.3
410445B Elective-II	Pervasive Computing	410445B.1
		410445B.2
410445C Elective-II	Embedded Security	410445C.1
		410445C.2
		410445C.3
410445D Elective-I	Multidisciplinary NLP	410445D.1
		410445D.2
		410446.1

	410446	Computer Laboratory 1	410446.2
			410446.3
	410447	Computer Laboratory 2	410447.1
			410447.2
			410447.3
			410447.4
	410448	Project	410448.1
			410448.2
			410448.3
			410448.4
			410448.5
BE(SEM-VIII,TERM-II)	410449	Software Design Methodologies and Testing	410449.1
			410449.2
			410449.3
	410450	High Performance Computing	410450.1
			410450.2
			410450.3
			410450.4
			410450.5
	410451A-Elective III	Mobile Computing	410451A.1
			410451A.2
			410451A.3
	410451B-Elective III	Web Technology	410451B.1
	410451C-Elective III	Cloud Computing	410451C.1
			410451C.2
	410451D-Elective III	Cyber Security	410451D.1
			410451D.2
	410452A-Elective IV	Business Analytic and	410452A.1
			410452A.2

	410452A-Elective IV	Intelligence	410452A.3
	410452B-Elective IV	Operations Research for Algorithms in Scientific Applications	410452B.1
			410452B.2
			410452B.3
	410452C-Elective IV	Mobile Applications	410452C.1
			410452C.2
	410453	Computer Laboratory-III	410453.1
			410453.2
			410453.3
	410454	Computer Laboratory-IV	410454.1
			410454.2
			410454.3
	410455	Project	410455.1
			410455.2
			410455.3
			410455.4
			410455.5
			410455.6
ME(COMPUTER)			
YEAR	COURSE CODE	COURSE NAME	COURSE OUTCOME NO.
	510101	Research Methodology	510101.1
			510101.2
			510101.3
			510101.4
			510101.5
			510101.6
			510101.7
			510101.8
	510102	Bio-Inspired Optimization Algorithms	510102.1
			510102.2

<b>FIRST YEAR (SEM-I,TERM-I)</b>		Algorithms	510102.3
	510103	Software Development and Version Control	510103.1
			510103.2
			510103.3
			510103.4
	510104	Embedded and Real Time Operating Systems	510104.1
			510104.2
			510104.3
			510104.4
			510104.5
	510105A	Advanced Digital Signal Processing	510105A.1
			510105A.2
			510105A.3
			510105A.4
	510105B	Data Mining	510105B.1
			510105B.2
			510105B.3
			510105B.4
	510105C	Network Design and Analysis	510105C.1
			510105C.2
			510105C.3
			510105C.4
	510105 D	Data Algorithms	510105 D.1
			510105 D.2
	510108	Operation Research	510108.1
			510108.2
			510108.3
			510108.4
			510108.5
		System Simulation and	510109.1
			510109.2

FIRST YEAR (SEM-II,TERM-II)	510109	System Simulation and Modeling	510109.3
			510109.4
	510110	Machine Learning	510110.1
			510110.2
			510110.3
			510110.4
	510111A	Image Processing	510111A.1
			510111A.2
			510111A.3
			510111A.4
	510111B	Web Mining	510111B.1
			510111B.2
			510111B.3
	510111C	Pervasive and Ubiquitous Computing	510111C.1
			510111C.2
			510111C.3
			510111C.4
	510111D	Network Security	510111D.1
			510111D.2
			510111D.3
			510111D.4
			510111D.5
	510112	Seminar I	510112.1
			510112.2
			510112.3
			610101.1

<b>SECOND YEAR (SEM- III,TERM-I)</b>	610101	Fault Tolerant Systems	610101.2
			610101.3
			610101.4
	610102	Information Retrieval	610102.1
			610102.2
			610102.3
			610102.4
	610103A	Cloud Security	610103A.1
			610103A.2
			610103A.3
			610103A.4
	610103B	Speech Signal Processing	610103B.1
			610103B.2
			610103B.3
			610103B.4
	610103C	Mobile Ad-hoc Networks	610103C.1
			610103C.2
			610103C.3
			610103C.4
	610103 D	Pattern Recognition	610103 D.1
			610103 D.2
			610103 D.3
			610103 D.4
	610104	Seminar II	610104.1
			610104.2
			610104.3
	610105	Dissertation Stage I	610105.1
			610105.2
			610105.3

			610105.4
SECOND YEAR (SEM- IV,TERM-II)	610107	Seminar III	610107.1
			610107.2
			610107.3
			610108.1
	610108	Dissertation Stage II	610108.2
			610108.3
			610108.4
			610108.5

# MANAGEMENT

ted to Pune University

## COURSE OUTCOMES

1. Solve real world problems logically using appropriate set, function, and relation models and interpret the associated operations and terminologies in context.
2. Analyze and synthesize the real world problems using discrete mathematics
1. Realize and simplify Boolean Algebraic assignments for designing digital circuits using K-Maps.
2. Design and implement Sequential and Combinational digital circuits as per the specifications.
3. Apply the knowledge to appropriate IC as per the design specifications.
4. Design simple digital systems using VHDL.
5. Develop simple embedded system for simple real world application.
1. To understand the analysis of algorithm.
2. To discriminate the usage of various structures in approaching the problem solution.
3. To design the algorithms to solve the programming problems.
4. To use effective and efficient data structures in solving various Computer Engineering domain problems.
5. To analyze the problems to apply suitable algorithm and data structure.
6. To use appropriate algorithmic strategy for better efficiency.
1. Demonstrate computer architecture concepts related to design of modern processors, memories and I/Os.
2. Analyze the principles of computer architecture using examples drawn from commercially available computers.
3. Evaluate various design alternatives in processor organization.
1. Analyze the strengths of object oriented programming
2. Design and apply OOP principles for effective programming
3. Develop programming application using object oriented programming language C++
4. Percept the utility and applicability of OOP

1. Learn the basics of gates.
2. Construct basic combinational circuits and verify their functionalities
3. Apply the design procedures to design basic sequential circuits.
1. To implement different Data Structures
2. To Implement the algorithms to solve the programming problems.
3. To Implement appropriate algorithmic strategy for better efficiency.
To apply basic concepts of OOP in developing programs in C++
To apply file handling, exception handling concept of OOP in developing programs in C++
To implement Standard Template Library of OOP in C++ language
1. Effectively communicate through verbal/oral communication and improve the listening skills
2. Write precise briefs or reports and technical documents.
3. Actively participate in group discussion / meetings / interviews and prepare & deliver presentations.
4. Become more effective individual through goal/target setting, self motivation and practicing creative thinking.
5. Function effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, Inter-personal relationships, conflict management and leadership quality.
1. To ensure greater safety on roads and an environment-friendly road transport operation
2. These issues will help to sensitize students to be broader towards the social, cultural, economic and human issues, involved in social changes
1. Making engineering and technology students aware of the various issues concerning man and society
2. These issues will help to sensitize students to be broader towards the social, cultural, economic and human issues, involved in social changes
3. Able to understand the nature of the individual and the relationship between the self and the community
4. Understanding major ideas, values, beliefs, and experiences that have shaped human history and cultures
1. Comprehend the importance of ecosystem and biodiversity
2. To correlate the human population growth and its trend to the environmental degradation and develop the awareness about his/her role towards environmental protection and prevention

3. Identify different types of environmental pollution and control measures
4. To correlate the exploitation and utilization of conventional and non-conventional resources
1. Better understanding of the dynamic behavior of the urban system by going beyond the physical appearance and by focusing on representations, properties and impact factors
2. Exploration of the city as the most complex human-made organism with a metabolism that can be modeled in terms of stocks and flows
3. Knowledge about data-informed approaches for the development of the future city, based on crowd sourcing and sensing
4. Knowledge about the latest research results in for the development and management of future cities
5. Understanding how citizens can benefit from data-informed design to develop smart and responsive cities
1. Will have ability of basic communication
2. Will have the knowledge of Japanese script
3. Will get introduced to reading , writing and listening skills
4. Will develop interest to pursue professional Japanese Language course
1. Solve higher order linear differential equation using appropriate techniques for modeling and analyzing electrical circuits
2. Solve problems related to Fourier transform, Z-Transform and applications to Signal and Image processing
3. Apply statistical methods like correlation, regression analysis and probability theory for analysis and prediction of a given data as applied to machine intelligence
4. Perform vector differentiation and integration to analyze the vector fields and apply to compute line, surface and volume integrals
5. Analyze conformal mappings, transformations and perform contour integration of complex functions required in Image processing, Digital filters and Computer graphics
1. Apply mathematics and logic to develop Computer programs for elementary graphic operations
2. Develop scientific and strategic approach to solve complex problems in the domain of Computer Graphics
3. Develop the competency to understand the concepts related to Computer Vision and Virtual reality
4. Apply the logic to develop animation and gaming programs

1. To apply appropriate advanced data structure and efficient algorithms to approach the problems of various domain.
2. To design the algorithms to solve the programming problems.
3. To use effective and efficient data structures in solving various Computer Engineering domain problems.
4. To analyze the algorithmic solutions for resource requirements and optimization
5. To use appropriate modern tools to understand and analyze the functionalities confined to the data structure usage.
1. To apply the assembly language programming to develop small real life embedded application
2. To understand the architecture of the advanced processor thoroughly to use the resources for programming
3. To understand the higher processor architectures descended from 80386 architecture
1. To analyze the strengths and weaknesses of programming languages for effective and efficient program development
2. To inculcate the principles underlying the programming languages enabling to learn new programming languages.
3. To grasp different programming paradigms
4. To use the programming paradigms effectively in application development
To develop basic primitive operation of Computer Graphics using C++/Java programming language
To develop 2D and 3D objects using Programming language
To develop animation and simple games using concepts of Computer Graphics
To implement advanced data Structures
To implement appropriate algorithm and advanced data structure to solve a programming problem of various domain
To implement different algorithms of a programming problem for resource requirements and optimization
To understand assembly programming language and 80386 programming model
To implement different algorithms using assembly language and NASM tool
To illustrate and implement 80387 math co-processor programs
1. Understanding of the global water cycle and its various processes

2. Understanding of climate change and their effects on water systems
3. Understanding of Drinking treatment and quality of groundwater and surface water
4. Understanding of the Physical, chemical, and biological processes involved in water treatment and distribution
1. Understand the fundamental legal principles related to confidential information, copyright, patents, designs, trademarks and unfair competition
2. Identify, apply and assess principles of law relating to each of these areas of intellectual property
3. Apply the appropriate ownership rules to intellectual property you have been involved in creating
1. Ability to understand what happiness is and why it matters to you
2. Ability to learn how to increase your own happiness
3. Understanding of the power of social connections and the science of empathy
4. Ability to understand what is mindfulness and its real world applications
1. Students understanding of philosophy and religion as well as daily life issues will be challenged and enhanced
2. Enhances the immune system
3. Intellectual and philosophical understanding of the theory of yoga and basic related Hindu scriptures will be developed
4. Powers of concentration, focus, and awareness will be heightened

#### **COURSE OUTCOMES**

1.design deterministic Turing machine for all inputs and all outputs
2.Subdivide problem space based on input subdivision using constraints
3. Apply linguistic theory
1. Design E-R Model for given requirements and convert the same into database tables.
2. Use database techniques such as SQL & PL/SQL.
3.Use modern database techniques such as NOSQL.
4. Explain transaction Management in relational database System.
5. Describe different database architecture and analyses the use of appropriate architecture in real time environment.
6. Use advanced database Programming concepts
1. Decide on a process model for a developing a software project

2. Classify software applications and Identify unique features of various domains
3. Design test cases of a software system.
4. Understand basics of IT Project management.
5. Plan, schedule and execute a project considering the risk management.
6. Apply quality attributes in software development life cycle.
1. Understand the need, usage and importance of an Information System to an organization.
2. Understand the activities that are undertaken while managing, designing, planning, implementation, and deployment of computerized information system in an organization.
3. Further the student would be aware of various Information System solutions like ERP, CRM, Data warehouses and the issues in successful implementation of these technology solutions in any organizations
4. Outline the past history, present position and expected performance of a company engaged in engineering practice or in the computer industry.
5. Perform and evaluate present worth, future worth and annual worth analyses on one of more economic alternatives.
6. Be able to carry out and evaluate benefit/cost, life cycle and breakeven analyses on one or more economic alternatives.
1. Analyze the requirements for a given organizational structure to select the most appropriate networking architecture, topologies, transmission mediums, and technologies
2. Demonstrate design issues, flow control and error control
3. Analyze data flow between TCP/IP model using Application, Transport and Network Layer Protocols.
4. Illustrate applications of Computer Network capabilities, selection and usage for various sectors of user community.
5. Illustrate Client-Server architectures and prototypes by the means of correct standards and technology.
6. Demonstrate different routing and switching algorithms
1. Evaluate problems and analyze data using current technologies in a wide variety of business and organizational contexts.
2. Create data-driven web applications
3. Incorporate best practices for building applications

