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T (02382) 267731/32/33

Email-info.engga.vdf.in

Website: www.vdfengineering.co.in(DTE Code: 2254)

PO CO OF CIVIL ENGINEERING DEPARTMENT OF ACADEMIC YEAR 2021-22

Vision

The vision of the department is the sharing of technical skills and knowledge for the benefit of student education and the development of business, society, and our nation.

Mission

Our goal is to offer top-notch engineering education that is in step with current scientific and technical advancement.

Program Educational Objective

Goal of the Civil engineering is to provide students with preparation to become worthy of professional careers in the field and to be motivated for lifelong learning. All prescribed courses have definite objectives and outcomes. Program objectives are expected qualities of engineers as under:

PEO1	Preparation: To prepare students to excel in various educational programmes or to succeed in industry / technical profession through further education/training;
PEO2	Core Competence: To provide students with a solid foundation in mathematical, scientific fundamentals required to solve Structural problems;
PEO3	Breadth: To train students with a breadth of scientific knowledge to comprehend, analyze, design & create novel products and solutions for real life problems;
PEO4	Professionalism: To inculcate in students professional/ethical attitude, effective team work skills, multidisciplinary approach and to relate engineering issues to a broader context;
PEO5	Learning Environment: To provide students with academic environment of excellence leadership, ethical guidelines and life-long learning needed for a long / productive career.
	Se.



Principal

Vilasrao Deshmukh Foundation
Group of Institutions, Latur

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In addition to above DBATU graduate is expected to be

- 1. Taking pride in their profession and have commitment to highest standards of ethical practices and related technical disciplines;
- 2. Able to design structural system that is safe, economical and efficient;
- 3. Capable of using modern tools efficiently in all aspects of professional practices;
- 4. Dealing successfully with real life civil engineering problems and achieve practical solutions based on a sound science and engineering knowledge;
- 5. Shall be engage in continuous research, development and exchange of knowledge for professional development;
- 6. Be honest in their control and performing their duties and promote effective use of resources through open, honest and impartial services to the public;
- 7. Act in such a manner which will uphold the honour, integrity, or dignity of the engineering profession, and avoid knowingly engaging in business or professional practices of a fraudulent, dishonest or unethical nature;
- 8. Recognize that the lives, safety, health and welfare of the general public are dependent upon engineering, decision and practices;
- 9. Continue their professional development throughout their careers and provide opportunities for the professional development;

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Course Outcomes:

SE (Civil) Part - I

Mathematics - III

CO1	student will be able to formulate and solve mathematical model of civilengineering phenomena in field of structures	
CO2	student will be able to formulate and solve mathematical model of civil engineering phenomena in field of survey	
СОЗ	student will be able to formulate and solve mathematical model of civil engineering phenomena in field of fluid mechanicsand soil mechanics.	

Mechanics of Solids

CO1	Students will be able to perform the stress-strain analysis.
CO2	Students will be able to draw force distribution diagrams for members and determinate beams.
СОЗ	Students will be able to find deflections in determinant beams.
CO4	Students will be able to visualize force deformation behavior of bodies.

Building Construction & Drawing

CO1	students will be able to understand types of masonry structures.
CO2	students will be able tocomprehend components of building and there purposes.
CO3	students will be able todraw plan, elevation and section of various structures.
CO4	students will be able to apply the principles of planning and by laws used for building planning.
CO5	students will be able toprepare detailed working drawing for doors and windows.



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Hydraulies I

CO1	Student will be able to Calibrate the various flow measuring devices.
CO2	Student will be able to Determine the properties of fluid and pressure and their measurement
СОЗ	Student will be able to Understand fundamentals of pipe flow, losses in property or pipe network
CO4	Student will be able to. Visualize fluid flow phenomena observed in Civil Engineering systems.

Surveying

CO1	Student will be able to perform measurements in linear/angular methods.
CO2	Student will be able to perform plane table surveying in general terrain.
СОЗ	Student will be able to know the basics of leveling and Theodolite survey in elevation and angular measurements.

SE (Civil) Part - II

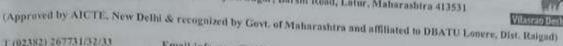
Building Planning and Drawing

CO1	students will be To plan buildings considering various principles of planning and by elaw of governing body.
CO2	students will beComprehend various utility requirements in buildings
СОЗ	students will beUnderstand various techniques for good acoustics.

Environmental Engineering

CO1	Students will be able to apply the water treatment concept and methods.
CO2	Students will be able to prepare basic process designs of water and wastewater treatment
СОЗ	Students will be able to apply the wastewater treatment concept and methods.
CO4	Students will be able to apply the solid waste management concepts

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Structural Mechanics- I

CO1	Students will be able to describe the concept of structural analysis, degree of indeterminacy.
CO2	Students will be able to calculate slopes and deflection at various locations for different types of beams.
CO3	Students will be able to identify determinate and indeterminate trusses and calculate forces in the members of trusses
	Perform the distribution of the moments the in continuous beam and frame

Water Resources Engineering

CO1	Students will be able to understand need of Irrigation in India and water requirement as per farming practice in India.
CO2	Students will be able to understand various irrigation structures and schemes. CO3: Develop basis for design of irrigation schemes.

Hydraulics-II

CO1	Students will design open channel sections in a most economical way
CO2	Students will know about the non-uniform flows in open channel and the characteristics of hydraulic jump.
СОЗ	Students will understand application of momentum principle of impact of jets on plane

Engineering Geology

CO1	Students will be able to recognize the different land forms which are formed by various geological agents.
CO2	Students will be able to identify the origin, texture and structure of various rocks and physical properties of mineral.
СОЗ	Students will be able to emphasize distinct geological structures which have influence on the civil engineering structure.
CO4	Students will be able to understand how the various geological conditions affect the design parameters of structures.



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TE (Civil) Part - I

Design of Steel Structures

COI	Students will be able to identify and compute the design loads and the stresses developed in the steel member
CO2	Students will be able to analyze and design the various connections and identify the potential failure modes.
СОЗ	Students will be able to analyze and design various tension, compression and flexural members.
CO4	Students will be able to understand provisions in relevant BIS Codes.

Structural Mechanics-II

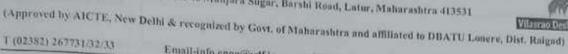
CO1	Students will be able to have a basic understanding of matrix method of analysis and will be
	able to analyze the determinant structure.
CO2	Students will be able to have a basic understanding of the principles and concepts related to
	finite difference and finite element methods
CO3	Students will be able to have a basic understanding of concept of influence line
	Soil Mechanics
	The state of the second different soil properties and behavior

CO1	Students will be able to understand different soil properties and behavior
CO2	Students will be able tounderstand stresses in soil and permeability and seepage aspects.
CO3	Students will be able to develop ability to take up soil design of various foundations.

Environmental Engineering

Students will be able to apply the water treatment concept and methods
Students will be able to prepare basic process designs of water and wastewater treatment plants.
Students will be able to apply the wastewater treatment concept and methods.
Students will be able to apply the solid waste management concepts.

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Transportation Engineering

CO1	Students will be able to comprehend various types of transportation systems and their history of the development
CO2	Students will be able to Comprehend to various types of pavements
CO3	Students will be able to design the pavements by considering various aspects associated with traffic safety measures

TE (Civil) Part - H

Design of Concrete Structures - 1

COI	Students will be able to comprehend to the various design philosophies used for design of reinforced concrete.
CO2	Students will be able to analyze and design the reinforced concrete slab using limit state and working state method.
CO3	Students will be able to analyze and design the reinforced concrete beam using limit state and working state method.
CO4	Students will be able to analyze and design the reinforced concrete column using limit state and working state method.

Foundation Engineering

CO1	Students will be able toto predict soil behavior under the application of loads and come up with appropriate solutions to foundation design queries.
CO2	Students will be able to analyze the stability of slope by theoretical and graphical methods.
СОЗ	Students will be able to analyze the results of in-situ tests and transform measurements and associated uncertainties into relevant design parameters.
CO4	Students will be able to synthesize the concepts of allowable stress design, appropriate factors of safety, margin of safety, and reliability.

Concrete Technology

students will be able to understand the various types and properties of ingredients of concrete. COL



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CO2	students will be able tounderstand effect of admixtures on the behavior of the fresh and hardened concrete.
CO3	students will be able to formulate concrete design mix for various grades of concrete.

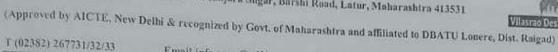
Project Management

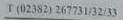
COI	the students will be able to Understand various steps in project Management, different types of charts.
CO2	the students will be able to Construct network by using CPM and PERT method.
CO3	the students will be able to Determine the optimum duration of project with the help of various time estimates
CO4	the students will be able to Know the concept of engineering economics, economic comparisons, and linear break even analysis problems.
CO5	Student will be able to Understand the concept of total quality Management including Juran and Deming's philosophy.

Building Planning and Design

CO1	Students will be to plan buildings considering various principles of planning and bye laws of governing body
CO2	Students will be comprehend various utility requirements in buildings
CO3	Students will be understand various techniques for good acoustics.

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B. E. (Civil) Part - I

Irrigation Engineering & Plumbing Techniques

CO1	Students will be able to Understand the methods and management of irrigation.
CO2	Students will be able toGain knowledge on Ground water structures.
CO3	Students will be able to Understand methods of irrigation & Their Design.
CO4	Students will be able to Get knowledge of plumbing materials and fixtures.
CO5	Students will be able to Get knowledge on water shed management & its need.

Advanced Concrete Technology

CO1	Students are able to decide the use of supplement cementatious in concrete, use of different admixture and its application as per requirement.
CO2	Students are capable to understand the special concrete, its properties and application as per requirement.
CO3	Students are able to do concrete mix design for required strength of concrete with different approach.
CO4	Students are able to know details of ready mix concrete plant.
CO5	Students are able to understand the durability of concrete, assessment and inspection of hardened concrete.

Architecture and Town Planning

CO1	Students willto learn fundamentals of town planning.
CO2	Students will understanding of application of technology, design of structure involving services & interior & landscape design of the concerned project.
CO3	Students will study of urban structures, urban continuity, movement structure, landscaping, people &vehicular movement's system design, economics, Architectural aesthetics & details.
CO4	Students will the students shall have acquired knowledge of the process involved in addressing a design problem with emphasis on site planning.
CO5	Students will understanding fundamental design principles &architectural expression; appropriate to place &Introduction to time-line to understand the role of resources and emergence of architecture.
CO6	Students will the students would have understood the fundamental concepts and theories of



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	urban design and different applications in design projects.
	Quantity surveying and Contracts
CO1	Student will be able toCO- Identify different items of works and their units and specifications.
	Student will be able toCO- Prepare approximate and detailed estimates, estimate of quantities
CO2	of different items
	of works
CO3	Students will able to CO- Prepare data sheets for different items of works and abstract
COS	estimate, .
	Students will able to CO- Prepare leads statement, and determines the quantity of earth work
CO4	by various
	methods.
CO5	Students will able to CO- Prepare detailed estimates of Building, Roads and Culverts.
CO6	Students will able to CO- Prepare detailed estimate for public health engineering works.
CO7	Students will able to CO- Prepare tender documents.
CO8	Students will able to CO- able to do structural health monitoring.
	Transportation Engineering- II
COI	Students will be able toUnderstand the methods of route alignment and design elements in
	Railway Planning and Constructions.
CO2	Understand the Construction techniques and Maintenance of Track laying and Railway
0.00	stations.
CO3	Gain an insight on the planning and site selection of Airport Planning and design.
CO4	Analyze and design the elements for orientation of runways and passenger facility systems.
CO5	Understand the various features in Harbours and Ports, their construction, coastal protection
.000	works and coastal Regulations to be adopted
	Interview Skill and Techniques
cor	Learners would be familiar with different interview skills and techniques employed
COI	in the industrial and the corporate world.
000	Students would be able to perform well in interview by developing body language,
CO2	rationalizing their aptitude and attitude for the interview.

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CO3	They would be able to participate effectively in group discussions, accept leadership and express their ideas effectively.
CO4	Students would be able to draft effective job applications and resume, CVs accurately as per the needs of the industries.
CO5	Students would develop right frame of mind by learning socializing skills, corporate etiquettes, and manners.

B. E. (Civil) Part - II

Design of Hydraulic Structures

COI	Students will be able toPerform the stability analysis of gravity dams
CO2	Students will be able to Explain the causes of failure of different types of dams and their design criteria
CO3	Students will be able to Design minor irrigation structures such as regulators, cross drainage works and canal falls

Ground Improvement Techniques

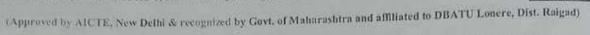
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15551	Student will have Appreciate the need for ground improvement and different mechanical,
COI	chemical, static and dynamic techniques
CO2	Student will haveRecognize various chemical stabilization and grouting techniques
CO3	Student will have Understand different ground improvement techniques for cohesionless soils
	Student will haveRecognize different ground improvement techniques for cohesive soils
CO4	engineering practice
C05	Student will have Selection of site specific method of improvement and its design
CO6	Student will haveldentify miscellaneous techniques of ground improvemen



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Construction Management

CO1	On completion of this course the students will have the knowledge of construction equipment's practices and techniques to be used in the field.
CO2	Be able to apply theoretical and practical aspects of project management techniques to achieve project goals.
CO3	Become familiar with construction equipment and their capabilities
CO4	Learn how to best utilize construction equipment on site work and heavy civil projects
CO5	Properly select heavy equipment based on applications, utilization, productivity, and other factors

A- Human Resource Development And OrganisationalBehaviour

Students will be aware about the cross cultural environment in the organization
Students should understand the group behavior for getting work done through and with thepeople.
Students should able to trace the root cause of conflict and resolve it.
Students should able to develop time management strategies.
Able to manage and develop Human Resource of the organization
Should strengthen the organizational communication.

B - Sustainable Engineering & Technology

CO1	Able to understand the different types of environmental pollution problems and their sustainable solutions
CO2	Able to work in the area of sustainability for research and education
СОЗ	Having a broader perspective in thinking for sustainable practices by utilizing the engineering knowledge and principles gained from this course
CO4	Learn how to best utilize construction equipment on site work and heavy civil projects
CO5	Properly select heavy equipment based on applications, utilization, productivity, and other factors

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- 4. Dealing successfully with real life civil engineering problems and achieve practical solutions based on a sound science and engineering knowledge;
- 5. Shall be engage in continuous research, development and exchange of knowledge for professional development;
- 6. Be honest in their control and performing their duties and promote effective use of resources through open, honest and impartial services to the public;
- 7. Act in such a manner which will uphold the honour, integrity, or dignity of the engineering profession, and avoid knowingly engaging in business or professional practices of a fraudulent, dishonest or unethical nature;
- 8. Recognize that the lives, safety, health and welfare of the general public are dependent upon engineering, decision and practices;
- 9. Continue their professional development throughout their careers and provide opportunities for the professional development;

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COZ	basis for design of irrigation schemes.

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Engineering Geology

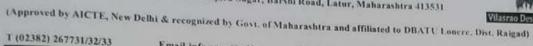
CO1	Students will be able to recognize the different land forms which are formed by various
	geological agents.
	Students will be able to identify the origin, texture and structure of various rocks and physical
CO2	properties of mineral.
	Students will be able to emphasize distinct geological structures which have influence on the
CO3	4 # Incoming structure
	Students will be able to understand how the various geological conditions affect the design
CO4	The state of the s
	parameters of structures.

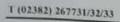


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Plot No.165A, Additional MIDC, Near to Manjara Sugar, Barshi Road, Latur, Maharashtra 413531





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Website: www.vdfengineering.co.in(DTE Code: 2254)

TE (Civil) Part-I

Structural Analysis-I

CO1	an ability to apply knowledge of mathematics, science, and engineering
CO2	an ability to design a system, component, or process to meet desired needs
CO3	an ability to identify, formulate, and solve engineering problems
CO4	Understand the basic concept of static and kinematic indeterminacy, slope and deflection of determinate and indeterminate beams for analysis of structures.
CO5	Evaluate determinate and indeterminate trusses and its application in the field
C06	Analyze two and three hinged arches and its application
CO7	Apply influence line diagrams for the analysis of structures under moving load.

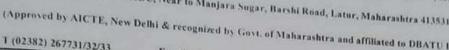
Water Resources Engineering-I

CO1	Understand the interaction among various processes in the hydrologic cycle
CO2	Apply the application of fluid mechanics and use of computers in solving a host of problems in hydraulic engineering
CO3	Study types and classes of hydrologic simulation models and design procedures for safe and effective passage of flood flows for design of hydraulic structures
CO4	Understand the basic aquifer parameters and estimate groundwater resources for different hydro-geological boundary conditions

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CO5	2) 267731/32/33 Email-info.engg/a.vdf.	www.vdfeneineering
	Understand application of systems cover the socio-technical aspects in	
	Apply the principles and and	s of remote sensing, GPS and GIS in the d and drought events in water resources engineering
	to hydrological extreme floo	d and drought events in water resources engineering

Foundation Engineering

COI	To predict soil behavior under the application of loads and come up with appropriate solutions to
CO2	Analyze the stability of slope by theoretical and graphical methods.
CO3	Analyze the results of in-situ tests and transform measurements and associated uncertainties into relevant design parameters.
	Synthesize the concepts of allowable stress design, appropriate factors of safety, margin of safety, and reliability

Environmental Engineering

CO1	Prepare basic process designs of water and wastewater treatment plants.
CO2	Understand the impact of humans on environment and environment on humans
CO3	Be able to plan strategies to control, reduce and monitor pollution.
CO4	Apply the water treatment process and concept
CO5	Describe methods of disposal ,sources and types of solid waste.
CO6	Be able to select the most appropriate technique for the water treatment and waste water.

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Transportation Engineering-1

CO1	Design various geometric elements of a highway
CO2	Determine the characteristics of pavement materials and design flexible pavements
CO3	Conduct traffic engineering studies and analyze data for efficient management of roadway facilities, Plan and design basic airport facilities

Structural Engineering-I (STEEL)

CO1	Identify and compute the design loads and the stresses developed in the steel member.
CO2	Analyze and design the various connections and identify the potential failure modes.
СОЗ	Analyze and design various tension, compression and flexural members
CO4	Understand provisions in relevant BIS Codes
CO5	Design of structural systems such as roof trusses, gantry girders

Constitution of India/ Essence ofIndian TraditionalKnowledge

CO1	Design various geometric elements of a highway
CO2	Explain the historical origins, philosophical foundations, and core principles of the Indian Constitution
CO3	Trace the sources and development of Indian intellectual traditions and cultural institutions.
CO4	Understand the principles of constitutional government as practiced in the India.

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TE (Civil) Part - II

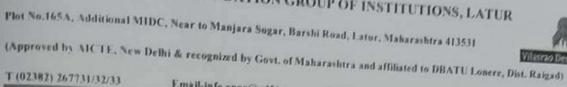
Structural Engineering-II (RCC)

COI	Students will be able to comprehend to the various design philosophies used for design of reinforced concrete.
CO2	They will possess the skills to solve problems dealing with different loads and Concrete and Steel
CO3	They will have knowledge in Structural Engineering

Engineering Economics, Estimation & Costing

CO1	Have an idea of Economics in general, Economics of India particularly for public sector agencies and private sector businesses
CO2	Be able to perform and evaluate present worth, future worth and annual worth analyses on one of more economic alternatives
СОЗ	Be able to carry out and evaluate benefit/cost, life cycle and breakeven analyses on one or more economic alternatives
CO4	Be able to understand the technical specifications for various works to be performed for a project and how they impact the cost of a structure
CO5	Be able to quantify the worth of a structure by evaluating quantities of constituents, derive their cost rates and build up the overall cost of the structure.
CO6	Be able to understand how competitive bidding works and how to submit a competitive bid proposal.

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Structural Analysis-II

CO1	Describe the concept of structural analysis, degree of indeterminacy.
CO2	Identify determinate and indeterminate trusses and calculate forces in the members of trusses perform the distribution of the moments the in continuous beam and frame
СОЗ	Calculate SF and BM by slopes and deflection method and MDMfor different types of beams.
CO4	Analyze of beams and frames by Kani"s method.
CO5	Calculate SF and BM of suspension bridges and cables.

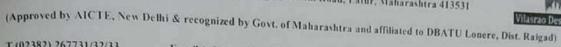
Water Resources Engineering-II

CO1	the students will be able to estimate irrigation water requirements
CO2	the students will be able to design irrigation canals and canal network
соз	the students will be able to plan an irrigation system
CO4	the students will be able to design irrigation canal structures
CO5	Student will be able to plan and design diversion head works, analyse stability of gravity and earth dams design ogee spillways and energy dissipation works



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Elective-I Materials, Testing & Evaluation

CO1	Calibrate electronic sensors.
CO2	Operate a data acquisition system
CO3	Operate various types of testing machines

Open Elective-II (Humanities) Soft skills and interpersonal

CO1	Know yourself and Know your world
CO2	Presonality development and soft skills



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B. E. (Civil) Part - I

Environmental Engineering -II

CO1	Students understood Sewage quantity and
CO2	Students understood Sewage quantity and quality for better treatment so as to reduce scarcity by recycling waste water Students understood industrial waste water quantity and quality for achieving better sanitation in society
	sanitation in society

Design of Structure - III

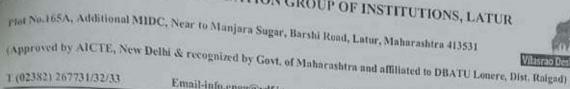
CO1	On the successful completion of course the students will be able to understand the difference between prestressed construction and RCC construction.
CO2	Also able to design the flat slab, combined footings, earth retaining structures and liquid

Water Resources Engineering - II

Students understood all type of dams and reservoirs.
Students understood Spillways, Gates & Energy dissipators.
students understood various canal structures, river training works etc.



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CO3	They would be able to participate effectively in group discussions, accept leadership and express their ideas effectively.
CO4	Students would be able to draft effective job applications and resume, CVs accurately as per the needs of the industries.
C05	Students would develop right frame of mind by learning socializing skills, corporate etiquettes, and manners.

B. E. (Civil) Part - II

Design of Hydraulic Structures

COI	Students will be able toPerform the stability analysis of gravity dams
CO2	Students will be able to Explain the causes of failure of different types of dams and their design criteria
CO3	Students will be able to Design minor irrigation structures such as regulators, cross drainage works and canal falls

Ground Improvement Techniques

COI	Student will have Appreciate the need for ground improvement and different mechanical, chemical, static and dynamic techniques
CO2	Student will haveRecognize various chemical stabilization and grouting techniques
CO3	Student will have Understand different ground improvement techniques for cohesionless soils
	Student will haveRecognize different ground improvement techniques for cohesive soils
CO4	engineering practice
CO5	Student will have Selection of site specific method of improvement and its design
CO6	Student will have Identify miscellaneous techniques of ground improvemen



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Elective- III HYDROPOWER ENGINEERING

CO₁

It is desired that students after undergoing academic study sessions as cited this above shall be competent and able to work as Engineers in the field of **Hydropower Engineering** with confidence and success.

IQAC Coordinator

H.Ø.D.

Primatical
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PO CO OF CIVIL ENGINEERING DEPARTMENT OF ACADEMIC YEAR 2019-20

Vision

The vision of the department is the sharing of technical skills and knowledge for the benefit of student education and the development of business, society, and our nation.

Mission

Our goal is to offer top-notch engineering education that is in step with current scientific and technical advancement...

Program Educational Objective

PEO1	Preparation: To prepare students to excel in various educational programmes or to succeed in industry / technical profession through further education/training;.
PEO2	Core Competence: To provide students with a solid foundation in mathematical, scientific fundamentals required to solve Structural problems;
PEO3	Breadth: To train students with a breadth of scientific knowledge to comprehend, analyze, design & create novel products and solutions for real life problems;
PEO4	Professionalism: To inculcate in students professional/ethical attitude, effective team work skills, multidisciplinary approach and to relate engineering issues to a broader context;
PEO5	Learning Environment: To provide students with academic environment of excellence, leadership, ethical guidelines and life-long learning needed for a long / productive career.



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Course Outcomes:

SE (CIVIL) Part - I

	SE (CIVIL) Part – I
	PCCCE301 Solid Mechanics
COI	Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practical problems
CO2	Apply basic knowledge of maths and physics to solve real-world problems
CO3	Understand measurement error, and propagation of error in processed data
	PCCCE302 Fluid Mechanics-I
COI	The objective of this course is to introduce the concepts of fluid mechanics useful in Civil Engineering applications
CO2	The course provides a first level exposure to the students to fluid statics, kinematics and dynamic
соз	Measurement of pressure, computations of hydrostatic forces on structural components and the
CO4	The topics included in this course are aimed to prepare a student to build a good fundamental background useful in the application-intensive courses covering hydraulics, hydraulic machinery and hydrology in later semesters
	DCCCE204 Floatronics & Sensor
COI	The objective of this Course is to provide the students with an introductory and broad treatment of the field of Electronics Engineering to facilitate better understanding of the electronics devices.
	the field of Distriction and State of the St
CO2	Know broadly the concepts and functionalities of the electronic devices and switches.
CO3	use, general specifications and deploy abilities of the analog electronic devices, and assemblies.
CO4	Confidence in handling and usage of digital electronic devices, tools an
	PCCCE305 Mechanical Engineering
CO1	Ability to apply mathematics, science, and engineering
CO2	Ability to design and conduct experiments, as well as to analyze and interpret data
CO3	Ability to identify, formulate, and solve engineering problems

SE (CIVIL) Part - II

PCC CE 401	Geotechnical Engineering
CO1	Understand the different types of soil, various phase diagrams and derive various phase relationships of the soil
CO2	Apply principles of phase diagram for soil properties and perform basic weightvolume calculation
CO3	Plot various stress distribution diagrams along the depth of the soil mass.
CO4	Understand variation in compaction curve with compaction effort and soil type.
CO5	Determine graphically and analytically the stress state in any plane of the soil mass.



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PCC CE 40	2 Engineering Geology & Disaster Management
COI	Student will be familiar with different ingredients of concrete.
CO2	Student will be familiar with properties of different ingredients of concrete.
CO3	Student will be familiar with different admixtures.
CO4	Student will be familiar with properties of fresh and harden concrete.
CO5	Student will be familiar with special concretes.
CO6	Student will be able to prepare concrete mix design.
PCC CE 403	
COI	Students will be able to apply their knowledge of fluid mechanics in addressing problems in open channels.
CO2	Student will possess the skills to solve problems in uniform, gradually and rapidly varied flows in steady conditions.
CO3	Problems pertain to design, construction as well as efficient working of various types of hydraulics structures and machines is considerably simplified by using dimensional analysis and model studies
CO4	Impact Of Jet on vanes which is a base for analysis and design of turbo machines.
CO5	They will have knowledge in hydraulic machines(pumps and turbines)
CC CE 404	Strength of Material
CO1	Describe the concepts and principles, understand the theory of elasticity including strain/displacement and Hooke's law relationships; and perform calculations, relative to the strength and stability of structures and mechanical components; (BT1 and BT2)
CO2	Define the characteristics and calculate the magnitude of combined stresses in individual members and complete structures; analyze solid mechanics problems using classical methods and energy methods; (BTI and BT4
CO3	Analyse various situations involving structural members subjected to combined stresses by application of Mohr's circle of stress; locate the shear center of thin wall beams; (BT4)
CO4	Calculate the deflection at any point on a beam subjected to a combination of loadY
C CE 405	Surveying & Geometrics
COI	Apply the knowledge, techniques, skills, and applicable tools of the discipline to engineering and surveying activities (BT1 abd BT3)
CO2	Apply the knowledge, techniques, skills, and applicable tools for setting out curves. (BT1 abd BT3)
СОЗ	Translate the knowledge gained for the implementation of Civil infrastructure facilities (BT1 and BT2)
C CE 406	Concrete Technology
CO1	Familiar with different ingredients of concrete, (BT1
CONTRACTOR OF THE PARTY OF THE	Familiar with properties of different ingredients of concrete, (BT1)
SHADOW FIRE BY	Familiar with different admixtures. (BT1 and BT2)



Principal

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Group of Institutions, Latur

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TE (CIVIL) Part - I

CE 301 Engineering Geology

COI	The students will be able to understand the details about Rock mechanics, Geoinformatics
CO2	The students will be able to study the geology.
СОЗ	The students will be able to select the suitability of site for different Construction Development work.

CE 302 Geotechnical Engineering - I

CO1	The students will be able to classify soils and know how water with soil affecting.
CO2	The students will get the idea about the shear strength parameters of soil

CE 303 Theory Of Structures - II

000	
COI	The student will have the knowledge on advanced methods of analysis of structures

CE 304 Design Of Structures-I (Steel) LSM

COI	This course covers the design of structural steel members subjected to compressive, tensile and bending loads, as per current codal provisions (IS 800 - 2007) including connections.
CO2	Design of structural systems such as roof trusses, gantry girders is included.

CF 305 Transportation Engineering-I

	CE 303 Transportation Engineering-1
COI	To understand Basic concept about Highway Engineering.
CO2	To understand the principles of Highway geometrics design as per IRC standards
CO3	Perform geometric design for the Highway& Basic concept of Pavement design
CO4	To understand Types of pavements & Materials required for highway construction.
CO5	To understand Construction procedure for different type of pavements
CO6	To understand maintenance procedure for different type of pavements
CO7	To understand the Traffic engineering& different types of traffic control device
CO8	To understand Basic idea about the Bridge engineering & Components parts of a bridge.



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CE 306 Geotechnical Engineering - II

CO1	To get the knowledge of classical theories of earth pressure & stress distribution,
CO2	To get the knowledge of how to improve the soil for stability of structure
CO3	Students get the knowledge of various techniques with which we will know how to improve weak soil by grouting or geosynthetics.
CO4	Student will solve actual problems of stability with various material, they will apply various theories and predict the risk factor.

CE 307 Environmental Engineering -I

	CD 30% ENTHORMER TENGENCETING T
CO1	Student will be able to Plan and design water supply systems for a rural/urban area
CO2	Student will be able to Use population forecasting methods.
СОЗ	Student will be able to Design various water treatment units and plan their operations on the basis of raw water quality and water demand.
CO4	Student will be able to Apply knowledge of advanced water treatment processes for individual water purification units.

CE 308 Design Of Structures- II(RCC) LSM

CO1	Students have explored the stream "Limit State Method of Design for R.C. Structures" and are equipped with knowledge of different methods of design and its classifications.
CO2	Students have been introduced to Limit State Analysis as well which has opened their wisdom for redistribution of moments.
СОЗ	Students are now competent to Design the structures for Limit Sate of Collapse for Flexure (i.e. Singly, Doubly, Fanged beam sections, Slabs, Staircase and Footing etc), Compression (i.e. Column), Bon, Torsion and for Shear
CO4	Students are competent to Design the structures for Limit Sate of Serviceability for Deflection and Cracking.

CF 309 Transportation Engineering-II

CO1	In Airport Engineering students will get knowledge of Airport planning, layout and runway and taxiway components
CO2	Students will get the feel of fundamentals of railway engineering from the syllabus, under railway Engineering students get knowledge of railway geometrics, Signalling & interlocking Points, crossing and turnouts etc.
соз	Students get knowledge regarding fundamentals of tunnel its excavation methods, support systems, and executional aspects of tunnel

CE 310 Water Resources Engineering

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CO1	Student will know the different terminologies related with hydrology.
CO2	Students will analyze hydrological parameters required for water resource management.
CO3	Student will assess ground water potential.
CO4	Students will identify suitable method of irrigation and drainage of waterlogged area

CE 311 d) Advanced Concrete Technology (Elective-I)

CO1	Students are able to decide the use of supplement cementatious in concrete, use of different admixture and its application as per requirement.
CO2	Students are capable to understand the special concrete, its properties and application as per requirement
СОЗ	Students are able to do concrete mix design for required strength of concrete with different approach
CO4	Students are able to know details of ready mix concrete plant
CO5	Students are able to understand the durability of concrete, assessment and inspection of hardened concrete.

B. E. (CIVIL) Part - I

CE 401 Environmental Engineering -II

CO1	Students understood Sewage quantity and quality for better treatment so as to reduce scarcity by recycling waste water.
CO2	Students understood industrial waste water quantity and quality for achieving better sanitation in society.

CE 402 Design of Structure - III

COI	Students will be able to understand the difference between prestressed construction and RCC construction.
	Students also able to design the flat slab, combined footings, earth retaining structures and liquid retaining structures.

CE 403 Water Resources Engineering - II

CO1	Students understood all type of dams and reservoirs.
	Students understood Spillways, Gates & Energy dissipaters
CO3	students understood various canal stactoreantive training works etc.

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- 7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate Vision The vision of the department is to achieve excellence in teaching, learning, research and transfer of technology and overall development of students. Mission Imparting quality education, looking after holistic development of students and conducting need based research and extension. The knowledge of, and need for sustainable development.
- 8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- 9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- 10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- 11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- 12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Educational Objective

PEO1	Graduates should excel in engineering positions in industry and other organizations that emphasize design and implementation of engineering systems and devices.
PEO2	Graduates should excel in best post-graduate engineering institutes, acquiring advanced degrees in engineering and related disciplines.
PEO3	Alumni should establish a successful career in an engineering-related field and adapt to changing technologies.
PEO4	Graduates are expected to continue personal development through professional study and self-learning.
PEO5	Graduates should be good citizens and cultured human beings, with full appreciation of the importance of professional, ethical and societal responsibilities.



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CO5	The course will inculcate the managerial skills among the students which will be helpful for them in future during actual execution of projects.
CO6	students will know different legal aspect and its provisions for construction project
CO7	The students will be able to carry out the Human resource Management efficiently
CO8	The students will be able to plan for Equipment's and material requirements.
CO9	Students will know the various management techniques for successful completion of construction projects.

CE 411 b) Hydropower Engineering

	CE 411 b) Hydropower Engineering
CO1	It is desired that students after undergoing academic study sessions as cited this above shall be competent and able to work as Engineers in the field of Hydropower Engineering with confidence and success

IQAC Coordinator

Deshmuks

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PO CO OF CIVIL ENGINEERING DEPARTMENT OF ACADEMIC YEAR 2018-19

Vision

The vision of the department is to achieve excellence in teaching, learning, research and transfer of technology and overall development of students.

Mission

Imparting quality education, looking after holistic development of students and conducting need based research and extension.

Graduate Attributes

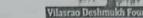
The Graduate Attributes are the knowledge skills and attitudes which the students have at the time of graduation. These Graduate Attributes identified by National Board of Accreditation are as follows:

- 1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
- Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
- 3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- 4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- 5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

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- 7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate Vision The vision of the department is to achieve excellence in teaching, learning, research and transfer of technology and overall development of students. Mission Imparting quality education, looking after holistic development of students and conducting need based research and extension. The knowledge of, and need for sustainable development.
- 8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- 9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- 10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- 11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- 12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Educational Objective

PEO1	Graduates should excel in engineering positions in industry and other organizations that emphasize design and implementation of engineering systems and devices.
PEO2	Graduates should excel in best post-graduate engineering institutes, acquiring advanced degrees in engineering and related disciplines.
PEO3	Alumni should establish a successful career in an engineering-related field and adapt to changing technologies.
PEO4	Graduates are expected to continue personal development through professional study and self-learning.
PEO5	Graduates should be good citizens and cultured human beings, with full appreciation of the importance of professional, ethical and societal responsibilities.



Principal

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Course Outcomes:

SE (Civil) Part - I

	Mathematics - III	
CO1	student will be able to formulate and solve mathematical model of civilengineering phenomena in field of structures	
CO2	student will be able to formulate and solve mathematical model of civil engineering phenomena in field of survey	
СОЗ	student will be able to formulate and solve mathematical model of eivil engineering phenomena in field of fluid mechanics and soil mechanics.	

	Mechanics of Solids
COI	Students will be able to perform the stress-strain analysis.
CO2	Students will be able to draw force distribution diagrams for members and determinate bear
СОЗ	Students will be able to find deflections in determinant beams.
CO4	Students will be able to visualize force deformation behavior of bodies.

Building Construction & Drawing

CO1	Students will be able to understand types of masonry structures.
CO2	Students will be able tocomprehend components of building and there purposes.
CO3	Students will be able todraw plan, elevation and section of various structures.
CO4	Students will be able to apply the principles of planning and by laws used for building planning.
CO5	Students will be able toprepare detailed working drawing for doors and windows.

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Hydraulics I

CO1	Student will be able to Calibrate the various flow measuring devices.
CO2	Student will be able to Determine the properties of fluid and pressure and their measurement.
СОЗ	Student will be able toUnderstand fundamentals of pipe flow, losses in pipe and analysis of pipe network.
CO4	Student will be able to. Visualize fluid flow phenomena observed in Civil Engineering systems.

CO1	Student will be able to perform measurements in linear/angular methods.
CO2	Student will be able to perform plane table surveying in general terrain.
СОЗ	Student will be able to know the basics of leveling and Theodolite survey in elevation and angular measurements.

SE (Civil) Part - II

Building Planning and Drawing

CO1	students will be To plan buildings considering various principles of planning and byelaw of governing body.
CO2	students will beComprehend various utility requirements in buildings
СОЗ	students will beUnderstand various techniques for good acoustics.

Environmental Engineering

	AND THE PROPERTY OF THE PROPER
CO1	Students will be able to apply the water treatment concept and methods.
CO2	Students will be able to prepare basic process designs of water and wastewater treatment plants
CO3	Students will be able to apply the wastewater treatment concept and methods.
CO4	Students will be able to apply the solid waste management concepts



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Structural Mechanics- I

	The state of the s
CO1	Students will be able to describe the concept of structural analysis, degree of indeterminacy.
CO2	Students will be able to calculate slopes and deflection at various locations for different types of beams.
СОЗ	Students will be able to identify determinate and indeterminate trusses and calculate forces in the members of trusses Perform the distribution of the moments the in continuous beam and frame

Water Resources Engineering

	water Resources Engineering
CO1	Students will be able to understand need of Irrigation in India and water requirement as per farming practice in India.
CO2	Students will be able to understand various irrigation structures and schemes. CO3: Develop basis for design of irrigation schemes.