4. Employ Integrated Development Environment(IDE) for implementing and testing of software solution
5. Construct software solutions by evaluating alternate architectural patterns.
1. Develop the ability to handle databases of varying complexities
2. Use advanced database Programming concepts
1. Demonstrate LAN and WAN protocol behavior using Modern Tools.
2. Analyze data flow between peer to peer in an IP network using Application, Transport and Network Layer Protocols.
3. Demonstrate basic configuration of switches and routers.
4. Develop Client-Server architectures and prototypes by the means of correct standards and technology.
1. Compare the interrelationships among security roles and responsibilities in a modern information-driven enterprise—to include interrelationships across security domains (IT, physical, classification, personnel, and so on)
2. Assess the role of strategy and policy in determining the success of information security;
3. Estimate the possible consequences of misaligning enterprise strategy, security policy, and security plans;
1. Understand the basic perception of profession, professional ethics, various moral issues & uses of ethical theories.
2. Understand various social issues, industrial standards, code of ethics and role of professional ethics in engineering field.
3. Follow Ethics as an engineering professional and adopt good standards & norms of engineering practice.
4. Apply ethical principles to resolve situations that arise in their professional lives
1. Expand your knowledge of emotional patterns in yourself and others
2. Discover how you can manage your emotions, and positively influence yourself and others
3. Build more effective relationships with people at work and at home
4. Positively influence and motivate colleagues, team members, managers
5. Increase your leadership effectiveness by creating an atmosphere that engages others
6. Apply EI behaviors and supports high performance
1. On completion of the course, learner will acquire additional knowledge and skill

1. Have ability of basic communication
2. Have the knowledge of Japanese script
3. Get introduced to reading, writing and listening skills for language Japanese
4. Develop interest to pursue professional Japanese Language course
1. Formulate the problem
2. Analyze the asymptotic performance of algorithms
3. Decide and apply algorithmic strategies to solve given problem
4. Find optimal solution by applying various methods
1. Analyze and synthesize system software
2. Use tools like LEX & YACC.
3. Implement operating system functions.
1. Implement an architectural design for IoT for specified requirement
2. Solve the given societal challenge using IoT
3. Choose between available technologies and devices for stated IoT challenge
1. Analyze the problem statement (SRS) and choose proper design technique for designing web-based/ desktop application
2. Design and analyze an application using UML modeling as fundamental tool
3. Apply design patterns to understand reusability in OO design
4. Decide and apply appropriate modern tool for designing and modeling
5. Decide and apply appropriate modern testing tool for testing web-based/desktop application
1. Analyze given assignment to select sustainable web development and design methodology
2. Develop web based application using suitable client side and server side web technologies
3. Develop solution to complex problems using appropriate method, technologies, frameworks, web services and content management
1. Be able to be familiar with basic technical writing concepts and terms, such as audience analysis, jargon, format, visuals, and presentation.
2. Be able to improve skills to read, understand, and interpret material on technology.
3. improve communication and writing skills
3. Develop web based application using suitable client side and server side web technologies

4. Develop solution to complex problems using appropriate method, technologies, frameworks, web services and content management
1. Understand the internals of language translators
2. Handle tools like LEX & YACC.
3. Understand the Operating System internals and functionalities with implementation point of view
1. Design the minimum system for sensor based application
2. Solve the problems related to the primitive needs using IoT
3. Develop full fledged IoT application for distributed environment
1. Create editorial calendars to manage content distribution.
2. Use Social Listening tools to create timely, relevant content.
3. Create Social Media policies that combine business objectives with appropriate use of social media channels and content.
1. Understand the concept of green IT and relate it to sustainable development.
2. Apply the green computing practices to save energy.
3. Discuss how the choice of hardware and software can facilitate a more sustainable operation,
4. Use methods and tools to measure energy consumption
1. Demonstrate an overview of the main sources of renewable energy.
2. Understand benefits of renewable and sustainable energy systems.
1. Enhance holistic development of students and improve employability skills
1. Possess ability of basic communication
2. Possess the knowledge of Japanese script
3. Get introduced to reading, writing and listening skills for language Japanese
4. Develop interest to pursue professional Japanese Language course

#### **COURSE OUTCOMES**

1.To solve problems in UG projects
2.To develop SRS in UG Projects
3.To solve problems for multi-core or distributed or concurrent/Parallel/Embedded environments
1.To solve problem of parsing and compiling
2.Ability to design and write simple compiler

3.To be able to use compiler tools in basic, concurrent, distributed and embedded environments
4.To develop awareness of latest trends and advances in compilers
1.To write and survey solution for multidisciplinary case-study using mathematical modeling give presentations using soft skills methodologies;
2. To write and survey embedded systems applications using machine learning;
3 To solve problems for multi-core or distributed, concurrent and embedded environments;
1.To perform image processing programming
2.To solve Image Processing problems using multi-core or distributed, concurrent/Parallel environments
1.Students will be able to design, model and analyze computer network.
2.Students will be able to use tools for network design, modeling and analysis.
3.To solve problems for multi-core or distributed, concurrent/Parallel environments
1.To solve problem using advanced programming
2.To solve problems for multi-core or distributed, concurrent/Parallel environments
1.To present survey on different learning, classification and data mining foundations.
2.To write programs and methods for data Mining applications.
3.To solve problems for multi-core or distributed, concurrent/Parallel environments
1.To solve problem in projects
2.To develop projects using Gami cation
3.To solve problems for multi-core or distributed, concurrent/Parallel environment
1.To solve problem pervasive computing abilities
2.To solve problems for multi-core or distributed, concurrent/Parallel environments
1.To solve problem in projects
2.To develop SRS in the projects
3.To solve Embedded Security problems
1.To solve problem in projects
2.To solve problems for multi-core or distributed, concurrent/Parallel environments
1.To demonstrate efficient design, analysis and testing of algorithmic assignments

2.To debug and demonstrate the Testing of functioning using Software Engineering for OO programming.
3.To effectively use multi-core or distributed, concurrent/Parallel environments
1.Problem solving abilities for smart devices
2.Problem solving abilities for gamifications
3.Problem solving abilities of pervasiveness, embedded security and NLP
4.To solve problems for multi-core or distributed, concurrent/Parallel environments
1.To solve problem in projects
2.To develop SRS and other software engineering documents in the project report
3.To solve problems using multi-core, distributed, embedded, concurrent/Parallel environments
4.To write conference paper
5.To demonstrate presentation, communication and team-work skills
1.To choose and apply design techniques for software system
2.To design and model using UML for a given software system
3.To design test cases and implement automated testing for client server, Distributed, mobile applications
1.Transform algorithms in the computational area to efficient programming code for modern computer architectures
2.Write, organize and handle programs for scientific computations
3.Use tools for performance optimization and debugging
4.Analyze code with respect to performance and suggest and implement performance improvements
5.To solve problems for multi-core or distributed, concurrent/Parallel environments
1.To write a survey on mobile computing building blocks
2.To write a presentation on survey FOSS tools and Technologies
3.To write test cases to solve problems using Mobile Computing algorithms
1.To use technologies for solving problems in projects
1.To install cloud computing environments
2.To develop any one type of cloud
1.To solve problem in Cyber Security
2.To solve problems for multi-core or distributed, concurrent/Parallel environments
1.To solve problem in projects
2.To develop SRS in the projects

3.To solve problems for multi-core or distributed, concurrent/Parallel environments
1.To solve problem in projects
2.To develop SRS in the projects
3.To solve problems for multi-core or distributed, concurrent/Parallel environments
1.To solve problem in projects
2.To develop mobile applications
1.To solve problems using mathematical modeling
2.To use software design methods and testing
3.To solve problems for multi-core or distributed, concurrent/Parallel environments
1.Ability to develop applications using BIA Technologies
2.Ability to develop applications using OR and Mobile Programming Technologies
3.To solve problems for multi-core or distributed, concurrent/Parallel environments
1.To solve problem and demonstrate the results of the project;
2.To develop SRS, reliability testing reports, and other software engineering 3.documents in the project
report;
4.To solve problems using multi-core, distributed, embedded, concurrent/Parallel environments;
5.To write conference paper;
6.To demonstrate presentation, communication and team-work skills.

#### **COURSE OUTCOMES**

1. Carry out Literature Survey
2. Identify appropriate topics for research work in computer engineering
3. Select and define appropriate research problem and parameters
4. Design the use of major experimental methods for research
5. Use appropriate tools, techniques, and processes of doing research in Computer science
6. Demonstrate own contribution to the body of knowledge
7. Become aware of the ethics in research, academic integrity and plagiarism
8. Write a research report and thesis
1.Describe the natural phenomena that motivate the algorithms
2. Apply nature-inspired algorithms to optimization

3. Select the appropriate strategy or optimal solution based on bio-inspired algorithms
1. Select and apply the design patterns to software development
2. Design software for real engineering Problems
3. Demonstrate team work for development of software in collaborative environment
4. Use of open source version control tool
1. Recognize and classify embedded and real-time systems
2. Explain communication bus protocols used for embedded and real-time systems
3. Classify and exemplify scheduling algorithms
4. Apply software development process to a given RTOS application
5. Design a given RTOS based application
1. Apply various transforms for Digital signal Processing
2. Use appropriate filters to suit to the DSP application
3. Choose the best DS Processor for the application development
4. Design the DSP application for the practical use
1. Apply basic, intermediate and advanced techniques to mine the data
2. Analyze the output generated by the process of data mining
3. Explore the hidden patterns in the data
4. Optimize the mining process by choosing best data mining technique
1. Apply the knowledge to design computer networks
2. Analyze the performance of networks based on chosen metrics
3. Design routing schemes for optimized routing
4. Choose appropriate and advanced techniques to build the computer network
1. Apply the concept of advanced algorithms for searching, sorting and network algorithms
2. Estimate the complexity of various algorithms and Measure the Choose appropriate algorithm to solve data centric problems
1. Identify the characteristics of different types of decision-making environments
2. Use appropriate decision making approaches and tools
3. Build various dynamic and adaptive models
4. Develop critical thinking and objective analysis of decision problems
5. Apply the OR techniques for efficacy
1. To apply modeling to understand system behavior
2. To design the simulation scheme for particular system

3To analyze the modeled and simulated systems
4. To compare the results of simulations confined to real world application
1. Acquire fundamental knowledge of learning theory
2. Design and evaluate various machine learning algorithms
3. Use machine learning methods for multivariate data analysis in various scientific fields
4. Choose and apply appropriate Machine Learning Techniques for analysis, forecasting, categorization and clustering of the data
1. Apply relevant mathematics required for image processing
2. Perform and analyze various image processing methods using appropriate tools
3. Use various image processing methods in spatial and frequency domain
4. Explore current trends and future scope in image processing applications
1. Transform Web Information into analytical form
2. Use various means to analyze and synthesize Social Networking information
3. Use appropriate tools used in analyzing the web information
1. Design and implement primitive pervasive applications
2. Analyze and estimate the impact of pervasive computing on future computing applications and society
3. Develop skill sets to propose solutions for problems related to pervasive computing system
4. Design a preliminary system to meet desired needs within the constraints of a particular problem space
1. Design and choose appropriate security model
2. Apply security means to various applications
3. Apply security algorithms in various environments for network security
4. Design network security solutions
5. Select appropriate tools to thwart network attacks
1. To use multiple thinking strategies to examine real-world issues and explore creative avenues of expression
2. To acquire, articulate, create and convey intended meaning using verbal and non-verbal method of communication
3. To learn and integrate, through independent learning in sciences and technologies, with disciplinary specialization and the ability to integrate information across
1. Analyze the system for the requirement of fault tolerance

2. Simulate the fault tolerance algorithms
3. Implement diagnosis and recovery of the system
4. Assess the reliability of the system
1. Implement the concept of Information Retrieval
2. Evaluate and Analyze retrieved information
3. Generate quality information out of retrieved information
4. Apply clustering and classification algorithms to analyze the information
1. Use various services offered for cloud environment
2. Apply computing security fundamentals confined to cloud environment
3. Analyze the cloud system for vulnerabilities, threats and attacks
4. Propose feasible security solution for cloud security
1. Inculcate the characteristics of speech signal in relation to production and hearing of speech by humans
2. Apply various algorithms of speech analysis common to many applications
3. The students will be able to design a simple system for speech processing
4. Analyze the performance of speech signal processing system
1. Assess Quality of Service in MANET
2. Evaluate the performance of various Protocols in MANET
3. Choose appropriate constituents and parameters to build MANET
4. Analyze the performance of MANET
1. Analyze various type of pattern recognition techniques
2. Identify and apply various pattern recognition and classification approaches to solve the problems
3. Evaluate statistical and structural pattern recognition
4. Percept recent advances in pattern recognition confined to various applications
1. To use multiple thinking strategies to examine real-world issues and explore creative avenues of expression
2. To acquire, articulate, create and convey intended meaning using verbal and non-verbal method of communication
3. To learn and integrate, through independent learning in sciences and technologies, with disciplinary specialization and the ability to integrate information across
1. Conduct thorough literature survey confined to the domain of choice
2. Develop presentation skills to deliver the technical contents
3. Furnish the report of the technical research domain

4. Analyze the findings and work of various authors confined to the chosen domain
1. To use multiple thinking strategies to examine real-world issues and explore creative avenues of expression
2. To acquire, articulate, create and convey intended meaning using verbal and non-verbal method of communication
3. To learn and integrate, through independent learning in sciences and technologies, with disciplinary specialization and the ability to integrate information across
1. Show evidence of independent investigation
2. Critically analyze the results and their interpretation ; infer findings
3. Report and present the original results in an orderly way and placing the open questions in the right perspective
4. Link techniques and results from literature as well as actual research and future research lines with the research
5. Appreciate practical implications and constraints of the specialist subject