Hydraulics-II

1 22 22 2	Students will design open channel sections in a most economical way
CO1	Students will design open channel sections in a most contract and the characteristics of
	Students will know about the non-uniform flows in open channel and the characteristics of
CO2	hydraulic jump.
1 - 1	Students will understand application of momentum principle of impact of jets on plane
CO3	Students will understand application of momentum principle of impact of impact of principle of impact of principle of impact of principle

Engineering Geology

	Engineering Geology
CO1	Students will be able to recognize the different land forms which are formed by various geological agents.
CO2	Students will be able to identify the origin, texture and structure of various rocks and physical properties of mineral.
соз	Students will be able to emphasize distinct geological structures which have influence on the civil engineering structure.
CO4	Students will be able to understand how the various geological conditions affect the design parameters of structures.



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TE (Civil) Part - I

	Engineering Geology
CO1	Understand weathering process and mass movement
CO2	Distinguish geological formations
CO3	Identify geological structures and a contract of the contract
CO4	Identify geological structures and processes for rock mass quality Identify subsurface information and groundwater potential sites through geophysical investigations
CO5	Apply geological principles for mitigation of natural hazards and select sites for dams

Geotechnical Engineering-I

	George Handwar Engineering-1
CO1	Understanding and determination of Index properties of soil.
CO2	To study the permeability, compaction, shear strength and consolidation of soil and its evaluation.
СОЗ	Analysis of slopes and calculation of earth pressure for different soil under various conditions. Determination of effective stress.
CO4	Classifying the soil. Study of different methods of soil exploration and preparation of soil profile.
CO5	Experimental determination of different properties of soil.

Theory of Structure -II

	Theory of Structure 11
CO1	Study of basic theorems of structural mechanics
CO2	Study and analysis of structures by slope deflection method and moment distribution method
CO3	Study and analysis of structures by Kani's method
CO4	Understand the behaviour of arches and analyse it
CO5	Study and apply the basic concepts of matrix methods in structural analysis



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Design of Structure-L (Steel) I SM

CO1	Study of rolled steel sections. Apply the IS code practice for the design of steel structural elements.
CO2	Analysis and design of compression and tension members including built-up sections
CO3	Analysis and design of column and beam. Design of column bases for column.
CO4	Analysis and design of the various members of the truss.
CO5	Design of plate girder and its components.

Transportation Engineering-I

	Transportation Engineering-1
CO1	Basic concept about Highway Engineering
CO2	To understand the principles of Highway geometrics design as per IRC standards
CO3	Perform geometric design for the Highway& Basic concept of Pavement design
CO4	To understand Types of pavements & Materials required for highway construction.
CO5	To understand Construction procedure for different type of pavements.
CO6	To understand maintenance procedure for different type of pavements.
CO7	To understand the Traffic engineering& different types of traffic control device.

TE (Civil) Part - II

Geotechnical Engineering-II

CO1	Student will solve actual problems of stability with various material, they will apply various theories and predict the risk factor.	
CO2	To understand the concept of slope stability.	
CO3	To appreciate the use of modern technology in the field of geotechnical engineering.	

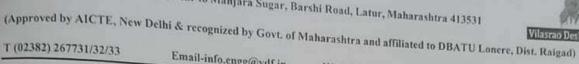
Environmental Engineering-I

CO1	Plan and design water supply systems for a rural/urban area		
CO2	Use population forecasting methods.		
СОЗ	Design various water treatment units and plan their operations on the basis of raw water quality and water demand.		
CO4	Apply knowledge of advanced water treatment processes for individual water purification units.		



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Design of Structure-II (RCC) LSM

CO1	Students have explored the stream "Limit State Method of Design for R.C. Structures" and equipped with knowledge of different methods of design for R.C. Structures"
CO2	and equipped with knowledge of different methods of design and its classifications. Students have been introduced to Limit State Analysis as well which has opened their
CO3	Students are now competent to Design the structures for Limit Sate of Collapse for Flexure (i.e. Singly, Doubly, Fanged beam sections, Slabs, Staircase and Footing etc), Compression (i.e. Column), Bon, Torsion and for Shear
CO4	Students are competent to Design the structures for Limit Sate of Serviceability for Deflection and Cracking.

Transportation Engineering-II

2. and portation Engineering-II
To study the basic elements of aircraft components and airport engineering.
To study about airport layout and geometric design of airport.
To learn about air traffic movements and control.
To study about airport capacity and drainage.
To study the basic elements of railway engineering & their component parts railways.
To study about geometric design of railway engineering
To learn about basic concepts of tunnel engineering and components parts and types.
To study about tunnel methods in soft rock and hard rock.
To study about drillings, explosives used in tunnels

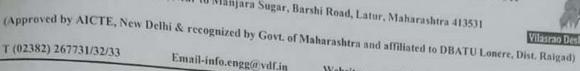
Water Resources Engineering -I

CO1	Student will know the different terminologies related with hydrology		
CO2	Students will analyse hydrological parameters required for water resource management.		
CO3	Student will assess ground water potential		
CO4	Students will identify suitable method of irrigation and drainage of waterlogged Area.		



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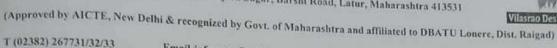
Elective	-I/Solid	Wanta	Management
PT .	- Solici	rraste	Vianagement

CO1	Explain municipal solid waste management systems with respect to its physical properties, and associated critical considerations in view of account of the physical consideration of the physical co
CO2	properties, and associated critical considerations in view of emerging technologies. Outline sources, types and composition of solid waste with methods of handling, sampling and storage of solid waste.
CO3	Select the appropriate method for solid waste collection, transportation, redistribution and disposal.
CO4	Describe methods of disposal of solid waste.



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B. E. (Civil) Part - I

Environmental Engir

CO1 Students understood Sewage quantity and quality for better treatment so as to scarcity by recycling waste water		
CO2	Students understood industrial waste water quantity and quality for achieving better sanitation in society.	

Design of structure-III

	Design of structure-III
CO1	On the successful completion of course the students will be able to understand the difference between prestressed construction and RCC construction.
CO2	Also able to design the flat slab, combined footings, earth retaining structures and liquid retaining structures.

Water Resources Engineering -II

CO1	Students understood all type of dams and reservoirs.
CO2	Students understood Spillways, Gates & Energy dissipaters.
CO3	students understood various canal structures, river training works etc.

Professional Ethics

CO1	To provide basic overview of functioning of different civil engineering related industries / firms.
CO2	To provide awareness on application of different drawings, contract documents in civil engineering.
CO3	To provide insight of code of ethics, duties and responsibilities as a Civil Engineer.

Elective -II/ Ground Water Engineering

CO1	Students will be able to understood ground water characteristics flow.
CO2	Students will be able to Ground Water exploration using different methods.
соз	It is desired that students after undergoing academic study sessions as cited this above shall be competent and able to work as Engineers in the field of Ground Water Engineering with confidence and success.



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B. E. (Civil) Part - II

	Professional Practice
CO1	Recall the fundamentals of building construction, building planning and computer aided drawing and environmental engineering
CO2	Understand the process to be followed for submission of any contract for government, semi government and private project.
CO3	Apply the basic knowledge acquired through subject for submission of any contract and its execution.
CO4	Analysis different type of contract in connection with estimation, specification, valuation and quantity surveying.
CO5	Propose the bill of quantities using different techniques of preliminary & detailed estimation of buildings & other structures.

Foundation Engineering

	I dandation Engineering
CO1	Recall the fundamentals of building construction and geotechnical engineering.
CO2	Identifying the applicability of different foundation design applicable to various types of soil.
CO3	Apply the different design philosophy of foundation applicable to soil.
CO4	Analysis various types of shallow and deep foundations.
CO5	Create understanding applicability of foundation design for different types of soil.

Project Planning & Management

	Project Planning & Wanagement
C01	The students will be able to understand and apply the knowledge of management functions like planning, scheduling, executing and controlling to construction projects.
CO2	The students will be able to demonstrate their capability for preparing the project networks to work out best possible time for completing the project.
СОЗ	The students will be able to understand and exercise the time- cost relationship in
CO4	The students will be able to implement the safety aspects during the execution of civil engineering project.
CO5	The course will inculcate the managerial skills among the students which will be helpful for them in future during actual execution of projects.
CO6	On completion of this course the students will know different legal aspect and its provisions for construction project

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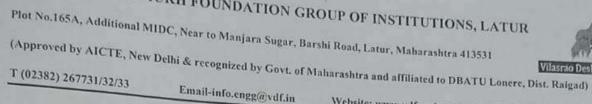
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CO7		
CO8	The students will be able to carry out	the Human resource Management efficiently.
CO9	The students will be able to plan for E On completion of this course the	quipment's and material requirements.
coy	techniques for successful completion	quipment's and material requirements. students will know the various management of construction projects.
	Name of the Control o	

CO1	Elective –III/Hydropower Engineering Record the fundamentals of fluid mechanics, water resource engineering and environmental engineering
CO2	Understand the significance of water power and hydraulic structures related to water power engineering
CO3	Apply the knowledge of mathematics, statistics, fluid mechanics, in design of penstocks, surge tanks and intakes
CO4	Analyse and design complete unit of hydroelectric power station & its components.

IQAC Coordinator

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PO CO OF CIVIL ENGINEERING DEPARTMENT OF ACADEMIC YEAR 2017-18

Vision

The vision of the department is the sharing of technical skills and knowledge for the benefit of student education and the development of business, society, and our nation.

Mission

Our goal is to offer top-notch engineering education that is in step with current scientific and technical advancement..

Program Educational Objective

PEO1	Preparation: To prepare students to excel in various educational programmes or to succeed in industry / technical profession through further education/training;.
PEO2	Core Competence: To provide students with a solid foundation in mathematical, scientific fundamentals required to solve Structural problems;
PEO3	Breadth: To train students with a breadth of scientific knowledge to comprehend, analyze, design & create novel products and solutions for real life problems;
PEO4	Professionalism: To inculcate in students professional/ethical attitude, effective team work skills, multidisciplinary approach and to relate engineering issues to a broader context;
PEO5	Learning Environment: To provide students with academic environment of excellence, leadership, ethical guidelines and life-long learning needed for a long / productive career.



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Course Outcomes:

SE (CIVIL) Part - I

Engineering Mathematics - III

	Engineering Wathematics - 111
COI	Student will demonstrate basic knowledge of L.D.E., P.D.E., Vector& F.T
CO2	Student will show the understanding of impact of Engg. Mathematics on CIVIL
CO3	Student will Demonstrate their understanding of mathematical ideas from multiple perspectives, such as by (a) using the internal connections between geometry, algebra, and numerical computation, (b) applying the connections between theory and applications, or (c) distinguishing between a formal proof and a less formal arguments and understanding the different roles these play in mathematics.

CE 202- Strength Of Materials

COI	Students will be able to perform the stress-strain analysis.
CO2	Students will be able to draw force distribution diagrams for members and determinate beams
CO3	Students will be able to find deflections in determinant beams
CO4	Students will be able to visualize force deformation behavior of bodies

CE 203- Fluid Mechanics-I

CO1	Student will be able to Calibrate the various flow measuring devices.
CO2	Student will be able to Determine the properties of fluid and pressure and their measurement.
соз	Student will be able to Understand fundamentals of pipe flow, losses in pipe and analysis of pipe network.
CO4	Student will be able to Visualize fluid flow phenomena observed in Civil Engineering systems.

CE 204-Surveying

COI	Student will be able to perform measurements in linear/angular methods.
CO2	Student will be able to perform plane table surveying in general terrain
СОЗ	Student will be able to know the basics of leveling and Theodolite survey in elevation and angular measurements.



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CE 205- Building Construction

	Student will be able to identify various components of building (foundation, Lintel, stairs case, roofs & floors), their functions and methods of construction so as to achieve good knowledge about building construction
CO2	Will be able to identify the materials such as paints and distemper used for treatment of the surfaces so as to achieve good knowledge about the building material
CO3	Students will be learn various building components & their construction method.

SE (CIVIL) Part - II

CE 206- Fluid Mechanics -II

	The state of the s
CO1	Students will be able to apply their knowledge of fluid mechanics in addressing problems in open channels.
CO2	Student will possess the skills to solve problems in uniform, gradually and rapidly varied flows in steady conditions.
СОЗ	Problems pertain to design, construction as well as efficient working of various types of hydraulics structures and machines is considerably simplified by using dimensional analysis and model studies
CO4	Impact Of Jet on vanes which is a base for analysis and design of turbo machines.
CO5	They will have knowledge in hydraulic machines(pumps and turbines)

	CE 208- Concrete Technology
CO1	Student will be familiar with different ingredients of concrete.
CO2	Student will be familiar with properties of different ingredients of concrete.
CO3	Student will be familiar with different admixtures.
CO4	Student will be familiar with properties of fresh and harden concrete.
CO5	Student will be familiar with special concretes.
CO6	Student will be able to prepare concrete mix design.

CF 207- Advanced Surveying

COI	Student will be familiar with various basic concepts in Surveying through theory and series of practical's based on theory.
CO2	Student will be familiar with hydrographic surveying & Trigonometrical Leveling.
CO3	Students will be learn about Remote Sensing & its application



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CE 209- Theory Of Struct

COI	Student will be able to
CO2	Student will be able to analyze Fixed and continuous beams. Student will be able to analyze proving beams.
	simply supported beams, and will be able to draw influence line diagrams for
CO3	Student will also be able to analyze columns.
CO4	Student will also be able to analyze three hinge arches and three hinge suspension bridges.
	will also be able to analyze three hinge arches and three hinge suspension bridges

CE 210- Ruilding DI

COI	Students will able to make the state of the
(())	Students will able to understand basic principles of building design and planning. Students will explore building drawing as a way of discovering and developing ideas for designing residential, commercial and public buildings
СОЗ	The student develops basic drawing skills; create multilayer architectural and working drawings.

CE 211- Professional Communication Skill

COI	Students would understand the concept, process and importance of Professional Communication
CO2	Students would acquire English Speaking and Writing Skills
CO3	Students would develop Presentation Skills

TE (CIVIL) Part - I

CE 301 Engineering Geology

COI	The students will be able to understand the details about Rock mechanics, Geoinformatics
	The students will be able to study the geology.
СОЗ	The students will be able to select the suitability of site for different Construction Development work

CE 302 Geotechnical Engineering - 1

COI	The students will be able to classify soils and know how water with soil affecting.	
CO2	The students will get the idea about the shear strength parameters of soil	

CE 303 Theory Of Structures - II



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COI	The state of the s	
	I he student will be	
	The student will have the knowledge on advanced methods of analysis of structure.	
	wiedge on advanced methods of analysis	
	structure of analysis of structure of analysis of structure of the structu	ctures

CE 304 Design Of Str

COI	This course covers the design of structural steel members subjected to compressive, tensile and bending loads, as per current codal provisions (IS 800 - 2007) including connections.
CO2	bending loads, as per current codal provisions (IS 800 - 2007) including connections. Design of structural systems such as roof teaching connections.
	Design of structural systems such as roof trusses, gantry girders is included

CE 305 Te

COI	To understand Engineering-I
CO2	To understand Basic concept about Highway Engineering.
CO3	and stand the principles of Highway geometries de
CO4	acoign for the riighway& Basic consent CD
CO5	Types of pavements & Materials required for Link
CO6	Construction procedure for different types of
CO7	To understand maintenance procedure for different type of pavements To understand the Traffic analysis and the state of t
CO8	To understand the Traffic engineering& different types of traffic control device To understand Basic idea about the District Control device
	To understand Basic idea about the Bridge engineering & Components parts of a bridge.

TE (CIVIL) Part - II

CE 306 Geotechnical Engineering - II

COI	To get the knowledge S. J.
CO2	To get the knowledge of classical theories of earth pressure & stress distribution,
	To get the knowledge of how to improve the soil for stability of structure Students get the knowledge of various techniques with which we will know how to improve weak Students get the knowledge of various techniques with which we will know how to improve weak
CO4	Student will solve actual problems of stability with various material, they will apply various theories and predict the risk factor.

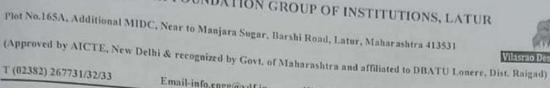
CE 307 Environmental Engineering -I

	Coshmukh Fo
612	Student will be able to Design various water treatment units and plan their operations on the basis of raw water quality and water demand.
	oradon will be able to tice population for
COI	Student will be able to Plan and design water supply systems for a rural/urban area



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Student will be able to Apply knowledge of advanced water treatment processes for individual CO4

CE 308 Design Of Structu

COI	Students have explored the stream "Limit State Method of Design for R.C. Structures" and are equipped with knowledge of different methods of design and its all the structures and are
CO2	equipped with knowledge of different methods of design and its classifications. Students have been introduced to Limit State Analysis as well which has opened their wisdom for redistribution of moments.
CO3	Students are now competent to Design the structures for Livis Co. U. C. Fl.
CO4	Students are competent to Design the structures for Limit Sate of Serviceability for Deflection and Cracking.

CE 309 Transportation Engine

COI	In Airport Engineering students will get knowledge of Airport planning, layout and runway and taxiway components
CO2	Students will get the feel of fundamentals of railway engineering from the syllabus, under railway Engineering students get knowledge of railway geometrics, Signalling & interlocking Points, crossing and turnouts etc.
СОЗ	Students get knowledge regarding fundamentals of tunnel its excavation methods, support systems, and executional aspects of tunnel

CE 310 Water Resources Engineering -I

CO1	Student will know the different terminologies related with hydrology.
CO2	Students will analyze hydrological parameters required for water resource management.
CO3	Student will assess ground water potential.
CO4	Students will identify suitable method of irrigation and drainage of waterlogged area

CE 311 d) Advanced Concrete Technology (Elective-I)

COI	Students are able to decide the use of supplement cementatious in concrete, use of different admixture and its application as per requirement.
CO2	Students are capable to understand the special concrete, its properties and application as per requirement
соз	Students are able to do concrete mix design for required strength of concrete with different approach
CO4	Students are able to know details of ready mix concrete plant



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COS	Students are able to understand the death in
COS	Students are able to understand the durability of concrete, assessment and inspection of hardened concrete.
like .	

B. E. (CIVIL) Part - I

CE 401 Environmental Engineering -II

COI	Students understood Sewage quantity and quality for better treatment so as to reduce scarcity by recycling waste water.
CO2	Students understood industrial waste water quantity and quality for achieving better sanitation in society.

CE 402 Design of Structure - III

	Students will be able to understand the difference between prestressed construction and RCC construction.
CO2	Students also able to design the flat slab, combined footings, earth retaining structures and liquid retaining structures.

CE 403 Water Resources Engineering - II

COI	Students understood all type of dams and reservoirs.	
CO2	Students understood Spillways, Gates & Energy dissipaters	
CO3	students understood various canal structures, river training works etc.	

CF-404 Professional Ethics

CO1	Students understood basic overview of functioning of different civil engineering related industries / firms.
CO2	Students understood awareness on application of different drawings, contract documents in civil engineering.
CO3	Students understood insight of code of ethics, duties and responsibilities as a Civil Engineer

CE 405 c) Ground Water Engineering

Students will able to work as Engineers in the field of Ground Water Engineering with confidence COL and success.



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B. E. (CIVIL) Part - II

COI	Students will be got Scope for the students to pick up diverse aspects of the subject Professional Practice.
CO2	Student shall be able to serve in different organizations carrying out different project works and infrastructure activities.
	student shall start his career as a consultant in this field.

CE 409 Foundation Engineering

	The study of Foundation :
COI	The study of Foundation engineering .subject develops the knowledge & confidence level of the
	students to select the proper type of fer and the students to select the proper type of fer and the select
-2120	students to select the proper type of foundation & its safe & economic design

CE 410 Project Planning And Managem

	- Sect Finning And Management
COI	The students will be able to understand and apply the knowledge of management functions like planning, scheduling, executing and controlling to construction projects.
CO2	The students will be able to demonstrate their capability for preparing the project networks to work out best possible time for completing the project.
CO3	The students will be able to understand and exercise the time- cost relationship in- practices.
CO4	The students will be able to implement the safety aspects during the execution of civil engineering project
CO5	The course will inculcate the managerial skills among the students which will be helpful for them in future during actual execution of projects.
CO6	students will know different legal aspect and its provisions for construction project
CO7	The students will be able to carry out the Human resource Management efficiently
CO8	The students will be able to plan for Equipment's and material requirements.
CO9	Students will know the various management techniques for successful completion of construction projects.



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CE 411 b) Hydropower Engineering

COI

It is desired that students after undergoing academic study sessions as cited this above shall be competent and able to work as Engineers in the field of Hydropower Engineering with confidence and success..

Zinotintoull IQAC Coordinator H.O.D.

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Letur-413531

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PO CO OF DEPARTMENT OF COMPUTER ENGINEERING ACADEMIC YEAR 2021-22

Vision

The department is committed to achieve academic excellence through education and research in the emerging and established areas of Computer Engineering

Mission

Building the capacities of young students to realize their professional and academic dreams.

Graduate Attributes

The Graduate Attributes are the knowledge skills and attitudes which the students have at the time of graduation. These Graduate Attributes identified by National Board of Accreditation are as follows:

- 1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
- 2. Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
- 3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- 4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- 5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

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- 7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate Vision The vision of the department is to achieve excellence in teaching, learning, research and transfer of technology and overall development of students. Mission Imparting quality education, looking after holistic development of students and conducting need based research and extension. The knowledge of, and need for sustainable development.
- 8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- 9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- 10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- 11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- 12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Educational Objective

PEO1	To provide sound knowledge of mathematical principles underlying various programming concepts.
PEO2	To develop an ability to understand complex issues in the analysis, design, implementation and operation of information systems.
PEO3	To provide knowledge of mechanisms for building large-scale computer-based systems.
PEO4	To develop an ability to provide computer-based solutions to problems from other disciplines of science and engineering.
PEO5	To impart skills necessary for adapting to rapid changes taking place in the field of information and communication technologies.



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Course Outcomes:

SY (CE) Part - I

Engineering Mathematics - III (BTBS301)

	Engineering Wathematics III (BIBESU)
CO1	Student will demonstrate basic knowledge of L.D.E., P.D.E., Vector& F.T
CO2	Student will show the understanding of impact of Engg. Mathematics on computer
соз	Student will Demonstrate their understanding of mathematical ideas from multiple perspectives, such as by (a) using the internal connections between geometry, algebra, and numerical computation, (b) applying the connections between theory and applications, or (c) distinguishing between a formal proof and a less formal arguments and understanding the different roles these play in mathematics.

Discrete Mathematics (BTCOC302)

CO1	Understand sets, relations, functions and discrete structures. Apply Propositional logic and First order logic to solve problems.
CO2	Express and solve number theoretic problems using algebraic properties of groups, Rings and fields.
CO3	To design and develop real time application using graph theory.
CO4	Students would be able to model and analyze computational processes using analytic And combinatorial methods.
CO5	Students will be able to use the methods learnt as part of this subject in subsequent Courses in the design and analysis of algorithms, theory of computation, and compilers.
CO6	Develop a discrete model for a given computational problem and solve.

Data Structure(BTCOC303)

CO1	Student should able to know fundamentals of data structures like array, list, linked list, stack, queue, tree, graph, hashing.
CO2	Student should able to identify suitable data structure for application.
CO3	Student should able to use data structure to solve problems.
CO4	Student should able to implement various data structures and algorithm essential for implementing computer based solutions.



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Computer Architecture & Organization (BTCOC304)

CO1	To understand the basic hardware and software issues of computer organization.
CO2	Identify functional units, bus structure and addressing modes.
СОЗ	Students will be able to identify where, when and how enhancements of computer Performance can be accomplished.
CO4	Students will also be introduced to more recent applications of computer organization In advanced digital systems.
CO5	Identify memory hierarchy and performance.

Object - Oriented Programming in C++ (BTCOC305A)

CO1	Appreciation and understanding of object oriented concepts and their utility.
CO2	Apply Object oriented approach to design software.
CO3	Ability to formulate the problem, come up with object oriented design.
CO4	Practicing use of different features of Object Oriented Methodology like templates exception handling, reflection etc.
CO5	Study different systems and apply different design methodologies based on the problem specification and objectives.

Object Oriented Programming in Java (BTCOC305B)

CO1	Appreciation and understanding of object oriented concepts and their utility.
CO2	Apply Object oriented approach to design software.
CO3	Ability to formulate the problem, come up with object oriented design.
CO4	Practicing use of different features of Object Oriented Methodology like templates exception handling, reflection etc.
CO5	Study different systems and apply different design methodologies based on the problem specification and objectives.



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Course Outcomes:

SY (CE) Part-II

Design & Analysis of Algorithms (BTCOC401)

	Design & Analysis of Argorithms (D1000101)
CO1	Analyzing the amortized time complexity of a given algorithm and data structure operations.
CO2	Decide the appropriate design methodology for a given problem from among the paradigms of Divide and Conquer, Dynamic Programming, Greedy, Branch and Bound.
CO3	Design algorithms for network flows.
CO4	Distinguish between P and NP classes of problems.

Operating Systems (BTCOC402)

	Operating of steme (
CO1	Understand functional architecture of an operating system.
CO2	To provide a detailed discussion of the various memory management techniques.
CO3	Learn about and understand theoretical concepts and programming constructs used for the operation of modern operating systems.
CO4	Gain practical experience with software tools available in modern operating systems such as semaphores, system calls, sockets and threads.

Basic Human Rights (BTHM403)

1111	Dasic Human Kights (2.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1			
CO1	Judgments and other materials generated by them.			
CO2	Develop an awareness of the primary areas of concern within the field of human rights law and other relevant branches of law, and the ways in which human rights are promoted and protected.			

Probability Theory and Random Processes (BTBS404)

shmukh

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gar Barshi Road

CO1	Develop appropriate probabilistic model for a given problem of algorithmic nature an computation of its statistical parameters.
CO2	Learning of different methods of statistics for data analysis.
CO3	Modeling of various real life problems of operation research.
CO4	Determine service time and waiting time in a queue.
CO5	To understand elementary queuing concepts and apply elsewhere in computer science.
COS	To understand element question and the second secon

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Digital	Logic	Docion	Q.	Microprocessors	(RTES405)
Digital	Logic	Design	0	VIICTODFOCESSORS	D1 E34031

COI	Perform the conversion among different number systems.
CO2	Design digital components including – decoders, multiplexers, arithmetic circuits.
CO3	Design of synchronous sequential circuits.
CO4	Describe design methodology for different combinational logic circuit.
CO5	Analyze digital systems and improve the performance by reducing complexities.
CO6	Test digital systems and analyze faults.



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Course Outcomes:

TY (CE) Part - I

Database Systems (BTCOC501)

	Database Systems (D1COCS01)
CO1	Model, design and normalize databases for real life applications.
CO2	To learn data models, conceptualize and depict a database system using ER diagram.
CO3	Query Database applications using Query Languages like SQL.
CO4	Understand validation framework like integrity constraints, triggers and assertions.
CO5	Understand various storage structures and query optimization.
1400 500 1501	Query Database applications using Query Languages like SQL. Understand validation framework like integrity constraints, triggers and assert

Theory of Computations (BTCOC502)

	The ball the
CO1	Design finite state machines, regular expressions and grammars for given languages.
CO2	Understand formal machines, languages and computations
соз	Develop analytical thinking and intuition for problem solving situations in related areas of theory of computation.
CO4	To know the limitations of computation, i.e. the unsolvability of problems.

Machine Learning (BTCOC503)

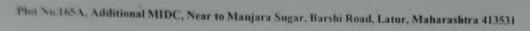
CO1	Understand big data challenges in different domains including social media, transportation, finance and medicine.
CO2	Use data analytics to explore and gain a broad understanding of a dataset.
CO3	Use data analytics methods to make predictions for a dataset.
CO4	Predict outcomes with supervised machine learning techniques.
CO5	Apply basic machine learning algorithms Linear Regression, k-Nearest Neighbors (k-NN), k means, Naive Bayes for predictive modeling to solve various real-life examples.

Cyber Laws (BTCOE504B)

CO1	Critically evaluate ongoing developments in law relating to Information Technologies.
CO2	Display an understanding of how these developments relate to one another.
CO3	Examine areas of doctrinal and political debate surrounding rules and theories.
CO4	Evaluate those rules and theories in terms of internal coherence and practical outcomes.
CO5	Draw on the analysis and evaluation contained in primary and secondary sources.
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Business	Communication	(BTCOE505B)
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CO1	Cultivate an ability to identify self-identity, attitude and motivate them to express effectively in small and larger groups of people.
CO2	Participate, collaborate, manage and communicate effectively, influentially by enhancing Llistening, S-speaking, R-reading and W-writing skills amongst the learners.
CO3	Emerge as an outstanding personality and learn to express, convey their own ideas, principles, concepts, philosophy through elegant expressions and manners by participating in group discussion and team projects.



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Course Outcomes:

TY (CE) Part - II

Compiler Design (BTCOC601)

	Compiler Design (D1COC001)
CO1	To inform students about different parsing techniques, techniques to generate intermediate code and different optimization techniques.
CO2	To enrich the knowledge in various phases of compiler and its use.
CO3	To introduce the concepts underlying the design and implementation of language processors.
CO4	To provide practical programming skills necessary for constructing a compiler.

Computer Networks (BTCOC602)

	Compared Methodis (DTCGC000)
CO1	To develop an understanding of modern network architectures from a design and performance perspective.
CO2	Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies.
CO3	To study protocols, network standards, the OSI model, IP addressing, cabling, networking components, and basic LAN design.
CO4	Ability to write program using socket programming.

Artificial Intelligence (BTCOE603B)

	Artificial Intelligence (BTCOL003B)
COL	To understand the notions of rational behavior and intelligent agents.
CO2	To develop a general appreciation of the goals, subareas, achievements and difficulties of AI.
соз	To provide the knowledge of methods of blind as well as informed search and ability to practically apply the corresponding techniques.
CO4	To develop general understanding of major concepts and approaches in knowledge Representation, planning, learning, robotics and other AI areas.
CO5	To developing programming skills for AI applications & exposure to logic Programming with Prolog.

Geographical Information System (BTCOE604A)

COI	To understand geographical information system
	To develop a general appreciation of the goals, subareas, achievements and difficulties of Digital Elevation Model (DEM)



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National So	cial Service	(BTCOF60	15)
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	- This could be tree (b) COLOUS)
CO1	To understand history of NSS
CO2	To inform students about different Youth Development Programmes in India



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Course Outcomes:

BE (CSE) Part - I

Cloud Computing (PFC 701 (A))

croud computing (I EC 701 (A))
Compare various cloud computing providers / Software.
Understand and familiarize with the basic concepts of cloud computing.
Understand how to build large scale distributed systems and cloud applications.
Comprehend the importance of cloud security.

Distributed Systems (PEC 702 (A))

	Distributed Officerins (120 102 (14))
CO1	Understand key features of the Distributed Systems such as Communications, Processes, Synchronization, Fault Tolerance, Consistency and Replications.
CO2	Use and apply important methods in distributed systems to support scalability and fault Tolerance.
CO3	Design and implement distributed applications of Distributed Systems.

Cyber Law and Ethics (OEC 703 (A))

	Cyber Law and Ethics (OEC 703 (71))
COI	Understand cyber-attack
CO2	Understand types of cybercrimes, cyber laws
CO3	Learn how to protect them self and ultimately society from such attacks

Distant (BSC 704)

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Course Outcomes:

BE (CSE) Part - II

Image Processing (PEC 801 (A))

CO1	Understand the need for image transforms different types of image transforms and their properties.	
CO2	Develop any image processing application	
соз	Understand the need for image compression and to learn the spatial and frequency domain techniques of image compression.	

Python Programming (OEC 802 (A))

CO1	To understand why Python is a useful scripting language for developers.
CO2	To learn how to design and program Python applications.
CO3	To learn how to use lists, tuples, and dictionaries in Python programs.
CO4	To learn how to identify Python object types.

Internet of Things (OEC 803 (A))

	Internet of Things (OLC 605 (14))
CO1	Able to understand the application areas of IOT.
CO2	Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks
CO3	Able to understand building blocks of Internet of Things and characteristics.

IQAC Coordinator



Principal VILASRAO DESHMUKH FOUNDATION GROUP OF INSTITUTIONS VDF School of Engg.&Tech. New MIDC, Latur-413531

Plot No.165A, Additional MIDC, Near to Manjara Sugar, Barshi Road, Latur, Maharashtra 413531



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Website: www.vdfengineering.co.in(DTE Code: 2254)

PO CO OF DEPARTMENT OF COMPUTER ENGINEERING ACADEMIC YEAR 2020-21

Vision

The department is committed to achieve academic excellence through education and research in the emerging and established areas of Computer Engineering

Mission

Building the capacities of young students to realize their professional and academic dreams.

Graduate Attributes

The Graduate Attributes are the knowledge skills and attitudes which the students have at the time of graduation. These Graduate Attributes identified by National Board of Accreditation are as follows:

- 1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
- 2. Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
- 3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- 4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- 5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

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- 7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate Vision The vision of the department is to achieve excellence in teaching, learning, research and transfer of technology and overall development of students. Mission Imparting quality education, looking after holistic development of students and conducting need based research and extension. The knowledge of, and need for sustainable development.
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- 10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- 11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- 12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Educational Objective

PEO1	To provide sound knowledge of mathematical principles underlying various programming concepts.
PEO2	To develop an ability to understand complex issues in the analysis, design, implementation and operation of information systems.
PEO3	To provide knowledge of mechanisms for building large-scale computer-based systems.
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PEO5	To impart skills necessary for adapting to rapid changes taking place in the field of information and communication technologies.



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Course Outcomes:

SY (CE) Part - I

Engineering Mathematics - III (BTBSC301)

	Engineering Mathematics of DE DDE Voctors ET
CO1	Student will demonstrate basic knowledge of L.D.E., P.D.E., Vector& F.T
CO2	Student will show the understanding of impact of Engg.Mathematics on computer
CO3	Student will Demonstrate their understanding of mathematical ideas from multiple perspectives, such as by (a) using the internal connections between geometry, algebra, and numerical computation, (b) applying the connections between theory and applications, or (c) distinguishing between a formal proof and a less formal arguments and understanding the different roles these play in mathematics.

Discrete Mathematics (BTCOC302)

	Discrete Mathematics (D1COCCO2)
CO1	Understand sets, relations, functions and discrete structures. Apply Propositional logic and First order logic to solve problems.
CO2	Express and solve number theoretic problems using algebraic properties of groups, Rings and fields.
CO3	To design and develop real time application using graph theory.
CO4	Students would be able to model and analyze computational processes using analytic And combinatorial methods.
CO5	Students will be able to use the methods learnt as part of this subject in subsequent Courses in the design and analysis of algorithms, theory of computation, and compilers.
CO6	Develop a discrete model for a given computational problem and solve.

Data Structure(BTCOC303)

CO1	Student should able to know fundamentals of data structures like array, list, linked list, stack, queue, tree, graph, hashing.
CO2	Student should able to identify suitable data structure for application.
CO3	Student should able to use data structure to solve problems.
CO4	Student should able to implement various data structures and algorithm essential for implementing computer based solutions.



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Computer Architecture & Organization (BTCOC304)

CO1	To understand the basic hardware and software issues of computer organization.
CO2	Identify functional units, bus structure and addressing modes.
CO3	Students will be able to identify where, when and how enhancements of computer Performance can be accomplished.
CO4	Students will also be introduced to more recent applications of computer organization In advanced digital systems.
	Identify memory hierarchy and performance.

Digital Electronics & Microprocessors (BTCOC305)

CO1	Perform the conversion among different number systems.
CO2	Design digital components including – decoders, multiplexers, arithmetic circuits.
CO3	Design of synchronous sequential circuits.
CO4	Describe design methodology for different combinational logic circuit.
CO5	Analyze digital systems and improve the performance by reducing complexities.
CO6	Test digital systems and analyze faults.

Basic Human Rights (BTHM3401)

relationships to each other, and the legal value and authority of declaration budgments and other materials generated by them.	Be familiar with the major universal and regional systems of human rights law, their relationships to each other, and the legal value and authority of declarations, decisions, Judgments and other materials generated by them.
CO2	Develop an awareness of the primary areas of concern within the field of human rights law and other relevant branches of law, and the ways in which human rights are promoted and protected.



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Course Outcomes:

SY (CE) Part - II

Design & Analysis of Algorithms (BTCOC401)

	Design te Amarysis of Angorithms (D1000102)
CO1	Analyzing the amortized time complexity of a given algorithm and data structure operations.
CO2	Decide the appropriate design methodology for a given problem from among the paradigms of Divide and Conquer, Dynamic Programming, Greedy, Branch and Bound.
CO3	Design algorithms for network flows.
CO4	Distinguish between P and NP classes of problems.

Probability and Statistics (BTCOC402)

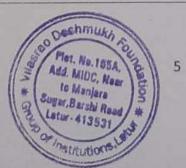
CO1	Develop appropriate probabilistic model for a given problem of algorithmic nature and computation of its statistical parameters.
CO2	Learning of different methods of statistics for data analysis.
CO3	Modeling of various real life problems of operation research.
CO4	Determine service time and waiting time in a queue.
CO5	To understand elementary queuing concepts and apply elsewhere in computer science.

Operating Systems (BTCOC403)

CO1	Understand functional architecture of an operating system.
CO2	To provide a detailed discussion of the various memory management techniques.
соз	Learn about and understand theoretical concepts and programming constructs used for the operation of modern operating systems.
CO4	Gain practical experience with software tools available in modern operating systems such as semaphores, system calls, sockets and threads.

Object Oriented Programming in Java (BTCOE404A)

CO1	Appreciation and understanding of object oriented concepts and their utility.
CO2	Apply Object oriented approach to design software.
CO3	Ability to formulate the problem, come up with object oriented design.
CO4	Practicing use of different features of Object Oriented Methodology like templates, exception handling, reflection etc.
CO5	Study different systems and apply different design methodologies based on the problem specification and objectives.



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Object - Oriented	Programming in C++ (RTCOF404R)

CO1	Appreciation and understanding of object oriented concepts and their utility.
CO2	Apply Object oriented approach to design software.
CO3	Ability to formulate the problem, come up with object oriented design.
CO4	Practicing use of different features of Object Oriented Methodology like templates exception handling, reflection etc.
CO5	Study different systems and apply different design methodologies based on the problem specification and objectives.

Numerical Methods (BTCOE406B)

CO1	Determine an interpolating function for data.
CO2	Solve initial value problems.
CO3	Aware of the use of numerical methods in modern scientific computing.
CO4	Students would be able to assess the approximation techniques to formulate and apply appropriate strategy to solve real world problems.



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Course Outcomes:

TE (CSE) Part - I

Signals & Systems (ESC 501)

CO1	Understand the concepts of continuous time and discrete time systems.	
CO2	Analyze systems in complex frequency domain.	
CO3	Understand sampling theorem and its implications.	

Database Management System (PCC-CS 502)

CO1	To understand the different issues involved in the design and implementation of a database system.
CO2	To study the physical and logical database designs, database modelling, relational, hierarchical, and network models.
CO3	To understand and use data manipulation language to query, update, and manage a database.
CO4	To develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency, distributed database, and intelligent database, Client/Server (Database Server), Data Warehousing.
CO5	To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modelling, designing, and implementing a DBMS.

Formal Language & Automata Theory (PCC-CS 503)

CO1	Design finite state machines, regular expressions and grammars for given languages.
CO2	Understand formal machines, languages and computations
соз	Develop analytical thinking and intuition for problem solving situations in related areas of theory of computation.
CO4	To know the limitations of computation, i.e. the unsolvability of problems.

Object Oriented Programming (PCC-CS 504)

scribe the procedural and object oriented paradigm.	
demonstrate and implement real world problem.	
fine classes modeling techniques and instances.	
sign object oriented solutions for small systems involving multiple objects.	
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Software Engineering (PEC

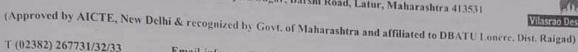
CO1	Define various software application domains and process models used in software development.
CO2	Need of software specification
CO3	Need of software specification and requirement and their gathering techniques. Demonstrate use of software and user interference to their gathering techniques.
CO5	Classify different testing strategies and statistics and compare them. Generate project schedule and organize different activities of project as per risk impact factor.
	Sample different activities of project as per risk impact factor



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Course Outcomes:

TE (CSE) Part - II

	Compiler Design (PCC-CS 601)
CO1	To inform students about different parsing techniques, techniques to generate intermediate code and different optimization techniques.
CO2	To enrich the knowledge in various phases of compiler and its use.
CO3	To introduce the concepts underlying the design and implementation of language processors.
CO4	To provide practical programming skills necessary for constructing a compiler.

Computer Networks (PCC-CS 602)

	Computer Networks (I CC-CS 002)
CO1	To develop an understanding of modern network architectures from a design and performance perspective.
CO2	Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies.
соз	To study protocols, network standards, the OSI model, IP addressing, cabling, networking components, and basic LAN design.
CO4	Ability to write program using socket programming.

Advanced Operating Systems (PEC 603)

CO1	Understand functional architecture of an operating system.
CO2	To provide a detailed discussion of the various memory management techniques.
СОЗ	Learn about and understand theoretical concepts and programming constructs used for the
CO4	Gain practical experience with software tools available in modern operating systems such as semaphores, system calls, sockets and threads.

Data Mining (PEC 604)

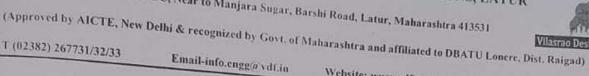
CO1	Interpret the contribution of data warehousing and data mining to the decision support level of organizations.
CO2	Evaluate different models used for OLAP and data pre-processing.
СОЗ	Categorize and carefully differentiate between situations for applying different data mining techniques: mining frequent pattern, association, correlation, classification, prediction, and cluster analysis.
CO4	Design and implement systems for data mining and evaluate the performance of



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different data mining algorithms.

Cultivate an ability of	
C. 1: and Interpersonal	Communication
Cultivate an abilia	Communication (OEC 605)

CO1	Cultivate an ability to identify self-identity, attitude and motivate them to express effectively Participate Participat
CO2	Turterpate, Collaborate manage 1
CO3	Llistening, S-speaking, R-reading and W-writing skills amongst the learners. Emerge as an outstanding personality and learn to express, convey their own ideas, principles, concepts, philosophy through elegant expressions and manners by participating in group discussion and team projects.



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Course Outcomes:

BE (CSE) Part - I

	Computer Networks (CS401)		
CO1 Learn various concepts of computer networks and TCP/IP protocols.			
CO2	Be able to evaluate the topological and routing strategies for a network.		
CO3			

	Understand how transaction processes and how to implement and control	
CO1	Understand how transaction processes and how to implement and control concurrency in transaction processing.	
CO2	Understand the data recovery after failure.	
CO3	O3 Be able to apply tuning to get better performance and migration of database	

Data Mining (CS/03)

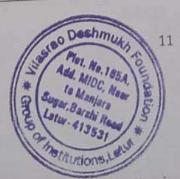
	Data Willing (CS403)		
CO1	Interpret the contribution of data warehousing and data mining to the decision support level of organizations.		
CO2	To do different models used for OLAP and data pre-processing.		
CO3	Categorize and carefully differentiate between situations for applying different data mining techniques: mining frequent pattern, association, correlation, classification,		
CO4	Design and implement systems for data mining and evaluate the performance of different data mining algorithms.		

Testing and Quality Assurance (CS407)

	Software resting and Valle in Carlos Tooting Life Cycle
COI	Formulate problem by following Software Testing Life Cycle
CO2	Design Manual Test cases for Software Project. Design Manual Test cases for Software Project.
CO3	Design Manual Test cases for Software Project. Follow the process related activity and testing techniques to work as team member.

ing Lah VI (CS412)

	Programming Lab VI (CS-12)
COI	Analyze the basic structure of a C# application. Analyze the basic structure of a C# applications on NET.
CO2	Be able to develop Window based live applications on .NET. Be able to develop Window based live application on a webserver.
	Understand process of executing a web application on a webserver. Understand process of executing a web applications on .NET.
CO4	Be able to design and develop Web based applications on .NET. Understand the syntax and functions available to deal with file processing for files.
CO5	Understand the syntax and functions available to don't



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Course Outcomes:

BE (CSE) Part - II

Mobile Computing (CS415)

CO1	Understand the infrastructure to develop mobile communication system (cellular theory) and the characteristics of different multiple access techniques in mobile communication.
CO2	Analyze the different inter-networking challenges and solutions in wireless mobile network.
CO3 The ability to develop applications that are mobile-device specific and current practice in mobile communication context.	

Cryptography and Network Security (CS416)

CO1	Implement various concepts of cryptography and network security.	
CO2	Analyze the security requirements of communication systems & networks.	
CO3		

Cloud Computing (CS 420)

CO1	Compare various cloud computing providers / Software.	
CO2	Inderstand and familiarize with the basic concepts of cloud computing.	
CO3	Understand how to build large scale distributed systems and cloud applications.	
CO4	Comprehend the importance of cloud security.	

Cuber Security (CS 421)

Cyber Security (CS 421)	
CO1	Understand cyber-attack
CO2	Understand types of cybercrimes, cyber laws
CO3 Learn how to protect them self and ultimately society from such attacks	

Open Source Technology Lab (CS425)

	Open Source Technology Euro (Co.120)	
CO1	Understand process of executing a PHP-based script on a webserver.	
CO2	Be able to develop a form containing several fields and be able to process the data provided on the form by a user in a PHP-based script.	
СОЗ	Understand the syntax and functions available to deal with file processing web URLs.	
CO4	Understand the syntax and use of PHP object-oriented classes.	milanos
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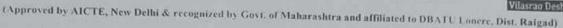
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PO CO OF DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING ACADEMIC YEAR 2019-20

Vision

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Building the capacities of young students to realize their professional and academic dreams.

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- 10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- 11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
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PEO4	To develop an ability to provide computer-based solutions to problems from other disciplines of science and engineering.
PEO5	To impart skills necessary for adapting to rapid changes taking place in the field of information and communication technologies.



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Course Outcomes:

SE (CSE) Part-I

Analog Electronic Circuits (ESC 301)

CO1	Understand the characteristics of transistors.(BT-1)	
CO2	Remembering and understanding the functioning of OP-AMP (BT-2)	
CO3	Design and analyze various rectifier and amplifier circuits.(BT-4)	
CO4	Design sinusoidal and non-sinusoidal oscillators. (BT-5)	
CO5	Design OP-AMP based circuits.(BT-5)	

Data structure & Algorithms (PCC- CS 302)

	Data structure de Argorithnis (1 CC- C5 502)	
CO1	For a given algorithm student will able to analyze the algorithms to determine the time and computation complexity and justify the correctness. (BT1 and BT2)	
CO2	For a given Search problem (Linear Search and Binary Search) student will able to implement it. (BT2 and BT3)	
СОЗ	For a given problem of Stacks, Queues and linked list student will able to implement it and analyze the same to determine the time and computation complexity.(BT3 and BT4)	
CO4	For a given problem of Qu e u e s student will able to implement it and analyze the same to determine the time and computation complexity. (BT4)	
CO5	For a given problem of linked list student will able to implement it and analyze the same to determine the time and computation complexity. (BT4 and BT5)	
CO6	Student will able to implement Tree and tree traversal algorithms and determine the time and computation complexity.	
C07	Student will able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, and Heap Sort and compare their performance in term of Space and Time complexity. (BT2 and BT3)	
CO8	Student will able to implement Graph search and traversal algorithms and determine the time and computation complexity. (BT3)	

Digital Electronics (ESC 303)

	Digital Electionics (ESC 505)
CO1	Understand working of logic families and logic gates.(BT-2)
CO2	Design and implement Combinational and Sequential logic circuits.(BT-3)
СОЗ	Understand the process of Analog to Digital conversion and Digital to Analog conversion.(BT-3)
CO4	Be able to use PLDs to implement the given logical problem.(BT-4)
CO5	Work in a design team that can propose, design successfully implement and report on a digital system projects.(BT-4)



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Website: www.vdfengineering.co.in(DTE Code: 2254)

IT Workshop (Sci Lab/MATLAB) PCC-CS 304

CO1	Understand the main features of the MATLAB development environment.
CO2	Use the MATLAB GUI effectively.
CO3	Design simple algorithms to solve problems.
CO4	Write simple programs in MATLAB to solve scientific and mathematical problems.
CO5	Know where to find help

Discrete Mathematics (PCC-CS 305)

CO1	Understand the notion of mathematical thinking, mathematical proofs and to apply them in problem solving.
CO2	Ability to reason logically.
CO3	Ability to understand relations, Diagraph and lattice.
CO4	Ability to understand use of functions, graphs and their use in programming applications. 5. Understand use of groups and codes in Encoding-Decoding
CO5	Apply discrete structures into other computing problems such as formal specification, verification, artificial intelligence, cryptography, Data Analysis and Data Mining etc.

Humanities-I (Effective Technical Communication) (HSMC 306)

CO1	Accumulate, review, mediate accurate information and transmit technical ideas, policies with greater clarity & precision.	
CO2	Draft, revise and edit technical drafts, letters, proposals, applications, with effective linguistic skills and abilities by eliminating grammatical errors in the same.	
СОЗ	Absorb, inculcate and practice an industrial ethics, professional work culture and collaborate effectively in organizational communication system.	
CO4	Lead, present and communicate business strategies persuasively and convincingly through result oriented endeavors both verbally and non-verbally within and outside organizations.	

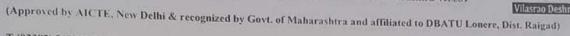
Seminar I (HSMC 307)

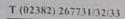
	Seminar 1 (HSMC 507)
CO1	Use multiple thinking strategies to examine real-world issues through self-learning.
CO2	Explore creative avenues of expression, solve problems, and make consequential decisions.
CO3	Developing stage courage and confidence
CO4	Apply innovative thinking for best presentation.



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Course Outcomes:

SE (CSE) Part - II

	computer organization (1 CC-C5401)	
CO1	Instruction Level Architecture and Instruction execution. (BT1)	
CO2	The current state of art in memory system design. (BT2)	
CO3	How I/O devices are accessed and its principles. (BT1 and BT2)	
CO4	To provide the knowledge on Instruction Level Parallelism.(BT 2)	
CO5	To impart the knowledge on micro programming.(BT4 and BT5)	

Operating Systems (PCC-CS402)

	Operating Systems (1 CC-CS402)
CO1	To learn the mechanisms of OS to handle processes and threads and their communication. (BT1 and BT2).
CO2	To learn the mechanisms involved in memory management in contemporary OS.(BT12and BT3).
СОЗ	To gain knowledge on distributed operating system concepts that includes architecture, mutual exclusion algorithms, deadlock detection algorithms and agreement protocols.(BT2 and BT4)
CO4	To know the components and management aspects of concurrency management.(BT1)
CO5	Study and understand the File management and Disk management.(BT2)

Design \$ Analysis of Algorithms (PCC-CS403)

	. " fermance of algorithms (BT3)
CO1	Analyze the asymptotic performance of algorithms.(BT3)
CO2	Write rigorous correctness proofs for algorithms. (BT4 and BT5)
CO3	Demonstrate a familiarity with major algorithms and data structures.(BT2)
CO4	Analyze and implement nonlinear data structures (BT1 and BT2).
	apply important algorithmic design paradigms and methods of analysis.(B13)
CO5	Synthesize efficient algorithms in common engineering design situations.(BT5)
CO6	Synthesize enicient algorithms in community

Management 1(Organizational Behavior/Finance & Accounting) (HSMC 404)

CO1	This course is to acquaint the students with the basic nature of management, its processor tasks and responsibilities of a professional manager as well as organizational behavioral dynamics governing an organization. The basic purpose of this course is to develop an insight of postulates, principles and the basic purpose of this course is to develop an insight of postulates, principles and the basic purpose of this course is to develop an insight of postulates, principles and the basic purpose of this course is to develop an insight of postulates, principles and the basic purpose of this course is to develop an insight of postulates, principles and the basic purpose of this course is to develop an insight of postulates.
CO2	to be seen of accounting and utilization of infancial and many
CO3	Information for planning, decision-making and control.



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	Mathematics-III (differential Calculus) (BSC-405)
CO1	Apply the concept of Linear & Non-Linear Programming Problem to the engineering problems.
CO2	Demonstrate the ability of using Transforms (Laplace, Fourier, Z, and Wavelet) in solving the Ordinary Differential Equations and Partial Differential Equations.
CO3	Solve the Ordinary and Partial Differential Equations using Transformation.
CO4	Identify the applicability of statistics and distribution of data.
CO5	Apply the concept of probability distribution to engineering problems.
CO6	Illustrate basic theory of correlations and regression and sampling theory.

Environmental Sciences (MC 406)

CO1	Students will understand the basics of environmental science.
CO2	Students will learn about causes of different pollution and their remedies.
CO3	The students will learn about social issues that are connected to environment
CO4	Students learning can be applicable for protection of environment

Interpersonal Skills and Personality development (HSMC 407)

CO1	Cultivate an ability to identify self-identity, attitude and motivate them to express effectively in small and larger groups of people.
CO2	Participate, collaborate, manage and communicate effectively, influentially by enhancing Llistening, S-speaking, R-reading and W-writing skills amongst the learners.
CO3	Emerge as an outstanding personality and learn to express, convey their own ideas, principles, concepts, philosophy through elegant expressions and manners by participating in group discussion and team projects.



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Course Outcomes:

TE (CSE) Part - I

Operating System (CS301) Understand Operating System Structure, Operations and Services, Process Concept, COL Multithreaded Programming, Process Scheduling and Synchronization. CO2 Apply the Concepts of Virtual Memory Management and File Systems. CO₃ Analyze the Secondary Storage and I/O Systems. CO4 Implement CPU Scheduling and Page Replacement Algorithms.

Automata Theory (CS302)

	rational ricory (ODDOW)	
CO1	Understand the concepts of automata, formal grammars and languages.	
CO2	Identify the capabilities and limitations of computing machine.	
CO3	Model various kinds of real-time problems.	

Database Management System (CS303)

CO1	Evaluate business information problem and find the requirements of a problem in terms of data.
CO2	Understand the uses the database schema and need for normalization.
СОЗ	Design the database schema with the use of appropriate data types for storage of data in database.

Organization & Architecture (CS304)

	Computer Organization & Aremteetare (6555.)
CO1	Understand how arithmetic and logical operations are performed by computers.
CO2	Make himself familiar with organizational and architectural principles and issues of a Digital Computer and to get a thorough understanding of working of various Organizational units.
CO3	Evaluate the performance of CPU, memory and I/O operations.

IAVA Programming (CS306)

CO1	Understand the principles and practice of object oriented analysis and design in the construction of robust, maintainable programs which satisfy their requirements.
	Competence to design, writes, compile, test and execute straightforward programs to address
CO2	various software problems. Be aware of the need and importance for a professional approach to design and good



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documentation to the finished programs.

CO1	Should be able to assemble and configure computer hardware.
CO2	Troubleshoot problems related to hardware.



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Course Outcomes:

TE (CSE) Part-II

Software Engineering (CS311)

CO1	Investigate and improve the specification of a software system.
CO2	Design system, component of process to meet desired needs within realistic constraints.
CO3	Identify, formulate and solve engineering problems.
CO4	Conduct standard tests and measurements.

Compiler Design (CS312)

	Compiler Design (CS512)
CO1	Acquire knowledge in different phases and specifying different types of tokens by lexical analyzer and also able to use the compiler tools like Lex, YACC etc.
CO2	Acquire the knowledge of modern compiler and its features.
CO3	Learn the code optimization techniques to improve the performance of a program in terms of speed & space.

Data Communication (CS312)

CO1	Basics data communication and two lower layers i.e. physical and data link layers.
CO2	Networking building blocks such as Ethernet, Cables and modems.
CO3	The conflicting issues and resolution techniques in data transmission.
CO4	The setting up of a network environment with all the necessary data communication components, procedure and techniques that make it functional
CO5	The different types of network topologies and protocols.

UNIX Operating System (CS314)

CO1	Learn UNIX structure, commands, and utilities.
CO2	Describe and understand the UNIX file system.
CO3	Write shell scripts in order to perform shell programming.
CO4	Acquire knowledge about text processing utilities, process management and system operation of UNIX.



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Python Programming (CS316

CO1	Understand the Python program development environment.
CO2	Understand the principles of Object-oriented programming with well-written modular code.
CO3	Solve problems with well-documented programs in the Python language, including the use of the logical constructs of that language.

Professional Aptitude & Logical Reasoning (CS319)

	1 Totessional Aptitude & Logical Reasoning (COST)
CO1	Identify, construct and compute numerical situations by work with numbers
CO2	Conceive and develop a methodology for analyzing and solving a problem
CO3	Analyze and interpret data
CO4	Develop and modify attention to detail
CO5	Define, modify and apply critical thinking to real time situations
CO6	Construct and design a structured approach to solving a given analytical situation.

Lab IV (CS320)

	Programming Lab IV (CS320)	
CO1	Decument and package a Java application	
CO2	Use many of the new enhancements added to the Java API	
CO3	Use assertions to write robust Java code.	
CO4	Write TCP/IP Client Server applications using sockets.	
CO5	The methods on a remote object using KWI.	
CO6	Perform database queries and updates using JDBC.	
	Reuse of classes using JAVA Beans.	0 4
CO7	Accuse 6.	ela-



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Course Outcomes:

BE (CSE) Part - I

Computer Networks (CSA)

Learn various concents of
Learn various concepts of computer networks and TCP/IP protocols. Be able to evaluate the torological desired and
Be able to evaluate the topological and routing strategies for a network. Be familiar with the different application layer protocols.
4

CO1	Understand how transaction processes and how to implement and control concurrency in transaction processing.
CO2	Understand the data recovery after failure.
CO3	Be able to apply tuning to get better performance and migration of database

Data Mining (CS403)

CO1	Interpret the contribution of data warehousing and data mining to the decision support level of organizations.
CO2	Evaluate different models used for OLAP and data pre-processing.
СОЗ	Categorize and carefully differentiate between situations for applying different data mining techniques: mining frequent pattern, association, correlation, classification, prediction, and cluster analysis.
CO4	Design and implement systems for data mining and evaluate the performance of different data mining algorithms.

Software Testing and Quality Assurance (CS407)

CO1	Formulate problem by following Software Testing Life Cycle
CO2	Design Manual Test cases for Software Project.
CO3	Follow the process related activity and testing techniques to work as team member.

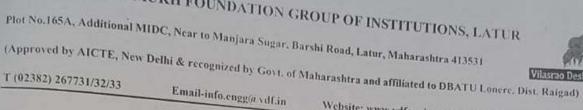
Programming Lab VI (CS412)

CO1	Analyze the basic structure of a C# application.
CO2	Be able to develop Window based live applications on .NET.
CO3	Understand process of executing a web application on a webserver.
CO4	Be able to design and develop Web based applications on .NET.
CO5	Understand the syntax and functions available to deal with file processing for files.



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Course Outcomes:

BE (CSE) Part - II

Mobile Computing (CS415

CO1	Understand the infrastructure to develop mobile communication system (cellular theory) and the characteristics of different multiple access techniques in mobile communication.
CO2	Analyze the different inter-networking challenges and solutions in wireless mobile network.
CO3	The ability to develop applications that are mobile-device specific and demonstrate current practice in mobile communication context.

Cryptography and Network Security (CS416)

CO1	Implement various concepts of cryptography and network security.
CO2	Analyze the security requirements of communication systems & networks.
CO3	Design cryptographic protocols to secure a system, networks or application.

Cloud Computing (CS 420)

CO1	Compare various cloud computing providers / Software.
CO2	Understand and familiarize with the basic concepts of cloud computing.
CO3	Understand how to build large scale distributed systems and cloud applications.
CO4	Comprehend the importance of cloud security.

Cyber Security (CS 421)

CO1	Understand cyber-attack
CO2	Understand types of cybercrimes, cyber laws
CO3	Learn how to protect them self and ultimately society from such attacks

Open Source Technology Lab (CS425)

QAC C	oordinator H.O.D.	Principal
CO4	Understand the syntax and use of PHP object-orie	ented classes.
СОЗ	Understand the syntax and functions available t server as well as processing web URLs.	Λ Λ
CO2	Be able to develop a form containing several fiel on the form by a user in a PHP-based script.	
CO1	Understand process of executing a PHP-based scr	

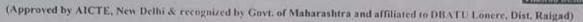
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PO CO OF DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING ACADEMIC YEAR 2018-19

Vision

The department is committed to achieve academic excellence through education and research in the emerging and established areas of Computer Engineering

Mission

Building the capacities of young students to realize their professional and academic dreams.

Graduate Attributes

The Graduate Attributes are the knowledge skills and attitudes which the students have at the time of graduation. These Graduate Attributes identified by National Board of Accreditation are as follows:

- 1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
- 2. Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
- 3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- 4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- 5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

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- 7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate Vision The vision of the department is to achieve excellence in teaching, learning, research and transfer of technology and overall development of students. Mission Imparting quality education, looking after holistic development of students and conducting need based research and extension. The knowledge of, and need for sustainable development.
- 8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- 10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- 11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- 12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Educational Objective

PEO1	To provide sound knowledge of mathematical principles underlying various programming concepts.	
PEO2	To develop an ability to understand complex issues in the analysis, design, implementation and operation of information systems.	
PEO3	To provide knowledge of mechanisms for building large-scale computer-based systems.	
PEO4	To develop an ability to provide computer-based solutions to problems from other disciplines of science and engineering.	
PEO5	To impart skills necessary for adapting to rapid changes taking place in the field of information and communication technologies.	

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Course Outcomes:

SE (CSE) Part - I

Engineering Mathematics III (CI 201))

CO1	Interpret the mathematical results in physical and other forms.	
CO2	Identify, formulate and solve the linear differential equations.	
CO3	Classify and solve the contour integration of complex functions.	

Discrete Mathematics (CI 202)

	District mathematics (C1 202)
CO1	Construct mathematical arguments using logical connectives and quantifiers.
CO2	Use logical notation to define and reason about fundamental concepts such as sets, relations, functions, and integers.
CO3	Synthesize induction hypotheses and simple induction proofs.
CO4	Apply the knowledge and skills obtained to investigate and solve a variety of discrete mathematical problems.

Data Structure (CI 203)

COI	Choose the appropriate data structure for modeling a given problem.
CO2	Understand and implement various data structures along with their application.

Digital System (CI 204)

CO1	Understand several fundamental concepts that can be applied to a wide variety of digital design problems.
CO2	Apply knowledge of hardware description language in designing.

Engineering Economics (CI 205)

CO1	Understand various concepts of economics.	
CO2	Economically plan for their own project.	
CO3	Get accustomed to the tax structure prevalent in the Indian economy.	

Programming Lab I (CI 206)

COI	Write programs using advance concepts of C language.
CO2	Understand and apply the pointers, memory allocation techniques and use of files for dealing with variety of problems.
CO3	Design graphics programs using C.



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Professional Communication Skill (Cl 207)

COI	Understand the concept, process and importance of professional communication
CO2	Acquire English speaking and writing skills
	Develop presentation skills



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Course Outcomes:

SE (CSE) Part - H

Microprocessors & Microcontrollers (C1 208)

	Microprocessors & Microcontrollers (C1 208)
	Learn the internal organization of some popular interoperation
CO2	Write assembly language and C programs for microprocessory, ADC, DAC and other
CO3	Write assembly language and C programs for microprocessors Perform hands-on with various interfaces: LCD, Keyboard, ADC, DAC and other peripherals using 8051.

	Computer Algorithms (CI 209)
COI	Analyze any algorithms and able to calculate their theoretical complexity. Analyze any algorithms and able to calculate their theoretical complexity. Understand the problem solving methods such as recurrences, dynamic programming and
	Understand the problem solving inches
CO3	Understand NP - hard and NP - complete concepts.

	System Programming (Cl 210)
eres a	Linderstand different components of a
CO2	Learn intermediate code generation in column such as memory management as pertaining to run time
CO3	Learn intermediate code generation in context of language designing. Know operating system functions such as memory management as pertaining to run time storage management.

Object Oriented Programming with C++ (CI 211)

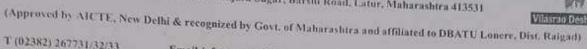
	Object Oriented Programming with C++ (Cl 211) Understand key features of the object-oriented programming language such as encapsulation
_	Understand key features of the object-office p (abstraction), inheritance and polymorphism. (abstraction), inheritance and polymorphism. Apply an object oriented approach to programming and identify potential benefits of object-office p (abstraction), inheritance and polymorphism.
CO3	Apply object-oriented concepts in real world applications.

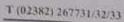
	Numerical Methods & Scientific Computing (CI 212) Understand the mathematical background of the different numerical methods and probability
CO1	Understand the mathematical background of distributions introduced in the course. Learn the different numerical methods to solve the algebraic equations and a system of linear
CO2	Learn the different numerical methods to sorre in and nonlinear equations. Understand the different numerical methods for interpolation, differentiation, integration and
CO3	Understand the different numerical methods for interpolations solving a set of ordinary differential equations.



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Course Outcomes:

TE (CSE) Part -1

Operating System (CS201)

CO1	Understand Operating System Structure, Operations and Services, Process Concept, Multithreaded Programming, Process Scheduling and Synchronization.
CO2	Apply the Concepts of Virtual Memory Management and File Systems.
CO3	Analyze the Secondary Storage and I/O Systems.
CO4	Implement CPU Scheduling and Page Replacement Algorithms.

Automata Theory (CS302)

CO1	Understand the concepts of automata, formal grammars and languages.	
CO2	Identify the capabilities and limitations of computing machine.	
CO3	Model various kinds of real-time problems.	

Database Management System (CS303)

COI	Evaluate business information problem and find the requirements of a problem in terms of data.
CO2	Understand the uses the database schema and need for normalization,
CO3	Design the database schema with the use of appropriate data types for storage of data in database.

Computer Organization & Architecture (CS304)

CO1	Understand how arithmetic and logical operations are performed by computers.
CO2	Make himself familiar with organizational and architectural principles and issues of a Digital Computer and to get a thorough understanding of working of various Organizational units.
CO3	Evaluate the performance of CPU, memory and I/O operations.

JAVA Programming (CS306)

CO1	Understand the principles and practice of object oriented analysis and design in the construction of robust, maintainable programs which satisfy their requirements.
CO2	Competence to design, writes, compile, test and execute straightforward programs to address
	various software problems.



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documentation to the finished programs.

Computer	Hardware &	Maintenance (CS310)

CO1	Should be able to assemble and configure computer hardware.	
CO2	Troubleshoot problems related to hardware.	-



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Course Outcomes:

TE (CSE) Part - II

Software Engineering

CO1	Investigate and improve the arm (C.3311)
CO2	Investigate and improve the specification of a software system. Design system component of
CO3	Design system, component of process to meet desired needs within realistic constraints. Identify, formulate and solve engineering problems.
CO4	Conduct standard tests and measurements.

Compiler Design (CS212

COI	Acquire knowledge in different phases and specifying different types of tokens by lexical analyzer and also able to use the compiler tools like Lex, YACC etc.
CO2	Acquire the knowledge of modern compiler and its features.
соз	Learn the code optimization techniques to improve the performance of a program in terms of speed & space.

Data Communication (CS312)

	Data Communication (CDD12)
COI	Basics data communication and two lower layers i.e. physical and data link layers.
CO2	Networking building blocks such as Ethernet, Cables and modems.
CO3	The conflicting issues and resolution techniques in data transmission.
CO4	The setting up of a network environment with all the necessary data communication components, procedure and techniques that make it functional
CO5	The different types of network topologies and protocols.

UNIX Operating System (CS314)

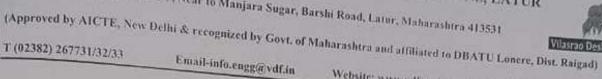
COI	Learn UNIX structure, commands, and utilities.
CO2	Describe and understand the UNIX file system.
CO3	Write shell scripts in order to perform shell programming.
CO4	Acquire knowledge about text processing utilities, process management and system operation of UNIX.



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004	Python Programming (CS316) Understand de Programming (CS316)
CO1	Understand the Purham
CO2	Understand the Python program development environment. Understand the principles of Object
CO3	Understand the principles of Object-oriented programming with well-written modular code. Solve problems with well-documented programs in the Python language, including the use of the logical constructs of that language.

CO1	Professional Aptitude & Logical Reasoning (CS319)
CO2	Identify, construct and compute numerical situations by work with numbers Conceive and develop a methodal.
CO3	Conceive and develop a methodology for analyzing and solving a problem Analyze and interpret data
CO4	Develop and modify attention to detail
CO5	Define, modify and apply critical thinking to real time situations
CO6	Construct and design a structured approach to solving a given analytical situation.

	Programming Lab IV (CS320)
CO1	Document and package a Java application
CO2	Use many of the new enhancements added to the Java API
CO3	Use assertions to write robust Java code.
CO4	Write TCP/IP Client Server applications using sockets.
CO5	Execute methods on a remote object using RMI.
CO6	Perform database queries and updates using JDBC.
CO7	Reuse of classes using JAVA Beans.



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Course Outcomes:

BE (CSE) Part - I

CO1	Learn various capacitations
CO2	Learn various concepts of computer networks and TCP/IP protocols. Be able to evaluate the topological and a second secon
	Be able to evaluate the topological and routing strategies for a network. Be familiar with the different application layer protocols.

Advanced Database Management Systems (CS402) Understand how transaction processes and how to implement and control CO₁ concurrency in transaction processing. CO₂ Understand the data recovery after failure. CO₃ Be able to apply tuning to get better performance and migration of database

Data Mining (CS403) Interpret the contribution of data warehousing and data mining to the decision CO₁ support level of organizations. Evaluate different models used for OLAP and data pre-processing. CO₂ Categorize and carefully differentiate between situations for applying different data mining techniques: mining frequent pattern, association, correlation, classification, CO3 prediction, and cluster analysis. Design and implement systems for data mining and evaluate the performance of CO₄ different data mining algorithms.

Software Testing and Quality Assurance (CS407) Formulate problem by following Software Testing Life Cycle CO₁ Design Manual Test cases for Software Project. CO₂ Follow the process related activity and testing techniques to work as team member. CO₃

Programming Lab VI (CS412) Analyze the basic structure of a C# application. COI Be able to develop Window based live applications on .NET. CO₂ Understand process of executing a web application on a webserver. CO₃ Be able to design and develop Web based applications on .NET. CO₄ Understand the syntax and functions available to deal with file processing for files. CO5

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Course Outcomes:

BE (CSE) Part - II

Mobile Computing (CS415) Understand the infrastructure to develop mobile communication system (cellular COL theory) and the characteristics of different multiple access techniques in mobile Analyze the different inter-networking challenges and solutions in wireless mobile CO2 The ability to develop applications that are mobile-device specific and demonstrate CO3

Cryptography and Network Security (CS416)

current practice in mobile communication context.

CO1	Implement various concepts of cryptography and network security.	
CO2	Analyze the security requirements of communication systems & networks.	
CO3	Design cryptographic protocols to secure a system, networks or application.	

Cloud Computing (CS 420)

CO1	Compare various cloud computing providers / Software.
CO2	Understand and familiarize with the basic concepts of cloud computing.
CO3	Understand how to build large scale distributed systems and cloud applications.
CO4	Comprehend the importance of cloud security.

Cyber Security (CS 421)

CO1	Understand cyber-attack
CO2	Understand types of cybercrimes, cyber laws
CO3	Learn how to protect them self and ultimately society from such attacks

Open Source Technology Lab (CS425)

	Open Source Technology End (SS 127)	
CO1	Understand process of executing a PHP-based script on a webserver.	1 Lite anavided
CO2	Be able to develop a form containing several fields and be able to produce on the form by a user in a PHP-based script.	
CO3	Understand the syntax and functions available to deal with file processing web URLs.	essing for files on the
CO4	Understand the syntax and use of PHP object-oriented classes.	Principal

IQAC Coordinator

VILASRAO DESHMUKH FOUNDATION GROUP OF INSTITUTIONS VDF School of Engg.&Tech. New MtDC, Latur-413531

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PO CO OF DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING ACADEMIC YEAR 2017-18

Vision

The department is committed to achieve academic excellence through education and research in the emerging and established areas of Computer Engineering

Mission

Building the capacities of young students to realize their professional and academic dreams.

Graduate Attributes

The Graduate Attributes are the knowledge skills and attitudes which the students have at the time of graduation. These Graduate Attributes identified by National Board of Accreditation are as follows:

- 1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
- 2. Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
- 3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- 4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- 5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal. health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

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- 7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate Vision The vision of the department is to achieve excellence in teaching, learning, research and transfer of technology and overall development of students. Mission Imparting quality education, looking after holistic development of students and conducting need based research and extension. The knowledge of, and need for sustainable development.
- 8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- 9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- 10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- 11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- 12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Educational Objective

PEO1	To provide sound knowledge of mathematical principles underlying various programming concepts,
PEO2	To develop an ability to understand complex issues in the analysis, design, implementation and operation of information systems.
PEO3	To provide knowledge of mechanisms for building large-scale computer-based systems.
PEO4	To develop an ability to provide computer-based solutions to problems from other disciplines of science and engineering.
PEO5	To impart skills necessary for adapting to rapid changes taking place in the field of information and communication technologies.



Principal
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Course Outcomes:

SE (CSE) Part - I

Engineering Mathematics III (CI 201))

CO1	Interpret the mathematical results in physical and other forms.	-
CO2	Identify, formulate and solve the linear differential equations.	
	Classify and solve the contour integration of complex functions	

Discrete Mathematics (CI 202)

CO1	Construct mathematical arguments using logical connectives and quantifiers.
CO2	Use logical notation to define and reason about fundamental concepts such as sets, relations, functions, and integers.
CO3	Synthesize induction hypotheses and simple induction proofs.
CO4	Apply the knowledge and skills obtained to investigate and solve a variety of discrete mathematical problems.

Data Structure (CI 203)

CO1	Choose the appropriate data structure for modeling a given problem.
CO2	Understand and implement various data structures along with their application.

Digital System (CI 204)

CO1	Understand several fundamental concepts that can be applied to a wide variety of digital design problems.
CO2	Apply knowledge of hardware description language in designing.

Engineering Economics (CI 205)

COI	Understand various concepts of economics.
CO2	Economically plan for their own project.
CO3	Get accustomed to the tax structure prevalent in the Indian economy,

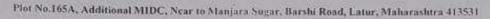
Programming Lab I (C1 206)

T SANSAGO	To the state of th
CO1	Write programs using advance concepts of C language.
CO2	Understand and apply the pointers, memory allocation techniques and use of files for dealing with variety of problems.
CO3	Design graphics programs using C.