**INDIRA COLLEGE OF ENGI**  
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**ACADEMIC**  
**COURSE**

SE(			
YEAR	COURSE CODE	COURSE NAME	COURSE OUTCOME NO.
SE (SEM-III,TERM-I)	204184	Data Structures and Algorithms	204184.1
			204184.2
			204184.3
			204184.4
			204184.5
			204184.6
	204183	Electrical Circuits and Machines	204183.1
			204183.2
			204183.3
			204183.4
	204186	Electronic Measuring Instruments & Tools	204186.1
			204186.2
			204186.3
			204186.4
			204186.5
			204186.6
	204185	Digital Electronics	204185.1
			204185.2
			204185.3
			204185.4
	204182	Electronic Devices & Circuits	204182.1
			204182.2
			204182.3
			204182.4
			204182.5

	204181	Signals and Systems	204181.1
			204181.2
			204181.3
			204181.4
			204181.5
<b>SE (SEM-IV,TERM-II)</b>	207005	Engineering Mathematics III	207005.1
			207005.2
			207005.3
			207005.4
			207005.5
	204187	Integrated Circuits	204187.1
			204187.2
			204187.3
			204187.4
			204187.5
			204187.6
			204187.7
			204187.8
			204187.9
	204189	Analog Communications	204189.1
			204189.2
			204189.3
			204189.4
	204190	Object Oriented Programming	204190.1
			204190.2
			204190.3
			204190.4
			204190.5

	204191	EMPLOYABILITY SKILL DEVELOPMENT	204190.6
			204191.1
			204191.2
			204191.3
			204191.4
	204188	Control Systems	204188.1
			204188.2
			204188.3
			204188.4
			204188.5
			204188.6

TE(

YEAR	COURSE CODE	COURSE NAME	COURSE OUTCOME NO.
TE (SEM-V,TERM-I)	304184	Microcontrollers	304184.1
			304184.2
			304184.3
	304193	Electronics System Design	304193.1
			304193.2
			304193.3
			304193.4
			304193.5
			304193.6
	304182	Digital Signal Processing	304182.1
			304182.2
			304182.3
	304183	Electromagnetics	304183.1
			304183.2
			304183.3
			304183.4
			304183.5
	304181	Digital Communication	304181.1
			304181.2
			304181.3

			304181.4
			304181.5
	304185	Mechatronics	304185.1
			304185.2
			304185.3
			304185.4
			304185.5
TE (SEM-VI,TERM-II)	304186	Power Electronics	304186.1
			304186.2
			304186.3
			304186.4
			304186.5
			304186.6
	304189	Advanced Processors	304189.1
			304189.2
			304189.3
			304189.4
	304187	Information Theory, Coding and Communication Networks	304187.1
			304187.2
			304187.3
			304187.4
			304187.5
	304188	Business Management	304188.1
			304188.2
			304188.3
			304188.4
	304190	System Programming and Operating Systems	304190.1
			304190.2
			304190.3
			304190.4
BE (ELECTRONICS AND COMMUNICATIONS)			
YEAR	COURSE CODE	COURSE NAME	COURSE OUTCOME NO.
	404183	Radiation & Microwave Techniques	404183.1
			404183.2
			404183.3
			404183.4
			404183.5
			404183.6
			404181.1
			404181.2

BE(SEM-VII,TERM-I)	404181	VLSI Design& Technology	404181.3
			404181.4
			404181.5
			404181.6
	404184	Digital Image and Video Processing (Elective-I)	404184.1
			404184.2
			404184.3
			404184.4
			404184.5
			404184.6
BE (SEM-VIII,TERM-II)	404182	Computer Networks & Security	404182.1
			404182.2
			404182.3
			404182.4
			404182.5
			404182.6
	404185	Electronics Product Design	404185.1
			404185.2
			404185.3
	404189	Mobile Communication	404189.1
			404189.2
			404189.3
	404190	Broadband Communication Systems	404190.1
			404190.2
	404191	Audio Video Engineering	404191.1
			404191.2
			404191.3
			404191.4
	404192	Wireless Sensor Networks	404192.1
			404192.2
			404192.3
			404192.4
			404192.5
			404192.6
ME			
YEAR	COURSE CODE	COURSE NAME	COURSE OUTCOME NO.

<b>FIRST YEAR (SEM-I,TERM-I)</b>	504505 (Elective - I)	Detection and Estimation Theory (* LATEX)	504505.1
			504505.2
			504505.3
	504501	Modeling & Simulation of CommunicationNetwork	504501.1
			504501.2
			504501.3
	504502	High Speed Communication Networks	504502.1
			504502.2
			504502.3
			504502.4
	504503	Network Security	504503
			504503
			504503
			504503
	504504	Research Methodology	504504.1
			504504.2
			504504.3
			504504.4
<b>FIRST YEAR (SEM-II,TERM-II)</b>	504508	Broadband Wireless Technologies	504508.1
			504508.2
			504508.3
			504508.4
	504507	Traffic Analysis and QoS	504507.1
			504507.2
			504507.3
			504507.4
	504509	Software Defined and Cognitive Radio	504509
			504509
			504509
	504510	Spread Spectrum and CDMA Systems(Elective-II)	504510
			504510
			504510
<b>SECOND YEAR (SEM-III,TERM-I)</b>	604501	4G LTE Cellular Systems	604501.1
			604501.2
			604501.3
			604501.4
	604502	Modern Communication Receiver Design & Technology	604502.1
			604502.2
			604502.3

			604502.4
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# NEERING AND MANAGEMENT (MS) and Affiliated to Pune University

YEAR 2019-20

## OUTCOMES

E&TC)
COURSE OUTCOMES
1. Get knowledge about computational efficiency of the principal algorithms such as sorting & searching applications.
2. Write and understand the programs that use arrays & pointers in C
3. Describe how arrays, records, linked structures are represented in memory and use them in algorithms.
4. Implement stacks & queues for various applications.
5. Understand various terminologies and traversals of trees and use them for various
6. Understand various terminologies and traversals of graphs and use them for various applications.
1. Analyze basic AC & DC circuit for voltage, current and power by using KVL, KCL, and network theorems.
2. Explain the working principle of different electrical machines.
3. Select proper electrical motor for given application.
4. Design and analyze transformers.
1. Understand fundamental of various electrical measurements.
2. Understand and describe specifications, features and capabilities of electronic instruments.
3. Finalize the specifications of instrument and select an appropriate instrument for given measurement.
4. Carry out required measurement using various instruments under different setups.
5. Able to compare measuring instruments for performance parameters
6. Select appropriate instrument for the measurement of electrical parameter professionally.
1. Use the basic logic gates and various reduction techniques of digital logic circuit in detail.
2. Design combinational and sequential circuits.
3. Design and implement hardware circuit to test performance and application
4. Understand the architecture and use of microcontrollers for basic operations and Simulate using simulation software.
1. Comply and verify parameters after exciting devices by any stated method.
2. Implement circuit and test the performance.
3. Analyze small signal model of FET and MOSFET
4. Explain behavior of FET at low frequency.
5. Design an adjustable voltage regulator circuits.

1. Understand mathematical description and representation of continuous and discrete time signals and systems.
2. Develop input output relationship for linear shift invariant system and understand the convolution operator for continuous and discrete time system.
3. Understand and resolve the signals in frequency domain using Fourier series and Fourier transforms.
4. Understand the limitations of Fourier transform and need for Laplace transform and develop the ability to analyze the system in s- domain.
5. Understand the basic concept of probability, random variables & random signals and develop the ability to find correlation, CDF, PDF and probability of a given event.
1. Solve higher order linear differential equation using appropriate techniques for modeling and analyzing electrical circuits.
3. Obtain Interpolating polynomials, numerically differentiate and integrate functions, numerical solutions of differential equations using single step and multi-step iterative methods used in modern scientific computing.
3. Obtain Interpolating polynomials, numerically differentiate and integrate functions, numerical solutions of differential equations using single step and multi-step iterative methods used in modern scientific computing.
4. Perform vector differentiation and integration, analyze the vector fields and apply to Electro-Magnetic fields.
5. Analyze conformal mappings, transformations and perform contour integration of complex functions in the study of electrostatics and signal processing
1. Understand the characteristics of IC and Op-Amp and identify the internal structure.
2. Understand and identify various manufacturing techniques.
3. Derive and determine various performances based parameters and their significance for Op-Amp.
4. Comply and verify parameters after exciting IC by any stated method.
5. Analyze and identify the closed loop stability considerations and I/O limitations
6. Analyze and identify linear and nonlinear applications of Op-Amp.
7. Understand and verify results (levels of V & I) with hardware implementation
8. Implement hardwired circuit to test performance and application for what it is being designed.
9. Understand and apply the functionalities of PLL to Frequency synthesizer, multiplier, FM, and AM demodulators
1. Understand and identify the fundamental concepts and various components of analog communication systems.
2. Explain signal to noise ratio, noise figure and noise temperature for single and cascaded stages in a communication system.
3. Describe analog pulse modulation techniques and digital modulation technique.
4. Develop the ability to compare and contrast the strengths and weaknesses of various communication systems.
1. Describe the principles of object oriented programming.
2. Apply the concepts of data encapsulation, inheritance in C++.
3. Understand basic program constructs in Java
4. Apply the concepts of classes, methods and inheritance to write programs Java.
5. Use arrays, vectors and strings concepts and interfaces to write programs in Java.

6. Describe and use the concepts in Java to develop user friendly program,
1. Have skills and preparedness for aptitude tests.
2. Be equipped with essential communication skills (writing, verbal and non-verbal)
3. Master the presentation skill and be ready for facing interviews.
4. Build team and lead it for problem solving.
1. Determine and use models of physical systems in forms suitable for use in the analysis and design of control systems
2. Determine the (absolute) stability of a closed-loop control system.
3. Perform time domain and frequency domain analysis of control systems required for stability analysis
4. Perform time domain and frequency domain correlation analysis.
5. Apply root-locus, Frequency Plots technique to analyze control systems
6. Express and solve system equations in state variable form.

(E&TC)

<b>COURSE OUTCOMES</b>
Learn importance of microcontroller in designing embedded application.
Learn use of hardware and software tools.
Develop interfacing to real world devices
Apply the fundamental concepts and working principles of electronics devices to design electronics systems.
Shall be able to interpret datasheets and thus select appropriate components and devices
Select appropriate transducer and signal conditioning circuit to design prototype of Data Acquisition system.
Design an electronic system/sub-system and validate its performance by simulating the same.
Shall be able to use an EDA tool for circuit schematic and simulation.
Create, manage the database and query handling using suitable tools
1) Analyze the discrete time signals and system using different transform domain techniques.
2) Design and implement LTI filters for filtering different real world signals
3) Develop different signal processing applications using DSP processor.
1) Understand the basic mathematical concepts related to electromagnetic vector fields.
2) Apply the principles of electrostatics to the solutions of problems relating to electric field and electric potential, boundary conditions and electric energy density.
3) Apply the principles of magnetostatics to the solutions of problems relating to magnetic field and magnetic potential, boundary conditions and magnetic energy density.
4) Understand the concepts related to Faraday's law, induced emf and Maxwell's equations.
5) Apply Maxwell's equations to solutions of problems relating to transmission lines and uniform plane wave propagation.
1) Understand working of waveform coding techniques and analyse their performance.
2) Analyze the performance of a baseband and pass band digital communication system in terms of error rate and spectral efficiency.
3) Perform the time and frequency domain analysis of the signals in a digital communication system.

4) Design of digital communication system.
5) Understand working of spread spectrum communication system and analyze its performance.
Identification of key elements of mechatronics system and its representation in terms of block diagram
Understanding basic principal of Sensors and Transducer.
To understand concept of Hydraulic and Pneumatic System Components and Actuators
To understand concept of Electrical Actuators
To Understand various case studies of Mechatronics systems
Analyse and Differentiate between Low Power and High Power Devices and Circuits.
Analyse Design & implement a triggering / gate drive circuit for a power device.
Integrate knowledge Understand, perform & analyze different controlled converters.
Integrate knowledge Understand, perform & analyze different Chopper & AC Controllers
Understand & Evaluate Power electronics protection circuits.
Understand & implement back up time, battery charger rating & other applications of power devices and power controller circuits.
1 ) Describe the ARM microprocessor architectures and its feature.
2) Interface the advanced peripherals to ARM based microcontroller
3) Design embedded system with available resources
4) Use of DSP Processors and resources for signal processing applications
1) Perform information theoretic analysis of communication system.
2) Design a data compression scheme using suitable source coding technique.
3) Design a channel coding scheme for a communication system.
4) Understand and apply fundamental principles of data communication and networking.
5) Apply flow and error control techniques in communication networks.
1) Get overview of Management Science aspects useful in business.
2) Get motivation for Entrepreneurship
3) Get Quality Aspects for Systematically Running the Business
4) To Develop Project Management aspect and Entrepreneurship Skills.
1) Demonstrate the knowledge of Systems Programming and Operating Systems
2) Formulate the Problem and develop the solution for same.
3) Compare and analyse the different implementation approach of system programming operating system abstractions.
4) Interpret various OS functions used in Linux / Ubuntu
<b>(E&amp;TC)</b>
<b>COURSE OUTCOMES</b>
1. Differentiate various performance parameters of radiating elements.
2. Analyze various radiating elements and arrays.
3. Apply the knowledge of waveguide fundamentals in design of transmission lines.
4. Design and set up a system consisting of various passive microwave components
5. Analyze tube based and solid state active devices along with their applications
6. Measure various performance parameters of microwave components.
1. Write effective HDL coding for digital design.
2. Apply knowledge of real time issues in digital design

3. Model digital circuit with HDL, simulate, synthesis and prototype in PLDs
4. Design CMOS circuits for specified applications.
5. Analyze various issues and constraints in design of an ASIC
6. Apply knowledge of testability in design and build self test circuit.
1. Develop and implement basic mathematical operations on digital images.
2. Analyze and solve image enhancement and image restoration problems.
3. Identify and design image processing techniques for object segmentation and recognition.
4. Represent objects and region of the image with appropriate method.
5. Apply 2-D data compression techniques for digital images.
6. Explore video signal representation and different algorithm for video processing.
Understand fundamental underlying principles of computer networking
Describe and analyze the hardware, software, components of a network and their interrelations.
Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies
Have a basic knowledge of installing and configuring networking applications.
Specify and identify deficiencies in existing protocols, and then go onto select new and better protocols.
Have a basic knowledge of the use of cryptography and network security.
Understand various stages of hardware, software and PCB design
Importance of product test & test specifications.
Special design considerations and importance of documentation
1. Apply the concepts of switching technique and traffic engineering to design multistage networks.
2. Explore the architecture of GSM
3. Differentiate thoroughly the generations of mobile technologies.
1. Perform Link power budget and Rise Time Budget by proper selection of components and check its viability.
2. Perform Satellite Link design for Up Link and Down Link.
1. Apply the fundamentals of Analog Television and Colour Television standards.
2. Explain the fundamentals of Digital Television, DTV standards and parameters.
3. Study and understand various HDTV standards and Digital TV broadcasting systems and acquainted with different types of analog, digital TV and HDTV systems.
4. Understand acoustic fundamentals and various acoustic systems.
1. Explain various concepts and terminologies used in WSN
2. Describe importance and use of radio communication and link management in WSN
3. Explain various wireless standards and protocols associated with WSN
4. Recognize importance of localization and routing techniques used in WSN
5. Understand techniques of data aggregation and importance of security in WSN
6. Examine the issues involved in design and deployment of WSN
(E&TC)
<b>COURSE OUTCOMES</b>

1. Describe the basics of statistical decision theory used for random signal detection
2. Calculate signal parameters by using Bayes's, LMS, MMSE estimators.
3. Analyze signal estimation using optimum filters
Analyze random processes and apply the knowledge to improve the performance of
Construct Monte Carlo algorithm and Design Traffic Modeling
Design different channel models and Time varying systems.
Compose the concepts of high-speed networks and Routing protocols.
Describe queuing Models and effect of congestion in Packet Switching Networks.
Compare TCP and ATM congestion control protocols
Describe integrated and differentiated services, Audio and video media transport in wired & wireless networks.
Design different cryptography algorithms.
Apply standards and laws of security related to different protocols and models.
Develop security application by considering authentication Processes.
Develop solutions for network and cyber security issues
Describe research process associated with the research methodology and performance analysis using different instruments.
Analyze and implement different numerical methods for defined problem.
Compose the performance analysis of experimental systems.
Defend a research proposal.
1. Analyze different parameters of MIMO system and types of OFDM systems.
2. Discriminate types of UWB and MAC protocols.
3. Describe different routing protocols and QoS wireless systems.
4. Describe architectures for EPON and WiMAX , their Design & operation Issues
Compare the different network management models and tools
Describe the concept of TMN and applications related to network management.
Choose a network in terms of quality to optimize high-speed network.
Describe the congestion control and traffic management techniques.
Describe the architecture of Cognitive Radio for end-to-end communication
Develop algorithms of SCA to test different radio sets.
Develop smart antenna algorithms.
Discriminate Binary Shift Register Sequences and synchronization techniques for Spread Spectrum Systems
Compare performance of Spread Spectrum Systems using different coding techniques.
Discriminate CDMA and WCDMA cellular systems
1. Describe the different standards of LTE and LTE –advanced such as SAE, EPC and EUTRAN.
2. Analyze the transmission and reception techniques for LTE for effective utilization of Spectrum.
3. Discriminate 4G technology.
4. Differentiate relay schemes and compare LTE with WiMAX.
Analyze and design the communication receiver.
Choose the dynamic range of communication receiver based on performance parameters.
Categorize different types of mixers and frequency synthesizer.

Choose blocks in design of IF receivers















**INDIRA COLLEGE OF ENGINEERING & TECHNOLOGY**  
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**ACADEMIC YEAR 2020-21**

**COURSE CODE: BT101**

**COURSE PATTERN**

YEAR	COURSE CODE	COURSE NAME	COURSE OUTCOME NO.
<b>FIRST YEAR (SEM-I, TERM-I)</b>	101	Accounting for business decisions	101.1
			101.2
			101.3
	102	Economic Analysis for Business Decisions	102.1
			102.2
			102.3
	103	Legal Aspects of Business	103.1
			103.2
	104	Business Research Methods	104.1
			104.2
			104.3
	105	Organizational Behaviour	105.1
			105.2
			105.3
			106.1

	106	Basics of Marketing	106.2
	107	MANAGEMENT FUNDAMNETAL	107.1
			107.2
			107.3
			107.4
			107.5
FIRST YEAR (SEM- II,TERM- II)	201	Marketing management	201.1
			201.2
			201.3
	202	Financial Management	202.1
			202.2
	203	Human Resource Management	203.1
	204	Decision Science	204.1
			204.2
			204.3
	205	Operations and Supply Chain Management	205.1
			205.2
			205.3

	206	Management Information Systems	206.1
			206.2
	213	Computer aided personal productivity tools LAB (CAPPTL)	213.1
			213.2
			213.3
			213.4
			213.5

**SY**

<b>SECOND</b>	301	Strategic Management	301.1
			301.2
			301.3
	302	Enterprise Performance Management	302.1
			302.2
			302.3
			302.4
			302.5
	303	Startup and New Venture Management	
	304	Summer Internship Project	304.1
			304.2
	305	Contemporary	305.1

YEAR (SEM-III,TERM-I)	305:Marketing	Contemporary Marketing Research	305.2
			305.3
	306:Marketing	Consumer Behaviour	306.1
			306.2
	305:Finance	Direct Taxation	305.1
			305.1
	305:HR	Labour & Social Security Laws	305.2
			306.1
	306:HR	Human Resource Accounting & Compensation Management	306.2
			305.1
	305:OPE	Planning & Control of Operations	305.2
			305.3
			305.4
			306.1
	306:OPE	Inventory Management	306.2
			401.1
	401	Managing for Sustainability	40.1.2
			401.3
			401.4
			402.1
	402	Dissertation	402.2
			402.3

**SECOND  
YEAR  
(SEM-  
IV,TERM-II)**

	403MKT	Services Marketing	403.1
			403.2
			403.3
	404MKT	Sales & Distribution Management	404.1
			404.2
			404.3
			404.4
	403 FIN	Indirect Taxation	403.1
			403.2
			403.3
	404 FIN	International Finance	404.1
			404.2
			404.3
	403 HR	Employment Relations	403.1
			403.2
			403.3
	404 HR	Strategic Human Resource Management	404.1
			404.2
			404.3

# ENGINEERING AND MANAGEMENT (MS) and Affiliated to Pune University

YEAR 2019-20

## OUTCOMES

IN 2016 ( FY MBA)
<b>COURSE OUTCOMES</b>
Basic concepts of financial accounting, cost accounting and management accounting.
Various tools from accounting and cost accounting this would facilitate the decision making.
Analytical abilities to face the business situations.
Equip the students of management with time tested tools and techniques of managerial economics to enable them to appreciate its relevance in decision making.
Explore the economics of information and network industries and to equip students with an understanding of how economics affect the business strategy of companies in these industries
develop economic way of thinking in dealing with practical business problems and challenges.
Acquaint students with general business law issues to help become more informed,
sensitive and effective business leaders.The students with an understanding of fundamental legal issues pertaining to the business world to enhance their ability to manage businesses effectively.
understand the concept and process of business research in business environment.
the use of tools and techniques for exploratory, conclusive and causal research.understand the concept of measurement in empirical systems
use statistical techniques for analysis of research data.
A solid understanding of human behavior in the workplace from an individual, group, and groups, and organizations act in order to expand your options of approaches and increase your own effectiveness.
To understand the human interactions in an organization.
To develop good team spirit.
importance of understanding external environment in marketing decision making.

students to a systematic frame work of marketing & implementations and to highlight need for different marketing approaches for services, goods, and for household consumers, organizational buyers.
Ability to apply conceptual knowledge base gained to solve real life business problems.
Ability to work diligently both individually and as part of teams using techniques such as case analysis, projects and assignments.
Demonstrate leadership and team membership skills which are ardently required for effective implementation and coordination of organizational activities.
Have an understanding of the global arena and competitive environments which are bringing paramount changes in business practices.
An ability to communicate effectively with a range of audiences through enhanced written and oral communication skills.
the concept of Marketing Mix as a framework for Marketing Decision making.
the need, importance and process of Marketing Planning and Control.
MAke Familiar to the students to the dynamic nature of Marketing Function.
various concepts related to financial management.
study in detail, various tools and techniques in the area of finance, develop the analytical skills this would facilitate the decision making in Business situations.
understand the role of HRM in an organization ,earn to gain competitive advantage through people, learn to study and design HRM system
understand role of quantitative techniques in managerial decision making.
understand process of decision problem formulation.
understand applications of various quantitative techniques in managerial settings.
develop an understanding of the strategic importance of Operations & SCM and how it can provide a competitive advantage in the marketplace, understand the relationship between Operations & SCM and other business functions, such as Marketing, Finance, Accounting, and Human Resources.
understand the relationship between Operations & SCM and other business functions, such as
develop knowledge of the issues related to designing and managing Operations & SCM and the techniques to do so

develop conceptual understanding about latest developments in the field of Information
use Information Technology to gain competitive advantage in business
Technology and the impact of I.T. in managing a business
demonstrate the application of various MS Office utilities functions w.r.t. various subject domains
enhance personal productivity through advanced features of MS Word, MS Excel & MS PowerPoint
instruct skills such as MS Outlook and basic social networking tools for business processes
share the knowledge and accelerate learning in the field of I

## **MBA**

Expose participants to various perspectives and concepts in the field of Strategic Management.
Help participants develop skills for applying these concepts to the solution of business problems.
Help students master the analytical tools of strategic management.
acquaint the students with a perspective of different facets of management of an enterprise,
provide inputs with reference to the Investment Decisions along with the techniques for those decisions,
inculcate the evaluation parameters of enterprise in terms of expenses
control systems and pricing,
develop the knowledge of the concept of auditing and its applicability as performance
offer the opportunity for the young students to acquire on job the skills, knowledge, attitudes, and perceptions along with the experience needed to constitute a professional identity.
help the students in exploring career opportunities in their areas of interest.
give the students an understanding of marketing research from both user's (management) and doer's (the researchers) perspective. ,design and produce,

evaluate a research proposal & understand the quality of research studies
understand the applications of business research tools in Marketing decision making.
the importance of understanding consumer behavior in Marketing.the environmental and individual influences on consumers,
understand consumer behavior in Indian context.
understand the basic concepts in Income Tax Act, 1961.,,acquaint with online filling of various forms and Returns. ,Calculate Gross Total Income and Tax Liability of an Individual.
give students insight into the implementation of labour laws.
make the students understand rationale behind labour laws ,equip students with important provisions of various labour laws, give students insight into the implementation of labour laws.
orient the students with the concepts related to human resource accounting & compensation management
Facilitate learning related to human resource accounting & compensation management for employees.
give an overview of Planning & Control of Operations,explain the role of forecasting in the operations planning process.,
explain the need for aggregate planning and the steps in aggregate planning.,
explain how is capacity planning done in organizations and what is its relationship with MRP.
highlight the importance of scheduling in operations management.
give an overview of various aspects of inventory.
explain the impact of types of inventory costs on inventory management decisions. explain the principles of JIT
Apply general ethical principles to particular cases or practices in business
Think independently and rationally about contemporary moral problems
Recognize the complexity of problems in practical ethics.
Demonstrate how general concepts of governance apply in a given situation or given circumstances.
To offer the opportunity for the young students to acquire on job the skills, knowledge, attitudes, and perceptions along with the experience needed to constitute a professional identity.
To provide means to immerse students in actual supervised professional experiences
To gain deeper understanding in specific areas

To emphasize the significance of services marketing in the global economy.
To make the students understand the deeper aspects of successful services marketing.
To provide insights to the challenges and opportunities in services marketing.
To provide foundations in components of sales and distribution management.
To introduce various facets of the job of a sales manager.
To focus on decision making aspects and implementation of decisions in sales and distribution management.
To understand the basic concepts in various Indirect Tax Acts.
To understand procedural part of Indirect Taxes
To acquaint with online filling of various Forms & Returns.
To make students familiar with the operations in foreign exchange markets
To sensitize students with complexities of managing finance of multinational firm.
To highlight the importance of the regulatory framework within which international financial transactions can take place, with special reference to India.
Give students insight into the IR scenario in India
Make students understand important laws governing IR
Create understanding about role of Govt., society and trade union in IR
To make students understand HR implications of organizational strategies
Understand the various terms used to define strategy & its process
Understand HR strategies in Indian & global perspective



**INDIRA COLLEGE**  
**Approved By AICTE New D**

**A**

YEAR	COURSE CODE	COURSE NAME
<b>FIRST YEAR (SEM-I,TERM-I)</b>	IT11	Fundamentals of Computer
	IT12	C Programming with Data Structure
	IT13	Software Engineering
	IT14	Database Management System