Principal

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Group of Institutions, Latur
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Professional Communication Skill (CI 207)

COI	Understand the concept, process and importance of professional communication
CO2	Acquire English speaking and writing skills
CO3	Develop presentation skills



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Course Outcomes:

SE (CSE) Part - II

Microprocessors & Microcontrollers (CI 208)

CO1	Learn the internal organization of some popular microprocessors/microcontrollers and design of microprocessors/microcontrollers-based systems.	
CO2	Write assembly language and C programs for microprocessors and microcontrollers.	
СОЗ	Perform hands-on with various interfaces: LCD, Keyboard, ADC, DAC and other peripherals using 8051.	

Computer Algorithms (CI 209)

	Comparer
CO1	Analyze any algorithms and able to calculate their theoretical complexity.
CO2	Understand the problem solving methods such as recurrences, dynamic programming and greedy method.
CO3	Understand NP - hard and NP - complete concepts.

System Programming (CI 210)

CO1	Understand different components of system software.
CO2	Learn intermediate code generation in context of language designing.
CO3	Know operating system functions such as memory management as pertaining to run time storage management.

Object Oriented Programming with C++ (CI 211)

COI	Understand key features of the object-oriented programming language such as encapsulation (abstraction), inheritance and polymorphism.
CO2	Apply an object oriented approach to programming and identify potential benefits of object- oriented programming over other approaches.
CO3	Apply object-oriented concepts in real world applications.

Numerical Methods & Scientific Computing (CI 212)

COI	Understand the mathematical background of the different numerical methods and probability distributions introduced in the course.
CO2	Learn the different numerical methods to solve the algebraic equations and a system of linear
соз	Understand the different numerical methods for interpolation, differentiation, integration and solving a set of ordinary differential equations.



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Course Outcomes:

TE (CSE) Part - I

Operating System (CS301)

CO1	Understand Operating System Structure, Operations and Services, Process Concept, Multithreaded Programming, Process Scheduling and Synchronization.
CO2	Apply the Concepts of Virtual Memory Management and File Systems.
CO3	Analyze the Secondary Storage and I/O Systems.
CO4	Implement CPU Scheduling and Page Replacement Algorithms.

	Automata Theory (C5502)	
CO1	Understand the concepts of automata, formal grammars and languages.	
CO2	Identify the capabilities and limitations of computing machine.	
CO3	Model various kinds of real-time problems.	

Database Management System (CS303)

CO1	Evaluate business information problem and find the requirements of a problem in terms of data.
CO2	Understand the uses the database schema and need for normalization.
СОЗ	Design the database schema with the use of appropriate data types for storage of data in database.

Computer Organization & Architecture (CS304)

COI	Understand how arithmetic and logical operations are performed by computers
CO2	Make himself familiar with organizational and architectural principles and issues of a Digital Computer and to get a thorough understanding of working of various Organizational units.
CO3	Evaluate the performance of CPU, memory and I/O operations.

1 X7 1 Decomposing (CS306)

	JAVA Programming (C3500)
CO1	Understand the principles and practice of object oriented analysis and design in the construction of robust, maintainable programs which satisfy their requirements.
CO2	Competence to design, writes, compile, test and execute straightforward programs to address various software problems.
CO3	Be aware of the need and importance for a professional approach to design and good



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T (02382) 267731/32/3	3 Email-info.engg@vdLin	Maharashtra and affiliated to DBATU Loner	Vilasrao Deshmukh Founds e, Dist. Ratgad)
4		www.vdfengincering.co.in(DT)	E Code: 2254)
	nentation to the finished program	ms.	1

COI	Computer Hardware & Maintenance (CS310) Should be able to assemble and configure computer hardware. Troubleshoot and the configure computer hardware.
CO2	Troubleshoot problems related to hardware.



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Course Outcomes:

TE (CSE) Part - II

Software Engineering (CS21

CO1	Investigate and improve the specification of a software system.
CO2	Design system, component of process to meet desired needs within realistic constraints.
CO3	Identify, formulate and solve engineering problems.
CO4	Conduct standard tests and measurements.

Compiler Design (CS312)

CO1	Acquire knowledge in different phases and specifying different types of tokens by lexical analyzer and also able to use the compiler tools like Lex, YACC etc.
CO2	Acquire the knowledge of modern compiler and its features.
СОЗ	Learn the code optimization techniques to improve the performance of a program in terms of speed & space.

Data Communication (CS312)

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CO2	Networking building blocks such as Ethernet, Cables and modems.
CO3	The conflicting issues and resolution techniques in data transmission.
CO4	The setting up of a network environment with all the necessary data communication components, procedure and techniques that make it functional
CO5	The different types of network topologies and protocols.

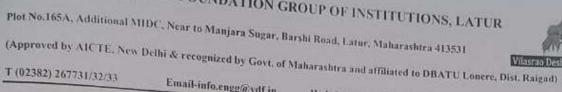
UNIX Operating System (CS314)

COI	Learn UNIX structure, commands, and utilities.
CO2	Describe and understand the UNIX file system.
CO3	Write shell scripts in order to perform shell programming.
CO4	Acquire knowledge about text processing utilities, process management and system operation of UNIX.



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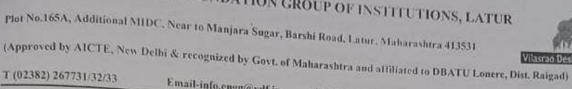
	Python Programming (CS316)
CO1	Understand the Python process 1
CO2	Understand the Python program development environment. Understand the principles of Objection of the principles of Objection of the Python program development environment.
	Understand the principles of Object-oriented programming with well-written modular code. Solve problems with well-documented programs in the Python language, including the use of the logical constructs of that language.

CO1	Identify, construct and compute numerical situations by work with numbers
CO2	Conceive and develop a methodology for analyzing and solving a problem
CO3	Analyze and interpret data
CO4	Develop and modify attention to detail
CO5	Define, modify and apply critical thinking to real time situations
CO6	Construct and design a structured approach to solving a given analytical situation.

Programming Lab IV (CS320) CO₁ Document and package a Java application Use many of the new enhancements added to the Java API CO₂ Use assertions to write robust Java code. CO₃ Write TCP/IP Client Server applications using sockets. CO₄ Execute methods on a remote object using RMI. CO5 Perform database queries and updates using JDBC. CO6 Reuse of classes using JAVA Beans. CO7



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Course Outcomes:

BE (CSE) Part - I

Computer Networks (CS40

CO1	Learn various concepts of computer networks and TCP/IP protocols.
CO2	Be able to evaluate the topological and routing strategies for a network.
CO3	Be familiar with the different application layer protocols.

CO1	Understand how transaction processes and how to implement and control concurrency in transaction processing.
CO2	Understand the data recovery after failure.
CO3	Be able to apply tuning to get better performance and migration of database

Data Mining (CS403)

CO1	Interpret the contribution of data warehousing and data mining to the decision support level of organizations.
CO2	Evaluate different models used for OLAP and data pre-processing.
соз	Categorize and carefully differentiate between situations for applying different data mining techniques: mining frequent pattern, association, correlation, classification, prediction, and cluster analysis.
CO4	Design and implement systems for data mining and evaluate the performance of different data mining algorithms.

Software Testing and Quality Assurance (CS407)

CO1	Formulate problem by following Software Testing Life Cycle
CO2	Design Manual Test cases for Software Project.
CO3	Follow the process related activity and testing techniques to work as team member.

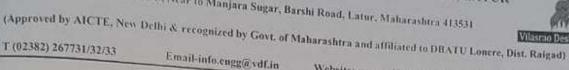
Programming Lab VI (CS412)

COI	Analyze the basic structure of a C# application.
CO2	Be able to develop Window based live applications on .NET.
CO3	Understand process of executing a web application on a webserver.
CO4	Be able to design and develop Web based applications on .NET.
CO5	Understand the syntax and functions available to deal with file processing for files.



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Course Outcomes:

BE (CSE) Part - II

Mobile Computing (CS415

CO1	Understand the infrastructure to develop mobile communication system (cellular theory) and the characteristics of different multiple access techniques in mobile communication.
CO2	Analyze the different inter-networking challenges and solutions in wireless mobile network.
СОЗ	The ability to develop applications that are mobile-device specific and demonstrate current practice in mobile communication context.

Cryptography and Network Security (CS416)

CO1	Implement various concepts of cryptography and network security.
CO2	Analyze the security requirements of communication systems & networks.
CO3	Design cryptographic protocols to secure a system, networks or application.

Cloud Computing (CS 420)

CO1	Compare various cloud computing providers / Software.
CO2	Understand and familiarize with the basic concepts of cloud computing.
CO3	Understand how to build large scale distributed systems and cloud applications.
CO4	Comprehend the importance of cloud security.

Cyber Security (CS 421)

COI	Understand cyber-attack	
CO2	Understand types of cybercrimes, cyber laws	
CO3	Learn how to protect them self and ultimately society from such attacks	

Open Source Technology Lab (CS425)

CO1	Understand process of executing a PHP-based script on a webserver.		
CO2	Be able to develop a form containing several fields and be able to pro on the form by a user in a PHP-based script.	ocess the data	provided
СОЗ	Understand the syntax and functions available to deal with file processing web URLs.	cessing for fi	
CO4	Understand the syntax and use of PHP object-oriented classes.	ला	lano.
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CO's OF ELECTRICAL ENGINEERING DEPARTMENT ACADEMIC YEAR 2021-22

Vision

To provide quality education to produce world leading, highly skilled, dynamic & innovative electrical engineers with best human values to contribute the knowledge for the betterment of society

Mission

- To provide high quality and effective education in the field of electrical engineering
- · To create effective interface with industries and communities.
- To impart quality and value based education enabling the students to meet the growing challenges in the industry
- · To develop students to cope up with modern technology to meet industry needs
- To provide extension services to rural society, industry professionals, and higher learning in the field of Electrical Engineering.
- To make the students aware of the impact of Electrical Engineering in the global scenario and the challenges of Electrical based industries and organizations.
- · To provide knowledge-based services and technologies to meet the needs of Society

Graduate Attributes

The Graduate Attributes are the knowledge skills and attitudes which the students have at the time of graduation. These Graduate Attributes identified by National Board of Accreditation are as follows:

- Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals
 and an engineering specialization to the solution of complex engineering problems.
- Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.

3. Design/development of solutions. Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal and environmental considerations.

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- 4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern
 engineering and IT tools including prediction and modeling to complex engineering activities with an
 understanding of the limitations.
- 6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- 7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate Vision The vision of the department is to achieve excellence in teaching, learning, research and transfer of technology and overall development of students. Mission Imparting quality education, looking after holistic development of students and conducting need based research and extension, the knowledge of, and need for sustainable development.
- 8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- 9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- 10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- 11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- 12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Educational Objective

PEO1	To equip graduates with a strong foundation in engineering science and Electrical Engineering fundamentals to become effective collaborates, researchers and real-time problem solver with technical competencies.
PEO2	Perceive the limitation and impact of engineering solutions in social, legal, environmental, Economical and multidisciplinary contexts.



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PEO3

Excel in industry/ technical profession, higher studies, and entrepreneurship exhibiting global competitiveness.

Course Outcomes:

SE-PART-I

ENGINEERING MATHEMATICS - III

CO1	Apply basic mathematical tools for solving engineering problems.
CO2	Provide skills in vector calculus & linear differential equations which would enable them to devise engineering solutions for given situations they may encounter in their Profession.
CO3	Deploy skills effectively in the solution of problems, principally in the area of Engineering Student will demonstrate basic knowledge of L.D.E., P.D.E., Vector & F.T

NETWORK ANALYSIS AND SYNTHESIS.

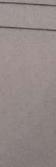
COI	To review basic components of electric network.
CO2	To design and develop network equations and their solutions.
CO3	To apply Laplace theorem for electric network analyses
СОЗ	To analyze AC circuit.

FLUID MECHANICS AND THERMAL ENGINEERING.

	ntroduce properties of fluid and hydraulic measurement To understand dynamics uid flow
CO2 To u	inderstand basic concepts of IC engines To understand concept of refrigeration

MEASUREMENT AND INSTRUMENTATION

CO1 To understand philosophy of mastronical



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1	CO2	To understand different methods analog and digital measurement.
1		To study principle of construction and operation of different transducer and dismay methods.

BASIC HUMAN RIGHTS

COI	To study concept of time value of money
CO2	To study about demand in detail
СОЗ	To understand Meaning of Production and factors of production,
CO4	To understand dif. Concept about market

ENGINEERING ECONOMICS

CO1	To study concept of time value of money
CO2	To study about demand in detail
СОЗ	To understand Meaning of Production and factors of production,
CO4	To understand dif. Concept about market

ELECTRICAL ENGINEERING MATERIALS

CO1	To study about crystal structure	
CO2	To understand magnetic material structure	*
CO3	To study about conducting and superconducting materials	
CO4	To study dielectric and nano materials.	

SE-PART-II

ELECTRICAL MACHINES-I

CO1	To study diff. types, machines	construction and operating principle of diff. types of electrical
	machines	of electrical



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POWER SYSTEM-I

COI	To understand basic operation of power system, power system components and their characteristics.
COI	characteristics.

ELECTRICAL INSTALLATION AND ESTIMATION

COI	To prepare estimates and costing of electrical installations of power system
CO2	To understand procedures of contracting and purchase.

NUMERICAL METHODS AND PROGRAMMING

CO1	To study and understand MATLAB programming.
CO2	To review mathematical concepts.
CO3	To develop computer program for linear and nonlinear equations.

PRODUCT DESIGN ENGINEERING

CO1	Create simple mechanical or other designs	
CO2	Create design documents for knowledge sharing	
СОЗ	Manage own work to meet design requirements	
CO4	Work effectively with colleagues	

SOLID STATE DEVICES

CO1	To study construction and characteristics of solid state devices.
CO2	To apply operational amplifier models in circuits employing negative feedback
CO3	To design electronics circuit using Timer IC and voltage regulators
CO4	To perform analysis of amplifiers using small signal models for the circuit elements
CO5	To calculate the frequency response of circuits containing BJT, Op-Amp etc

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TE-PART-I

POWER SYSTEM-I

CO1	Understand concepts of HVDC power transmission and renewable energy generation.
CO2	Understand the concepts of power systems.
соз	Understand the various power system components.
CO4	Evaluate fault currents for different types of faults.
CO5	Understand the generation of over-voltages and insulation coordination.

CONTROL SYSTEM

CO1	Solve liner and non-liner control problems
CO2	Characterize a system and find its study state behavior
CO3	Investigate stability of a system using different tests
CO4	Design various controllers

MICROPROCESSOR & MICROCONTROLLER

CO1	Write assembly language programs and download the machine code that will provide solutions real-world control problems such as fluid level control, temperature control, and batch processes.
CO2	Differentiate between microprocessor and microcontroller.
CO3	Describe the architecture and features of various types of microcontroller.
CO4	Demonstrate programming proficiency using the various addressing modes and all types of instructions of the target microcontroller.
CO5	Program using the capabilities of the stack, the program counter the internal and external memory, timer and interrupts and show how these are used to execute a programme.
C06	Write assemble assembly language programs on PC and download and run their program on the training boards.
C07	Design electrical circuitry to the Microcontroller I/O ports in order to interface with external devices.



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ELECTRICAL MACHINE DESIGN

CO1	Students will be able to analyze
CO2	Students will be able to analyze and represent the control system mathematically. Students will be able to analyze the control system in time and frequency domain.
	I time and frequency domain.

MICROCONTROLLER AND MICROPROCESSORS

CO1	Use software tools to do design calculations.
CO2	Understand the construction and performance characteristics of electrical machines.
CO3	Understand the various factors which influence the design: electrical, magnetic and thermal loading of electrical machines
CO4	Understand the principles of electrical machine design and carry out a basic design of an AC machine.

ELECTRICAL MACHINE DESIGN

CO1	Use software tools to do design calculations.
CO2	Understand the construction and performance characteristics of electrical machines
СОЗ	Understand the various factors which influence the design: electrical magnetic and thermal loading of electrical machines
CO4	Understand the principles of electrical machine design and carry out a basic design of an AC machine.

DIGITAL CONTROL SYSTEM

COI	Design and analyse digital controllers.
CO2	Obtain discrete representation of LTI systems.
СОЗ	Analyse stability of open loop and closed loop discrete-time systems.
CO4	Design state feedback and output feedback controllers.

MANAGEMENT

Analyze the internal/external factors affecting a business/organization to evaluate COL

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CO2	Manage pe	ople, processes, and reso	ources within a diverse organization.
			ncepts in an integrated manner.

SOFT SKILLS PERSONALITY DEVELOPMENT

Function effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, Inter-personal relationships, conflict management and leadership quality.
Effectively communicate through verbal/oral communication and improve the listening skills Write precise briefs or reports and technical documents
Actively participate in group discussion / meetings / interviews and prepare & deliver presentations
Become more effective individual through goal/target setting, self motivation and practicing creative thinking.

TE-PART-II

POWER SYSTEM-II

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COI	Understand the basics of power system economics.
CO2	Use numerical methods to analyses a power system in steady state.
СОЗ	Understand stability constraints in a synchronous grid.
CO4	Understand methods to control the voltage, frequency and power flow.
CO5	Understand the monitoring and control of a power system.

ELECTROMAGNETIC FIELDS

COI	To understand the propagation of EM waves.
CO2	To understand the basic laws of electromagnetism.
СОЗ	To obtain the electric and magnetic fields for simple configurations under static conditions.
CO4	To analyse time varying electric and magnetic fields.
CO5	To understand Maxwell's equation in different forms and different media.



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INDUSTRIAL ELECTRICAL SYSTEM

CO1	Analyze and select the proper size of various electrical system components.
CO2	Understand the electrical wiring systems for residential, commercial and industrial consumers, representing the systems with standard symbols and drawings, SLD.
CO3	Understand various components of industrial electrical systems.

PLC&SCADA APPLICATION

CO1	To apply knowledge gained about PLCs and SCADA systems to identify few real- life industrial applications.
CO2	To develop architecture of SCADA explaining each unit in detail.
CO3	To develop a software program using modern engineering tools and technique for PLC and SCADA.

HIGH VOLTAGE ENGINEERING

CO1	Knowledge of how over-voltages arise in a power system, and protection against these over voltages.
CO2	Understand the basic physics related to various breakdown processes in solid, liquid and gaseous insulating materials.
CO3	Knowledge of generation and measurement of D. C., A.C., & Impulse voltages.
CO4	Knowledge of tests on H. V. equipment and on insulating materials, as per the standards.

POWER PLANT ENGINEERING

CO1	Student will able to classify different types of sub-stations.
CO2	Student will able to understand power generation scheme.
соз	Student will able to design Mechanical and electrical parameters of transmission lines and problems.
CO4	Student can suggest economical aspect in power supply system.
CO5	Student will identify problems with tariff system.



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THERMAL & FLUID ENGINEERING

COI	Apply the concept of Entropy, Calculate heat, work and other important thermodynamic Properties for various ideal gas processes.
CO2	Develop basic knowledge on Fluid Statistics, Dynamics.
CO3	Apply principles of fluid mechanics to the operation, design, and selection of Machinery and their components.
CO4	Understand and apply various laws of thermodynamics to various processes and real Systems.
C05	Apply the concept of Entropy, Calculate heat, work and other important thermodynamic Properties for various ideal gas processes.

BE-PART-I

INDUSTRIAL MANAGEMENT & ECONOMICS

CO1	An ability to function on multidisciplinary teams
CO2	An ability to identify, formulate, and solve engineering problems
CO3	An understanding of professional and ethical responsibility
CO4	An ability to communicate effectively
CO5	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
CO6	A recognition of the need for, and an ability to engage in life-long learning
CO7	A knowledge of contemporary issues

ELECTRICAL DRIVES

CO1	Analyze the operation of the converter, chopper fed dc drive.
CO2	Analyze the operation of both classical and modern induction motor drives.
Chientee	
CO3	Design the current and speed controllers to a closed loop solid-state d.c motor drive.

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CO4

Select the drives for any particular application.

POWER SYSTEM OPERATION AND CONTROL

COI	Calculate the economic load dispatch for a given generator and load specifications.
CO2	Model the governor system.
CO3	Identify the blocks in a load frequency control system.
CO4	Calculate the amount of reactive power to be compensated in a transmission system.

SWITCH GEAR AND PROTECTION

CO1	Students will able to use mathematical tools and engineering knowledge to study the importance of protection needs.
CO2	Students will able to design protection controls as per requirement.
CO3	Students will understand their responsibility in designing protective schemes.
CO4	Learner will able to design and use protection equipment's economically and understands its impact on environment.
CO5	Students will have an ability to use technical skills, and modern engineering tools necessary for engineering practice.

SMART ELECTRIC GRID

CO1	Acquire in-depth understanding on recent development of power grids, i.e. smart
CO2	Apply advanced analysis tools in planning and operation of smart grids
CO3	Acquire skills in presentation and interpretation of results in written form.

EHV A.C. TRANSMISSION SY



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COI	Highlight need for EHV ac transmission.
CO2	Calculate line and ground parameters.
CO3	Enlist problems encountered in EHV transmission.
CO4	Express issues related to UHV transmission discussed.

BE-PART-II

HIGH VOLTAGE ENGINEERING

CO1	Reproduce concepts in breadth with various concepts of breakdown phenomenon of solid, liquid and gaseous materials along with various causes of overvoltage and protection from them.
.CO2	List and reproduce various methods of generation and measurement of DC, AC and impulse high voltage.
СОЗ	Demonstrate an ability to carry various DC. AC and impulse testing on high voltage equipments and materials.
CO4	Apply safety measures, earthing, shielding for layout of HV apparatus required in High voltage laboratory

POWER QUALITY AND HARMONICS

COI	Characterize power quality events.
CO2	Reproduce causes of voltage sag and estimate magnitude of voltage sag.
СОЗ	Carry out harmonic analysis and calculate total harmonic distortion.
CO4	Calculate parameters for passive harmonic filter.

INDUSTRIAL AUTOMATION



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CO1	Describe working of various black
CO2	Describe working of various blocks of basic industrial automation system. Connect the peripherals with the PLC.
CO3	Use various PLC functions and develop small PLC programs.
CO4	Summarize Distributed control system and SCADA system.
CO5	Use various industrial motor drives for the Industrial Automation

HVDC AND FACTS

CO1	Understand the operations of different FACTS devices.
CO2	Select the controllers for different Contingencies.
CO3	Analyze the different FACTS devices in different stability conditions.
CO4	Select an appropriate FACTS device for a particular application.
CO5	Understand the importance of Transmission power through HVDC.
CO6	Calculate power conversion between AC to DC and DC to AC

SPECIAL TOPICS IN ELECTRICAL ENGINEERING

CO1	Describe the process of restructuring of power system.
CO2	Identify various operation of restructured power system.
CO3	Knowledge of power sector in India.
CO4	Learn the preparation of energy audit report & conservation in different electrical system

IQAC Co-ordinator

HOD-Electrical Engi.



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CO's OF ELECTRICAL ENGINEERING DEPARTMENT

ACADEMIC YEAR 2020-21

Vision

To provide quality education to produce world leading, highly skilled, dynamic & innovative electrical engineers with best human values to contribute the knowledge for the henerment of society

Mission

- To provide high quality and effective education in the field of electrical engineering
- · To create effective interface with industries and communities.
- To impart quality and value based education enabling the students to meet the growing challenges in the industry
- To develop students to cope up with modern technology to meet industry needs
- To provide extension services to rural society, industry professionals, and higher learning in the field of Electrical Engineering.
- To make the students aware of the impact of Electrical Engineering in the global scenario and the challenges of Electrical based industries and organizations.
- · To provide knowledge-based services and technologies to meet the needs of Society

Graduate Attributes

The Graduate Attributes are the knowledge skills and attitudes which the students have at the time of graduation. These Graduate Attributes identified by National Board of Accreditation are as follows:

- 1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
- Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
- 3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

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- 4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to
- 5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an
- 6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional
- 7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate Vision The vision of the department is to achieve excellence in teaching, learning, research and transfer of technology and overall development of students. Mission Imparting quality education, looking after holistic development of students and conducting need based research and extension, the knowledge of, and need for sustainable development.
- 8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- 9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- 10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- 11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- 12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Educational Objective

PEO1	To equip graduates with a strong foundation in engineering science and Electrical Engineering fundamentals to become effective collaborates, researchers and real-time problem solver with technical competencies.
PEO2	Perceive the limitation and impact of engineering solutions in social, legal, environmental, Economical and multidisciplinary contexts.



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PEO3

Excel in industry/ technical profession, higher studies, and entrepreneurship exhibiting global competitiveness.

Course Outcomes:

SE-PART-I

ENGINEERING MATHEMATICS - III

COI	Apply basic mathematical tools for solving engineering problems.
CO2	Provide skills in vector calculus & linear differential equations which would enable them to devise engineering solutions for given situations they may encounter in their Profession.
CO3	Deploy skills effectively in the solution of problems, principally in the area of Engineering Student will demonstrate basic knowledge of L.D.E., P.D.E., Vector & F.T

NETWORK ANALYSIS AND SYNTHESIS.

COI	To review basic components of electric network.
CO2	To design and develop network equations and their solutions.
CO3	To apply Laplace theorem for electric network analyses
CO3	To analyze AC circuit.

FLUID MECHANICS AND THERMAL ENGINEERING

COI	To introduce properties of fluid and hydraulic measurement To understand dynamics of fluid flow
CO2	To understand basic concepts of IC engines To understand concept of refrigeration and air conditioning

MEASUREMENT AND INSTRUMENTATION

To understand philosophy of measurement COL



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	Email-info.engg@vdf.in	W. C.	THE STREET CONTRACTOR .

CO ₂	To understand different methods analog and digital measurement. To study principle of control of c
CO3	To study principle of construction and operation of different transducer and disma methods.
	methods. Operation of different transducer and disma

BASIC HUMAN RIGHTS

CO1	To study concept of time value of money
CO2	To study about demand in detail
CO3	To understand Meaning of Production and factors of production,
CO4	To understand dif. Concept about market

ENGINEERING ECONOMICS

CO1	To study concept of time value of money	
CO2	To study about demand in detail	
CO3	To understand Meaning of Production and factors of production,	
CO4	To understand dif. Concept about market	

ELECTRICAL ENGINEERING MATERIALS

COI	To study about crystal structure	
CO2	To understand magnetic material structure	1
соз	To study about conducting and superconducting materials	
CO4	To study dielectric and nano materials.	

SE-PART-II

ELECTRICAL MACHINES - I

To study diff. types, construction and operating principle of diff. types of electrical COL machines

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POWER SYSTEM-I

COI	To understand basic oper	ation of power system, power system components and their
	characteristics.	and of power system, power system components and their

ELECTRICAL INSTALLATION AND ESTIMATION

01	10 prepare estimates and costing of electrical
CO2	To prepare estimates and costing of electrical installations of power system To understand procedures of contracting and purchase.

NUMERICAL METHODS AND PROGRAMMING

CO1	To study and understand MATLAB programming.
CO2	To review mathematical concepts.
CO3	To develop computer program for linear and nonlinear equations.

PRODUCT DESIGN ENGINEERING

CO1	Create simple mechanical or other designs
CO2	Create design documents for knowledge sharing
СОЗ	Manage own work to meet design requirements
CO4	Work effectively with colleagues

SOLID STATE DEVICES

COS	To calculate the frequency response of circuits containing BJT, Op-Amp etc
CO4	To perform analysis of amplifiers using small signal models for the circuit elements
CO3	To design electronics circuit using Timer IC and voltage regulators.
CO2	16 apply operational amplifier models in circuits employing negative feedback
COI	To study construction and characteristics of solid state devices.



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TE-PART-I

ELECTRICA	L MACHINE-II
	WIACHINE-II
To otal tion	

CO3	To determine different operating characteristics of AC and DC machines
CO2	motor. motor.
CO1	To study different methods of speed control of AC and DC motor To study importance and procedure 6 Methods of AC and DC motor

POWER SYSTEM-II

CO1	To study different parameters of power system operation and control
CO2	To study load flow and Diff. methods of reactive power control.
CO3	To understand diff. methods of fault analysis and stability study

MICROPROCESSOR AND MICRO CONTROLLER

COI	To know the architecture of 8085 and 8051.
CO2	To understand interfacing and interrupt features of 8085 and 8051.
соз	To develop program for basic applications.

VALUE EDUCATION, HUMAN RIGHTS AND LEGISLATIVE **PROCEDURES**

COI	To understand value of education and self-development	
CO2	To develop good values and character	
соз	To know Human right and legislative procedure	

ILLUMINATION ENGINEERING

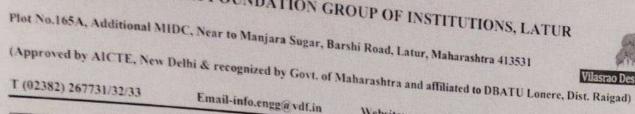
COI	To get the detailed information about modern lamps and their accessories.	
CO2	To get detailed insight of indoor and outdoor illumination system components, its controls and design aspects.	
соз	To introduce the modern trends in the lighting	
CO4	To know the requirements of energy efficient lighting.	

ADVANCES IN RENEWABLE ENERGY SYSTEMS

To know the principle of energy conversion technique from biomass, geothermal and COI



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	hybrid energy	Website: www.vdfengineering.co.in(DTE Code; 2254)
CO2	hybrid energy systems.	
002	To understand effects of air pollution	and I

POWER PLANT ENGINEERING.

CO1	To review basic components of power system, energy sources. To understand principle of
COZ	To understand principle of construction and operation of different conventional power plants.

DESIGN AND ANALYSIS OF ALGORITHMS

COI	To know fundamental characteristic of an algorithm.
CO2	To understand strategy of algorithm formation,
CO3	To develop different algorithm.

TE-PART-II

CONTROL SYSTEM

CO1	To understand the behavior of nonlinear control system.	
CO2	To design and analyze PID controller.	
СОЗ	To understand and analyze state variable technique.	
CO4	To design and analyze suitable control system for engineering application.	

PRINCIPLES OF ELECTRICAL MACHINE DESIGN

COI	To understand principles of electric machine design.
CO2	To design different components of electric machine.
соз	To design Transformer
CO4	To understand CAD and use it for transformer design

POWER ELECTRONICS

3213 312	To review principle of construction, operation and characteristics of basic semiconductor devices.	The real Party lies
CO2	To understand and analyze performance of controlled and uncontrolled converters.	The second second



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CO3	To understand and analyze performance of DC to DC converters and DC to AC
CO4	To understand and analyze performance of AC voltage controllers

INDUSTRIAL AUTOMATION AND CONTROL

CO1	To understand construction and working principle of different industrial measurement systems.
	To understand new trends in industrial process control.

ARTIFICIAL NEURAL NETWORK

COI	To review basic principles of neuron structure.
CO2	To understand building blocks artificial neural network.
CO3	To understand different networks of ANN
CO4	To develop different algorithm for learning.
CO5	To study and understand Fuzzy neural networks.

SWITCH GEAR AND PROTECTION

COL	To understand principles of protective relaying.
CO2	To understand principle of construction, operation and selection of different type of circuit breaker used in power system.
соз	To understand different protection schemes used in power system operation

COMPUTER AIDED ANALYSIS AND DESIGN

COI	To study different computer aided tools in engineering application.
CO2	To understand the functionality of different engineering software.
CO3	To apply different software in engineering design.

MECHATRONICS

1	To understand concept of mechatronics.
CO2	To understand sensor and transducer construction and operation.



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CO3	To understand microprocessor architecture and operation. To understand principle.
CO4	To design a robot for
CO5	To design a robot for engineering application.

RURAL TECHNOLOGY AND COMMUNITY DEVEL

COI	To analysis data, information and knowledge.
CO2	To understand concepts of marketing.
CO3	To identify projects and work for community development
CO4	To understand and analyze business model.

PROJECT MANAGEMENT

COL	To understand concepts of project management.	
CO2	To develop a project plan.	
COS	To understand the project implementation strategy.	
CO4	To analyze post project affects.	

BE-PART-I

INDUSTRIAL MANAGEMENT & ECONOMICS

CO6	A recognition of the need for, and an ability to engage in life-long learning
con	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
004	An ability to communicate effectively
con	An understanding of professional and ethical responsibility
cor	An ability to identify, formulate, and solve engineering problems
(0)	An ability to function on multidisciplinary teams



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A knowledge of contemporary issues CO7

ELECTRICAL DRIVES

COI	Analyze the operation of the converter, chopper fed dc drive.
CO ₂	Analyze the operation of both classical and modern induction motor drives.
CO3	Design the current and speed controllers for a closed loop solid-state d.c motor drive
CO4	Select the drives for any particular application.

POWER SYSTEM OPERATION AND CONTROL

COI	Calculate the economic load dispatch for a given generator and load specifications
CO2	Model the governor system.
CO3	Identify the blocks in a load frequency control system.
CO4	Calculate the amount of reactive power to be compensated in a transmission system

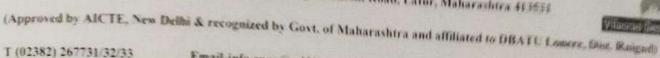
SWITCH GEAR AND PROTECTION

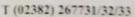
CO1	Students will able to use mathematical tools and engineering knowledge to study the importance of protection needs.
CO2	Students will able to design protection controls as per requirement.
СОЗ	Students will understand their responsibility in designing protective schemes.
CO4	Learner will able to design and use protection equipment's economically and understands its impact on environment.
CO5	Students will have an ability to use technical skills, and modern engineering tools necessary for engineering practice.



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SMART ELECTRIC GRID

CO1	Acquire in-depth understanding on recent development of power grids, i.e. smart grid
CO2	Apply advanced analysis tools in planning and operation of smart grids
CO3	Acquire skills in presentation and interpretation of results in written form.

EHV A.C. TRANSMISSION SYSTEM

CO1	Highlight need for EHV ac transmission.	
CO2	Calculate line and ground parameters.	
CO3	Enlist problems encountered in EHV transmission.	
CO4	Express issues related to UHV transmission discussed.	

BE-PART-II

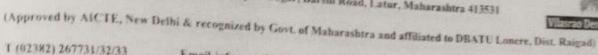
HIGH VOLTAGE ENGINEERING

CO1	Reproduce concepts in breadth with various concepts of breakdown phenomenon of solid, liquid and gaseous materials along with various causes of overvoltage and protection from them.
CO2	List and reproduce various methods of generation and measurement of DC, AC and impulse high voltage.
CO3	Demonstrate an ability to carry various DC. AC and impulse testing on high voltage equipments and materials.
CO4	Apply safety measures, earthing, shielding for layout of HV apparatus required in High voltage laboratory



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POWER QUALITY AND HARMONICS

COL	Characterize power quality events.
CO2	Reproduce causes of voltage sag and estimate magnitude of voltage sag.
CO3	Carry out harmonic analysis and calculate total harmonic distortion.
CO4	Calculate parameters for passive harmonic filter.

INDUSTRIAL AUTOMATION

COI	Describe working of various blocks of basic industrial automation system.
CO2	Connect the peripherals with the PLC.
CO3	Use various PLC functions and develop small PLC programs.
CO4	Summarize Distributed control system and SCADA system.
CO5	Use various industrial motor drives for the Industrial Automation

HVDC AND FACTS

Understand the operations of different FACTS devices.
Select the controllers for different Contingencies.
Analyze the different FACTS devices in different stability conditions.
Select an appropriate FACTS device for a particular application.
Understand the importance of Transmission power through HVDC.
Calculate power conversion between AC to DC and DC to AC

SPECIAL TOPICS IN ELECTRICAL ENGINEERING

COI	Describe the process of restructuring of power system.
CO2	Identify various operation of restructured power system.
CO3	Knowledge of power sector in India

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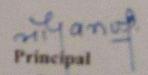
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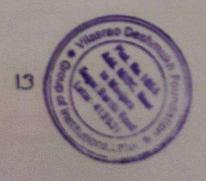
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CO's OF ELECTRICAL ENGINEERING DEPARTMENT

ACADEMIC YEAR 2019-20

Vision

To provide quality education to produce world leading, highly skilled, dynamic & innovative electrical engineers with best human values to contribute the knowledge for the betterment of society

Mission

- To provide high quality and effective education in the field of electrical engineering
- To create effective interface with industries and communities.
- To impart quality and value based education enabling the students to meet the growing challenges in the industry
- · To develop students to cope up with modern technology to meet industry needs
- To provide extension services to rural society, industry professionals, and higher learning in the field of Electrical Engineering.
- To make the students aware of the impact of Electrical Engineering in the global scenario and the challenges of Electrical based industries and organizations.
- To provide knowledge-based services and technologies to meet the needs of Society

Graduate Attributes

The Graduate Attributes are the knowledge skills and attitudes which the students have at the time of graduation. These Graduate Attributes identified by National Board of Accreditation are as follows:

- Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals
 and an engineering specialization to the solution of complex engineering problems.
- Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
- 3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

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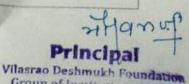
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- 4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- 5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- 6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- 7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate Vision The vision of the department is to achieve excellence in teaching, learning, research and transfer of technology and overall development of students. Mission Imparting quality education, looking after holistic development of students and conducting need based research and extension, the knowledge of, and need for sustainable development.
- 8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- 9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- 10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- 11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- 12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Educational Objective

PEO1	To equip graduates with a strong foundation in engineering science and Electrical Engineering fundamentals to become effective collaborates, researchers and real-time problem solver with technical competencies.
PEO2	Perceive the limitation and impact of engineering solutions in social, legal, environmental, Economical and multidisciplinary contexts.





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PEO₃

Excel in industry/ technical profession, higher studies, and entrepreneurship exhibiting global competitiveness.

Course Outcomes:

SE- PART- I

ELECTRICAL CIRCUIT ANALYSIS

CO1	Network theorems for the analysis of electrical circuits.
CO2	Obtain the transient and steady-state response of electrical circuits.
CO3	Analyze circuits in the sinusoidal steady-state (single-phase and three phase).
CO3	Analyze two port circuit behaviors.