	BM11	Principles and Practices of Management and Organizational Behavior
	BM12	Business Process Domains*
	IT21	Essentials of Operating System
	IT22	Web Technologies
	IT23	Core Java

FIRST YEAR (SEM-II,TERM-II)	IT24	Essentials of Networking
	MT21	Discrete Mathematics
	BM21	Essentials of Marketing*
YEAR	COURSE CODE	COURSE NAME

<b>SECOND YEAR (SEM-III,TERM-I)</b>	MTC31	Probability and Combinatorics
	ITC31	Multimedia Tools for Presentation
		Soft Skills-Presentation
	T1-IT31	Advanced Data Structure and C++ programming
	T1-IT32	Design and Analysis of Algorithms (DAA)
	T1-IT33	Object Oriented Analysis and Design

	T1-IT34	Advanced Internet Technology
<b>SECOND YEAR (SEM-IV,TERM-II)</b>	ITC41	Optimization Techniques
	ITC42	Research Methodology & Statistical Tools*
	SSC41	Soft Skills -Interview *
	T1-IT41	Advanced Java
	T1-IT42	Python programming
	T1-IT43	Advance DBMS

	T1-IT44	Cloud Computing
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YEAR	COURSE CODE	COURSE NAME
THIRD YEAR (SEM-V, TERM-I)	ITC51	Software Project Management
	SSC51	Soft Skills - Group Discussion*
	T1-IT51	ASP .Net using C#
	T1-IT52	Service Oriented Architecture

	T1-IT53	Big Data Analytics
	T1-IT54	Mobile Application Development

# OF ENGINEERING AND MANAGEMENT

Delhi, DTE (MS) and Affiliated to Pune University

**ACADEMIC YEAR 2019-20**

## **COURSE OUTCOMES**

<b>COURSE PATTERN ( FY MCA)</b>	
<b>COURSE OUTCOME NO.</b>	<b>COURSE OUTCOMES</b>
IT11.1	Understand the number system & solve the conversion problems.
IT11.2	Analyse and design the working of sequential & combinational circuits .
IT11.3	Define Hardware & memory requirement to configure and design a computer.
IT12.1	Understand the fundamentals of C programming.
IT12.2	Choose the loops and decision making statements to solve the problem.
IT12.3	Implement different Operations on arrays.
IT12.4	Use functions to solve the given problem.
IT12.5	Understand pointers, structures and unions.
IT12.6	Implement file Operations in C programming for a given application.
IT13.1	How to apply the software engineering lifecycle by demonstrating competence in communication, planning, analysis, design, construction, and deployment
IT13.2	Understanding of software requirements and the SRS documents.
IT13.3	Understand input output design concepts.
IT13.4	Understand Different approaches and models for System Development:such as Waterfall,Prototyping,Spiral (including WIN-WIN Spiral) ,RAD
IT14.1	Students will be able to understand the features of database management systems and Relational databases.
IT14.2	Master the basics of SQL and construct queries using SQL
IT14.3	To understand the functional dependencies and design of the database
IT14.4	Familiar with the basic issues of transaction processing and concurrency control.

BM11.1	To understand the principles and functions of management.
BM11.2	To learn the scientific decision making process and problem solving techniques.
BM11.3	To learn modern management process.
BM11.4	To learn behavioural aspects of an individual in the organization.
BM12.1	Student will learn & understand the processes and practices in business and their applications
BM12.2	Student will learn and working of advance business applications like CRM and SCM.
BM12.3	Student will understand the financial aspect of business and management
BM12.4	Student will learn and analyze the financial statements of a business.
IT21.1	Student will be able to The mechanisms of OS to handle processes and threads and their communication.
IT21.2	To learn various process management concepts including scheduling,synchronization,deadlocks.
IT21.3	learn concepts of memory management includingvirtual memory.
IT21.4	Issues related to file system interface and implementation,disk management.
IT22.1	Apply markup languages for processing, identifying, and presenting information in web pages.
IT22.2	Use scripting languages and web services to transfer data and add interactive components to web pages.
IT22.3	Creating server side ASP applications to send data from
IT23.1	knowledge of the structure and model of the Java programming language, (knowledge)
IT23.2	use the Java programming language for various programming technologies (understanding)
IT23.3	develop software in the Java programming language, (application)
IT23.4	evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements (analysis)
IT23.5	propose the use of certain technologies by implementing them in the Java programming language to solve the given problem (synthesis)
IT23.6	choose an engineering approach to solving problems, starting from the acquired knowledge of programming and know ledge of operating systems. (evaluation)

IT24.1	To understand the concepts of the OSI reference model and the TCP-IP reference model.
IT24.2	To learn the concepts of protocols, network interfaces and design/performance issues in local area networks and wide area networks.
IT24.3	Identify the different types of network topologies and protocols.
IT24.4	Design, calculate, and apply subnet masks and addresses to fulfill networking requirements.
MT21.1	Write an argument using logical notation and determine if the argument is or is not valid.
MT21.2	Demonstrate the ability to write and evaluate a proof or outline the basic structure of and give examples of each proof technique described.
MT21.3	Understand the basic principles of sets and operations in sets.
MT21.4	Prove basic set equalities.
MT21.5	Apply counting principles to determine probabilities.
MT21.6	Demonstrate an understanding of relations and functions and be able to determine their properties.
MT21.7	Determine when a function is 1-1 and "onto".
MT21.8	Demonstrate different traversal methods for trees and graphs.
MT21.9	Model problems in Computer Science using graphs and trees
BM21.1	Identify core concepts of marketing and the role of marketing in business and society.
BM21.2	Ability to develop marketing strategies based on product, price, place and promotion objectives.
BM21.3	Ability to create an integrated marketing communications plan which includes promotional strategies and measures of effectiveness.
BM21.4	Ability to communicate the unique marketing mixes and selling propositions for specific product offerings.
BM21.5	Ability to collect, process, and analyze consumer data to make informed marketing decisions.
BM21.6	Ability to analyze marketing problems and provide solutions based on a critical examination of marketing information.
<b>SY MCA</b>	
<b>COURSE OUTCOME NO.</b>	<b>COURSE OUTCOMES</b>
MTC31.1	How to use binomial and multinomial Theorems in our real life

MTC31.2	Mathematical Expectation of Probability Distribution
MTC31.3	use of ranom variables in probability
MTC31.4	Special cases of probability distribution
MTC31.5	Mathematical Expectation of Probability Distribution
T1-IT31.1	Students will be able to write C++ as well as DS programs with CPP using advanced language features
T1-IT31.2	Students will be able to utilize OO techniques to design C++ programs
T1-IT31.3	Students will be able to use the standard C++ library, exploit advanced C++ techniques
T1-IT31.4	Students will be able to write application using datastructure like queue, stack and linked list
T1-IT31.5	Students will be able to Learn Application of graph and tree for efficiency of code
T1-IT32.1	Students should be able to Analyze the efficiency of algorithms using time and space complexity theory
T1-IT32.2	Students should be able to Understand and implement various sorting and searching techniques
T1-IT32.3	Students should be able to understand different advance algorithms and methods (greedy,dynamic programming,backtracking,branch and bound)used in computer science to create strong logic.
T1-IT32.4	Students should be able to Apply the algorithms and design techniques to solve problems
T1-IT33.1	Students should be able to use an object-oriented method for analysis and design.
T1-IT33.2	Students should be know how to use UML for notation.
T1-IT33.3	Students should be proficient using Rational Rose Modeler to represent both analysis and design models, including the following UML diagrams: use case, class, sequence, collaboration, activity and statechart diagrams.
T1-IT33.4	Identify business classes, attributes and relationships and construct the domain model as a class diagram using Rational Rose Modeler.
T1-IT34.1	To Understand and acquainted with the concept of HTML5,Angular Js,Jquery,XML,PHP

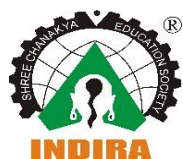
T1-IT34.2	To Implement HTML5 ,Angular JS ,Jquery,AJAX in web pages
T1-IT34.3	To develop web based systems using HTML5, XML, PHP, AJAX, JQuery and MySQL.
ITC41.1	Describe clearly a problem, identify its parts and analyze the individual functions.
ITC41.2	Feasibility study for solving an optimization problem
ITC41.3	Becoming a mathematical translation of the verbal formulation of an optimization problem
ITC41.4	To design algorithms, the repetitive use of which will lead reliably to finding an approximate solution
ITC41.5	Evaluate and measure the performance of an algorithm.
ITC41.6	Discovery, study and solve optimization problems.
ITC41.7	Understand optimization techniques using algorithms.
ITC41.8	Investigate, study, develop, organize and promote innovative solutions for various application
ITC42.1	Student will learn to create scientific attitude towards solving a management problem and impart knowledge about tools available for carrying out research with the evidence of statistical techniques.
T1-IT41.1	Students will be able to do socket programming and develop chat application
T1-IT41.2	develop server side applications with database handling using servlets, JSP, JDBC and Hibernate and Springs framework.
T1-IT41.1	Design real life situational problems and think creatively about solutions of them.
T1-IT41.2	Apply a solution clearly and accurately in a program using Python.
T1-IT41.3	Apply the best features of mathematics, engineering and natural sciences to program real life problems.
T1-IT43.1	Students will be able to differentiate types of database management system.
T1-IT43.2	Identify the introductory distributed database and parallel database concepts and its structures
T1-IT43.3	Students will be able to Apply some data mining (clustering and classification) algorithms
T1-IT43.4	Student will learn basic concepts and techniques of data warehousing

T1-IT44.1	To understand the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud, etc. explain the core issues of cloud computing such as security, privacy, and interoperability.
T1-IT44.2	To learn the appropriate technologies, algorithms, and approaches for the related issues.
T1-IT44.3	identify problems, and explain, analyze, and evaluate various cloud computing solutions.
T1-IT44.4	Explore some important cloud computing driven commercial systems such as Google Apps, Microsoft Azure and Amazon Web Services and other businesses cloud applications.

#### TY MCA

COURSE OUTCOME NO.	COURSE OUTCOMES
ITC51.1	Students should be able to Apply project management concepts and techniques to an IT project.
ITC51.2	Identify issues that could lead to IT project success or failure.
ITC51.3	Explain project management in terms of the software development process.
ITC51.4	Describe the responsibilities of IT project managers.
ITC51.5	Apply project management concepts through working in a group as team leader or active teammember on an IT project.
T1-IT51.1	Successful students will be able to design web applications using ASP.NET
T1-IT51.2	Successful students will be able to use ASP.NET controls in web applications.
T1-IT51.3	Successful students will be able to debug and deploy ASP.NET web applications
T1-IT51.4	Successful students will be able to create database driven ASP.NET web applications and web services
T1-IT52.1	Explain the meaning of the "Service Oriented" paradigm both from the business and technical point of view.
T1-IT52.2	Current technologies used to implement a SOA , in particular Web services.
T1-IT52.3	understand the applicability of SOA design patterns and the meaning of the major SOA implementation technologies.

T1-IT53.1	Student should be able to Understand the Big Data challenges & opportunities ,its applications
T1-IT53.2	Student should be able to Gain conceptual understanding of NOSQL Database.
T1-IT53.3	Student should be able to Understanding of concepts of map and reduce and functional programming
T1-IT53.4	Student should be able to Gain conceptual understanding of Hadoop Distributed File System.
T1-IT54.1	student should be able to: develop high-level plans for script solutions for mobile and evaluate the post-production outcome
T1-IT54.2	student should be able to: design scripts to meet given interface and media control requirements
T1-IT54.3	student should be able to use variables, properties and other code elements appropriately to implement the code design
T1-IT54.4	student should be able to devise, carry out and evaluate functional test strategies of mobile design;
T1-IT54.5	student should be able to implement and evaluate techniques for the installation of mobile applications and delivery via various channels
T1-IT54.6	student should be able to explain the principles of technologies which support media production and delivery on a variety of platforms.



**INDIRA COLLEGE OF E**  
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**ACADEM**  
**COU**

SI			
YEAR	COURSE CODE	COURSE NAME	COURSE OUTCOME NO.
<b>SE (SEM-III,TERM-I)</b>	207002	Engineering Mathematics - III	207002.1
			207002.2
			207002.3
			207002.4
			207002.5
	202041	Manufacturing Process-I	202041.1
			202041.2
			202041.3
			202041.4
			202041.5
			202041.6
	202042	Computer Aided Machine Drawing	202042.1
			202042.2
			202042.3
			202042.4
			202042.5
	202043	Thermodynamics	202043.1
			202043.2
			202043.3
			202043.4
			202043.5
			202043.6
	202044	Material Science	202044.1
			202044.2
			202044.3



			202050.5
			202050.6
	203152	Electrical and Electronics Engineering	203152.1
			203152.2
			203152.3
			203152.4
			203152.5
			203152.6
	202053	Machine Shop - I	202053.1
			202053.2
			202053.3
			202053.4
			202053.5
			202053.6
			TI
YEAR	COURSE CODE	COURSE NAME	
	302041	Design of Machine Elements-I	302041.1
			302041.2
			302041.3
			302041.4
			302041.5
			302041.6
	302042	Heat Transfer*	302042.1
			302042.2
			302042.3
			302042.4
			302042.5
			302043.1
			302043.2
			302043.3
TE /SEM			

TE (SEM-V, TERM-I)	302043	Theory of Machines-II®	302043.4
			302043.5
			302043.6
	302044	Turbo Machines	302044.1
			302044.2
			302044.3
			302044.4
	302045	Metrology and Quality Control®	302045.1
			302045.2
			302045.3
			302045.4
	302046	Skill Development	302046.1
			302046.2
			302046.3
			302046.4
TE (SEM-VI, TERM-II)	302047	Numerical Methods and Optimization*	302047.1
			302047.2
			302047.3
			302047.4
	302048	Design of Machine Elements-II	302048.1
			302048.2
			302048.3
			302048.4
			302048.5
			302048.6
	302049	Refrigeration and Air Conditioning	302049.1
			302049.2
			302049.3
			302049.4
	302050	Mechatronics	302050.1
			302050.2
			302050.3
			302050.4
			302050.5
			302050.6
	302051	Manufacturing - Process-II®	302051.1
			302051.2
			302051.3
			302051.4

302052	Machine Shop-II®	302052.1
302053	Seminar®	302053.1
		302053.2
		302053.3
		302053.4
302054	Audit Course*	302054.1
		302054.2
		302054.3
		302054.4

**BI**

YEAR	COURSE CODE	COURSE NAME	
	402041	Hydraulics and Pneumatics	402041.1
			402041.2
			402041.3
			402041.4
			402041.5
			402041.6
	402042	CAD CAM Automation	402042.1
			402042.2
			402042.3
			402042.4
			402042.5
			402042.6
	402043	Dynamics of Machinery	402043.1
			402043.2
			402043.3
			402043.4
			402043.5
			402043.6
			402044 A.1
			402044 A.2

<b>BE(SEM-VII,TERM-I)</b>	402044 A	Elective-I Finite Element Analysis	402044 A.3
			402044 A.4
			402044 A.5
			402044 A.6
	402044 B	Elective-I Computational Fluid Dynamics	402044B.1
			402044B.2
			402044B.3
			402044B.4
			402044B.5
	402044 C	Elective-I Heating, Ventilation, Air Conditioning and Refrigeration Engineering	402044 C.1
			402044 C.2
			402044 C.3
			402044 C.4
			402044 C.5
			402044 C.6
	402045 A	Elective - II Automobile Engineering	402045 A.1
			402045 A.2
			402045 A.3
			402045 A.4
	402045 B	Elective - II Operation Research	402045 B.1
			402045 B.2
			402045 B.3
			402045 B.4
	402045 C	Elective - II Energy Audit and Management	402045 C.1
			402045 C.2
			402045 C.3
			402045 C.4
			402045 C.5
			402045 C.6
	402050	Project - I	402046.1
			402046.2
			402046.3
	402047	Energy Engineering	402047.1
			402047.2
			402047.3

**BE (SEM-  
VIII,TERM-II)**

			402047.4
			402047.5
			402047.6
	402048	Mechanical System Design	402048.1
			402048.2
			402048.3
			402048.4
	402049 A	Elective-III Tribology	402049 A.1
			402049 A.2
			402049 A.3
			402049 A.4
	402049 B	Elective-III Industrial Engineering	402049 B.1
			402049 B.2
			402049 B.3
			402049 B.4
			402049 B.5
	402049 C	Elective-III Robotics	402049 C.1
			402049 C.2
			402049 C.3
			402049 C.4
			402049 C.5
			402049 C.6
	402050 A	Elective-IV Advanced Manufacturing Processes	402050A.1
			402050A.2
			402050A.3
			402050A.4
			402050A.5
			402050A.6
	402050 B	Elective-IV Solar and Wind Energy	402050 B.1
			402050 B.2
			402050 B.3
			402050 B.4
	402050 C	Elective-IV Product Design and Development	402050 C.1
			402050 C.2
			402050 C.3
			402050 C.4
			402050 C.5
			402050 C.6
	402051	Project-II	402051.1
			402051.2

			402051.3
M			
YEAR	COURSE CODE	COURSE NAME	
FIRST YEAR (SEM-I,TERM-I)	507101	Advanced Mathematics and Numerical Methods	507101.1
			507101.2
			507101.3
			507101.4
			507101.5
			507101.6
	502102	Advanced Thermodynamics and Combustion Technology	502102.1
			502102.2
			502102.3
			502102.4
			502102.5
			502102.6
	502103	Advanced Fluid Mechanics	502103.1
			502103.2
			502103.3
			502103.4
			502103.5
			502103.6
	502104	Research Methodology	502104.1
			502104.2
			502104.3
			502104.4
			502104.5
			502104.6
	502105	Project Management	502105A.1
			502105A.2
			502105A.3
		Operation Management	502105B.1
			502105B.2
			502105B.3
		Environmental and Pollution control	502105C.1
			502105C.2
			502105C.3
	502106	Advanced Heat Transfer	502107.1
			502107.2
			502107.3
			502107.4
			502107.5
			502107.6
			502107.7

<b>FIRST YEAR (SEM-II, TERM-II)</b>	502108	Air Conditioning Technology	502108.1
			502108.2
			502108.3
			502108.4
			502108.5
			502108.6
	502109	Measurements and Controls	502109.1
			502109.2
			502109.3
			502109.4
			502109.5
	502110	Turbomachinery	502110A.1
			502110A.2
		Gas Turbine	502110B.1
			502110B.2
		Selection of Fans, Pumps and blowers	502110C.1
			502110C.2
			502110C.3
	502112	Seminar-1	502112.1
			502112.2
			502112.3
<b>YEAR</b>	<b>COURSE CODE</b>	<b>COURSE NAME</b>	
<b>SECOND YEAR (SEM-III, TERM-I)</b>	602113	Computational Fluid Dynamics	602113.1
			602113.2
			602113.3
			602113.4
			602113.5
			602113.6
	602114	Design of Heat Transfer Equipments	602114.1
			602114.2
			602114.3
			602114.4
			602114.5
			602114.6
	602115	Solar Energy	602115A.1
			602115A.2
		Waste Heat Recovery and Cogeneration	602115B.1
			602115B.2
		Biomass Technology	602115C.1
			602115C.2
<b>SECOND YEAR (SEM-IV, TERM-II)</b>	602117	Project	602117.1
			602117.2

(SEMI-IV, PERMIT II)	602117	Project	602117.3
			602117.4

# ENGINEERING AND MANAGEMENT

## DTE (MS) and Affiliated to Pune University

**MIC YEAR 2019-20**

### IRSE OUTCOMES

<b>E(MECHANICAL)</b>
<b>COURSE OUTCOMES</b>
Solve higher order linear differential equations and apply to Mechanical engineering problems such as mechanical vibrations and heat transfer.
Integral Transform techniques such as laplace transform, Fourier transform
Apply statistical methods like correlation, regression analysis in analyzing and interpreting experimental data and probability theory applied to construction management.
Perform vector differentiation and integration, analyze the vector fields and apply to fluid flow problems
Solve various partial differential equations such as wave equation, one and two dimensional heat flow
Understand and analyze foundry practices like pattern making, mold making, Core making and Inspection of defects
Understand and analyze Hot and Cold Working, Rolling, Forging, Extrusion and Drawing Processes.
Understand different plastic molding processes, Extrusion of Plastic and Thermoforming
Understand different Welding and joining processes and its defects
Understand, Design and Analyze different sheet metal working processes.
Understand the constructional details and Working of Centre Lathe
Understand the importance of CAD in the light of allied technologies such as CAM, CAE, FEA, CFD, PLM.
Understand the significance of parametric technology and its application in 2D sketching.
Understand the significance of parametric feature-based modeling and its application in 3D machine components modeling
Ability to create 3D assemblies that represent static or dynamic Mechanical Systems.
Ability to ensure manufacturability and proper assembly of components and assemblies. Ability to communicate between Design and Manufacturing using 2D drawings.
Apply various laws of thermodynamics to various processes and real systems.
Apply the concept of Entropy, Calculate heat, work and other important thermodynamic properties for various ideal gas processes.
Estimate performance of various Thermodynamic gas power cycles and gas refrigeration cycle and availability in each case.
Estimate the condition of steam and performance of vapour power cycle and vapour compression cycle.
Estimate Stoichiometric air required for combustion, performance of steam generators and natural draught requirements in boiler plants.
Use Psychrometric charts and estimate various essential properties related to Psychrometry and
Understand the basic concepts and properties of Material
Understand about material fundamental and processing.
Select proper metal, alloys, nonmetal and powder metallurgical component for specific requirement

Detect the defects in crystal and its effect on crystal properties.
Evaluate the different properties of material by studying different test
Recognize how metals can be strengthened by cold-working and hot working
Apply Knowledge of Mathematics science for Engineering applications
Design and conduct experiments ,as well to analyse interpret data
Design a component to meet desired needs within realistic constraints of health and safety
Identify formulate and solve engineering problems
Practice professional and ethical responsibility
Use the techniques,skills,and modern engineering tools necessary for engineering practice
Apply knowledge of mathematics, science for engineering applications
Design and conduct experiments, as well as to analyze and interpret data
Identify, formulate, and solve engineering problems
Practice professional and ethical responsibility
Design a component to meet desired needs within realistic constraints of health and safety
Use the techniques, skills, and modern engineering tools necessary for engineering practice
Use of various properties in solving the problems in fluids
Use of Bernoulli's equation for solutions in fluids
Determination of forces drag and lift on immersed bodies
Developed right-attitudinal and behavioral change
Improved communication, interaction and presentation of ideas.
Right attitudinal and behaviouralchange
Identify mechanisms in real life applications.
Perform kinematic analysis of simple mechanisms
Perform static and dynamic force analysis of slider crank mechanism
Determine moment of inertia of rigid bodies experimentally.
Analyze velocity and acceleration of mechanisms by vector and graphical methods
Describe how metals and alloys formed and how the properties change due to microstructure
Apply core concepts in Engineering Metallurgy to solve engineering problems.
Conduct experiments, as well as to analyze and interpret data
Select materials for design and construction.
Possess the skills and techniques necessary for modern materials engineering practice
Recognize how metals can be strengthened by alloying, cold-working, and heat treatment
Classify various types of Engines, Compare Air standard, Fuel Air and Actual cycles and make out various losses in real cycles.
Understand Theory of Carburetion, Modern Carburetor, Stages of Combustion in S. I. Engines and Theory of Detonation, Pre-ignition and factors affecting detonation.
Understand Fuel Supply system, Types of Injectors and Injection Pumps, Stages of Combustion in CI Engines, Theory of Detonation in CI Engines and Comparison of SI and CI Combustion and Knocking and Factors affecting, Criteria for good combustion chamber and types.
Carry out Testing of I. C. Engines and analyze its performance

Describe construction and working of various I. C. Engine systems (Cooling, Lubrication, Ignition, Governing, and Starting) also various harmful gases emitted from exhaust and different devices to control pollution and emission norms for pollution control.
Describe construction, working of various types of reciprocating and rotary compressors with performance calculations of positive displacement compressors.
Acquire knowledge about the constructional details and principle of operation of dc machines. Develop the capability to identify and select suitable DC Motor and its speed control methods for given industrial application.
Acquire knowledge about the constructional details and principle of operation of three phase induction motors. Develop the capability to identify and select suitable speed control methods and starters for given industrial application.
Understand construction and working principles of different special purpose motors.
Ability to differentiate between microprocessor and microcontroller. Understand features and architecture of Arduino IDE.
Understand ATmega 328p based Arduino board for interfacing. Ability to interface Arduino IDE with LCD, LED and Keypad.
Ability to interface Arduino IDE with different sensors for mechanical applications.
Operate various machines like lathe, milling, drilling
Perform plain turning, taper turning, and screw cutting etc. on lathe machine
Perform resistant welding operations
Perform various sheet metal operations
Perform plastic moulding operations
industry standard safety practices and specific safety requirements for different machining operations
<b>E(MECHANICAL)</b>
<b>COURSE OUTCOMES</b>
Ability to identify and understand failure modes for mechanical elements and design of machine elements based on strength.
Ability to design Shafts, Keys and Coupling for industrial applications
Ability to design machine elements subjected to fluctuating loads.
Ability to design Power Screws for various applications
Ability to design fasteners and welded joints subjected to different loading conditions.
Ability to design various Springs for strength and stiffness.
Analyze the various modes of heat transfer and implement the basic heat conduction equations for steady one dimensional thermal system.
Implement the general heat conduction equation to thermal systems with and without internal heat generation and transient heat conduction.
Analyze the heat transfer rate in natural and forced convection and evaluate through experimentation investigation
Interpret heat transfer by radiation between objects with simple geometries.
Analyze the heat transfer equipment and investigate the performance.
Student will be able to understand fundamentals of gear theory which will be the prerequisite for gear
Student will be able to perform force analysis of Spur, Helical, Bevel, Worm and Worm gear.
The student to analyze speed and torque in epi-cyclic gear trains which will be the prerequisite for gear box design.