ANALOG & DIGITAL CIRCUIT

CO1	Able to identify, analyze op-amp circuit topologies and design the op amp circuits.
CO2	Able to demonstrate the operation of simple logic gates.
CO3	Able to combine simple gates into more complex circuit.

ELECTRICAL MACHINE-I

COL	Understand the concepts of magnetic circuits.
CO2	Understand the operation of dc machines.
CO3	Analyse the differences in operation of different de machine configurations.
CO4	Analyse single phase and three phase transformers circuits.
CO5	Design and conduct experiments as well as analyse the parameter of DC machine & transformer.
CO6	Develop understanding of professional & ethical responsibility of DC machine & transformer

NUMERICAL METHODS USING MAN AB

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COI	Demonstrate types of errors
CO2	Demonstrate types of errors in computation and their causes of occurrence. Identify various types of equation and apply appropriate numerical method to solve integration
CO ₃	Apply different numerical method for interpolation, differentiation and numerical integrations
CO4	Apply and Compare various numerical methods to solve first and second order ODE.
CO5	Apply and Compare various numerical methods to solve Linear Simultaneous Equations.

ENGINEERING MECHANICS

CO1	Use scalar and vector analytical techniques for analysing forces in statically determinate structures
CO2	Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practical problems
CO3	Apply basic knowledge of maths and physics to solve real-world problems
CO4	Understand measurement error, and propagation of error in processed data
CO5	Understand basic kinematics concepts – displacement, velocity and acceleration (and their angular counterparts)
CO6	Understand basic dynamics concepts – force, momentum, work and energy and Understand and be able to apply Newton's laws of motions
CO7	Understand and be able to apply other basic dynamics concepts - the Work-Energy principle, Impulse-Momentum principle and the coefficient for
CO8	Learn to solve dynamics problems. Appraise given information and determine which concepts apply, and choose an appropriate solution strategy; and Attain an introduction to basic machine parts such as pulleys and mass-spring systems.

EFFECTIVE TECHNICAL COMMUNICATION

Accumulate, review, mediate accurate information and transmit technical ideas, policies with greater clarity & precision.
Oraft, revise and edit technical drafts, letters, proposals, applications, with effective
Absorb, inculcate and practice an industrial ethics, professional work culture and
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CO4	Lead, preser through resu organization	at and communicate but It oriented endeavors b	siness strategies persuasively and convincingly oth verbally and non-verbally within and outside

SE- PART - II

ELECTRICAL MEASUREMENT & INSTRUMENTATION

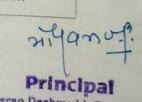
CO1	Discuss the operating principles of common electrical and electronic measuring instruments, devices and circuits, and their application to testing	
CO2	Measure the performance of equipment and circuits and Identify and classify error sources, and explain how their effects can be minimized in particular measurement situations	
CO3	Discuss human and environmental implications of measurement systems;	
CO3	Analyze test massurement systems; Analyze test massurement systems;	
CO3	Analyze test measurements and circuit performance mathematically in both time and frequency domains;	
СОЗ	Specify details of instrumentation and devices intended for a particular application	
CO3	Evaluate the results of tests and measurements taken from circuitry constructed by the student.	

ENGINEERING MATHEMATICS - III

COI	Define the principal concepts about probability and express the concept of probability and its features.
CO2	explain major distributions of random variables and calculate the expected value and the moments
СОЗ	Students who can participate & succeed in competitive exams like GATE, GRE.

ELECTRICAL MACHINE - II

COI	Student will be able to determine performance of the induction motor.
CO2	Student will be able to design rating of induction motor for a given application



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CO3	Student will be able to evaluate parameters of single phase induction motor
CO4	Student will be able to evaluate performance of three phase synchronous machines
CO5	Student will be able to design a three phase winding of AC machines
CO6	Student will be able to design the ratings of synchronous machines for given application

SIGNALS AND SYSTEMS

CO1	Be able to classify systems based on their properties: in particular, to understand and exploit the implications of linearity, time-invariance, causality, memory, and bounded-input, bounded-out (BIBO) stability
CO2	Determine Fourier transforms for continuous-time and discrete-time signals (or impulse-response functions), and understand how to interpret and plot Fourier transform magnitude and phase functions
СОЗ	Understand the need to define two new transforms—the Laplace and Z transforms—to treat a class of signals broader than what the Fourier transforms—
CO4	Understand the relationships among the various representations of LTI systems—linear constant-coefficient difference or differential equation, frequency response, transfer function, and impulse response—and infer one representation from another (e.g., determine the impulse response from the difference equation, etc.).

POWER ELECTRONICS

CO1	Understand the fundamental principles and applications of power electronics circuits
CO2	Solve problems and design switching regulators according to specifications.
СОЗ	Use Computer-aided techniques for the design of power converter circuits.
CO4	Appreciate the latest developments in power electronics.
CO5	Assimilate new technological and development in related field

BIOLOGY-I



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COI	Demonstrate basic knowledge of digestion, absorption, and metabolism.
CO2	Define and discuss the functions and sources of nutrients and Define the basic mechanism of cell mitotic and meiotic divisions
CO3	Demonstrate a broad knowledge of the concepts, mechanisms and underlying science and pseudo-science

TE-PART-I

POWER SYSTEM ENGINEERING

CO1	Ability to model and represent power system components
CO2	Ability to use software development tools to simulate and analyze the system
CO3	Ability to implement corrective measure for immediate as well as long term solution to the system problems

ELECTRICAL MACHINE DESIGN

CO1	An ability to design a system, a component to meet desired needs, differentiate and will be able to compare different options based on results, and able to analyze and interpret results for different industrial application to meet desired needs within realistic constraints and confirms manufacture ability.
CO2	Students will build an ability to identify, formulate and solve industrial problems related to machine and equipment design problems
СО3	With the basic knowledge of the machines, equipment's design and course, students will be able to develop computer programs for the utility and machine design techniques.
CO4	Students will understand broad education necessary to understand the impact of electrical machine design solutions in a global and economical context.

CONTROL SYSTEM I



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COI	Students will be able to analyze and represent the control system mathematically.
CO2	Students will be able to analyze the control system in time and frequency domain.

MICROCONTROLLER AND MICROPROCESSORS

CO1	To Understand the basic architecture of 8051 and 8086.
CO2	To understand the basic programming used in microcontroller and microprocessor based systems.
СОЗ	To implement any system using microcontrollers and processors.
CO4	To understand coprocessor 8087 and some high end processors.
CO5	To develop interfacing to real world devices.

SIGNALS AND SYSTEMS

CO1	Be able to classify systems based on their properties: in particular, to understand and exploit the implications of linearity, time-invariance, causality, memory, and
CO2	Determine Fourier transforms for continuous-time and discrete-time signals (or impulse-response functions), and understand how to interpret and plot Fourier transform magnitude and phase functions.
СОЗ	Understand the need to define two new transforms—the Laplace and Z transforms—to treat a class of signals broader than what the Fourier transform can handle.
CO4	Understand the relationships among the various representations of LTI systems— linear constant-coefficient difference or differential equation, frequency response, transfer function, and impulse response—and infer one representation from another (e.g., determine the impulse response from the difference equation, etc.).
CO5	Understand the properties, as well the analysis and design implications, of interconnections of LTI systems—parallel, series (cascade), and feedback—in the time and transform domains.



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TE-PART-H

ELECTROMAGNETIC FIELDS

CO1	To introduce the basic mathematical concepts related to electromagnetic vector fields
CO2	To impart knowledge on the concepts of electrostatics, electrical potential, energy density and their applications.
CO3	To impart knowledge on the concepts of magneto statics, magnetic flux density, scalar and vector potential and its applications.
CO4	To impart knowledge on the concepts of Concepts of electromagnetic waves and Pointing vector.
C05	To impart knowledge on the concepts of Concepts of electromagnetic waves and Pointing vector.

POWER SYSTEM ANALYSIS

COI	Use the models of power system components and analyze them.
CO2	Compute various electrical parameters of power system under various fault conditions.
CO3	Carry out the stability studies for a single machine infinite bus system.

CONTROL SYSTEM-II

CO1	Students will be able to design the controller in time and frequency domain.
CO2	Students will be able to analyze and design the control system in modern approach.
СОЗ	Students will be able to analyze the non linear control system
CO3	Students will be able to analyze the discrete time control system.

POWER ELECTRONICS



Principal

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Group of Institutions, Latur

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to Manjara Sugur Barshi Road, Letur

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1 (02382) 26	57731/32/33	CHILITETING CHARACTER AT	Website: www.vdfengineering.co.in(DTE Code: 2254)
CO1	Understan	d the fundamental principal	

CO1	Understand the fundamental principles and applications of power electronics circuits
CO2	Solve problems and design switching regulators according to specifications.
CO3	Use Computer-aided techniques for the design of power converter circuits.
CO4	Appreciate the latest developments in power electronics.
CO5	Assimilate new technological and development in related field

ELECTRICAL ESTIMATION & ELECTRICAL UTILIZATION

CO1	To develop ability amongst the students to design heating element for resistance furnaces and design-illumination schemes. To develop ability amongst the students to analyze the Performance of arc furnaces, electric traction, different sources of light, illumination schemes, electric traction.
CO2	Students will understand domestic installation service connection and calculation of number of different materials in the form of an estimate.
CO3	Students will develop self and lifelong learning skills, introduce professionalism for successful career.

BE-PART-I

INDUSTRIAL MANAGEMENT & ECONOMICS

CO5	global, economic, environmental, and societal context
	The broad education necessary to understand the impact of engineering solutions in
CO4	An ability to communicate effectively
CO3	An understanding of professional and ethical responsibility
CO2	An ability to identify, formulate, and solve engineering problems
COI	An ability to function on multidisciplinary teams



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Principal

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CO6	A recognit	ion of the need for, and a	in ability to engage in life-long learning

CO6	A recognition of the need for, and an ability to engage in life-long learning
CO7	A knowledge of contemporary issues

ELECTRICAL DRIVES

CO ₁	Analyze the operation of the converter, chopper fed dc drive.
CO ₂	Analyze the operation of both classical and modern induction motor drives.
CO ₃	Design the current and speed controllers for a closed loop solid-state d.c motor drive
CO4	Select the drives for any particular application .

POWER SYSTEM OPERATION AND CONTROL

CO1	Calculate the economic load dispatch for a given generator and load specifications.
CO2	Model the governor system.
CO3	Identify the blocks in a load frequency control system.
CO4	Calculate the amount of reactive power to be compensated in a transmission system

SWITCH GEAR AND PROTECTION

COI	Students will able to use mathematical tools and engineering knowledge to study the importance of protection needs.
CO2	Students will able to design protection controls as per requirement.
СОЗ	Students will understand their responsibility in designing protective schemes.
CO4	Learner will able to design and use protection equipment's economically and understands its impact on environment.
CO5	Students will have an ability to use technical skills, and modern engineering tools necessary for engineering practice.



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SMART ELECTRIC GRID

CO1	Acquire in-depth understanding on recent development of power grids, i.e. smart grid
CO2	Apply advanced analysis tools in planning and operation of smart grids
CO3	Acquire skills in presentation and interpretation of results in written form.

EHV A.C. TRANSMISSION SYSTEM

COI	Highlight need for EHV ac transmission.
CO2	Calculate line and ground parameters.
CO3	Enlist problems encountered in EHV transmission.
CO4	Express issues related to UHV transmission discussed.

BE-PART-II

HIGH VOLTAGE ENGINEERING

CO1	Reproduce concepts in breadth with various concepts of breakdown phenomenon of solid, liquid and gaseous materials along with various causes of overvoltage and protection from them. List and reproduce various methods of generation and measurement of DC, AC and
CO2	impulse high voltage.
CO3	Demonstrate an ability to carry various DC. AC and impulse testing on high voltage equipments and materials.
CO4	Apply safety measures, earthing, shielding for layout of HV apparatus required in High voltage laboratory



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POWER QUALITY AND HARMONICS

COI	Characterize power quality events.
CO2	Reproduce causes of voltage sag and estimate magnitude of voltage sag.
CO3	Carry out harmonic analysis and calculate total harmonic distortion.
CO4	Calculate parameters for passive harmonic filter.

INDUSTRIAL AUTOMATION

COL	Describe working of various blocks of basic industrial automation system.
CO2	Connect the peripherals with the PLC.
CO3	Use various PLC functions and develop small PLC programs.
CO4	Summarize Distributed control system and SCADA system.
CO5	Use various industrial motor drives for the Industrial Automation

HVDC AND FACTS

CO1	Understand the operations of different FACTS devices.	
CO2	Select the controllers for different Contingencies.	
CO3	Analyze the different FACTS devices in different stability conditions.	
CO4	Select an appropriate FACTS device for a particular application.	
CO5	Understand the importance of Transmission power through HVDC.	
CO6	Calculate power conversion between AC to DC and DC to AC	

SPECIAL TOPICS IN ELECTRICAL ENGINEERING

COL	Describe the process of restructuring of power system.
CO2	Identify various operation of restructured power system.
CO3	Knowledge of power sector in India.

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CO₄

Learn the preparation of energy audit report & conservation in different electrical system

Zinofinian IQAC Co-ordinator

HOD-Electrical Engi.



Principal

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Website: www.vdfengineering.co.in(DTE Code: 2254)

CO's OF ELECTRICAL ENGINEERING DEPARTMENT ACADEMIC YEAR 2018-19

Vision

To provide quality education to produce world leading, highly skilled, dynamic & innovative electrical engineers with best human values to contribute the knowledge for the betterment of society

Mission

- To provide high quality and effective education in the field of electrical engineering
- To create effective interface with industries and communities.
- To impart quality and value based education enabling the students to meet the growing challenges in the industry
- To develop students to cope up with modern technology to meet industry needs
- To provide extension services to rural society, industry professionals, and higher learning in the field of Electrical Engineering.
- To make the students aware of the impact of Electrical Engineering in the global scenario and the challenges of Electrical based industries and organizations.
- . To provide knowledge-based services and technologies to meet the needs of Society

Graduate Attributes

The Graduate Attributes are the knowledge skills and attitudes which the students have at the time of graduation. These Graduate Attributes identified by National Board of Accreditation are as follows:

- Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals
 and an engineering specialization to the solution of complex engineering problems.
- Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
- 3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

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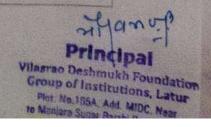
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- 4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions,
- 5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- 6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- 7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate Vision The vision of the department is to achieve excellence in teaching, learning, research and transfer of technology and overall development of students. Mission Imparting quality education, looking after holistic development of students and conducting need based research and extension, the knowledge of, and need for sustainable development.
- 8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- 9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- 10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- 11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- 12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Educational Objective

PEO1	To equip graduates with a strong foundation in engineering science and Electrical Engineering fundamentals to become effective collaborates, researchers and real-time problem solver with technical competencies.
PEO2	Perceive the limitation and impact of engineering solutions in social, legal, environmental, Economical and multidisciplinary contexts.





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PEO3

Excel in industry/ technical profession, higher studies, and entrepreneurship exhibiting global competitiveness.

Course Outcomes:

SE- PART-I

Engineering Mathematics - III

COI	Apply basic mathematical tools for solving engineering problems.
CO2	Provide skills in vector calculus & linear differential equations which would enable them to devise engineering solutions for given situations they may encounter in their Profession.
CO3	Deploy skills effectively in the solution of problems, principally in the area of Engineering Student will demonstrate basic knowledge of L.D.E., P.D.E., Vector & F.T

Electrical Machines-I

CO1	Design and conduct experiments as well as analyse the parameter of DC machine & Transformer.
CO2	Develop understanding of professional & ethical responsibility of DC machine & Transformer.
CO3	Analysis and investigation of the major performance characteristics of different types of motors.

ELECTRICAL MEASURMENT AND INSTRUMENTS

Discuss the operating principles of common electrical and electronic measuring COL instruments, devices and circuits, and their application to testing;



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CO ₂	Measure the performance of
CO3	Measure the performance of equipment and circuits; Identify and classify error sources, and explain how their effects can be minimized in particular measurement situations;
CO4	Discuss human and environmental implications of measurement systems; Analyze single- and the control of the co
CO5	Analyze single- and three-phase circuits to determine voltage and current values; Analyze test measurement
CO6	Analyze test measurements and circuit performance mathematically in both time and Frequency domains

ELECTRONICS DEVICS AND CIRCUITS

COI	Able to identify, analyze op-amp circuit topologies and discuss the relative properties of op-amp circuits.
CO2	Able to combine simple gates into more complex circuit.
CO3	Able to demonstrate the operation of simple logic gates.

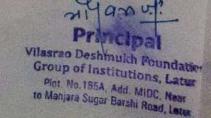
NUMERICAL METHODS USINGMATLAB

CO1	Solve various methods of numerical analysis of linear and non linear problems in MATLAB by writing program.
CO2	Use of method for solving the problems in engineering
СОЗ	Develop algorithm, flow chart and computer program for solution of linear and nonlinear problems

SE- PART - II

ENGINEERING MATHEMATICS - IV

Students will demonstrate basic knowledge of Laplace transform-COL



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	transform, Besselfunction & Complex Variable. Students will a server of the server of
CO ₂	Students will show the understanding of impact of Engg. Mathematics on Electrical Engg.
	Students who can participate & succeed in competitive exams like GATE, GRE.

ELECTRICAL MACHINE - II

COI	Student will be able to determine performance of the induction motor. Student will be able to decimal to deci
CO ₂	Student will be able to design rating of induction motor for a given application
СОЗ	Student will be able to evaluate parameters of single phase induction motor
CO4	Student will be able to evaluate performance of three phase synchronous machines
CO5	Student will be able to design a three phase winding of AC machines
CO6	Student will be able to design the ratings of synchronous machines for given application

ANALOG AND DIGITAL CIRCUIT

COI	Able to identify, analyze op-amp circuit topologies and design the op amp circuits
CO2	Able to demonstrate the operation of simple logic gates.
CO3	Able to combine simple gates into more complex circuit.

POWER PLANT ENGINEERING

COI	Knowledge of the operation, construction and design of various components of power plants		
CO2	Calculate the performance parameters of various power plants		



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Define and calculate the various factors of plant load and economy. CO3

NETWORK ANALYSIS

CO1	Student will able to work with basic fundamentals, theorems used in circuit's analysis.
CO2	Student will able to work with steady state analysis of different AC circuits, Attenuators, filters and coupled circuit.

COMMUNICATION SKILLS

COI	After going through the content of the syllabus, the students will be able to focus on the development of their personality with the help of good communication skills.
CO2	At the end of the course, the students will be able to develop comprehension, improve Vocabulary, grammatical ability, enhance writing skills, correspond with others and enhance skills in spoken English.

TE-PART-I

POWER SYSTEM ENGINEERING

COI	Ability to model and represent power system components
CO2	Ability to use software development tools to simulate and analyze the system
СО3	Ability to implement corrective measure for immediate as well as long term solution to the system problems

ELECTRICAL MACHINE DESIGN

An ability to design a system, a component to meet desired needs, differentiate and will be able to compare different options based on results, and able to analyze and COL interpret results for different industrial application to meet desired needs within realistic constraints and confirms

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	Email-info.engg@vdf.in	and ambated to DBATU Loner	c. Dist. Raigad)
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CO2	Students will build an ability to identify, formulate and solve industrial problems With the basis by
CO3	With the basic knowledge of the machines, equipment's design and course, students will be able to develop computer programs for the utility and machine design techniques.
CO4	Students will understand broad education necessary to understand the impact of electrical machine design solutions in a global and economical context.

CONTROL SYSTEM I

CO1	Students will be able to analyze and my
CO2	Students will be able to analyze and represent the control system mathematically. Students will be able to analyze the control system in time and frequency domain
	analyze the control system in time and frequency domain

MICROCONTROLLER AND MICROPROCESSORS

COI	To Understand the basic architecture of 8051 and 8086.
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SIGNALS AND SYSTEMS

COI	Be able to classify systems based on their properties: in particular, to understand and exploit the implications of linearity, time-invariance, causality, memory, and bounded-input, bounded-out (BIBO) stability
CO2	Determine Fourier transforms for continuous-time and discrete-time signals (or impulse-response functions), and understand how to interpret and plot Fourier transform magnitude and phase functions

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CO3	Understand the need to define two new transforms—the Laplace and Z transforms—to treat a class of signals broader than what the Fourier
CO4	Understand the relationships among the various representations of LTI systems— linear constant-coefficient difference or differential equation, frequency response, transfer function, and impulse response—and infer one representation from another (e.g., determine the impulse response from the difference equation, etc.).
CO5	Understand the properties, as well the analysis and design implications, of interconnections of LTI systems—parallel, series (cascade), and feedback—in the time and transform domains.

TE-PART-II

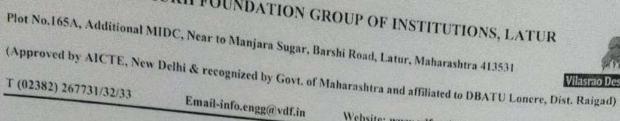
ELECTROMAGNETIC FIELDS

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POWER SYSTEM ANALYSIS

COI	Use the models of power system components and analyze them.
CO2	Compute various electrical parameters of power system under various fault conditions.
CO3	Carry out the stability studies for a single machine infinite bus system.

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CONTROL SYSTEM-II

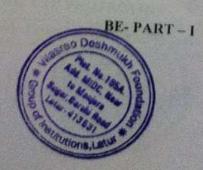
COI	Students will be able to day
CO ₂	Students will be able to design the controller in time and frequency domain. Students will be able to analyze and docinal.
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CO ₃	Students will be able to analyze the discrete time control system.

POWER ELECTRONICS

COI	Understand the fundamental principles and applications of power electronics circuits
CO2	Solve problems and design switching regulators according to specifications.
CO3	Use Computer-aided techniques for the design of power converter circuits.
CO4	Appreciate the latest developments in power electronics.
CO5	Assimilate new technological and development in related field

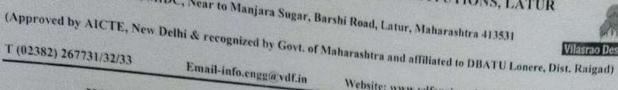
ELECTRICAL ESTIMATION & ELECTRICAL UTILIZATION

CO1	To develop ability amongst the students to design heating element for resistance furnaces and design-illumination schemes. To develop ability amongst the students to analyze the Performance of arc furnaces, electric traction, different sources of light, illumination schemes, electric traction.
CO2	Students will understand domestic installation service connection and calculation of number of different materials in the form of an estimate.
СОЗ	Students will develop self and lifelong learning skills, introduce professionalism for successful career.



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INDUSTRIAL MANAGEMENT & ECONOMICS

COI	An ability to function on multidisciplinary teams
CO ₂	An ability to identify, formulate, and solve engineering problems
CO ₃	An understanding of professional and ethical responsibility
CO4	An ability to communicate effectively
CO5	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
CO6	A recognition of the need for, and an ability to engage in life-long learning
C07	A knowledge of contemporary issues

ELECTRICAL DRIVES

COI	Analyze the operation of the converter, chopper fed dc drive.
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CO4	Select the drives for any particular application.

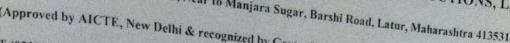
POWER SYSTEM OPERATION AND CONTROL

COI	Calculate the economic load dispatch for a given generator and load specifications. Model the governor system
CO2	Model the governor system.
CO3	Identify the blocks in a load frequency control system.
CO4	Calculate the amount of reactive power to be asset
	Calculate the amount of reactive power to be compensated in a transmission systematical compensated compensated in a transmission systematical compensated compe

SWITCH GEAR AND PROTECTION

Students will able to use mathematical tools and engineering knowledge to study the COL

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	importance of protection needs. Website: www.vdfengineering.co.in(DTE Code: 2254)
CO ₂	10111110000
CO ₃	Students will able to design protection controls as per requirement. Students will understand their recommendations are students.
CO4	Students will understand their responsibility in designing protective schemes. Learner will able to design and use protection equipment's economically and understands its impact on environment.
CO5	Students will have an ability to use technical skills, and modern engineering tools necessary for engineering practice.

SMART ELECTRIC GRID

CO1	Acquire in-depth understanding on recent development of power grids, i.e. smart
CO2	Apply advanced analysis tools in planning and operation of smart grids
CO3	Acquire skills in presentation and interpretation of results in written form.

EHV A.C. TRANSMISSION SYSTEM

CO1	Highlight need for EHV ac transmission.
202	Calculate line and ground parameters.
CO3	Enlist problems encountered in EHV transmission.
CO4	Express issues related to UHV transmission discussed.

BE- PART - II

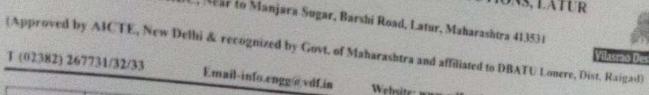
HIGH VOLTAGE ENGINEERING

Reproduce concepts in breadth with various concepts of breakdown phenomenon of COI solid, liquid and gaseous materials along with various causes of overvoltage and



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	protection from them. Website: www.vdfengincering.eo.in(DTE Code: 2254)
CO2	List and reproduce various methods of generation and measurement of DC. AC and impulse high voltage.
CO3	Demonstrate an ability to carry various DC. AC and impulse testing on high voltage equipments and materials.
CO4	Apply safety measures, earthing, shielding for layout of HV apparatus required in High voltage laboratory

POWER QUALITY AND HARMONICS

COL	Characterize power quality events.
CO2	Reproduce causes of voltage sag and estimate magnitude of voltage sag
CO3	Carry out harmonic analysis and calculate total harmonic distortion.
CO4	Calculate parameters for passive harmonic filter.

INDUSTRIAL AUTOMATION

COI	Describe working of various blocks of basic industrial automation system.
CO2	Connect the peripherals with the PLC.
CO3	Use various PLC functions and develop small PLC programs.
CO4	Summarize Distributed control system and SCADA system.
CO5	Use various industrial motor drives for the Industrial Automation

HVDC AND FACTS

COI	Understand the operations of different FACTS devices.
CO2	Select the controllers for different Contingencies.
CO3	Analyze the different FACTS devices in different stability conditions.



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CO4	Select an appropriate FACTS device for a particular application. Understand the interest of the second sec
CO5	Understand the importance of Transmission power through HVDC.
CO6	Calculate power conversion between AC to DC and DC to AC

SPECIAL TOPICS IN ELECTRICAL ENGINEERING

COI	Describe the process of restructuring of power system.
CO2	Identify various operation of restructured power system.
CO3	Knowledge of power sector in India.
CO4	Learn the preparation of energy audit report & conservation in different electrical system

IOAC Co-ordinator

HOD-Electrical Engi.

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CO's OF ELECTRICAL ENGINEERING DEPARTMENT ACADEMIC YEAR 2017-18

Vision

To provide quality education to produce world leading, highly skilled, dynamic & innovative electrical engineers with best human values to contribute the knowledge for the betterment of society

Mission

- To provide high quality and effective education in the field of electrical engineering
- To create effective interface with industries and communities.
- To impart quality and value based education enabling the students to meet the growing challenges in the industry
- To develop students to cope up with modern technology to meet industry needs
- To provide extension services to rural society, industry professionals, and higher learning in the field of Electrical Engineering.
- * To make the students aware of the impact of Electrical Engineering in the global scenario and the challenges of Electrical based industries and organizations.
- To provide knowledge-based services and technologies to meet the needs of Society

Graduate Attributes

The Graduate Attributes are the knowledge skills and attitudes which the students have at the time of graduation. These Graduate Attributes identified by National Board of Accreditation are as follows:

- 1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
- 2. Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
- 3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

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- 4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- 5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- 6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- 7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate Vision The vision of the department is to achieve excellence in teaching, learning, research and transfer of technology and overall development of students. Mission Imparting quality education, looking after holistic development of students and conducting need based research and extension, the knowledge of, and need for sustainable development.
- 8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- 10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- 11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- 12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Educational Objective

PEO1	To equip graduates with a strong foundation in engineering science and Electrical Engineering fundamentals to become effective collaborates, researchers and real-time problem solver with technical competencies.
PEO2	Perceive the limitation and impact of engineering solutions in social, legal, environmental, Economical and multidisciplinary contexts.



Principal

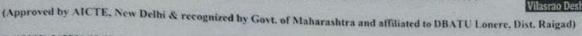
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PEO3

Excel in industry/ technical profession, higher studies, and entrepreneurship exhibiting global competitiveness.

Course Outcomes:

SE-PART-I

Engineering Mathematics - III

COI	Apply basic mathematical tools for solving engineering problems.
CO2	Provide skills in vector calculus & linear differential equations which would enable them to devise engineering solutions for given situations they may encounter in their Profession.
CO3	Deploy skills effectively in the solution of problems, principally in the area of Engineering Student will demonstrate basic knowledge of L.D.E., P.D.E., Vector & F.T

Electrical Machines-I

CO1	Design and conduct experiments as well as analyse the parameter of DC machine & Transformer.
CO2	Develop understanding of professional & ethical responsibility of DC machine & Transformer.
соз	Analysis and investigation of the major performance characteristics of different types of motors.

ELECTRICAL MEASURMENT AND INSTRUMENTS

CO1 Discuss the operating principles of common electrical and electronic measuring instruments, devices and circuits, and their application to testing;



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	Construction of the content of the c
CO2	Measure the performance of equipment and circuits;
CO3	Identify and classify error sources, and explain how their effects can be minimized in particular measurement situations;
CO4	Discuss human and environmental implications of measurement systems;
CO5	Analyze single- and three-phase circuits to determine voltage and current values;
CO6	Analyze test measurements and circuit performance mathematically in both time and Frequency domains

ELECTRONICS DEVICS AND CIRCUITS

CO1	Able to identify, analyze op-amp circuit topologies and discuss the relative properties of op-amp circuits.
CO2	Able to combine simple gates into more complex circuit.
CO3	Able to demonstrate the operation of simple logic gates.

NUMERICAL METHODS USINGMATLAB

COI	Solve various methods of numerical analysis of linear and non linear problems in
	MATLAB by writing program.
CO2	Use of method for solving the problems in engineering
CO3	Develop algorithm, flow chart and computer program for solution of linear and nonlinear problems

SE- PART - H

ENGINEERING MATHEMATICS - IV

CO1 | Students will demonstrate basic knowledge of Laplace transform-



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	transform, Besselfunction & Complex Variable.
CO2	Students will show the understanding of impact of Engg. Mathematics on Electrical Engg.
CO3	Students who can participate & succeed in competitive exams like GATE, GRE.

ELECTRICAL MACHINE - II

CO1	Student will be able to determine performance of the induction motor.
CO2	Student will be able to design rating of induction motor for a given application
CO3	Student will be able to evaluate parameters of single phase induction motor
CO4	Student will be able to evaluate performance of three phase synchronous machines
CO5	Student will be able to design a three phase winding of AC machines
CO6	Student will be able to design the ratings of synchronous machines for given application

ANALOG AND DIGITAL CIRCUIT

Able to identify, analyze op-amp circuit topologies and design the op amp circuits.
Able to demonstrate the operation of simple logic gates.
Able to combine simple gates into more complex circuit.

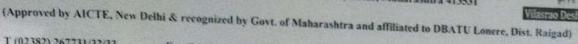
POWER PLANT ENGINEERING

	Knowledge of the operation, construction and design of various compo	nents of
COI	power plants	
CO2	Calculate the performance parameters of various power plants	lina



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CO3

Define and calculate the various factors of plant load and economy.

NETWORK ANALYSIS

CO1	Student will able to work with basic fundamentals, theorems used in circuit's analysis.
CO2	Student will able to work with steady state analysis of different AC circuits,
	Attenuators, filters and coupled circuit.

COMMUNICATION SKILLS

CO1	After going through the content of the syllabus, the students will be able to focus on the development of their personality with the help of good communication skills.
	At the end of the course, the students will be able to develop comprehension,
CO2	improve Vocabulary, grammatical ability, enhance writing skills, correspond with
	others and enhance skills in spoken English.

TE-PART-I

POWER SYSTEM ENGINEERING

COI	Ability to model and represent power system components
CO2	Ability to use software development tools to simulate and analyze the system
CO3	Ability to implement corrective measure for immediate as well as long term solution to the system problems

ELECTRICAL MACHINE DESIGN

An ability to design a system, a component to meet desired needs, differentiate and will be able to compare different options based on results, and able to analyze and COL interpret results for different industrial application to meet desired needs within realistic constraints and confirms manufacture ability.



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CO2	Students will build an ability to identify, formulate and solve industrial problems related to machine and equipment design problems.
CO3	With the basic knowledge of the machines, equipment's design and course, students will be able to develop computer programs for the utility and machine design techniques.
CO4	Students will understand broad education necessary to understand the impact of electrical machine design solutions in a global and economical context.

CONTROL SYSTEM I

	Students will be able to analyze and represent the control system mathematically.
CO2	Students will be able to analyze the control system in time and frequency domain.

MICROCONTROLLER AND MICROPROCESSORS

COI	To Understand the basic architecture of 8051 and 8086.
CO2	To understand the basic programming used in microcontroller and microprocessor
	based systems.
CO3	To implement any system using microcontrollers and processors.
CO4	To understand coprocessor 8087 and some high end processors.
COS	To develop interfacing to real world devices.

SIGNALS AND SYSTEMS

-		Be able to classify systems based on their properties: in particular, to understand and
	CO1	exploit the implications of linearity, time-invariance, causality, memory, and
		bounded-input, bounded-out (BIBO) stability
-		Determine Fourier transforms for continuous-time and discrete-time signals (or
1	CO2	impulse-response functions), and understand how to interpret and plot Fourier
		transform magnitude and phase functions.



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CO3	Understand the need to define two new transforms—the Laplace and Z transforms—to treat a class of signals broader than what the Fourier transform can handle.
CO4	Understand the relationships among the various representations of LTI systems— linear constant-coefficient difference or differential equation, frequency response, transfer function, and impulse response—and infer one representation from another (e.g., determine the impulse response from the difference equation, etc.).
CO5	Understand the properties, as well the analysis and design implications, of interconnections of LTI systems—parallel, series (cascade), and feedback—in the time and transform domains.

TE-PART-II

ELECTROMAGNETIC FIELDS

COL	To introduce the basic mathematical concepts related to electromagnetic vector fields
	To impart knowledge on the concepts of electrostatics, electrical potential, energy
CO2	density and their applications.
	To impart knowledge on the concepts of magneto statics, magnetic flux density,
CO3	scalar and vector potential and its applications.
CO4	To impart knowledge on the concepts of Concepts of electromagnetic waves and
	Pointing vector.
	To impart knowledge on the concepts of Concepts of electromagnetic wayes and
CO5	
	Pointing vector.

POWER SYSTEM ANALYSIS

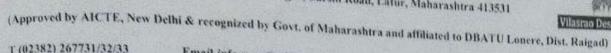
CO1	Use the models of power system components and analyze them.
CO2	Compute various electrical parameters of power system under various fault conditions.
CO3	Carry out the stability studies for a single machine infinite bus system.

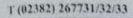


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CONTROL SYSTEM-II

CO1	Students will be able to design the controller in time and frequency domain.
CO2	Students will be able to analyze and design the control system in modern approach.
CO3	Students will be able to analyze the non linear control system
CO3	Students will be able to analyze the discrete time control system.
-	

POWER ELECTRONICS

CO1	Understand the fundamental principles and applications of power electronics circuits
CO2	Solve problems and design switching regulators according to specifications.
CO3	Use Computer-aided techniques for the design of power converter circuits.
CO4	Appreciate the latest developments in power electronics.
CO5	Assimilate new technological and development in related field

ELECTRICAL ESTIMATION & ELECTRICAL UTILIZATION

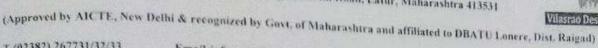
	To develop ability amongst the students to design heating element for resistance
	furnaces and design-illumination schemes. To develop ability amongst the students
COI	to analyze the Performance of arc furnaces, electric traction, different sources of
	light, illumination schemes, electric traction.
CO2	Students will understand domestic installation service connection and calculation of
	number of different materials in the form of an estimate.
CO3	Students will develop self and lifelong learning skills, introduce professionalism for
	successful career.

BE-PART-I



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INDUSTRIAL MANAGEMENT & ECONOMICS

COI	An ability to function on multidisciplinary teams
CO2	An ability to identify, formulate, and solve engineering problems
CO3	An understanding of professional and ethical responsibility
CO4	An ability to communicate effectively
C05	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
CO6	A recognition of the need for, and an ability to engage in life-long learning
CO7	A knowledge of contemporary issues

ELECTRICAL DRIVES

CO1	Analyze the operation of the converter, chopper fed de drive.
CO2	Analyze the operation of both classical and modern induction motor drives.
CO3	Design the current and speed controllers for a closed loop solid-state d.c motor drive
CO4	Select the drives for any particular application .

POWER SYSTEM OPERATION AND CONTROL

	the for a given generator and load specifications.
CO1	Calculate the economic load dispatch for a given generator and load specifications.
CO2	Model the governor system.
CO3	Identify the blocks in a load frequency control system.
CO4	Calculate the amount of reactive power to be compensated in a transmission system.
C04	Calculate

SWITCH GEAR AND PROTECTION

Students will able to use mathematical tools and engineering knowledge to study the COL



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	importance of protection needs. Website: www.vdfengineering.co.in(DTE Code: 2254)
CO2	Students will able to design protection controls as per requirement.
CO3	Students will understand their responsibility in designing protective schemes. Learner will able to design.
CO4	Learner will able to design and use protection equipment's economically and understands its impact on environment.

Students will have an ability to use technical skills, and modern engineering tools

SMART ELECTRIC GRID

necessary for engineering practice.

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CO5

COI	Acquire in-depth understanding on recent development of power grids, i.e. smart grid
CO2	Apply advanced analysis tools in planning and operation of smart grids
соз	Acquire skills in presentation and interpretation of results in written form.

EHV A.C. TRANSMISSION SYSTEM

CO1	Highlight need for EHV ac transmission.
CO2	Calculate line and ground parameters.
CO3	Enlist problems encountered in EHV transmission.
CO4	Express issues related to UHV transmission discussed.

BE-PART-II

HIGH VOLTAGE ENGINEERING

COL	Reproduce concepts in breadth with various concepts of breakdown phenomenon of
	solid, liquid and gaseous materials along with various causes of overvoltage and



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	protection from them.
CO2	List and reproduce various methods of generation and measurement of DC, AC and impulse high voltage.
CO3	Demonstrate an ability to carry various DC. AC and impulse testing on high voltage equipments and materials.
CO4	Apply safety measures, earthing, shielding for layout of HV apparatus required in High voltage laboratory

POWER QUALITY AND HARMONICS

COI	Characterize power quality events.
CO2	Reproduce causes of voltage sag and estimate magnitude of voltage sag-
CO3	Carry out harmonic analysis and calculate total harmonic distortion.
CO4	Calculate parameters for passive harmonic filter.

INDUSTRIAL AUTOMATION

Describe working of various blocks of basic industrial automation system.
Connect the peripherals with the PLC.
Use various PLC functions and develop small PLC programs.
Summarize Distributed control system and SCADA system.
Use various industrial motor drives for the Industrial Automation

HVDC AND FACTS

COI	Understand the operations of different FACTS devices.
CO2	Select the controllers for different Contingencies.
CO3	Analyze the different FACTS devices in different stability conditions.

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CO4	Select on assure
	Select an appropriate FACTS device for a particular application.
CO5	Understand A.
	Understand the importance of Transmission power through HVDC.
	Calculate power conversion between AC to DC and DC to AC

SPECIAL TOPICS IN ELECTRICAL ENGINEERING

COI	Describe the process of restructuring of power system.
CO2	Identify various operation of restructured power system.
CO3	Knowledge of power sector in India.
CO4	Learn the preparation of energy audit report & conservation in different electrical system

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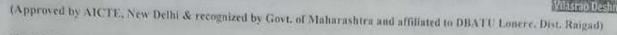
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PO CO OF ELECTRONIC & TELECOMMUNICATION ENGINEERING DEPARTMENT

ACADEMIC YEAR 2021-22

Vision

To be a Centre of technical education in electronics & electronic communication to provide excellent technical resources to create technocrats for the well-being of society..

Mission

- To educate the scholars of electronics & communication engineering stream with welldefined and rigorously structured curriculum and well equipped laboratories to meet the growing challenges of the Industry.
- Encouraging students with basic course knowledge to go for further higher Education.
- Promoting scholars towards research through constant interaction with research organizations and Industries..

Graduate Attributes [Program Outcomes (POS)]

The Graduate Attributes are the knowledge skills and attitudes which the students have at the time of graduation. These Graduate Attributes identified by National Board of Accreditation are as follows:

- PO-1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
- PO-2. Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
- PO-3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO-4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO-5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

M MIGG NAME

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COMMUNICAL

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PO-6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO-7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate Vision The vision of the department is to achieve excellence in teaching, learning, research and transfer of technology and overall development of students. Mission Imparting quality education, looking after holistic development of students and conducting need based research and extension. The knowledge of, and need for sustainable development.

PO-8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO-9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO-10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO-11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO-12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Educational Objectives.

PEO1	To provide requisite Engineering knowledge as well as information about recent trends in the field of communication Engineering to the students
PEO2	To develop lifelong learning environment for multidisciplinary engineering education.

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Email-info.engg@vdf.in

Website: www.vdfengineering.co.in

(DTE Code:

Course Outcomes:

SE (E&TC) Part - I

ENGINEERING MATT

CO1	Solve higher order linear differential equation using appropriate techniques for modeling analyzing electrical circuits.
CO2	Communication systems and Size of Laplace transform and applications to
CO3	Obtain Interpolating polynomials, numerically differentiate and integrate functions, numerical solutions of differential equations using single step and multi-step iterative
CO4	Perform vector differentiation and integration, analyze the vector fields and apply to
CO5	Analyze conformal mappings, transformations and perform contour integration of complex functions in the study of electrostatics and signal processing

DIGITAL ELECTRONICS

CO1	Use the basic logic gates and various reduction techniques of digital logic circuit in detail.	
CO2	Design combinational and sequential circuits	
CO3	Design and implement hardware circuit to test performance and application.	
CO4	Understand the architecture and use of VHDL for basic operations and Simulate using simulation software	

ELECTRONIC DEVICES & CIRCUITS

CO1	Comply and verify parameters after exciting devices by any stated method.
CO2	Implement circuit and test the performance.
CO3	Analyze small signal model of FET and MOSFET.
CO4	Explain behavior of FET at low frequency.
C05	Design an adjustable voltage regulator circuits.

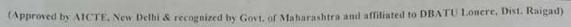
ELECTRICAL MACHINES & INSTRUMENTS

COI	The ability to formulate and then analyze the working of any electrical machine us mathematical model under loaded and unloaded conditions.	sing
CO2	The skill to analyze the response of any electrical machine.	
СОЗ	The ability to troubleshoot the operation of an electrical machine	
CO4	The ability to select a suitable measuring instrument for a given application.	.01

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CO5	The ability to estimate and correct deviations in measurements due to the influence of the instrument and due to the accuracy of the instrument.
CO6	Learn and know about and being able to use global, regional, national, and local human rights instruments and mechanisms for the protection of human rights

SE (E&TC) Part - III

NETWORK THEORY

_	THE WORK THEORY
CO1	Apply knowledge of mathematics to solve numerical based on network simplification and i will be used to analyze the same.
CO2	Design passive filters and attenuators theoretically and practically. To apply knowledge for design of active filters as well as digital filters and even extend this to advance adaptive filters
CO3	Identify issues related to transmission of signals, analyze different RLC networks.
CO4	Find technology recognition for the benefit of the society

BASIC HUMAN RIGHTS

CO1	Simply put, human rights education is all learning that develops the knowledge, skills, and values of human rights
CO2	Strengthen the respect for human rights and fundamental freedoms.
CO3	Enable all persons to participate effectively in a free society
CO4	Learn about human rights principles, such as the universality, indivisibility, and interdependence of human rights.
CO5	Learn about regional, national, state, and local law that reinforces international human rights law.
CO6	Learn and know about and being able to use global, regional, national, and local human rights instruments and mechanisms for the protection of human rights

PROBABILITY THEORY AND RANDOM PROCESSES

	TOTAL PORT I ROCESSES
CO1	Understand representation of random signals
CO2	Investigate characteristics of random processes
203	Make use of theorems related to random signals
204	To understand propagation of random signals in LTI systems.
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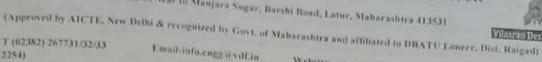
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SIGNAL & SYSTEMS

COI	Understand mathematical description and representation of continuous and discrete time Develop input output relationship for the
CO2	convolution operator.
СОЗ	transforms transforms in frequency domain using the
CO4	Understand the limitations of Fourier transform and need for Laplace transform and develop Understand the hasis consent.
CO5	the ability to analyze the system in s- domain Understand the basic concept of probability, random variables & random signals and develop the ability to find correlation, CDF, PDF and probability as
	develop the ability to find correlation, CDF, PDF and probability of a given event

PYTHON PROGRAMMING

CO1	Experience	
CO2	Experience with an interpreted Language.	
CO3	To build software for real needs Prior Introduction to testing software	

TE (E&TC) Part-I

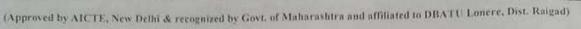
CONTROL SYSTEMS ENGINEERING

	ASE STSTEMS ENGINEERING
CO1	Model a physical system and express its internal dynamics and input-output relationships by
CO2	Understand and explain the relationships between the parameters of a control system and its
CO3	Identify the parameters that the system is sensitive to. Determine the stability of a system and parameter ranges for a desired degree of stability
CO4	Plot the Bode, Nyquist, Root Locus diagrams for a given control system and identify the
CO5	Determine the frequency response of a control system and use it to evaluate or adjust the
CO6	Mdoel and analyse the control systems with
CO7	Design a P. PD. Pl. or PID controller based on the transient and steady state response criteria



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EIECTROMAGNETIC FIELD THOERY

CO1	Understanding the vector fields E, D, H & B
CO2	Cleared the Concepts Divergence and Stokes theorem
CO3	Get an idea of the concepts: Work done, Potential, Potential gradient and dipole
CO4	Get the idea of the terms Conductors, Dielectrics, boundary conditions and capacitance
CO5	Understanding of Poisson's and Laplace's equations
CO6	Get knowledge about Time Varying Field and Maxwell's Equations
CO7	Get an idea of Uniform Plane Wave used for propa

DIGITAL SIGNAL PROCESSING

CO1	Represent discrete-time signals analytically and visualize in time domain 2, 3, 4.
CO2	Understand the meaning and implications of the properties of systems and signals
соз	Understand transform domain and its significance and problems related to computational complexity
CO4	Specify and design digital filters
CO5	Draw the structure for realization of a given system

COMPUTER ARCHITECTURE

COI	Learn how computers work
CO2	Know basic principles of computer's working
CO3	Analyze the performance of computers
CO4	Know how computers are designed and built
CO5	Understand issues affecting modern processors (caches, pipelines etc.).

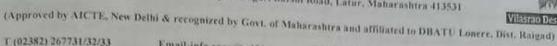
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MICROCONTROLLER AND ITS APPLICATION

CO1	Learner Gains Ability To Apply Knowledge Of Engineering In Designing Different Case Studies
CO2	Students Get Ability To Conduct Experiments Based On Interfacing Of Devices To Or Interfacing To Real World Applications
СОЗ	Graduates Will Be Able To Design Real Time Controllers Using Microcontroller Based System.
CO4	Students Get Ability To Interface Mechanical System To Function In Multidisciplinary System Like In Robotics, Automobiles
CO5	Students Can Identify And Formulate Control And Monitoring Systems Using Microcontrollers
CO6	Students Will Design Cost Effective Real Time System To Serve Engineering Solution For Global, Social And Economic Context.
CO7	Learners Get Acquainted With Modern Tools Like Programmers, Debuggers, Cross Compilers And Current IDE I.E. Integrated Development Environment Tools.

DATA STRUCTURE AND ALGORITHM USING JAVA

CO1	To Impart The Basic Concepts Of Data Structures And Algorithms.
CO2	To Understand Concepts About Searching And Sorting Techniques
СОЗ	Describe How Arrays, Records, Linked Structures Are Represented In Memory And Use Them In Algorithms
CO4	To Understand Basic Concepts About Stacks, Queues, Lists Trees And Graphs.
CO5	To Enable Them To Write Algorithms For Solving Problems With The Help Of Fundamental Data Structures.

TE (E&TC) Part - II

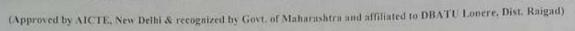
ANTENNA AND WAVE PROPAGATION

CO1	Understand the concept of radiation through mathematical formulation	
CO2	Plot the characteristics of wire and aperture antennas.	
CO3	Develop the performance characteristics of array antenna.	
CO4	Measure the antenna parameters and understand its fundamentals.	
CO5	Understand the behavior of nature on em wave propagation	els es

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COMPUTER NETWORK AND CLOUD COMPUTING

	COMPUTER NETWORK AND CLOUD COMPUTING
CO1	To Master The Terminology And Concepts Of The OSI Reference Model And The TCP-IP Reference Model
CO2	To Master The Concepts Of Protocols, Network Interfaces, And Design/Performance Issues In Local Area Networks And Wide Area Networks.
CO3	To Be Familiar With Wireless Networking Concepts.
CO4	To Be Familiar With Contemporary Issues In Networking Technologies.
CO5	To Be Familiar With Network Tools And Network Programming
CO6	For A Given Requirement (Small Scale) Of Wide-Area Networks (Wans), Local Area Networks (Lans) And Wireless Lans (Wlans) Design It Based On The Market Available Component.
CO7	For A Given Problem Related TCP/IP Protocol Developed The Network Programming.

DIGITAL IMAGE PROCESSING

CO1	Review The Fundamental Concepts Of Digital Image Processing System
CO2	Analyze Images In The Frequency Domain Using Various Transforms.
CO3	Categories Various Compression Techniques
CO4	Interpret Image Segmentation And Representation Techniques

POWER ELECTRONICS

	TOWEREEECTROMES	
CO1	Understand basic principle of power conversion.	
CO2	Design & implement a triggering / gate drive circuit for a power device	
CO3	Design & implement protection circuits for power devices.	
CO4	Understand, design & analyze different Power electronics converters.	
CO5	Utilize power converters in different industrial applications	

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B. E. (E&TC) Part - I

MICROWAVE THEORY AND TECHNIQUES

CO1	Understand Various Microwave System Components Their Properties
CO2	Appreciate That During Analysis/ Synthesis Of Microwave Systems, The Different Mathematical Treatment Is Required Compared To General Circuit Analysis
CO3	Understand Microwave Systems For Different Practical Application.

MOBILE COMMUNICATION NETWORK

CO1	Understand The Working Principles Of The Mobile Communication Systems
CO2	Understand The Relation Between The User Features And Underlying Technology
CO3	Analyze Mobile Communication Systems For Improved Performance.

FIBRE OPTIC COMMUNICATION

Estimate Various Losses In Optical Fiber
Design Fiber Optic Communication Link
Find Out The Necessity Of Optical Amplifier.

COMPUTER NETWORK

CO1	Identify The Components Required To Build Different Types Of Network
CO2	Choose The Required Functionality At Each Layer For Given Application Identify Solution For Each Function At Each Layer
CO3	Trace The Fiow Of Information From One To Another Node In The Network

B. E. (E&TCl) Part - II

SATELLITE COMMUNICATION

CO1	Visualize The Architecture Of Satellite Systems As A Means Of High Speed, High Range Communication System.
CO2	State Various Aspects Related To Satellite Systems Such As Orbital Equations, Sub-Systems In A Satellite, Link Budget, Modulation And Multiple Access Schemes.
СОЗ	Solve Numerical Problems Related To Orbital Motion And Design Of Link Budget For The Given Parameters And Commissional Foundation Foundation and Design Of Link Budget For The

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MECHATRONICS

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COI	Identification Of Key Elements Of Mechatronics System And Its Representation In Terms Of Block Diagram
CO2	Understanding The Concept Of Signal Processing And Use Of Interfacing Systems Such As ADC, DAC, Digital I/O
CO3	Interfacing Of Sensors, Actuators Using Appropriate DAQ Micro-Controller.
CO4	Time And Frequency Domain Analysis Of System Model (For Control Application)
CO5	PID Control Implementation On Real Time Systems.
CO6	Development Of PLC Ladder Programming And Implementation Of Real Life System.

ARTIFICIAL INTELLIGENCE DEEP LEARNING

CO1	Identify The AI Based Problems.
CO2	Apply Techniques To Solve The AI Problems.
CO3	Define Learning And Explain Various Logic Inferences.
CO4	Discuss Different Learning Techniques

DIGITAL VLSI DESIGN

COL	Model Digital Circuit With, Simulate, Synthesis In Microwind.
CO2	Understand Chip Level Issues And Need Of Testability.
CO3	Design Digital CMOS Circuits For Specified Applications.

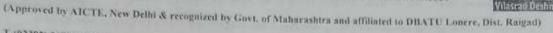
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PO CO OF ELECTRONIC & TELECOMMUNICATION ENGINEERING DEPARTMENT

ACADEMIC YEAR 2020-21

Vision

To be a Centre of technical education in electronics & electronic communication to provide excellent technical resources to create technocrats for the well-being of society.,

Mission

- To educate the scholars of electronics & communication engineering stream with welldefined and rigorously structured curriculum and well equipped laboratories to meet the growing challenges of the Industry.
- Encouraging students with basic course knowledge to go for further higher Education.
- Promoting scholars towards research through constant interaction with research organizations and Industries...

Graduate Attributes [Program Outcomes (POS)]

The Graduate Attributes are the knowledge skills and attitudes which the students have at the time of graduation. These Graduate Attributes identified by National Board of Accreditation are as follows:

- PO-1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
- PO-2. Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
- PO-3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO-4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO-5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

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PO-6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO-7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate Vision The vision of the department is to achieve excellence in teaching, learning, research and transfer of technology and overall development of students. Mission Imparting quality education, looking after holistic development of students and conducting need based research and extension. The knowledge of, and need for sustainable development.

PO-8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO-9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO-10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO-11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO-12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Educational Objectives.

PEO1	To provide requisite Engineering knowledge as well as information about recent trends in the field of communication Engineering to the students
PEO2	To develop lifelong learning environment for multidisciplinary engineering education.



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Course Outcomes:

SE (E&TC) Part - I

ENGINEERING MATHEMATICS -III

	TAXOST PARTIES AND THE STATE OF THE
COI	Solve higher order linear differential equation using appropriate techniques for modeling and analyzing electrical circuits.
CO2	Solve problems related to Fourier transform, Laplace transform and applications to Communication systems and Signal processing
СОЗ	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
CO4	Perform vector differentiation and integration, analyze the vector fields and apply to Electromagnetic fields.
CO5	Analyze conformal mappings, transformations and perform contour integration of complex functions in the study of electrostatics and signal processing

DIGITAL LOGIC DESIGN

CO1	Use the basic logic gates and various reduction techniques of digital logic circuit in detail. 2
CO2	Design combinational and sequential circuits.
CO3	Design and implement hardware circuit to test performance and application.
CO4	Understand the architecture and use of VHDL for basic operations and Simulate using simulation software.

Electronic Devices & Circuits

COI	Comply and verify parameters after exciting devices by any stated method.
CO2	Implement circuit and test the performance.
CO3	Analyze small signal model of FET and MOSFET.
CO4	Explain behavior of FET at low frequency.
CO5	Design an adjustable voltage regulator circuits.

BASIC HUMAN RIGHTS

CO1	Simply put, human rights education is all learning that develops the knowledge, skills, and values of human rights.
CO2	Strengthen the respect for human rights and fundamental freedoms.
СОЗ	Enable all persons to participate effectively in a free society
CO4	Learn about human rights principles, such as the universality, indivisibility, and interdependence of human rightsch Found

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CO5	Learn about regional, national, state, and local law that reinforces international human rights law.
CO6	Learn and know about and being able to use global, regional, national, and local human rights instruments and mechanisms for the protection of human rights

NETWORK ANALYSIS

	NETWORK ANALYSIS
CO1	Apply knowledge of mathematics to solve numerical based on network simplification and it will be used to analyze the same.
CO2	Design passive filters and attenuators theoretically and practically. To apply knowledge for design of active filters as well as digital filters and even extend this to advance adaptive filters
CO3	Identify issues related to transmission of signals, analyze different RLC networks.
CO4	Find technology recognition for the benefit of the society

	Analog Circuits
CO1	Understand the characteristics of IC and Op-Amp and identify the internal structure.
CO2	Understand and identify various manufacturing techniques
CO3	Derive and determine various performances based parameters and their significance for Op-Amp
CO4	Comply and verify parameters after exciting IC by any stated method
C05	Analyze and identify the closed loop stability considerations and I/O limitations
CO6	Analyze and identify linear and nonlinear applications of Op-Amp.
CO7	Understand and verify results (levels of V & I) with hardware implementation.
CO8	Implement hardwired circuit to test performance and application for what it is being designed

SE (E&TC) Part - II

ELECTRICAL MACHINES & INSTRUMENTS

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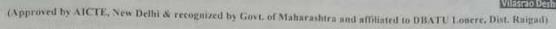
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The ability to formulate and then analyze the working of any electrical machine using mathematical model under loaded and unloaded conditions.
The skill to analyze the response of any electrical machine
The ability to troubleshoot the operation of an electrical machine
The ability to select a suitable measuring instrument for a given application

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CO5	The ability to estimate and correct deviations in measurements due to the influence of the instrument and due to the accuracy of the instrument.
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ANALOG COMMUNICATION ENCINEEDING

CO1	Understand and identify the fundamental concepts and various components of analog communication systems.
CO2	Understand the concepts of modulation and demodulation techniques.
CO3	Design circuits to generate modulated and demodulated wave.
CO4	Equip students with various issues related to analog communication such as modulation, demodulation, transmitters and receivers and noise performance.
CO5	Understand the concepts of modulation and demodulation techniques of angle modulation (frequency and phase).
CO6	Explain signal to noise ratio, noise figure and noise temperature for single and cascaded stages in a communication system
СО7	Develop the ability to compare and contrast the strengths and weaknesses of various communication systems

MICROPROCESSOR

CO1	Learner gains ability to apply knowledge of engineering in designing different case studies.
CO2	Students get ability to interface mechanical system to function in multidisciplinary system like in robotics, Automobiles
CO3	Students can identify and formulate control and monitoring systems using microprocessors.
CO4	Students get ability to conduct experiments based on interfacing of devices to or interfacing to real world applications.
CO5	Students will design cost effective real time system to serve engineering solution for Global, social and economic context.
CO6	This course understanding will enforce students to acquire knowledge of recent trends like superscalar and pipelining and thus finds recognition of continuous updation.
CO7	Learn use of hardware and software tools, 8. Develop interfacing to real world device

SIGNAL & SYSTEMS

CO1	Understand mathematical description and representation of continuous and discrete time signals and systems.
CO2	Develop input output relationship for linear shift invariant system and understand the convolution operator for continuous and discrete time system
СОЗ	Understand and resolve the signals in frequency domain using Fourier series and Fourier transforms
CO4	Understand the limitations of Founds Form and need for Laplace transform and develop

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random signals and

	the ability to analyze the system in s- domain
CO5	Understand the basic concept of probability, random variables & random signals a develop the ability to find correlation, CDF, PDF and probability of a given event

	TRODUCT DESIGN ENGINEERING	
CO1	Create simple mechanical or other designs	
CO2	Create design documents for knowledge sharing	
CO3	Manage own work to meet design requirements	
CO4	Work effectively with colleagues	

	Able to solve algebraic and transcendental equations by using numerical techniques and will
CO1	be able to compare different numerical techniques used for this purpose and also will be able to choose a proper one as per the requirement of the problem.
CO2	Able to solve a system of linear equations with any number of variables using different direct and iterative numerical techniques
C03	. Understand the concept of interpolation, finite difference operators and their relations, and can apply different interpolation techniques on equi-spaced or non equi-spaced data values
CO4	Prepare them to write computer programs for the numerical computational techniques
CO5	Understand application of the NMCP course in many engineering core subjects like signal processing, digital communication, numerical techniques in electromagnetics etc
CO6	Understand procedure-oriented and object oriented programming concepts
CO7	Capable of writing C and C++ programs efficiently

TE (E&TC) Part - I

CONTROL SYSTEMS

CO1	Model a physical system and express its internal dynamics and input-output relationships by means of block diagrams, mathematical model and transfer functions
CO2	Understand and explain the relationships between the parameters of a control system and its stability, accuracy, transient behaviour.
СОЗ	Identify the parameters that the system is sensitive to. Determine the stability of a system and parameter ranges for a desired degree of stability
CO4	Plot the Bode, Nyquist, Root Locus diagrams for a given control system and identify the parameters and carry out the stability analysis
CO5	Determine the frequency response of a control system and use it to evaluate or adjust the relative stability
CO6	Mdoel and analyse the control systems using state space analysis
CO7	Design a P, PD, PI, or PID controller based on the transient and steady state response criteria

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Website: www.vdfengineering.co.in

(DTE Code:

EIECTROMAGNETIC ENGINEERING

ELECTROMAGNETIC ENGINEERING
Understanding the vector fields E, D, H & B
Cleared the Concepts Divergence and Stokes theorem
Get an idea of the concepts: Work done, Potential, Potential gradient and dipole
Get the idea of the terms Conductors, Dielectrics, boundary conditions and capacitance
Understanding of Poisson's and Laplace's equations
Get knowledge about Time Varying Field and Maxwell's Equations
Get an idea of Uniform Plane Wave used for propa

DIGITAL SIGNAL PROCESSING

CO1	Represent discrete-time signals analytically and visualize in time domain 2, 3, 4.
CO2	Understand the meaning and implications of the properties of systems and signals
соз	Understand transform domain and its significance and problems related to computational complexity
CO4	Specify and design digital filters
C05	Draw the structure for realization of a given system

COMMUNICATION ENGINEERING

	COMMICATOR
CO1	Understand the random process by the perceptive of channel noise.
CO2	Analyze behavior of analog communication system in presence of channel noise.
CO3	Analyze effect of channel noise on the analog communication system
CO4	Design the Optimum Filter like Matched Filter to optimize the detector performan

PROFESSIONAL ELECTIVE-1 (COMPUTER ORGANIZATION

	Demonstrate computer architecture concepts related to design of modern processors,
C	
C	memories and I/Os. Analyze the principles of computer architecture using examples drawn from commercially available computers Analyze the principles of computer architecture using examples drawn from commercially
C	Analyze the principles of computer arctifecture using starting available computers.



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(DTE Code:

CO1	To impart knowledge, with respect to concepts, principles and practical applications of Economics, which govern the functioning of a firm/organization under different market conditions.
CO2	To help the students to understand the fundamental concepts and principles of management; the basic roles, skills, functions of management, various organizational structures and basic knowledge of marketing

TE (E&TC) Part - II

EMBEDDED SYSTEMS

CO1	Explain ARM architecture
CO2	Identify built-in peripherals and write programs for interfacing of I/O devices
CO3	Write embedded C programs for ARM
CO4	Design real world problems using the concepts of RTOS.

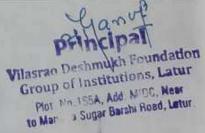
DIGITAL COMMUNICATION

CO1	
COI	Understand the principles of digital communications system.
CO2	Explain importance and use of probability and random variables in digital [] communication
CO3	Characterize communication signal and system.
CO4	Work out the practical and design implementation of different type of encoding and decoding techniques.
CO5	To understand concepts of Information theory and various coding techniques.
CO6	Understand the M-ary communication which is pre-requisites for Digital Commun

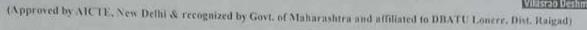
ANTENNA AND WAVE PROPAGATION

CO1	Understand the concept of radiation through mathematical formulation
CO2	Plot the characteristics of wire and aperture antennas.
CO3	Develop the performance characteristics of array antenna.
CO4	Measure the antenna parameters and understand its fundamentals.
CO5	Understand the behavior of nature on em wave propagation





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(DTE Code:

POWER ELECTRONICS

CO1	Understand basic principle of power conversion.
CO2	Design & implement a triggering / gate drive circuit for a power device
CO3	Design & implement protection circuits for power devices.
CO4	Understand, design & analyze different Power electronics converters.
CO5	Utilize power converters in different industrial applications

(PROFESSIONAL ELECTIVE -II) DIGITAL IMAGE PROCESSING

COI	Describe the fundamentals of Image Processing and Image transform techniques.
CO2	Apply image enhancement technique in frequency and spatial domain
CO3	Develop and analyze image compression techniques
CO4	Demonstrate segmentation algorithms for general image.
CO5	Apply morphological operations to images/ Improve segmented image output by morphological operations.
CO6	Design and implement image processing algorithms for real-world problems.

CYBER SECURITY

COI	Describe the fundamentals of Image Processing and Image transform techniques.
CO2	Apply image enhancement technique in frequency and spatial domain
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CO4	Demonstrate segmentation algorithms for general image.
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CO6	Design and implement image processing algorithms for real-world problems.

B. E. (E&TC) Part - I

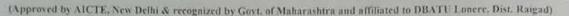
RE ANTENNA AND MICROWAVE ENGINEERING

	All all Indiana.	
COI	Ability to understand the basic operation and working of Microwave Tubes	
CO2	Identify the state of art microwave tubes and semiconductors and their real use In	real life
CO3	Application of microwave and RF antenna for industrial and scientific purpose	

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(DTE Code:

(EL-1)SATELLITE COMMUNICATION AND RADAR ENGINEERING

CO1	Understand fundamental underlying principles of satellite communication
CO2	Describe complete knowledge about the earth and space subsystems
CO3	Have a basic knowledge of the use of Satellite system and mobile services provided.
CO4	Explain the basics of satellite communication
CO5	Explain and analyzes link budget of satellite signal for proper communication
CO6	Use the different application of satellite communication

DIGITAL VISI DESIGN

Model digital circuit with and the
JModel digital circuit with, simulate, synthesis in Microwind. Understand chip level issues and need of testability
Design digital CMOS circuits for specified applications.
ł

WIRELESS AND MOBILE COMMUNICATION)

COI	Explain and apply the concepts telecommunication switching, traffic and networks.
CO2	Analyze the telecommunication traffic.
CO3	Analyze radio channel and cellular capacity
CO4	Explain and apply concepts of GSM and CDMA system.

B. E. (E&TCI) Part - II

OPTICAL FIBER COMMUNICATION

CO1	Estimate various losses in optical fiber,
CO2.	Design fiber optic communication link
СОЗ	Find out the necessity of optical amplifier

COMPUTER NETWORKS

CO1	Identify the components required to build different types of network
CO2	Choose the required functionality at each layer for given application identify solution for each function at each layer
CO3	Trace the flow of information from one to another node in the network

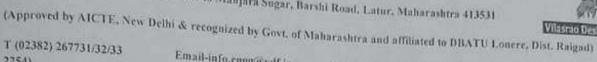


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EL-IHITOT & SENSOR NETWO

CO1	Explain in a concise manner how the general Internet as well as Internet of Things work.
CO2	Understand constraints and opportunities of wireless and mobile networks for Internet of Things
CO3	Use basic measurement tools to determine the real-time performance of packet based networks
CO4	Analyze trade-offs in interconnected wireless embedded sensor networks.
CO5	Understand the vision of IoT from a global context.
CO6	Determine the Market perspective of IoT
CO7	Use of Devices, Gateways and Data Management in IoT.
CO8	Building state of the art architecture in IoT.
CO9	Application of IoT in Industrial and Commercial Building Automation and Real World Design Constraints

EL-IV (INDUSTRIAL ORGANIZATION & PROJECT MANAGEMENT

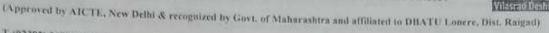
COI	Students will able to follow types of industries.
CO2	Students can evaluate time estimation of the project used in industry.
CO3	Students will able to understand software evaluation used with industry

zinoffntantl **IQAC** Coordinator

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DTE Code

PO CO OF ELECTRONIC & TELECOMMUNICATION ENGINEERING DEPARTMENT

ACADEMIC YEAR 2020-21

Vision

To be a Centre of technical education in electronics & electronic communication to provide excellent technical resources to create technocrats for the well-being of society..

Mission

- To educate the scholars of electronics & communication engineering stream with welldefined and rigorously structured curriculum and well equipped laboratories to meet the growing challenges of the Industry.
- Encouraging students with basic course knowledge to go for further higher Education.
- Promoting scholars towards research through constant interaction with research organizations and Industries...

Graduate Attributes [Program Outcomes (POS)]

The Graduate Attributes are the knowledge skills and attitudes which the students have at the time of graduation. These Graduate Attributes identified by National Board of Accreditation are as follows:

- **PO-1.** Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
- PO-2. Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
- PO-3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO-4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO-5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

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PO-6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO-7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate Vision The vision of the department is to achieve excellence in teaching, learning, research and transfer of technology and overall development of students. Mission Imparting quality education, looking after holistic development of students and conducting need based research and extension. The knowledge of, and need for sustainable development.

PO-8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO-9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO-10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO-11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO-12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Educational Objectives.

PEO1	To provide requisite Engineering knowledge as well as information about recent trends in the field of communication Engineering to the students
PEO2	To develop lifelong learning environment for multidisciplinary engineering education.



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Course Outcomes:

SE (E&TC) Part - I

ENGINEERING MATHEMATICS -III

	EMOTIVEENING WATHEMATICS -III
COI	Solve higher order linear differential equation using appropriate techniques for modeling and analyzing electrical circuits.
CO2	Solve problems related to Fourier transform, Laplace transform and applications to Communication systems and Signal processing
СОЗ	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
CO4	Perform vector differentiation and integration, analyze the vector fields and apply to Electromagnetic fields.
CO5	Analyze conformal mappings, transformations and perform contour integration of complex functions in the study of electrostatics and signal processing

DIGITAL LOGIC DESIGN

CO1	Use the basic logic gates and various reduction techniques of digital logic circuit in detail. 2, 3, 4.
CO2	Design combinational and sequential circuits.
CO3	Design and implement hardware circuit to test performance and application.
CO4	Understand the architecture and use of VHDL for basic operations and Simulate using simulation software.

Electronic Devices & Circuits

	Electronic Devices & Circuits
CO1	Comply and verify parameters after exciting devices by any stated method.
CO2	Implement circuit and test the performance.
CO3	Analyze small signal model of FET and MOSFET.
CO4	Explain behavior of FET at low frequency.
C05	Design an adjustable voltage regulator circuits.

BASIC HUMAN RIGHTS

	DADIC TICINIA
CO1	Simply put, human rights education is all learning that develops the knowledge, skills, and values of human rights.
CO2	Strengthen the respect for human rights and fundamental freedoms.
CO3	Enable all persons to participate effectively in a free society
CO4	Learn about human rights principles, such as the universality, indivisibility, and interdependence of human rights have been such as the universality, indivisibility, and

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CO5	Learn about regional, national, state, and local law that reinforces international human rights law.
CO6	Learn and know about and being able to use global, regional, national, and local human rights instruments and mechanisms for the protection of human rights

NETWORK ANALYSIS

	NETWORK ANALYSIS
CO1	Apply knowledge of mathematics to solve numerical based on network simplification and it will be used to analyze the same.
CO2	Design passive filters and attenuators theoretically and practically. To apply knowledge for design of active filters as well as digital filters and even extend this to advance adaptive filters
CO3	Identify issues related to transmission of signals, analyze different RLC networks.
CO4	Find technology recognition for the benefit of the society

	Analog Circuits
CO1	Understand the characteristics of IC and Op-Amp and identify the internal structure.
CO2	Understand and identify various manufacturing techniques
CO3	Derive and determine various performances based parameters and their significance for Op-Amp
CO4	Comply and verify parameters after exciting IC by any stated method
C05	Analyze and identify the closed loop stability considerations and I/O limitations
CO6	Analyze and identify linear and nonlinear applications of Op-Amp.
CO7	Understand and verify results (levels of V & I) with hardware implementation.
CO8	Implement hardwired circuit to test performance and application for what it is being designed

SE (E&TC) Part - II

ELECTRICAL MACHINES & INSTRUMENTS

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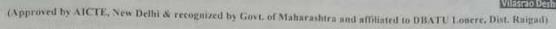
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The ability to formulate and then analyze the working of any electrical machine using mathematical model under loaded and unloaded conditions.
The skill to analyze the response of any electrical machine
The ability to troubleshoot the operation of an electrical machine
The ability to select a suitable measuring instrument for a given application

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CO5	The ability to estimate and correct deviations in measurements due to the influence of the instrument and due to the accuracy of the instrument.
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ANALOG COMMUNICATION ENCINEEDING

CO1	Understand and identify the fundamental concepts and various components of analog communication systems.
CO2	Understand the concepts of modulation and demodulation techniques.
CO3	Design circuits to generate modulated and demodulated wave.
CO4	Equip students with various issues related to analog communication such as modulation, demodulation, transmitters and receivers and noise performance.
CO5	Understand the concepts of modulation and demodulation techniques of angle modulation (frequency and phase).
CO6	Explain signal to noise ratio, noise figure and noise temperature for single and cascaded stages in a communication system
СО7	Develop the ability to compare and contrast the strengths and weaknesses of various communication systems

MICROPROCESSOR

CO1	Learner gains ability to apply knowledge of engineering in designing different case studies.	
CO2	Students get ability to interface mechanical system to function in multidisciplinary system like in robotics, Automobiles	
CO3	Students can identify and formulate control and monitoring systems using microprocessors.	
CO4	Students get ability to conduct experiments based on interfacing of devices to or interfacing to real world applications.	
CO5	Students will design cost effective real time system to serve engineering solution for Globa social and economic context.	
CO6	This course understanding will enforce students to acquire knowledge of recent trends like superscalar and pipelining and thus finds recognition of continuous updation.	
CO7	Learn use of hardware and software tools, 8. Develop interfacing to real world device	

SIGNAL & SYSTEMS

CO1	Understand mathematical description and representation of continuous and discrete time signals and systems.
CO2	Develop input output relationship for linear shift invariant system and understand the convolution operator for continuous and discrete time system
СОЗ	Understand and resolve the signals in frequency domain using Fourier series and Fourier transforms
CO4	Understand the limitations of Founds Form and need for Laplace transform and develop

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random signals and

	the ability to analyze the system in s- domain
CO5	Understand the basic concept of probability, random variables & random signals a develop the ability to find correlation, CDF, PDF and probability of a given event

	TRODUCT DESIGN ENGINEERING	
CO1	Create simple mechanical or other designs	
CO2	Create design documents for knowledge sharing	
CO3	Manage own work to meet design requirements	
CO4	Work effectively with colleagues	

	Able to solve algebraic and transcendental equations by using numerical techniques and will
CO1	be able to compare different numerical techniques used for this purpose and also will be able to choose a proper one as per the requirement of the problem.
CO2	Able to solve a system of linear equations with any number of variables using different direct and iterative numerical techniques
C03	. Understand the concept of interpolation, finite difference operators and their relations, and can apply different interpolation techniques on equi-spaced or non equi-spaced data values
CO4	Prepare them to write computer programs for the numerical computational techniques
CO5	Understand application of the NMCP course in many engineering core subjects like signal processing, digital communication, numerical techniques in electromagnetics etc
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TE (E&TC) Part - I

CONTROL SYSTEMS

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(DTE Code:

EIECTROMAGNETIC ENGINEERING

ELECTROMAGNETIC ENGINEERING
Understanding the vector fields E, D, H & B
Cleared the Concepts Divergence and Stokes theorem
Get an idea of the concepts: Work done, Potential, Potential gradient and dipole
Get the idea of the terms Conductors, Dielectrics, boundary conditions and capacitance
Understanding of Poisson's and Laplace's equations
Get knowledge about Time Varying Field and Maxwell's Equations
Get an idea of Uniform Plane Wave used for propa

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CO3	Analyze effect of channel noise on the analog communication system
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PROFESSIONAL ELECTIVE-1 (COMPUTER ORGANIZATION

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C	Analyze the principles of computer arctifecture using starting available computers.