Student will be able to design cam profile for given follower motions and understand cam Jump phenomenon, advance cam curves.
The student will synthesize a four bar mechanism with analytical and graphical methods.
The student will analyze the gyroscopic couple or effect for stabilization of ShipAeroplane and Four wheeler vehicle. b. Student will choose appropriate drive for given application (stepped / step-less).
Apply Thermodynamics and kinematics principles to turbo machines
Analyze the performance of turbo machine
Ability to select turbo machine for given application
Predict performance of turbo machine using model analysis
Understand the methods of measurement, selection of measuring instruments / standards of measurement, carryout data collection and its analysis.
Explain tolerance, limits of size, fits, geometric and position tolerances and gauge design
Understand and use/apply Quality Control Techniques/ Statistical Tools appropriately.
Develop an ability of problem solving and decision making by identifying and analyzing the cause for variation and recommend suitable corrective actions for quality improvement.
understanding the shop floor working
Understanding of working of different tools in Workshop
Practical analysis of problem
Analysis and Understanding
Use appropriate Numerical Methods to solve complex mechanical engineering problems.
Formulate algorithms and programming
Use Mathematical Solver.
Generate Solutions for real life problem using optimization technique
To understand and apply principles of gear design to spur gears and industrial spur gear boxes
To become proficient in design of helical and bevel gear
to develop capability to analyse rolling contact bearing and its selection from manufactures catalogue
to learn a skill to design worm gear box for various design applications
To inculcate an ability to design belt drives and selection of belt,rope and chain drives
To achieve an expertise in design of sliding contact bearing in industrial applications
Illustrate the fundamental principles and applications of refrigeration and air conditioning system-
Obtain cooling capacity and coefficient of performance by conducting test on vapour compression refrigeration systems
Present the properties, applications and environmental issues of different refrigerants
Operate and analyze the refrigeration and air conditioning systems
Identification of key elements of mechatronics system and its representation in terms of block diagrams
Understanding the concept of signal processing and use of interfacing systems such as ADC, DAC, digital
Interfacing of Sensors,Actuators using appropriate DAQ microcontroller
Time and frequency domain analysis of system models
PID control implementation on real time systems
Development of PLC ladder diagram programming and implementation of real life system
Student should be able to apply the knowledge of various manufacturing processes.
Student should be able to identify various process parameters and their effect on processes.
Student should be able to figure out application of modern machining.
Students should get the knowledge of Jigs and Fixtures for variety of operations.

Ability to develop knowledge about the working and programming techniques for various machines and
Establish motivation for any topic of interest and develop a thought process for technical presentation.
Organize a detailed literature survey and build a document with respect to technical publications.
Analysis and comprehension of proof-of-concept and related data.
Effective presentation and improve soft skills. Make use of new and recent technology (e.g. Latex) for creating technical reports
To create and sustain a community of learning in which students acquire knowledge in fire, safety and hazard management and learn to apply it professionally with due consideration for ethical, human life & property safety issues
To pursue research and development in fire safety engineering, hazard management and disseminate its findings.
To meet the challenges of today and tomorrow in the most effective,
To help in building national capabilities in fire safety engineering, disaster management, hazard management, industrial safety education through practical training to ensure a fire safe nation
<b>E(MECHANICAL)</b>
<b>COURSE OUTCOMES</b>
Understand working principle of components used in hydraulic & pneumatic systems.
Identify various applications of hydraulic & pneumatic systems.
Selection of appropriate components required for hydraulic and pneumatic systems.
Analyse hydraulic and pneumatic systems for industrial/mobile applications.
Design a system according to the requirements.
Develop and apply knowledge to various applications.
Apply homogeneous transformation matrix for geometrical transformations of 2D CAD entities for basic geometric transformations
Use analytical and synthetic curves and surfaces in part modeling
Do real times analysis of simple mechanical elements like beams, trusses, etc. and comment on safety of engineering components using analysis software.
Generate CNC program for Turning / Milling and generate tool path using CAM software.
Demonstrate understanding of various rapid manufacturing techniques and develop competency in designing and developing products using rapid manufacturing technology.
Understand the robot systems and their applications in manufacturing industries.
Apply balancing technique for static and dynamic balancing of multi cylinder inline and radial engines.
Estimate natural frequency for single DOF undamped & damped free vibratory systems.
Determine response to forced vibrations due to harmonic excitation, base excitation and excitation due to unbalance forces.
Estimate natural frequencies, mode shapes for 2 DOF undamped free longitudinal and torsional vibratory systems.
Describe vibration measuring instruments for industrial / real life applications along with suitable
Explain noise, its measurement & noise reduction techniques for industry and day today life problems.
Understand the different techniques used to solve mechanical engineering problems.
Derive and use 1-D and 2-D element stiffness matrices and load vectors from various methods to solve for displacements and stresses.

Apply mechanics of materials and machine design topics to provide preliminary results used for testing the reasonableness of finite element results.
Explain the inner workings of a finite element code for linear stress, displacement, temperature and modal analysis.
Use commercial finite element analysis software to solve complex problems in solid mechanics and heat transfer.
Interpret the results of finite element analyses and make an assessment of the results in terms of modeling (physics assumptions) errors, discretization (mesh density and refinement toward convergence) errors, and numerical (round-off) errors.
Analyse and model fluid flow and heat transfer problems.
Generate high quality grids and interpret the correctness of numerical results with physics.
Conceptualize the programming skills.
Use A CFD tool effectively for Practical problems and research.
Interpretation of Software solution to physics involved in Fluid flow & Heat Transfer
Determine the performance parameters of trans-critical & ejector refrigeration systems
Estimate thermal performance of compressor, evaporator, condenser and cooling tower.
Describe refrigerant piping design, capacity & safety controls and balancing of vapour compressor
Explain importance of indoor and outdoor design conditions, IAQ, ventilation and air distribution system.
ventilation and air distribution system. • Estimate heat transmission through building walls using CLTD and decrement factor & time lag methods with energy-efficient and cost-effective measures for building envelope.
Explain working of types of desiccant, evaporative, thermal storage, radiant cooling, clean room and heat pump air-conditioning systems.
To compare and select the proper automotive system for the vehicle.
To analyse the performance of the vehicle.
To diagnose the faults of automobile vehicles.
To apply the knowledge of EVs, HEVs and solar vehicles
Apply LPP and Decision Theory to solve the problems
Apply the concept of transportation models to optimize available resources.
Decide optimal strategies in conflicting situations. Implement the project management techniques.
.Minimize the process time Optimize multi stage decision making problems
Compare energy scenario of India and World.
Carry out Energy Audit of the Residence / Institute/ Organization
Evaluate the project using financial techniques
Identify and evaluate energy conservation opportunities in Thermal Utilities.
Identify and evaluate energy conservation opportunities in Electrical Utilities.
Identify the feasibility of Cogeneration and WHR Use a CFD tool effectively for practical problems and
Find out the gap between existing mechanical systems and develop new creative new mechanical
Learn about the literature review
Get the experience to handle various tools, tackles and machines.
Describe the power generation scenario, the layout components of thermal power plant and analyze the improved Rankin cycle, Cogeneration cycle
Analyze the steam condensers, recognize the an environmental impacts of thermal power plant and method to control the same
Recognize the layout, component details of hydroelectric power plant and nuclear power plant

Realize the details of diesel power plant, gas power plant and analyze gas turbine power cycle
Emphasize the fundamentals of non-conventional power plants
Describe the different power plant electrical instruments and basic principles of economics of power
Understand the difference between component level design and system level design.
Design various mechanical systems like pressure vessels, machine tool gear boxes, material handling systems, etc. for the specifications stated/formulated
Learn optimum design principles and apply it to mechanical components
Handle system level projects from concept to product.
The course will enable the students to know the importance of Tribology in Industry.
The course will enable the students to know the basic concepts of Friction, Wear, Lubrications and their measurements
This course will help students to know the performance of different types of bearings and analytical analysis thereof
This course will help students to apply the principles of surface engineering for different applications of tribology.
Apply the Industrial Engineering concept
Understand, analyze and implement different concepts involved in method study.
Design and Develop different aspects of work system and facilities
Understand and Apply Industrial safety standards, financial management practices.
Undertake project work based on modeling & simulation area.
Identify different type of robot configuration with relevant terminology.
Design robot with desired motion with suitable trajectory planning.
Select suitable sensors, actuators and drives for robotic systems.
Understand kinematics in robotic systems
Select appropriate robot programming for given application
Understand need of IoT, machine learning, simulation in robotics.
Classify and analyze special forming processes
Analyze and identify applicability of advanced joining processes
Understand and analyze the basic mechanisms of hybrid non-conventional machining techniques
Select appropriate micro and nano fabrication techniques for engineering applications
Understand and apply various additive manufacturing technology for product development
Understand material characterization techniques to analyze effects of chemical composition, composition variation, crystal structure, etc.
Design of solar food drier for domestic purpose referring existing system
Design of parabolic dish solar cooker for domestic purpose referring existing system
Design of solar photovoltaic system for domestic purpose referring existing system
Design miniature wind mill for domestic purpose referring existing system
Understand essential factors for product design
Design product as per customer needs and satisfaction
Understand Processes and concepts during product development
Understand methods and processes of Forward and Reverse engineering
Carry various design processes as DFA, DFMEA, design for safety
Understand the product life cycle and product data management
Find out the gap between existing mechanical systems and develop new creative new mechanical
Learn about the literature review

Get the experience to handle various tools, tackles and machines.
<b>E(MECHANICAL)</b>
<b>COURSE OUTCOMES</b>
apply and solve Linear Algebraic Equations
understand Linear Regression Analysis methods
Expalin methods of Differentiation & Integration
solve Eigen Values & Eigen Vectors of Matrices
solve Ordinary differential equations
apply and solve Ordinary differential equations
Explain the Equation of state and properties of pure substance
Apply the laws of thermodynamics to real life problems
Estimate Exergy Analysis of Thermal Systems
Derive and explain Thermodynamic Property Relations
Describe chemical reaction,phase and chemical equilibrium,gas mixtures concepts to analyse the combust
Explain Thermodynamics of Biological systems
Describe the governing equations integral and differencial relations
explain Navier-Stokes Equations,exact solutions and Analysis of numerical schemes
Describe Elementary Plane-Flow Solutions,Role of viscosity in rotational and irrotational flows, Concept of
Explain Boundary layer equations,Effect of pressure gradient
Understand turbulent flow and explain Various Turbulent Models.
Expain one dimenssional compressible flow,normal shock relations and oblick shocks
understand reserach meaning and types,methods and methodology.
farmulate Research Problem and understand the Concept & need of research design.
Apply Mathematical Modelling and prediction of performance
Explain basic instrumentation used in research.
understand and apply statitics in research.
write research report and publish research work.
Explain project and understand planning,budgeting,implementing
Describe Implementation and performance monitoring. Implementation plan for top management
Explain Planning Budget, Procurement Procedures, Construction, Measurement & Verification.
Explain Operating systems models, key decisions, Planning and controlling
Describe Technology and knowledge management, Quality Management
Understand Operations - Challenges, Opportunities, Excellence, risk management and sustainability throu
Identify Pollution and Environmental Ethics
Understand Nuclear hazards Environmental impact and economic aspects
Realize Emission standards and regulations for Automobiles.
Understand modes of heat transfer and laws of heat transfer and apply it to real system
solve the transient heat conduction problems
solve the problems related to External Forced Convection
Apply the Principle of Fluid flow and Convective heat transfer
solve the problems related to natural convection
Apply the correlations of boiling and condensation to solve real life problems
Solve the problems of thermal radiation.

understand HVAC basics terminology
understand and apply Psychrometry
Realize and analysis importance of thermal comfort.
calculate heating and cooling load
design duct system
design air conditioning system
explain Instrument types and performance characteristics
evaluate Measurement Uncertainty
Measure field quantities
measure derived quantities
understand basics of controller
Analyse the Axial flow Compressors, Centrifugal flow compressors
analyse Axial flow Turbines and Radial flow Turbines
Understand basics of Compressible flow
analysis of ideal and real engine
analyse conservation opportunities
evaluate performance
Select fans, pumps and blowers
To use multiple thinking strategies to examine real-world issues and explore creative avenues of expression
To acquire, articulate, create and convey intended meaning using verbal and non-verbal method of
To learn and integrate, through independent learning in sciences and technologies, with disciplinary specialization and the ability to integrate information across

<b>COURSE OUTCOMES</b>
understand application of CFD and Basics governing equation
understand Discretization and Essentials of Numerical Methods
use Curvilinear Coordinates and Numerical Grid Generation
Compute Heat-Transfer on a Cartesian-Geometry
Solve Eulers and Navier-Stokes Equations
explain Turbulence Modeling
classify Heat Exchangers
Solve to Determine Exchanger Effectiveness
analyse Heat Exchanger Pressure Drop
understand Heat Transfer Characteristics
understand basics of cooling tower and furnaces
explain thermal devices
understand solar cell
understand environmental impact of photovoltaic
Understand Waste Heat Recovery
understand Cogeneration
understand Biomass potential and Use
understand Environmental impact of biomass
Find out the gap between existing mechanical systems and develop new creative new mechanical
Learn about the literature review

Get the experience to handle various tools, tackles and machines.
inculcate research culture















tion technology.

f lift and drag.

igh case studies









**INDIRA COLLEGE OF ENGINEERING AND TECHNOLOGY**  
Approved By AICTE New Delhi, DTE (M)

**ACADEMIC YEAR**

**COURSE OF STUDY**

**SE(MECHANICAL ENGINEERING)**

YEAR	COURSE CODE	COURSE NAME	COURSE OUTCOME NO.
<b>SE (SEM-III, TERM-I)</b>	207002	Engineering Mathematics - III	207002.1
			207002.2
			207002.3
			207002.4
			207002.5
	202043	Thermodynamics*	202043.1
			202043.2
			202043.3
			202043.4
			202043.5
			202043.6
	202051	Strength of Materials*	202051.1
			202051.2
			202051.3
			202051.4
			202051.5
			202051.6
			202061.1
			202061.2
			202061.3