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TE (E&TC) Part - II

EMBEDDED SYSTEMS

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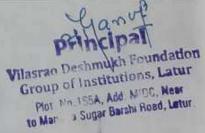
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CO5	To understand concepts of Information theory and various coding techniques.
CO6	Understand the M-ary communication which is pre-requisites for Digital Commun

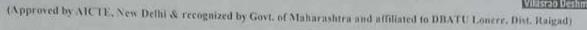
ANTENNA AND WAVE PROPAGATION

CO1	Understand the concept of radiation through mathematical formulation
CO2	Plot the characteristics of wire and aperture antennas.
CO3	Develop the performance characteristics of array antenna.
CO4	Measure the antenna parameters and understand its fundamentals.
CO5	Understand the behavior of nature on em wave propagation





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(DTE Code:

POWER ELECTRONICS

CO1	Understand basic principle of power conversion.
CO2	Design & implement a triggering / gate drive circuit for a power device
CO3	Design & implement protection circuits for power devices.
CO4	Understand, design & analyze different Power electronics converters.
CO5	Utilize power converters in different industrial applications

(PROFESSIONAL ELECTIVE -II) DIGITAL IMAGE PROCESSING

COI	Describe the fundamentals of Image Processing and Image transform techniques.
CO2	Apply image enhancement technique in frequency and spatial domain
CO3	Develop and analyze image compression techniques
CO4	Demonstrate segmentation algorithms for general image.
CO5	Apply morphological operations to images/ Improve segmented image output by morphological operations.
CO6	Design and implement image processing algorithms for real-world problems.

CYBER SECURITY

COI	Describe the fundamentals of Image Processing and Image transform techniques.
CO2	Apply image enhancement technique in frequency and spatial domain
CO3	Develop and analyze image compression techniques
CO4	Demonstrate segmentation algorithms for general image.
CO5	Apply morphological operations to images/ Improve segmented image output by morphological operations.
CO6	Design and implement image processing algorithms for real-world problems.

B. E. (E&TC) Part - I

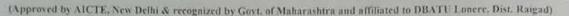
RE ANTENNA AND MICROWAVE ENGINEERING

	All all Indiana.	
COI	Ability to understand the basic operation and working of Microwave Tubes	
CO2	Identify the state of art microwave tubes and semiconductors and their real use In	real life
CO3	Application of microwave and RF antenna for industrial and scientific purpose	

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(DTE Code:

(EL-1)SATELLITE COMMUNICATION AND RADAR ENGINEERING

CO1	Understand fundamental underlying principles of satellite communication
CO2	Describe complete knowledge about the earth and space subsystems
CO3	Have a basic knowledge of the use of Satellite system and mobile services provided.
CO4	Explain the basics of satellite communication
CO5	Explain and analyzes link budget of satellite signal for proper communication
CO6	Use the different application of satellite communication

DIGITAL VISI DESIGN

Model digital circuit with and the
JModel digital circuit with, simulate, synthesis in Microwind. Understand chip level issues and need of testability
Design digital CMOS circuits for specified applications.
ł

WIRELESS AND MOBILE COMMUNICATION)

COI	Explain and apply the concepts telecommunication switching, traffic and networks.
CO2	Analyze the telecommunication traffic.
CO3	Analyze radio channel and cellular capacity
CO4	Explain and apply concepts of GSM and CDMA system.

B. E. (E&TCI) Part - II

OPTICAL FIBER COMMUNICATION

CO1	Estimate various losses in optical fiber,
CO2.	Design fiber optic communication link
СОЗ	Find out the necessity of optical amplifier

COMPUTER NETWORKS

CO1	Identify the components required to build different types of network
CO2	Choose the required functionality at each layer for given application identify solution for each function at each layer
CO3	Trace the flow of information from one to another node in the network

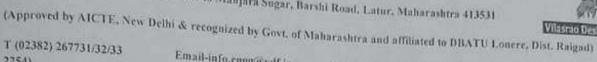


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(DTF, Code:

EL-IHITOT & SENSOR NETWO

CO1	Explain in a concise manner how the general Internet as well as Internet of Things work.
CO2	Understand constraints and opportunities of wireless and mobile networks for Internet of Things
CO3	Use basic measurement tools to determine the real-time performance of packet based networks
CO4	Analyze trade-offs in interconnected wireless embedded sensor networks.
CO5	Understand the vision of IoT from a global context.
CO6	Determine the Market perspective of IoT
CO7	Use of Devices, Gateways and Data Management in IoT.
CO8	Building state of the art architecture in IoT.
CO9	Application of IoT in Industrial and Commercial Building Automation and Real World Design Constraints

EL-IV (INDUSTRIAL ORGANIZATION & PROJECT MANAGEMENT

COI	Students will able to follow types of industries.
CO2	Students can evaluate time estimation of the project used in industry.
CO3	Students will able to understand software evaluation used with industry

zinoffntantl **IQAC** Coordinator

Principal Prot Waghmare M. A . Principal Condat VILASRAO DESHUNKH FOUNDAT GROUP OF INSTITUTIONS VDF School of Engg &Tech. New MIDC, Latur-413531



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(DTF. Code: 2254)

PO CO OF ELECTRONIC & TELECOMMUNICATION ENGINEERING DEPARTMENT

ACADEMIC YEAR 2018-19

Vision

To be a Centre of technical education in electronics & electronic communication to provide excellent technical resources to create technocrats for the well-being of society..

Mission

- To educate the scholars of electronics & communication engineering stream with well-defined and rigorously structured curriculum and well equipped laboratories to meet the growing challenges of the Industry.
- Encouraging students with basic course knowledge to go for further higher Education.
- Promoting scholars towards research through constant interaction with research organizations and industries...

Graduate Attributes [Program Outcomes (POS)]

The Graduate Attributes are the knowledge skills and attitudes which the students have at the time of graduation. These Graduate Attributes identified by National Board of Accreditation are as follows:

- PO-1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
- PO-2. Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.

PO-3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.



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- PO-4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO-5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- PO-6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO-7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate Vision The vision of the department is to achieve excellence in teaching, learning, research and transfer of technology and overall development of students. Mission Imparting quality education, looking after holistic development of students and conducting need based research and extension. The knowledge of, and need for sustainable development.
- PO-8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO-9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO-10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- PO-11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- PO-12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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ENGINEERING MATHEMATICS -III

	After successfully completing the course students will be able to
COI	Solve higher order linear differential equation using appropriate techniques for modeling and analyzing electrical circuits.
CO2	Solve problems related to Fourier transform, Laplace transform and applications to Communication systems and Signal processing
СОЗ	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
CO4	Perform vector differentiation and integration, analyze the vector fields and apply to Electromagnetic fields.
CO5	Analyze conformal mappings, transformations and perform contour integration of complex functions in the study of electrostatics and signal processing

DIGITAL LOGIC DESIGN

After successfully completing the course students will be able to

COI	Use the basic logic gates and various reduction techniques of digital logic circuit in detail.
CO2	Understand the architecture and use of VHDL for basic operations and Simulate using simulation software.
CO3	Design combinational and sequential circuits
CO4	Design and implement hardware circuit to test performance and application.

ELECTRONICS CIRCUITS & DEVICES-1

After successfully completing the course students will be able to

COI	Demonstrate Semiconductor Diode and Diode circuits	
CO2	Implement circuit and test the performance.	
CO3	Analyze small signal model of FET and MOSFET.	
CO4	Explain behavior of FET at low frequency.	
CO5	Design an adjustable voltage regulator circuits & Oscillator circuits	

NUMERICAL ANALYSIS & COMPUTATION

After successfully completing the course students will be able to

Able to solve algebraic and transcendental equations by using numerical techniques and will be able to compare different numerical techniques used for this purpose and also will be able to choose a proper one as per the requirement of the problem.



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CO2	Able to solve a system of linear equations with any number of variables using different direct and iterative numerical techniques
соз	Understand the concept of interpolation, finite difference operators and their relations, and can apply different interpolation techniques on equi-spaced or non equi-spaced data values
CO4	Prepare them to write computer programs for the numerical computational techniques
CO5	Understand application of the NMCP course in many engineering core subjects like signal processing, digital communication, numerical techniques in electromagnetics etc

NETWORK THEORY

COI	Apply knowledge of mathematics to solve numerical based on network simplification and it will be used to analyze the same.
CO2	Design passive filters and attenuators theoretically and practically. To apply knowledge for design of active filters as well as digital filters and even extend this to advance adaptive filters
СОЗ	Identify issues related to transmission of signals, analyze different RLC networks.
CO4	Find technology recognition for the benefit of the society
CO5	Design passive filters and attenuators theoretically and practically. To apply knowledge for design of active filters as well as digital filters and even extend this to advance adaptive filters.

PROFESSIONAL COMMUNICATION

filters

After successfully completing the course of

COI	Communication with essential communication skills (writing, verbal and non-verbal)
CO2	Master the presentation skill and be ready for facing interviews.
СОЗ	Do effective Business Correspondence

SE (E&TC) Part - II ENGINEERING MATHEMATICS -IV After successfully completing the course students will be able to



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COI	Solve Z-Transform
CO2	Perform Linear Transformations
	Understand & solve Complex Integration
	Understand & solve Probability distribution
СОЗ	Understand & solve a function of a Complex Variable
	ELECTRONICS DEVICS & CIRCUITS-II After successfully completing the course students will be able to
COI	Demonstrate Transistors at high Frequencies
CO2	Explain Application of OP-AMP with Diode
CO3	Demonstrate Operational Amplifier and their General linear application
CO4	Demonstrate Power Amplifiers
CO5	Explain specification and use of various Voltage Regulators ICS
	ANALOG COMMUNICATION SYSTEMS
CO1	Understand and identify the fundamental concepts and various components of analog communication systems.
CO2	Understand the concepts of modulation and demodulation techniques.
СОЗ	Explain signal to noise ratio, noise figure and noise temperature for single and cascaded stages in a communication system
CO4	Design circuits to generate modulated and demodulated wave.
CO5	Understand the concepts of modulation and demodulation techniques of angle modulation

SIGNAL & SYSTEMS

(frequency and phase).

After successfully completing the course students will be able to Understand mathematical description and representation of continuous and discrete time signals and systems. COL Develop input output relationship for linear shift invariant system and understand the convolution operator for continuous and discrete time system CO2 Understand and resolve the signals in frequency domain using Fourier series and Fourier CO3 Understand the limitations of Fourier transform and need for Laplace transform and develop CO4

> MICROPROCESSOR & INTERFACING After successfully completing the course students will be able to



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Principal Vilasrao Deshmukh Foundation Group of Institutions, Latur Plot. No. 165A, Add. MIDC, Near

to Manjara Sugar Barshi Road, Letur

C(2)1	Explain Intel 8086 Architecture
CO2	Design the 8086 CPU module
CO3	Explain 8087 coprocessor Learner gains ability to apply knowledge of engineering in designing different case studies
CO4	Learner gains ability to apply knowledge of engineering in

ORIECT ORIENTED PROGRAMMING

Obsect Ottle	i ill be obje to
m tr	he course students will be able to
After encossfully completing	He Course Students

COI	Understand: object oriented programming	
CO2	Understand: catching an exception & Exception objects	
CO3	Define: Components and Categories	
CO4	Describe: Different types of inheritance	

TE (E&TC) Part - I&II

DATA STRUCTURES AND COMPUTER ALGORITHMS

	DATAGIROGICAGO
CO1	Able to understand the concepts of data structure, data type and array data structure.
CO2	Able to analyze algorithms and determine their time complexity.
CO3	Able to implement linked list data structure to solve various problems.
CO4	Able to understand and apply various data structure such as stacks, queues, trees and graphs to solve various computing problems using C-programming language.
CO5	Able to implement and know when to apply standard algorithms for searching and sorting.
CO6	Able to effectively choose the data structure that efficiently model the information in a problem

DIGITAL SIGNAL PROCESSING

COI	Understand the Discrete Time Signals Analytically & Visualize them in the time and frequency domain
CO2	Able to Understand the Transform domain & it's significance & problems related to computational complexity.
CO3	Be able to specify & design any digital filters.

CONTROL SYSTEMS

COI	Represent the mathematical model of a system
CO2	Determine the response of different order systems for various step inputs



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STOCHASTIC PROCESS

COI	Have a fundamental knowledge of the basic probability concepts
CO2	Have a good knowledge of standard distributions which can describe real life phenomena
CO3	Acquire skills in handling situations involving several random variable and functions of random variables.
CO4	Understand and characterize phenomena which evolve with respect to time in probabilistic Manner

EMBEDDED SYSTEM DESIGN

CO1	After successfully completing the course students will be able to describe the microcontroller and ARM Processor Architecture and its Features.
CO2	Learn importance of microcontroller and ARM Processor in designing embedded applications.
CO3	Learn use of hardware and software tools.
CO4	Develop interfacing to real world devices

PROFESSIONAL ETHICS

CO1	Be able to distinguish among morals, values, ethics, and the law and to explore how they impact professional practice
CO2	Have an increased personal understanding of issues related to ethics and the law
соз	Have examined one's own ethical decision-making processes and develop guidelines for enhancing one's ability to generate ethical behavior and solutions to conflicts arising in the practice.

MINI PROJECT-I

COI	Demonstrate a through and systematic understanding of project contents.
CO2	Understand methodologies and professional way of documentation and communication
CO3	Know the key stages in development of the project.
CO4	Extend or use the idea in mini project for major project

DIGITAL COMMUNICATION SYSTEMS

	Perform the time and frequency domain analysis of the signals in a digital communication	
CO1	Perform the time and frequency domain analysis of the systems.	
CO2	Design a suitable source and channel coding scheme for a communication system.	
	Design a damage	Barre



Principal Proposition

Vilasrao Deshmukh Foundation Group of Institutions, Latur Plot. No. 185A. Add. MIDC. Near to Manjara Sugar Barshi Road, Letur TROMAGNETIC ENGINEERING

	ELECTROMAGNETIC EXCENTED
COI	Apply vector calculus to static electric-magnetic fields in different engineering situations
CO2	Analyze Maxwell's equations in different forms (differential come)
CO3	engineering problems. Examine the phenomena of wave propagation in different media & its interfaces & in applications of microwave engineering
CO4	applications of microwave engineering Analyze the nature of electromagnetic wave propagation in guided medium which are used in microwave applications.

POWER ELECTRONICS

CO1	Demonstrate an understanding of fundamentals of thyristor family.
CO2	Analyze the various applications and circuits based on thyristor.
CO3	Build and test circuits using power devices such as SCR, IGBT and MOSFET.
CO4	Analyze and design controlled rectifier, DC to DC converters, DC to AC inverters, how to analyze these rectifiers, inverters and some basic application examples

ELECTRONIC INSTRUMENTS AND MEASUREMENTS

COI	To identify various errors in measurement system and correct them.
CO2	To know the fundamentals of measuring systems including the particular limitations and capabilities of a number of measuring devices (pressure transducers, strain gages, thermocouples, etc.) and equipments (oscilloscope, spectrum analyser, etc.).
CO3	To be familiar with various computer controlled test systems

PROFESSIONAL APTITUDE AND LOGICAL REASONING

	PROFESSIONAL APTITUDE AND LOGICAL REASONING	
COI	Crack different aptitude tests of various competitive exams.	
CO2	Achieve success in recruitment process of various industries.	

MINI PROJECT-II

COI	Demonstrate a through and systematic understanding of project contents.
CO2	Understand methodologies and professional way of documentation and communication.
CO3	Know the key stages in development of the project.
CO4	Extend or use the idea in mini project for major project.



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BE (E&TC) Part - I&II

Digital VLSI DESIGN

COL	Model digital circuit with	
COZ	Model digital circuit with, simulate, synthesis in Microwind	
CO3	Understand chip level issues and need of testability. Design digital CMOS circuits for specified applications	

RF Antenna & Microwave engineering

COL	At the
2.01	Ability to understand the basic operation and working of Microwave Tube
CO2	Identify the state of art microwave tubes and semiconductors and their real use in real life
CO3	Application of microwave and RF antenna for industrial and scientific purpose

Satellite Communication & Radar Engineering

COL	Understand fundamental underlying principles of satellite communication
CO2	Describe complete knowledge about the earth and space subsystems
CO3	Have a basic knowledge of the use of Satellite system and mobile services provided.
CO4	Explain the basics of satellite communication
CO5	Explain and analyzes link budget of satellite signal for proper communication
CO6	Use the different application of satellite communication

Wireless & Mobile Communication

COI	Explain and apply the concepts telecommunication switching, traffic and networks.
CO2	Analyze the telecommunication traffic.
CO3	Analyze radio channel and cellular capacity.
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	Computer Network
COL	Identify the components required to build different types of network
CO2	Choose the required functionality at each layer for given application identify solution re- each function at each layer
CO3	Trace the flow of information from one to another node in the network

CO1 Estimate various losses in optical fiber,

CO2 Design fiber optic communication link

CO3 Find out the necessity of optical amplifier.

CO1 Explain in a concise manner how the general Internet as well as Internet of Things work

CO2 Understand programming using python and raspberry PL.

CO3

Use basic measurement tools to determine the real-time performance of packet based networks.

CO4 Analyze trade-offs in interconnected wireless embedded sensor networks.

CO5 Application of IoT in Industrial and Commercial Building Automation and Real World Design Constraints.

CO6 To study different hardware physical devices like Beagle bone a Black cubiboard.

	Industrial Organization & Project Management	18
COI	Students will able to follow types of industries.	
CO2	Students can evaluate time estimation of the project used in industry	1 100
CO3	Students will able to understand software evaluation used with industry.	

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Principal.

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Website: www.vdfengineering.co.in

(DTF. Code: 2254)

PO CO OF ELECTRONIC & TELECOMMUNICATION ENGINEERING DEPARTMENT

ACADEMIC YEAR 2018-19

Vision

To be a Centre of technical education in electronics & electronic communication to provide excellent technical resources to create technocrats for the well-being of society.

Mission

- To educate the scholars of electronics & communication engineering stream with well-defined and rigorously structured curriculum and well equipped laboratories to meet the growing challenges of the Industry.
- Encouraging students with basic course knowledge to go for further higher Education.
- Promoting scholars towards research through constant interaction with research organizations and industries...

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- PO-2. Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.

PO-3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.



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- PO-4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO-5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- PO-6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO-7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate Vision The vision of the department is to achieve excellence in teaching, learning, research and transfer of technology and overall development of students. Mission Imparting quality education, looking after holistic development of students and conducting need based research and extension. The knowledge of, and need for sustainable development.
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- PO-9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO-10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
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20 Manyara Sugar Barahi Roou, Latur.

ENGINEERING MATHEMATICS -III

	After successfully completing the course students will be able to
COI	Solve higher order linear differential equation using appropriate techniques for modeling and analyzing electrical circuits.
CO2	Solve problems related to Fourier transform, Laplace transform and applications to Communication systems and Signal processing
СОЗ	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
CO4	Perform vector differentiation and integration, analyze the vector fields and apply to Electromagnetic fields.
CO5	Analyze conformal mappings, transformations and perform contour integration of complex functions in the study of electrostatics and signal processing

DIGITAL LOGIC DESIGN

After successfully completing the course students will be able to

COI	Use the basic logic gates and various reduction techniques of digital logic circuit in detail.
CO2	Understand the architecture and use of VHDL for basic operations and Simulate using simulation software.
CO3	Design combinational and sequential circuits
CO4	Design and implement hardware circuit to test performance and application.

ELECTRONICS CIRCUITS & DEVICES-1

After successfully completing the course students will be able to

COI	Demonstrate Semiconductor Diode and Diode circuits	
CO2	Implement circuit and test the performance.	
CO3	Analyze small signal model of FET and MOSFET.	
CO4	Explain behavior of FET at low frequency.	
CO5	Design an adjustable voltage regulator circuits & Oscillator circuits	

NUMERICAL ANALYSIS & COMPUTATION

After successfully completing the course students will be able to

Able to solve algebraic and transcendental equations by using numerical techniques and will be able to compare different numerical techniques used for this purpose and also will be able to choose a proper one as per the requirement of the problem.



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CO2	Able to solve a system of linear equations with any number of variables using different direct and iterative numerical techniques
СОЗ	Understand the concept of interpolation, finite difference operators and their relations, and can apply different interpolation techniques on equi-spaced or non equi-spaced data values
CO4	Prepare them to write computer programs for the numerical computational techniques
CO5	Understand application of the NMCP course in many engineering core subjects like signal processing, digital communication, numerical techniques in electromagnetics etc

NETWORK THEORY

	After successfully completing the course students will be able to
CO1	Apply knowledge of mathematics to solve numerical based on network simplification and it will be used to analyze the same.
CO2	Design passive filters and attenuators theoretically and practically. To apply knowledge for design of active filters as well as digital filters and even extend this to advance adaptive filters
СОЗ	Identify issues related to transmission of signals, analyze different RLC networks.
CO4	Find technology recognition for the benefit of the society
CO5	Design passive filters and attenuators theoretically and practically. To apply knowledge for design of active filters as well as digital filters and even extend this to advance adaptive filters

PROFESSIONAL COMMUNICATION

After successfully completing the course students will be able to

COI	Communication with essential communication skills (writing, verbal and non-verbal)
CO2	Master the presentation skill and be ready for facing interviews.
СОЗ	Do effective Business Correspondence

SE (E&TC) Part – II
ENGINEERING MATHEMATICS –IV
After successfully completing the course students will be able to



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COI	Solve Z-Transform
CO2	Perform Linear Transformations
	Understand & solve Complex Integration
	Understand & solve Probability distribution
СОЗ	Understand & solve a function of a Complex Variable
	ELECTRONICS DEVICS & CIRCUITS-II After successfully completing the course students will be able to
COI	Demonstrate Transistors at high Frequencies
CO2	Explain Application of OP-AMP with Diode
CO3	Demonstrate Operational Amplifier and their General linear application
CO4	Demonstrate Power Amplifiers
CO5	Explain specification and use of various Voltage Regulators ICS
	ANALOG COMMUNICATION SYSTEMS
CO1	Understand and identify the fundamental concepts and various components of analog communication systems.
CO2	Understand the concepts of modulation and demodulation techniques.
СОЗ	Explain signal to noise ratio, noise figure and noise temperature for single and cascaded stages in a communication system
CO4	Design circuits to generate modulated and demodulated wave.
CO5	Understand the concepts of modulation and demodulation techniques of angle modulation

SIGNAL & SYSTEMS

(frequency and phase).

After successfully completing the course students will be able to Understand mathematical description and representation of continuous and discrete time signals and systems. COL Develop input output relationship for linear shift invariant system and understand the convolution operator for continuous and discrete time system CO2 Understand and resolve the signals in frequency domain using Fourier series and Fourier CO3 Understand the limitations of Fourier transform and need for Laplace transform and develop CO4

> MICROPROCESSOR & INTERFACING After successfully completing the course students will be able to



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C(2)1	Explain Intel 8086 Architecture
CO2	Design the 8086 CPU module
CO3	Explain 8087 coprocessor Learner gains ability to apply knowledge of engineering in designing different case studies
CO4	Learner gains ability to apply knowledge of engineering in

ORIECT ORIENTED PROGRAMMING

Obsect Ottle	i ill be obje to
m tr	he course students will be able to
After encossfully completing	He Course Students

COI	Understand: object oriented programming	
CO2	Understand: catching an exception & Exception objects	
CO3	Define: Components and Categories	
CO4	Describe: Different types of inheritance	

TE (E&TC) Part - I&II

DATA STRUCTURES AND COMPUTER ALGORITHMS

	DATAGIROGICAGO
CO1	Able to understand the concepts of data structure, data type and array data structure.
CO2	Able to analyze algorithms and determine their time complexity.
CO3	Able to implement linked list data structure to solve various problems.
CO4	Able to understand and apply various data structure such as stacks, queues, trees and graphs to solve various computing problems using C-programming language.
CO5	Able to implement and know when to apply standard algorithms for searching and sorting.
CO6	Able to effectively choose the data structure that efficiently model the information in a problem

DIGITAL SIGNAL PROCESSING

COI	Understand the Discrete Time Signals Analytically & Visualize them in the time and frequency domain
CO2	Able to Understand the Transform domain & it's significance & problems related to computational complexity.
CO3	Be able to specify & design any digital filters.

CONTROL SYSTEMS

COI	Represent the mathematical model of a system
CO2	Determine the response of different order systems for various step inputs



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STOCHASTIC PROCESS

COI	Have a fundamental knowledge of the basic probability concepts
CO2	Have a good knowledge of standard distributions which can describe real life phenomena
CO3	Acquire skills in handling situations involving several random variable and functions of random variables.
CO4	Understand and characterize phenomena which evolve with respect to time in probabilistic Manner

EMBEDDED SYSTEM DESIGN

CO1	After successfully completing the course students will be able to describe the microcontroller and ARM Processor Architecture and its Features.
CO2	Learn importance of microcontroller and ARM Processor in designing embedded applications.
CO3	Learn use of hardware and software tools.
CO4	Develop interfacing to real world devices

PROFESSIONAL ETHICS

CO1	Be able to distinguish among morals, values, ethics, and the law and to explore how they impact professional practice
CO2	Have an increased personal understanding of issues related to ethics and the law
соз	Have examined one's own ethical decision-making processes and develop guidelines for enhancing one's ability to generate ethical behavior and solutions to conflicts arising in the practice.

MINI PROJECT-I

COI	Demonstrate a through and systematic understanding of project contents.
CO2	Understand methodologies and professional way of documentation and communication
CO3	Know the key stages in development of the project.
CO4	Extend or use the idea in mini project for major project

DIGITAL COMMUNICATION SYSTEMS

	Perform the time and frequency domain analysis of the signals in a digital communication	
CO1	Perform the time and frequency domain analysis of the systems.	
CO2	Design a suitable source and channel coding scheme for a communication system.	
	Design a damage	Barre



Principal Proposition

Vilasrao Deshmukh Foundation Group of Institutions, Latur Plot. No. 185A. Add. MIDC. Near to Manjara Sugar Barshi Road, Letur TROMAGNETIC ENGINEERING

	ELECTROMAGNETIC EXCENTED
COI	Apply vector calculus to static electric-magnetic fields in different engineering situations
CO2	Analyze Maxwell's equations in different forms (differential come)
CO3	engineering problems. Examine the phenomena of wave propagation in different media & its interfaces & in applications of microwave engineering
CO4	applications of microwave engineering Analyze the nature of electromagnetic wave propagation in guided medium which are used in microwave applications.

POWER ELECTRONICS

CO1	Demonstrate an understanding of fundamentals of thyristor family.
CO2	Analyze the various applications and circuits based on thyristor.
CO3	Build and test circuits using power devices such as SCR, IGBT and MOSFET.
CO4	Analyze and design controlled rectifier, DC to DC converters, DC to AC inverters, how to analyze these rectifiers, inverters and some basic application examples

ELECTRONIC INSTRUMENTS AND MEASUREMENTS

COI	To identify various errors in measurement system and correct them.
CO2	To know the fundamentals of measuring systems including the particular limitations and capabilities of a number of measuring devices (pressure transducers, strain gages, thermocouples, etc.) and equipments (oscilloscope, spectrum analyser, etc.).
CO3	To be familiar with various computer controlled test systems

PROFESSIONAL APTITUDE AND LOGICAL REASONING

	PROFESSIONAL APTITUDE AND LOGICAL REASONING	
COI	Crack different aptitude tests of various competitive exams.	
CO2	Achieve success in recruitment process of various industries.	

MINI PROJECT-II

COI	Demonstrate a through and systematic understanding of project contents.
CO2	Understand methodologies and professional way of documentation and communication.
CO3	Know the key stages in development of the project.
CO4	Extend or use the idea in mini project for major project.



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BE (E&TC) Part - I&II

Digital VLSI DESIGN

COL	Model digital circuit with	
COZ	Model digital circuit with, simulate, synthesis in Microwind	
CO3	Understand chip level issues and need of testability. Design digital CMOS circuits for specified applications	

RF Antenna & Microwave engineering

COL	At the
2.01	Ability to understand the basic operation and working of Microwave Tube
CO2	Identify the state of art microwave tubes and semiconductors and their real use in real life
CO3	Application of microwave and RF antenna for industrial and scientific purpose

Satellite Communication & Radar Engineering

COL	Understand fundamental underlying principles of satellite communication
CO2	Describe complete knowledge about the earth and space subsystems
CO3	Have a basic knowledge of the use of Satellite system and mobile services provided.
CO4	Explain the basics of satellite communication
CO5	Explain and analyzes link budget of satellite signal for proper communication
CO6	Use the different application of satellite communication

Wireless & Mobile Communication

COI	Explain and apply the concepts telecommunication switching, traffic and networks.
CO2	Analyze the telecommunication traffic.
CO3	Analyze radio channel and cellular capacity.
CO4	Explain and apply concepts of GSM and CDMA system



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	Computer Network
COL	Identify the components required to build different types of network
CO2	Choose the required functionality at each layer for given application identify solution re- each function at each layer
CO3	Trace the flow of information from one to another node in the network

CO1 Estimate various losses in optical fiber,

CO2 Design fiber optic communication link

CO3 Find out the necessity of optical amplifier.

CO1 Explain in a concise manner how the general Internet as well as Internet of Things work

CO2 Understand programming using python and raspberry PL.

CO3

Use basic measurement tools to determine the real-time performance of packet based networks.

CO4 Analyze trade-offs in interconnected wireless embedded sensor networks.

CO5 Application of IoT in Industrial and Commercial Building Automation and Real World Design Constraints.

CO6 To study different hardware physical devices like Beagle bone a Black cubiboard.

	Industrial Organization & Project Management	18
COI	Students will able to follow types of industries.	
CO2	Students can evaluate time estimation of the project used in industry	1 100
CO3	Students will able to understand software evaluation used with industry.	

Zinofo Enul.
I QAC Coordinator

H. O.D.

Principal.

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(DTE Code: 2254)

PO CO OF MECHANICAL ENGINEERING DEPARTMENT OF ACADEMIC YEAR 2021-22

Vision

The vision of the department is to achieve excellence in teaching, learning, research and transfer of technology and overall development of students.

Mission

Imparting quality education, looking after holistic development of students and conducting need based research and extension.

Graduate Attributes

The Graduate Attributes are the knowledge skills and attitudes which the students have at the time of graduation. These Graduate Attributes identified by National Board of Accreditation are as follows:

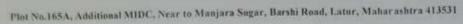
- 1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
- 2. Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
- 3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- 4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- 5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- 6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- 7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate Vision The vision of the department is to achieve

Piot. No. 165A.

Piot. No. 165A.

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to Manjara
Sugar, Barshi Road
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excellence in teaching, learning, research and transfer of technology and overall development of students. Mission Imparting quality education, looking after holistic development of students and conducting need based research and extension. The knowledge of, and need for sustainable development.

- 8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- 9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- 10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- 11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- 12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Educational Objective

Graduates should excel in engineering positions in industry and other organizations that emphasize design and implementation of engineering systems and devices.
Graduates should excel in best post-graduate engineering institutes, acquiring advanced degrees in engineering and related disciplines.
Alumni should establish a successful career in an engineering-related field and adapt to changing technologies.
Graduates are expected to continue personal development through professional study and self-learning.
Graduates should be good citizens and cultured human beings, with full appreciation of the importance of professional, ethical and societal responsibilities.



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Course Outcomes:

SE (Mechanical) Part - I

Engineering Mathematics-III

CO1	Expose the learners to different processes used in physics for industrial and technological applications.
CO2	Understand the importance of Applied Physics in physical phenomena.
СОЗ	Acquire Basic knowledge of Oscillation for Simple Harmonic, Mechanical and electrical simple harmonic oscillators.
CO4	Demonstrate knowledge of quantum mechanics and thermal physics.
CO5	Employ the knowledge of optical instruments mirrors and lens.
CO6	Implement the concept thermo dynamical equations and their applications in various fields of geometric optics

Fluid Mechanics

Define fluid, define and calculate various properties of fluid Calculate hydrostatic forces on the plane and curved surfaces and explain stability of floating bodies
Calculate hydrostatic forces on the plane and curved surfaces and explain stability of floating bodies
Explain various types of flow. Calculate acceleration of fluid particles
Apply Bernoulli's equation to simple problems in fluid mechanics
Explain laminar and turbulent flows on flat plates and through pipes
Explain and use dimensional analysis to simple problems in fluid mechanics
Understand centrifugal pump.



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Thermodynamics

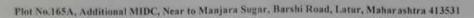
CO1	Define the terms like system, boundary, properties, equilibrium, work, heat, idea gas, entropy etc. used in thermodynamics.
CO2	Studied different laws of thermodynamics and apply these to simple thermal systems to study energy balance
CO3	Studied Entropy, application and disorder.
CO4	Studied various types of processes like isothermal, adiabatic, etc. considering system with ideal gas and represent them on p-v and T-s planes.
CO5	Represent phase diagram of pure substance (steam) on different thermodynamic planes like p-v, T-s, h-s, etc. Show various constant property lines on them.

Machine Drawing and CAD Lab

CO1	Interpret the object with the help of given sectional and orthographic views.
CO2	Construct the curve of intersection of two solids
CO3	Draw machine element using keys, cotter, knuckle, bolted and welded joint
CO4	Assemble details of any given part. i. e. valve, pump, machine tool part etc.
CO5	Represent tolerances and level of surface finish on production drawings
CO6	Understand various creating and editing commands in Auto Cad



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SE (Mechanical) Part - II

Manufacturing Processes-I

	Wantifacturing Frocesses-1
COI	Identify castings processes, working principles and applications and list various defects in metal casting
CO2	Understand the various metal forming processes, working principles and applications
СОЗ	Classify the basic joining processes and demonstrate principles of welding, brazing and soldering.
CO4	Study center lathe and its operations including plain, taper turning, work holding devices and cutting tool.
CO5	Understand milling machines and operations, cutters and indexing for gear cutting.
CO6	Study shaping, planing and drilling, their types and related tooling's

Theory of Machines- I

CO1	Define basic terminology of kinematics of mechanisms
CO2	Classify planar mechanisms and calculate its degree of freedom
CO3	Perform kinematic analysis of a given mechanism using ICR and RV methods
CO4	Introduction of different types of lubrication system.
CO5	Perform kinematic analysis of slider crank mechanism using Klein's construction and analytical approach
CO6	Perform balancing of unbalance forces in rotating masses, different types of single/multi cylinder reciprocating engines in different positions.

Basic Human Rights

Dusic Trumun Tights
Understand the history of human rights.
Learn to respect others caste, religion, region and culture.
Be aware of their rights as Indian citizen.
Understand the importance of groups and communities in the society.
Realize the philosophical and cultural basis and historical perspectives of human rights.
Make them aware of their responsibilities towards the nation.



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Strength of Materials

COI	State the basic definitions of fundamental terms such as axial load, eccentric load, stress, strain, E, μ , etc.
CO2	Recognize the stress state (tension, compression, bending, shear, etc.) and calculate the value of stress developed in the component in axial/eccentric static and impact load cases.
CO3	Distinguish between uniaxial and multiaxial stress situation and calculate principal stresses, max. Shear stress, their planes and max. Normal and shear stresses on a given plane.
CO4	Analyze given beam for calculations of SF and BM
CO5	Calculate slope and deflection at a point on cantilever /simply supported beam using double integration, Macaulay's, Area-moment and superposition methods

Applied Thermodynamics

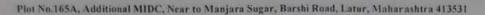
	22 Place Friedrick Squarmes
COI	Define the terms like calorific value of fuel, stoichiometric air-fuel ratio, excess air, equivalent evaporation, boiler efficiency, etc. Calculate minimum air required for combustion of fuel.
CO2	Studied and Analyze gas power cycles and vapour power cycles and derive expressions for the performance parameters like thermal efficiency.
СОЗ	Classify various types of boiler, nozzle, steam turbine and condenser used in steam power plant.
CO4	Classify various types condenser, nozzle and derived equations for its efficiency.
CO5	Draw P-v diagram for single-stage reciprocating air compressor, with and without clearance volume, and evaluate its performance. Differentiate between reciprocating and rotary air compressors.