	202061	Material Science and Metallurgy	202061.4
			202061.5
			202061.6
	202062	Fluid Mechanics and Machinery	202062.1
			202062.2
			202062.3
			202062.4
			202062.5
			202062.6
	202055	Audit Course	202055.1
			202055.2
			202055.3
			202055.4
	202063	Thermal Engineering	202063.1
			202063.2
			202063.3
			202063.4
			202063.5
			202063.6
	202064	Metrology and Quality Control	202064.1
			202064.2
			202064.3
			202064.4
			202065.1

<b>SE (SEM-IV,TERM-II)</b>	202065	Manufacturing Engineering	202065.2
			202065.3
			202065.4
			202065.5
			202065.6
		<b>Computer Aided Machine Drawing</b>	202066.1
			202066.2
			202066.3
			202066.4
			202066.5
			202066.6
	202067	Soft Skills	202067.1
			202067.2
			202067.3
	202068	THEORY OF MACHINES	202068.1
			202068.2
			202068.3
			202068.4
			202068.5
	<b>203152</b>	Electrical and Electronics Engineering	203152.1
			203152.2
			203152.3
	302047	Numerical Methods and Optimization	302047.1
			302047.2
			302047.3
			302047.4
			302047.5
	302042	Heat Transfer*	302042.1
			302042.2
			302042.3
			302042.4

**TE (SEM-V,TERM-I)**

		302042.5
302050	Mechatronics	302050.1
		302050.2
		302050.3
		302050.4
		302050.5
		302050.6
302061	Applied Computer Aided Engineering	302061.1
		302061.2
		302061.3
302062	Machine design	302062.1
		302062.2
		302062.3
		302062.4
302054	Audit Course	302054.1
		302054.2
		302054.3
		302054.4
302064	Industrial In-plant Training –I	302064.1
		302064.2
		302064.3
302063	Industrial Case Study Assignments	302063.1
		302063.2
302065	Seminar	302053.1
		302053.2
		302053.3
		302053.4
302066	Materials and Manufacturing	302066.1

**TE (SEM-VI,TERM-I)**

	302066	Engineering	302066.2
			302066.3
	302067	Industrial Engineering and Technology Management	302067.1
			302067.2
			302067.3
			302067.4

<b>BE(MECHANICAL)</b>			
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YEAR	COURSE CODE	COURSE NAME	
<b>BE(SEM-VII,TERM-I)</b>	402061	Industrial In-plant Training-II	402061.1
			402061.2
			402061.3
	402062	Project	402062.1
			402062.2
			402062.3
	402063	Technical Paper Presentation	402063.1
			402063.2
	402064	Automobile Engineering (Self-Study - III)	402064.1
			402064.2
			402064.3
			402064.4
	402065	Plant Engineering and Maintenance (Self-Study - IV )	402065.1
			402065.2
			402065.3
			402065.4
			402065.5
			402065.6
	402047	Energy Engineering	402047.1
			402047.2
			402047.3
			402047.4
			402047.5
			402047.6
			402048.1

<b>BE (SEM-VIII,TERM-II)</b>	402048	Mechanical System Design	402048.2
			402048.3
			402048.4
	402066	Mechanical Vibrations	402066.1
			402066.2
			402066.3
			402066.4
			402066.5
	402068 D	Elective -I - Hydraulics & Pneumatics	402068 D.1
			402068 D.2
			402068 D.3
			402068 D.4
			402068 D.5
			402068 D.6
	402069 A	Elective -II- Energy Audit and Management	402069 A.1
			402069 A.2
			402069 A.3
			402069 A.4
			402069 A.5
			402069 A.6

# ENGINEERING AND MANAGEMENT (MS) and Affiliated to Pune University

YEAR 2019-20

## JTCOMES

L SANDWICH)
<b>COURSE OUTCOMES</b>
Solve higher order linear differential equations and apply to Mechanical engineering problems such as mechanical vibrations and heat transfer.
Integral Transform techniques such as laplace transform, Fourier transform
Apply statistical methods like correlation, regression analysis in analyzing and interpreting experimental data and probability theory applied to construction management.
Perform vector differentiation and integration, analyze the vector fields and apply to fluid flow problems
Solve various partial differential equations such as wave equation, one and two dimensional heat flow equations.
Apply various laws of thermodynamics to various processes and real systems.
Apply the concept of Entropy, Calculate heat, work and other important thermodynamic properties for various ideal gas processes.
Estimate performance of various Thermodynamic gas power cycles and gas refrigeration cycle and availability in each case.
Estimate the condition of steam and performance of vapour power cycle and vapour compression cycle.
Estimate Stoichiometric air required for combustion, performance of steam generators and natural draught requirements in boiler plants.
Use Psychrometric charts and estimate various essential properties related to Psychrometry and processes
Apply Knowledge of Mathematics science for Engineering applications
Design and conduct experiments ,as well to analyse interpret data
Design a component to meet desired needs within realistic constraints of health and safety
Identify formulate and solve engineering problems
Practice professional and ethical responsibility
Use the techniques,skills,and modern engineering tools necessary for engineering practice
Understanding basic concepts and properties of Material Science
Understanding mechanical behavior of materials and their testing and estimate properties of materials
knowledge in various classes of materials, their properties, compositions and applications

Understanding various heat treatments suitable for ferrous and non ferrous materials
Understanding various processes of Powder Metallurgy techniques its application and various non ferrous materials
understanding various polymers composites and ceramics, their properties,application and structure
Understand and apply various fluid properties and hydrostatic concept to various geometry
Apply Bernoulli's principle to various flow system and concept of Fluid kinematics to find velocities and acceleration at any point in a flow field.
Estimate the major and minor losses through pipe and Velocity ,shear stress distribution for laminar flow in a pipe
Apply thermodynamics and kinematics principles to turbo machines
Estimate and Analyze the performance of turbo machines
Identify the components of a centrifugal pump and determine the operating performance characteristics of a centrifugal pump
To create and sustain a community of learning in which students acquire knowledge in fire, safety and hazard management and learn to apply it professionally with due consideration for ethical, human life & property safety issues.
To pursue research and development in fire safety engineering, hazard management and disseminate its findings.
To meet the challenges of today and tomorrow in the most effective, efficient and contemporary educational manner.
To help in building national capabilities in fire safety engineering, disaster management, hazard management, industrial safety education through practical training to ensure a fire safe nation.
Understand the types of compressors, selection, work and related efficiencies
To know different refrigeration systems and COP
Conversant with gas turbines and Jet propulsion
Understand all the IC Engine systems, layouts and its importance
Able to understand methods to test the IC Engine
Understand the concept of normal and abnormal combustion in engine and emission
develop and evaluate measurement techniques
create awareness among the students regarding different gauges used in industries.
understand limits, fits and tolerances will aid them while assembling different parts to perform desired function developing interchangeability concept.
understand SQC tools will help the students in continual improvement process.
Understand various casting methods and suggest appropriate method pertaining to the application

Understand basics of metal forming processes, selection of equipments and tooling
Classify, describe and configure the principles of various welding techniques
Understanding mechanism of chip formation, differentiate between oblique and orthogonal cutting, estimate cutting forces in metal cutting
Demonstrate and configure the functions of milling, drilling and grinding machines and estimate machining time for various metal cutting operations
Identify characteristics of non-conventional machining processes, describe basic mechanisms and list-out applications
Understand the importance of CAD in the light of allied technologies such as CAM, CAE, FEA, CFD, PLM.
Understand the significance of parametric technology and its application in 2D sketching.
Understand the significance of parametric feature-based modeling and its application in 3D machine components modeling.
Ability to create 3D assemblies that represent static or dynamic Mechanical Systems.
Ability to ensure manufacturability and proper assembly of components and assemblies.
Ability to communicate between Design and Manufacturing using 2D drawings.
Improved communication, interaction and presentation of ideas.
Right attitudinal and behavioural change
Developed right-attitudinal and behavioral change
Identify mechanisms in real life applications.
Perform kinematic analysis of simple mechanisms.
Perform static and dynamic force analysis of slider crank mechanism.
Determine moment of inertia of rigid bodies experimentally.
Analyze velocity and acceleration of mechanisms by vector and graphical methods.
Develop the capability to identify and select suitable DC motor / induction motor / special
Program Arduino IDE using conditional statements
Interfacing sensors with Arduino IDE
Use appropriate Numerical Methods to solve complex mechanical engineering problems.
Formulate algorithms and programming.
Use Mathematical Solver.
Generate Solutions for real life problem using optimization techniques.
Analyze the research problem
Analyze the various modes of heat transfer and implement the basic heat conduction equations for steady one dimensional thermal system.
Implement the general heat conduction equation to thermal systems with and without internal heat generation and transient heat conduction.
Analyze the heat transfer rate in natural and forced convection and evaluate through experimentation investigation.
Interpret heat transfer by radiation between objects with simple geometries.

Analyze the heat transfer equipment and investigate the performance.
Identification of key elements of mechatronics system and its representation in terms of block diagram
Understanding the concept of signal processing and use of interfacing systems such as ADC, DAC, digital I/O
Interfacing of Sensors, Actuators using appropriate DAQ micro-controller
Time and Frequency domain analysis of system model (for control application) programming and implementation of real life system.
PID control implementation on real time systems
Development of PLC ladder programming and implementation of real life system.
Analyze and design real world components
Suggest whether the given solid is safe for the load applied.
Select suitable manufacturing method for complex components.
Ability to analyze the stress and strain of mechanical components and understand, identify and quantify failure modes for Machine components.
Ability to select standard machine components from Manufacturer's catalogue.
Enhancement in proficiency of CAD software for designing Mechanical systems and to generate production drawing.
Ability to design different machine elements.
To create and sustain a community of learning in which students acquire knowledge in fire, safety and hazard management and learn to apply it professionally with due consideration for ethical, human life & property safety issues.
To pursue research and development in fire safety engineering, hazard management and disseminate its findings.
To meet the challenges of today and tomorrow in the most effective, efficient and contemporary educational manner.
To help in building national capabilities in fire safety engineering, disaster management, hazard management, industrial safety education through practical training to ensure a fire safe nation.
Work in industrial environment with professional ethics.
Understand various industrial aspects.
Able to analyze and solve engineering problems.
analyse the industrial problems and its solution simple problem
present the case study observed during the training
Establish motivation for any topic of interest and develop a thought process for technical presentation.
Organize a detailed literature survey and build a document with respect to technical publications.
Analysis and comprehension of proof-of-concept and related data.
Effective presentation and improve soft skills. Make use of new and recent technology (e.g. Latex) for creating technical reports
understand advanced materials and manufacturing processes and its use in industry.

display professional skills in selecting proper materials at work.
develop a good product by using proper manufacturing process.
The student will understand Concept of Industrial engineering and its role in production
The student will be good team member and project leaders to carry out projects in companies.
The student will display professional ethics while dealing with their colleagues at work.
The student will develop good inter personnel skills to deal with their superiors, peers as well as juniors.

#### **L SANDWICH)**

#### **COURSE OUTCOMES**

Work in industrial environment with professional ethics.
Understand various industrial aspects.
Able to analyze and solve engineering problems.
Correlate and implement theory knowledge to solve specific industrial problems.
Develop systematic approach to solve specific industrial problem.
Competent to face industrial problems.
Understand advanced technology and research in engineering.
Communicate and present the work effectively
Ability to understand the fundamentals of Automobile systems.
Ability to understand Automobile systems, its development and performance.
Ability to analyze automobile safety, automobile electronics and performance testing of automobiles.
Ability to understand construction and working of off road vehicles.
Understand basic principles of plant engineering, classify maintenance work and able to perform manpower planning.
Identify basic plant facilities and selection of layout for product/process engineering.
Identify maintenance problems and calculate machine availability and system downtime.
To understand product life cycle cost estimation.
Learn steps to be followed for failure analysis and conservation of plant safety.
Understand advanced techniques in maintenance engineering.
Describe the power generation scenario, the layout components of thermal power plant and analyze the improved Rankin cycle, Cogeneration cycle
Analyze the steam condensers, recognize the an environmental impacts of thermal power plant and method to control the same
Recognize the layout, component details of hydroelectric power plant and nuclear power plant
Realize the details of diesel power plant, gas power plant and analyze gas turbine power cycle
Emphasize the fundamentals of non-conventional power plants
Describe the different power plant electrical instruments and basic principles of economics of power generation.
Understand the difference between component level design and system level design.

Ability to design various mechanical systems like pressure vessels, machine tool gear boxes, material handling systems, etc. for the specifications stated/formulated.
Ability to learn optimum design principles and apply it to mechanical components.
Ability to handle system level projects from concept to product.
Apply balancing technique for static and dynamic balancing of multi cylinder inline & radial engines.
Estimate natural frequency for single DOF un-damped & damped free vibratory systems.
Determine response to forced vibrations due to harmonic excitation, base excitation & excitation due to unbalance forces.
Estimate natural frequencies, mode shapes for 2 DOF un-damped free longitudinal & torsional vibratory systems.
Describe vibration measuring instruments for industrial / real life applications along with suitable method for vibration control.
Understand working principle of components used in hydraulic & pneumatic systems.
Identify various applications of hydraulic & pneumatic systems.
Selection of appropriate components required for hydraulic and pneumatic systems.
Analyse hydraulic and pneumatic systems for industrial/mobile applications.
Design a system according to the requirements.
Develop and apply knowledge to various applications.
Compare energy scenario of India and World
Carry out Energy Audit of the Residence / Institute/ Organization.
Evaluate the project using financial techniques
Identify and evaluate energy conservation opportunities in Thermal Utilities
Identify and evaluate energy conservation opportunities in Electrical Utilities.
Identify the feasibility of Cogeneration and WHRUse a CFD tool effectively for practical problems and research.