Fluid Machinery

	a ratio trademinery
CO1	Understand and apply momentum equation
CO2	Understand and explain Hydrodynamic Machines
CO3	Explain difference between impulse and reaction turbines
CO4	Find efficiencies, draw velocity triangles
CO5	Explain governing mechanisms for hydraulic turbines
CO6	Explain working of various types of pumps, draw velocity diagrams, do simple calculations
CO7	Design simple pumping systems



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TE (Mechanical) Part - I

Heat Transfer

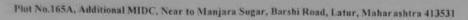
CO1	Explain the laws of heat transfer and deduce the general heat conduction equation and to explain it for 1-D steady state heat transfer in regular shape bodies
CO2	Describe the critical radius of insulation, overall heat transfer coefficient, thermal conductivity and lumped heat transferInterpret the extended surfaces
СОЗ	Illustrate the boundary layer concept, dimensional analysis, forced and free convection under different conditions
CO4	Describe the Boiling heat transfer, mass transfer and Evaluate the heat exchanger
CO5	and examine the LMTD and NTU methods applied to engineering problems
CO6	Explain the thermal radiation black body, emissivity and reflectivity and evaluation of view factor and radiation shields

Applied Thermodynamics - I

	Applied Thermodynamics - 1
COI	Define the terms like calorific value of fuel, stoichiometric air-fuel ratio, excess air, equivalent evaporation, boiler efficiency, etc. Calculate minimum air required fo combustion of fuel.
CO2	Study and Analyze gas power cycles and vapour power cycles like Otto, Diesel, dual, Joule and Rankine cycles and derive expressions for the performance parameters like thermal efficiency, Pm
СОЗ	Classify various types of boiler, nozzle, steam turbine and condenser used in steam power plant.
CO4	Classify various types of IC engines. Sketch the cut section of typical diesel engine and label its components. Define the terms like TDC, BDC, rc, etc.
CO5	Draw P-v diagram for single-stage reciprocating air compressor, with and without clearance volume, and evaluate its performance. Differentiate between reciprocating and rotary air compressors.



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Applied Thermodynamics Lab

CO1	Conduct test on Bomb calorimeter, nozzle, steam turbine, condenser, compressor etc. to study their performance.
CO2	Draw performance curves of these machines.
CO3	Analyze the results obtained from the tests.
CO4	Draw conclusions based on the results of the experiments
CO5	Based on your visit to Industry, sketch its layout and write specifications.

Machine Design Practice - I

CO1	Apply design process to an open ended problem
SOUTH STATE OF THE	rapply design process to an open ended problem
CO2	Determine suitable material and size for structural component of machine/system
CO3	Apply iterative technique in design including making estimate of unknown values for first computation and checking or revisiting and re-computing
CO4	Choose logically and defend selection of design factors
CO5	Design of components for given part/system i.e. shaft, keys, coupling, links, screws, springs etc.
CO6	Work effectively as a part of design group/team
CO7	Have good communication skill, orally, graphically as well as in writing

Theory of Machines Lab - H

CO1	Explain various types of gear boxes, gear trains, belt and rope drives
CO2	Interpreting physical principles and phenomenon of governor, gyroscopic, flywheel
CO3	Measure vibration parameters in single degree of freedom systems
CO4	Evaluating natural frequency of 1 dof

Field Training/Internship/Industrial Training - II

CO1	To make the students aware of industrial culture and organizational setup
CO2	To create awareness about technical report writing among the student.



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TE (Mechanical) Part - II

Manufacturing Processes - II

	- Additional of the Control of the C
CO1	Understand the process of powder metallurgy and its applications
CO2	Calculate the cutting forces in orthogonal and oblique cutting
CO3	Evaluate the machinability of materials
CO4	Understand the abrasive processes
CO5	Explain the different precision machining processes
CO6	Design jigs and fixtures for given application

Machine Design - II

	AN INTERPORT AND AN AND AN AND AN AND AN AND AN AND AND
CO1	Define function of bearing and classify bearings.
CO2	Understanding failure of bearing and their influence on its selection.
CO3	Classify the friction clutches and brakes and decide the torque capacity and friction
S.C.SERGOOD	disk parameter.
CO4	Select materials and configuration for machine element like gears, belts and chain
CO5	Design of elements like gears, belts and chain for given power rating
CO6	Design thickness of pressure vessel using thick and thin criteria

Applied Thermodynamics - II

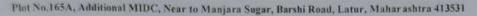
COI	Define the terms like calorific value of fuel, stoichiometric air-fuel ratio, excess air, equivalent evaporation, boiler efficiency, etc. Calculate minimum air required for combustion of fuel.
CO2	Study and Analyze gas power cycles and vapour power cycles like Otto, Diesel, dual, Joule and Rankine cycles and derive expressions for the performance parameters like thermal efficiency, Pm power plant.
CO3	Classify various types of IC engines. Sketch the cut section of typical diesel engine and label its components. Define the terms like TDC, BDC, rc, etc.
CO4	Draw P-v diagram for single-stage reciprocating air compressor, with and without clearance volume, and evaluate its performance. Differentiate between reciprocating and rotary air compressors.



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Additive Manufacturing

	1 ASSOCIATION OF THE PROPERTY
CO1	Understand the importance of Additive Manufacturing
CO2	Classify the different AM processes
CO3	Design for AM processes
CO4	Understand the applications of AM
CO5	Differentiate the post processing processes

Quantitative Techniques in Project Management

CO1	Define and formulate research models to solve real life problems for allocating limited resources by linear programming.
CO2	Apply transportation and assignment models to real life situations.
CO3	Apply queuing theory for performance evaluation of engineering and management systems.
CO4	Apply the mathematical tool for decision making regarding replacement of items in real life
CO5	Determine the EOQ, ROP and safety stock for different inventory models.
CO6	Construct a project network and apply CPM and PERT method.

Renewable Energy Sources

CO1	Explain the difference between renewable and non-renewable energy	
CO2	Describe working of solar collectors	
CO3	Explain various applications of solar energy	
CO4	Describe working of other renewable energies such as wind, biomass	

Solar Energy

COI	Describe measurement of direct, diffuse and global solar radiations falling on horizontal and inclined surfaces.
CO2	Analyze the performance of flat plate collector, air heater and concentrating type collector.
CO3	Understand test procedures and apply these while testing different types of collectors.
CO4	Study and compare various types of thermal energy storage systems.
CO5	Analyze payback period and annual solar savings due to replacement of conventional systems.
CO6	Design solar water heating system for a few domestic and commercial applications.

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(DTE Code: 2254)

Metrology and Quality Control Lab

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CO1	Measure linear, angular circular features, dimensional and geometric features
CO2	Measure surface roughness of components
CO3	Calibration of metrological equipment

Machine Design Practice - II

COL	Apply design process to an open ended problems
CO1	Apply design process to an open ended problems
CO2	Determine suitable material and size for structural component of machine/system
CO3	Apply iterative technique in design including making estimate of unknown values for first computation and checking or revisiting and re-computing Choose logically and defend selection of design factors
CO5	Design of components for given part/system i.e shaft, keys, coupling, links, screws, springs etc. Work effectively as a part of design group/team
CO6	Have good communication skill, orally, graphically as well as in writing

IC Engine Lab

	TC Eligite Elio
COI	Conduct test on IC Engines to study their performance.
CO2	Draw performance curves of these machines/systems.
CO3	Analyse the results obtained from the tests.
CO4	Draw conclusions based on the results of the experiments

Refrigeration and Air Conditioning Lab

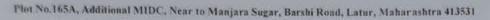
CO1	Conduct test on Refrigeration and air conditioning test units to study their performance.
CO2	Draw performance curves of these machines/systems.
CO3	Analyse the results obtained from the tests.
CO4	Draw conclusions based on the results of the experiments



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Technical Project for Community Services

CO1	Visit nearby places to understand the problems of the community
CO2	Select one of the problems for the study, state the exact title of the project and define scope of the problem
CO3	Explain the motivation, objectives and scope of the project
CO4	Evaluate possible solutions of the problem
CO5	Design, produce, test and analyze the performance of product/system/process
CO6	Modify, improve the product/system/process

BE (Mechanical) Part - I

Automation in Manufacturing

CO1	To Understand the basics of Automation & Control system in Manufacturing.
CO2	To use fundamentals of FMS & Automation principle in manufacturing.
CO3	To apply concepts of soft & hard Automation.
CO4	To understand functioning of NC machines, CNC machines, CAD, CAM.

Refrigeration and Air conditioning

CO1	Illustrate the fundamental principles and applications of refrigeration and air conditioning system
CO2	Obtain cooling capacity and coefficient of performance by conducting test on vapor compression refrigeration systems
CO3	Present the properties, applications and environmental issues of different refrigerants
CO4	Calculate cooling load for air conditioning systems used for various applications
CO5	Operate and analyze the refrigeration and air conditioning systems.

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Finite Element Method

	Time Element Piteriou
CO1	Understand the concept of finite element method to solve various Mechanical Engineering problems.
CO2	Apply the knowledge of FEM for 1D stress analysis and heat transfer analysis.
CO3	Understand the role and significance of shape functions in finite element formulations and use of linear, quadratic, and cubic shape functions for interpolation
CO4	Be aware of global, local, and natural coordinates
CO5	Formulate and solve problems of trusses, beams, planar loading and axisymmetric.
CO6	Understand the formulation of two-dimensional elements (triangle and quadrilateral continuum and shell elements)

Power Plant Engineering

	1 ower 1 mit Engineering
CO1	Explain layout, construction and working of the components inside a thermal power plant
CO2	Explain layout, construction and working of the components inside a Diesel, Gas and
CO3	Combined Cycle Power Plants
CO4	Explain layout, construction and working of the components inside a Nuclear Power Plant
CO5	Explain layout, construction and working of the components inside Renewable Energy Power Plants
CO6	Explain the applications of power plants while extend their knowledge to power plant economics and environmental hazards and estimate the costs of the environmental hazards and estimate the costs of the electrical energy production



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Gas Dynamics and Jet Propulsion Subject Code

CO1	Understand the thermodynamic cycles of jet engines.
CO2	Understand the basics of compressible fluid flow in inlets of compressors and turbines.
CO3	Analyze Jet engines; determine propulsion efficiency and design of inlets and outlets.
CO4	Understand the Jet propulsion systems working principles.

Product Design and Development

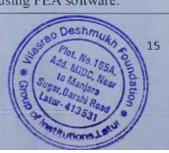
CO1	Understand and explain the product design concept
CO2	Understand and explain the concept of Conceptual design
CO3	Explain the concept of Industrial design and robust design concepts.
CO4	Understand the concept of Design for manufacture and assembly.
CO5	Understand the legal factors, social issues, engineering ethics related to product design
CO6	Understand the concept of Concurrent engineering, rapid prototyping

Maintenance and Reliability

CO1	Understand the fundamental concept of Reliability and Maintenance & the various types of probability theories.
CO2	Analyze and use particular maintenance strategies like, predictive, preventive etc.
CO3	Illustrate the role of Failure Mode, Effects and Criticality Analysis
CO4	Adopt Reliability principles in product life cycle management

Mechanical Engineering Lab III (Analysis)

Analyze stresses and strains induced in 2-D truss subjected to plane forces
Analyze stresses and strains induced in 1-D beam (simply supported or cantilever beams)
Use FEA software for Static stress concentration factor calculation
Use FEA software to solve 2D Forced convection problem
Analyze any machine component using FEA software.
Analyze Stress and deflection of any machine component consisting of 3-D elements using FEA software.



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Interview Techniques and Mock Exercise

	Three view Techniques and Work Exercise	
CO1	Learners would be familiar with different interview skills and techniques employed in the industrial and the corporate world.	
CO2	Students would be able to perform well in interview by developing body language, rationalizing their aptitude and attitude for the interview.	
CO3	They would be able to participate effectively in group discussions, accept leadership and express their ideas effectively.	
CO4	Students would be able to draft effective job applications and resume, CVs accurately as per the needs of the industries	
CO5	Students would develop right frame of mind by learning socializing skills, corporate etiquettes, and manners.	

BE (Mechanical) Part - II

Industrial Engineering and Management

CO1	This subject also helps a student to be a self-employable by getting knowledge of management techniques.
CO2	Statistical Knowledge enhances chances to get a certification from worldwide famous organization like ASQ, i.e. American Society for Quality
CO3	Student will demonstrate Commitment to quality, timeliness, and continuous improvement in production rate in manufacturing sector
CO4	Enhancing General awareness of Work System Design, Production Planning and Inventory Control, Management of Quality

Design of Transmission System

	Design of Transmission System
CO1	Apply the concepts of design to belts, chains and rope drives.
CO2	Apply the concepts of design to spur, helical gears.
CO3	Apply the concepts of design to worm and bevel gears.
CO4	Apply the concepts of design to gear boxes.
CO5	Apply the concepts of design to cams, brakes and clutches



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	Total Quality Management
CO1	Students should be able to Quality environment of the organization.
CO2	Student should be able to know the TQM approach for manufacturing/service organization in length.
CO3	Student should be able to know various Quality terms like Tolerance and Variability, PDCA cycle, Crosby's 10 points and Deming's 14 Points.
CO4	Student should be able to know international/national Quality awards

Machine Tool Design

CO1	Ability enhancement for the design of various components of structures, guideways, spindles of machine tools
CO2	Ability enhancement to adopt & implement the recent trends required as per the applications
CO3	Students are able to understand the knowledge of vibration of machine tool, different control systems in machine tool and different machine tool testing methods

Numerical Method for Engineers

	Numerical Method for Engineers
COL	Apply Mathematical Modeling and for Engineering Problem Solving.
CO2	Understand different root finding methods.
CO3	Solve Mathematical Equations by various methods.
CO4	Solve system of linear equation
CO5	Apply Numerical Integration

	Internet of Things
CO1	Able to understand the application areas of IOT.
CO2	Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks
CO3	Able to understand building blocks of Internet of Things and characteristics.

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Cyber Law & Ethi.

	Cycle Law & Etilics
CO1	Understanding concepts related to cyber world and cyber law in general
CO2	Develop competitive edge on various facets of cyber crimes
CO3	Problems arising out of online transactions and provoke them to find solutions
CO4	Intellectual property issues in the cyber space and the growth and development of the law
CO5	Regulation of cyber space at national and international level.
CO6	Upholding ethical standards in cyber laws and intellectual property issues

Artificial Intelligence

CO1	Artificial intelligence enhance work force and create jobs.	
CO2	AI helps flag bais and drive diversity.	
CO3	AI creates business oriented architecture.	
CO4	AI makes positive impact on the world with other technologies.	

Entrepreneurship Development

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CO1	Appreciate the importance of embarking on self-employment and has developed the confidence and personal skills for the same.
CO2	Identify business opportunities in chosen sector / sub-sector and plan and market and sell products / services.
CO3	Start a small business enterprise by liaising with different stake holders 4. Effectively manage small business enterprise.

IQAC Coordinator

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PO CO OF MECHANICAL ENGINEERING DEPARTMENT OF ACADEMIC YEAR 2020-21

Vision

The vision of the department is to achieve excellence in teaching, learning, research and transfer of technology and overall development of students.

Mission

Imparting quality education, looking after holistic development of students and conducting need based research and extension.

Graduate Attributes

The Graduate Attributes are the knowledge skills and attitudes which the students have at the time of graduation. These Graduate Attributes identified by National Board of Accreditation are as follows:

- 1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
- Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
- 3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- 4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- 5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- 6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- 7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate Vision The vision of the department is to achieve

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excellence in teaching, learning, research and transfer of technology and overall development of students. Mission Imparting quality education, looking after holistic development of students and conducting need based research and extension. The knowledge of, and need for sustainable development.

- 8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- 9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- 10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- 11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- 12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Educational Objective

PEO1	Graduates should excel in engineering positions in industry and other organizations that emphasize design and implementation of engineering systems and devices.
PEO2	Graduates should excel in best post-graduate engineering institutes, acquiring advanced degrees in engineering and related disciplines.
PEO3	Alumni should establish a successful career in an engineering-related field and adapt to changing technologies.
PEO4	Graduates are expected to continue personal development through professional study and self-learning.
PEO5	Graduates should be good citizens and cultured human beings, with full appreciation of the importance of professional, ethical and societal responsibilities.

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Course Outcomes:

SE (Mechanical) Part - I

Physics - II (Optics and Waves)

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COI	Expose the learners to different processes used in physics for industrial and technological applications.
CO2	Understand the importance of Applied Physics in physical phenomena.
CO3	Acquire Basic knowledge of Oscillation for Simple Harmonic, Mechanical and electrical simple harmonic oscillators.
CO4	Demonstrate knowledge of quantum mechanics and thermal physics.
CO5	Employ the knowledge of optical instruments mirrors and lens.
CO6	Implement the concept thermodynamically equations and their applications in various field of geometric optics

Mathematics - III

CO1	Understand the solution methodologies for second order Partial Differential Equations.
CO2	Solve interpolation and integral using numerical methods.
CO3	Solve the Ordinary and Partial Differential Equations using Laplace Transformation.
CO4	Use the concept of correlation and regressions for statistical parameters.
CO5	Formulate and solve problems involving random variables and probability distribution.
CO6	Apply statistical methods for analyzing experimental data.

Thermodynamics

	Thermodynamics
CO1	Apply various laws of thermodynamics to various processes and real systems.
CO2	Apply the concept of Entropy, Calculate heat, work and other important thermodynamic properties for various ideal gas processes
CO3	Estimate performance of various Thermodynamic gas power cycles and gas refrigeration cycle and availability in each case.
CO4	Analyze the condition of steam and performance of vapour power cycle and vapour compression cycle.
CO5	Understand Stoichiometric air required for combustion, performance of steam generators and natural draught requirements in boiler plants.
CO6	Use Psychrometric charts and estimate various essential properties related to Psychrometry and processes.



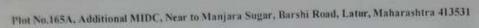
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Basic Electronics Engineering

	Basic Electronics Engineering
CO1	Design an application using Operational amplifier
CO2	Troubleshoot and maintain standard electronic circuits.
CO3	Design and verify the basic logic gate operations.
CO4	Design the basics of Electronic communication transmission medium circuits.
CO5	Understand the principles of semiconductor devices and their applications.
CO6	Be aware of the working of timing circuits and oscillators.
CO7	Analyze logic gates and flip flop as a building block of digital systems.
CO8	Learn the basics of Electronic communication system

Engineering Mechanics

	Engineering Mechanics
CO1	Use scalar and vector analytical techniques for analyzing forces in statically determinate structures
CO2	Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practical problems.
CO3	Apply basic knowledge of mathematics and physics to solve real-world problems.
CO4	Know basic kinematics concepts – displacement, velocity and acceleration (and their angular counterparts).
CO5	Realize basic dynamics concepts - force, momentum, work and energy.
CO6	Understand and be able to apply Newton's laws of motion.
CO7	Apply basic dynamics concepts - the Work-Energy principle, Impulse-Momentum principle and the coefficient of restitution.
CO8	Recognize basic machine parts such as pulleys and mass-spring systems.



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Effective Technical Communication

CO1	Accumulate, review, mediate accurate information and transmit technical ideas, policies with greater clarity & precision.
CO2	Draft, revise and edit technical drafts, letters, proposals, applications, with effective linguistic skills and abilities by eliminating grammatical errors in the same.
соз	Absorb, inculcate and practice an industrial ethics, professional work culture and collaborate effectively in organizational communication system.
CO4	Lead, present and communicate business strategies persuasively and convincingly through result oriented endeavors both verbally and non-verbally within and outside organizations.

Seminar - I

CO1	Use multiple thinking strategies to examine real-world issues through self learning.
CO2	Explore creative avenues of expression, solve problems, and make consequential decisions.
CO3	Developing stage courage and confidence.
CO4	Apply innovative thinking for best presentation.

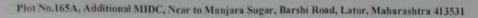
Environmental Science

	Environmental science	
CO1	Understand the basics of environmental science.	
CO2	Learn about causes of different pollution and their remedies.	
CO3	Learn about social issues that are connected to environment	
CO4	Apply knowledge for protection of environment.	

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SE (Mechanical) Part - II

Internal Combustion Engine

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CO1	Relate the basic Thermodynamics, Heat Transfer with actual cycle analysis and actual losses in engine.
CO2	Recognize functioning and differences among fuel introduction systems of different engines also designs of fuel carburetor and design principles.
соз	Understand the working and construction of turbocharging and supercharging.
CO4	Determine and understand the effects of spark timing, valve timing, A/F ratio, engine geometry, fuel type, and manifold on engine performance and emissions
CO5	Prepare a performance report and emissions analysis of an internal combustion engine
CO6	Plot performance characteristics curve during testing and to know about engine emissions.

Fluid Mechanics and Machinery

	Figure Mechanics and Machinery
CO1	Develop basic knowledge on Fluid Statistics, Dynamics, and Hydro-electric power stations.
CO2	Apply principles of fluid mechanics to the operation, design, and selection of machinery.
CO3	Mathematically analyze simple flow situations.
CO4	Estimation of efficiency, performance of pumps and turbines.
CO5	Design and planning of Hydroelectric Power plant with the available water resources and requirement of power.
CO6	Identify, formulate and solve problems related to fluids at rest and in motion.
CO7	Knowledge to design pipeline systems, floating bodies and hydraulic gates.
CO8	Knowledge to design pipeline systems, floating bodies and hydraulic gates.



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Strength of Waterian	
Understand the concepts of various stresses and their significant effects in context with engineering applications.	
Acquire elementary knowledge of stresses, strains & material properties. Understand & analyze the basic principles involved in the behavior of machine parts under load in the context of designing it.	
Use expressions for estimation of deformation in axially loaded members under gradual, sudden and impact loads.	
Effectively use the concepts of shear force and bending moment diagrams in design of machine elements.	
Compute the principal stresses and Strains by analytical and graphical methods (Mohr"s circle of stress 2-D.	
Estimate the Slope and Deflection in determinate beams.	
Explain the important concepts of stress and strain, their significance in concept with engineering applications and is useful while studying the subjects like, Machine Design, Theory of machines, Dynamics of Machines.	

Mechanical Engineering Drawing

CO1	Read and interpret the drawing.	
CO2	Understand the concepts of limit, fits, and tolerance for various machine parts.	
CO3	Visualize and prepare detail drawing of a given object.	
CO4	Draw details and assembly of different mechanical systems.	
CO5	Convert detailed drawing into assembly drawing using modeling software.	
CO6	Convert assembly drawing into detailed drawing using modeling software.	
CO7	Prepare detailed drawing of any given physical object/machine element with actual measurements.	

Instrumentation & Control

CO1	Understand concepts of process dynamics and various forms of mathematical models.
CO2	Develop mathematical models of chemical and processes by writing unsteady-state mass and energy balances.
СОЗ	Analyze, design and tune feedback / feed forward controllers in the context of various control strategies used to control chemical and biological processes.
CO4	Recognize and fit various simple empirical models that are used for designing controllers.
CO5	Understand and design basic control strategies.

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Biology for Engineers

CO1	Understand the body sensory system
CO2	Understand the body Immunology
CO3	Understand the body Metabolism Functions
CO4	Understand the Genetics

Professional Practice, Law and Ethics

CO1	Illustrate as a practitioners of the mechanical engineering profession in the society.
CO2	Develop ideas of the legal and practical aspects of their profession.
CO3	Apply principles of contract management.
CO4	Use alternative Dispute Resolution system.
CO5	Perform the concept of Intellectual property.



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TE (Mechanical) Part - I

Manufacturing Technology - II

	Control of the Contro
CO1	The students will be able to understand the details about machines used in production
CO2	The students will be able to understand the mechanics behind metal cutting.
CO3	The students will be able to understand the finishing and super finishing processes.
CO4	The students will be able to understand the Physics of material removal behind the various non-conventional machining processes.

Machine Design- I

CO1	Ability to analyze the stress and strain of mechanical components and understand, identify and quantify failure modes for mechanical part
CO2	Ability to decide optimum design parameters for mechanical systems.
CO3	Ability to design mechanical system for fluctuating loads.
CO4	Acquire skill in preparing production drawing pertaining to various designs

Heat Transfer

CO1	Understand the modes of heat transfer and basic laws of heat transfer
CO2	Analyze the problems involving steady state heat conduction with and without internal heat generation.
CO3	Develop solutions for transient heat conduction.
CO4	Understand and Evaluate heat transfer coefficients for natural and forced convection
CO5	Analyze the heat exchanger and fins performance.
CO6	Calculate radiation heat transfer between black body and gray body surfaces.

Mechatronics - I

CO1	Develop the skill to identify the suitable sensor and actuator for a Mechatronic system.
CO2	Develop the skill required for interfacing the electronic and electro-mechanical systems.
CO3	Develop the skill to indigenously design and develop a Mechatronic system.
CO4	Develop the skill to model a complete automated electro-mechanical system.
CO5	Understand the working and use of hydraulic and pneumatic actuators.

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CAD/CAM

CO1	Identify proper computer graphics techniques for geometric modeling.	
CO2	Transform, manipulate objects, store and manage data.	
CO3	Prepare computer assisted part program and post process.	
CO4	Prepare part programming applicable to CNC machines.	
CO5	Use rapid prototyping and tooling concepts in any real life applications.	

TE (Mechanical) Part - II

Tool Engineering

CO1	Selection of a die for a given component
CO2	Classify and explain various press tools and press tools operations
CO3	Selection of locating and clamping devices for given component
CO4	Select and design jig and fixture for given component.

Machine Design - II

	machine Design - II
CO1	Design and analyze belts, brakes, clutches.
CO2	Understand gear drives and their applications; design procedure and introduction to gear design standard practices.
CO3	The construction, working, important features and selection process from manufacturers catalogue for rolling contact bearings
CO4	Analyze the pressure distribution and design of journal bearings.

Power Developing Devices

CO1	Differentiate between SI and CI Engines
CO2	Understand and explain Combustion of SI and CI Engines.
CO3	Plot and analyze Performance Characteristics of SI and CI Engines
CO4	Explain Gas Turbine and its performance.



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Mechatronics - II

CO1	Student shall understand Basic component and design of pneumatic systems.
CO2	Student shall understand Basic component and design of HYDRULIC systems
CO3	Student To understand the signal conditioning phenomenon, necessity, and outline.
CO4	. Student to understand concept of PLC its industrial use, application to Mechatronics.
CO5	Student shall Development of PLC ladder programming and implementation of real life system Hydraulics+Pneumatics + Electrical Electronics +Plc.

Power Plant Engineering

	Tower Thate Engineering
CO1	Ability to have adequacy with design, erection and development of Power Plant.
CO2	Optimization of Power Plants with respect to available resources.

B. E. (Mechanical) Part - I

Refrigeration and Air Conditioning

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CO1	In order to assess the students' progress in the subject towards achieving knowledge and learning. He/She is assessed by conducting three tests in the semester. He/She is assigned minimum five assignments, homework problems, Solving University Question papers to grasp knowledge in the subject
CO2	The various experiments were performed during practical hours to understand the basic concept and working of the Refrigeration cycle. A local cold storage plant is visited to understand the cycle of Refrigeration and Air conditioning. Finally the student is examined by conducting Practical/Oral Examination based on Term Work, Test performance and finally theory paper of University level, based on the syllabus.
CO3	The student is expected to use his subject knowledge to design the Refrigeration or Air Conditioning plant and to optimize the performance of the same.

Finite Element Methods

CO1	Develop the finite element equations to model engineering problems
CO2	Apply the basic finite element formulation techniques to solve engineering problems.
CO3	Use commercial FEA software, to solve problems related to mechanical engineering



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Advanced Machining & Manufacturing

	Transmitted Transmitted to Transmitted Tra
CO1	Selection of appropriate manufacturing process for Advance components.
CO2	Characterization of work piece materials.

Operations Research Techniques

	Operations Resemble 1 changes
COI	Upon successful completion of this course, the student will be able to
CO2	Illustrate the need to optimally utilize the resources in various types of industries
CO3	Apply and analyze mathematical optimization functions to various applications.
CO4	Demonstrate cost effective strategies in various applications in industry

Renewable Energy

CO1	Apply the technology to capture the energy from the renewable source like Sun, Wind, Ocean, Biomass and Geothermal.
CO2	Apply the direct energy conversion methods.

B. E. (Mechanical) Part - II

Automobile Engineering

COL	Students will be able to demonstrate and explain various automobile systems
CO2	Students will be able to explain the importance of various important systems like differential, steering, Brakes, Suspensions etc.
СОЗ	Students will be able to explain principle of operation, construction and application of latest sensor Technology used in automobiles.

Production Planning & Control

	Troduction Children & Commission
CO1	Illustrate the types of production and use of functions of PPC on the shop floor.
CO2	Illustrate the design and development of the product on the shop floor.
CO3	Illustrate the optimization technique used in batch production.
CO4	To calculate the idle time and machine cycle efficiency to improve the productivity.
CO5	To develop the balanced line of production with minimum idle time.
CO6	To understand how to maintain the inventory for shop floor.



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Quality Engineering

	Property of the second
CO1	After studying the subject students will become experts in applying the various tools and able to operate the skill in taking sharp decisions in business.

Automation & Robotics

CO1	Acquire the skills in understanding Automation in Industry & Robot programming Language.
CO2	Acquire the skill in robot task planning for problem solving.
CO3	Develop skills in understanding various sensors, robot peripherals and their use.
CO4	Develop skills in identifying areas in manufacturing, where robotics can be deployed for enhancing productivity.

Zinofintam **IQAC** Coordinator

H.O.D.

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PO CO OF MECHANICAL ENGINEERING DEPARTMENT OF ACADEMIC YEAR 2019-20

Vision

The vision of the department is to achieve excellence in teaching, learning, research and transfer of technology and overall development of students.

Mission

Imparting quality education, looking after holistic development of students and conducting need based research and extension.

Graduate Attributes

The Graduate Attributes are the knowledge skills and attitudes which the students have at the time of graduation. These Graduate Attributes identified by National Board of Accreditation are as follows:

- 1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
- 2. Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
- 3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- 4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- 5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- 6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

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- 7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate Vision The vision of the department is to achieve excellence in teaching, learning, research and transfer of technology and overall development of students. Mission Imparting quality education, looking after holistic development of students and conducting need based research and extension. The knowledge of, and need for sustainable development.
- 8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- 9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- 10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- 11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- 12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Educational Objective

PEO1	Graduates should excel in engineering positions in industry and other organizations that emphasize design and implementation of engineering systems and devices.
PEO2	Graduates should excel in best post-graduate engineering institutes, acquiring advanced degrees in engineering and related disciplines.
PEO3	Alumni should establish a successful career in an engineering-related field and adapt to changing technologies.
PEO4	Graduates are expected to continue personal development through professional study and self-learning.
PEO5	Graduates should be good citizens and cultured human beings, with full appreciation of the importance of professional, ethical and societal responsibilities.

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Course Outcomes:

SE (Mechanical) Part - I

Physics - II (Optics and Waves)

	Timpares II (Spires III)
COI	Expose the learners to different processes used in physics for industrial and technological applications.
CO2	Understand the importance of Applied Physics in physical phenomena.
CO3	Acquire Basic knowledge of Oscillation for Simple Harmonic, Mechanical and electrical simple harmonic oscillators.
CO4	Demonstrate knowledge of quantum mechanics and thermal physics.
CO5	Employ the knowledge of optical instruments mirrors and lens.
CO6	Implement the concept thermodynamically equations and their applications in various fields of geometric optics

Mathematics - III

	TARREST AND
CO1	Understand the solution methodologies for second order Partial Differential Equations.
CO2	Solve interpolation and integral using numerical methods.
CO3	Solve the Ordinary and Partial Differential Equations using Laplace Transformation.
CO4	Use the concept of correlation and regressions for statistical parameters.
CO5	Formulate and solve problems involving random variables and probability distribution.
CO6	Apply statistical methods for analyzing experimental data.

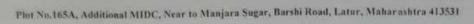
Thermodynamics

	Thermodynamics
COI	Apply various laws of thermodynamics to various processes and real systems.
CO2	Apply the concept of Entropy, Calculate heat, work and other important thermodynamic properties for various ideal gas processes
СОЗ	Estimate performance of various Thermodynamic gas power cycles and gas refrigeration cycle and availability in each case.
CO4	Analyze the condition of steam and performance of vapour power cycle and vapour compression cycle.
CO5	Understand Stoichiometric air required for combustion, performance of steam generators and natural draught requirements in boiler plants.
CO6	Use Psychrometric charts and estimate various essential properties related to Psychrometry and processes.



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Basic Electronics Engineering

COI	Design an application using Operational amplifier
CO2	Troubleshoot and maintain standard electronic circuits.
CO3	Design and verify the basic logic gate operations.
CO4	Design the basics of Electronic communication transmission medium circuits.
CO5	Understand the principles of semiconductor devices and their applications.
CO6	Be aware of the working of timing circuits and oscillators.
CO7	Analyze logic gates and flip flop as a building block of digital systems.
CO8	Learn the basics of Electronic communication system

Engineering Mechanics

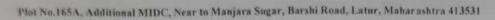
	Engineering Mechanics
CO1	Use scalar and vector analytical techniques for analyzing forces in statically determinate structures
CO2	Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practical problems.
СОЗ	Apply basic knowledge of mathematics and physics to solve real-world problems.
CO4	Know basic kinematics concepts – displacement, velocity and acceleration (and their angular counterparts).
CO5	Realize basic dynamics concepts - force, momentum, work and energy.
CO6	Understand and be able to apply Newton's laws of motion.
CO7	Apply basic dynamics concepts - the Work-Energy principle, Impulse-Momentum principle and the coefficient of restitution.
CO8	Recognize basic machine parts such as pulleys and mass-spring systems,

Effective Technical Communication

COI	Accumulate, review, mediate accurate information and transmit technical ideas, policies with greater clarity & precision.
CO2	Draft, revise and edit technical drafts, letters, proposals, applications, with effective linguistic skills and abilities by eliminating grammatical errors in the same.
СОЗ	Absorb, inculcate and practice an industrial ethics, professional work culture and collaborate effectively in organizational communication system.
CO4	Lead, present and communicate business strategies persuasively and convincingly through result oriented endeavors both verbally and non-verbally within and outside organizations.



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Seminar - I

	The County of th
CO1	Use multiple thinking strategies to examine real-world issues through self learning.
CO2	Explore creative avenues of expression, solve problems, and make consequential decisions.
CO3	Developing stage courage and confidence.
CO4	Apply innovative thinking for best presentation.

Environmental Science

COI	Understand the basics of environmental science.
CO2	Learn about causes of different pollution and their remedies.
CO3	Learn about social issues that are connected to environment
CO4	Apply knowledge for protection of environment.

SE (Mechanical) Part - II

Internal Combustion Engine

Internal Combustion Engine	
CO1	Relate the basic Thermodynamics, Heat Transfer with actual cycle analysis and actual losses in engine.
CO2	Recognize functioning and differences among fuel introduction systems of different engines also designs of fuel carburetor and design principles.
CO3	Understand the working and construction of turbocharging and supercharging.
CO4	Determine and understand the effects of spark timing, valve timing, A/F ratio, engine geometry, fuel type, and manifold on engine performance and emissions
CO5	Prepare a performance report and emissions analysis of an internal combustion engine
CO6	Plot performance characteristics curve during testing and to know about engine emissions.



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Fluid Mechanics and Machinery

	Tidd Medianes and Machinery
CO1	Develop basic knowledge on Fluid Statistics, Dynamics, and Hydro-electric power stations.
CO2	Apply principles of fluid mechanics to the operation, design, and selection of machinery.
CO3	Mathematically analyze simple flow situations.
CO4	Estimation of efficiency, performance of pumps and turbines.
CO5	Design and planning of Hydroelectric Power plant with the available water resources and requirement of power.
CO6	Identify, formulate and solve problems related to fluids at rest and in motion.
CO7	Knowledge to design pipeline systems, floating bodies and hydraulic gates.
CO8	Knowledge to design pipeline systems, floating bodies and hydraulic gates.

Strength of Material

CO1	Understand the concepts of various stresses and their significant effects in context with engineering applications.
CO2	Acquire elementary knowledge of stresses, strains & material properties. Understand & analyze the basic principles involved in the behavior of machine parts under load in the context of designing it.
CO3	Use expressions for estimation of deformation in axially loaded members under gradual, sudden and impact loads.
CO4	Effectively use the concepts of shear force and bending moment diagrams in design of machine elements.
CO5	Compute the principal stresses and Strains by analytical and graphical methods (Mohr"s circle of stress 2-D.
CO6	Estimate the Slope and Deflection in determinate beams.
CO7	Explain the important concepts of stress and strain, their significance in concept with engineering applications and is useful while studying the subjects like, Machine Design, Theory of machines, Dynamics of Machines.

Mechanical Engineering Drawing

CO1	Read and interpret the drawing.
CO2	Understand the concepts of limit, fits, and tolerance for various machine parts.
CO3	Visualize and prepare detail drawing of a given object.
CO4	Draw details and assembly of different mechanical systems.
CO5	Convert detailed drawing into assembly drawing using modeling software.
CO6	Convert assembly drawing into detailed drawing using modeling software.
CO7	Prepare detailed drawing of any given physical object/machine element with actual measurements.

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Instrumentation & Control

	- And a supplied of Court of
CO1	Understand concepts of process dynamics and various forms of mathematical models.
CO2	Develop mathematical models of chemical and processes by writing unsteady-state mass and energy balances.
CO3	Analyze, design and tune feedback / feed forward controllers in the context of various control strategies used to control chemical and biological processes.
CO4	Recognize and fit various simple empirical models that are used for designing controllers.
CO5	Understand and design basic control strategies.

Biology for Engineers

CO1	Understand the body sensory system
CO2	Understand the body Immunology
CO3	Understand the body Metabolism Functions
CO4	Understand the Genetics

Professional Practice, Law and Ethics

CO1	Illustrate as a practitioners of the mechanical engineering profession in the society.
002	Develop ideas of the legal and practical aspects of their profession.
CO3	Apply principles of contract management.
CO4	Use alternative Dispute Resolution system.
CO5	Perform the concept of Intellectual property.



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TE (Mechanical) Part - I

Manufacturing Technology - II

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Machine Design- I

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Mechatronics - I

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Develop the skill to indigenously design and develop a Mechatronic system.
Develop the skill to model a complete automated electro-mechanical system.
Understand the working and use of hydraulic and pneumatic actuators.

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CAD/CAM

COI	Identify proper computer graphics techniques for geometric modeling.
CO2	Transform, manipulate objects, store and manage data.
CO3	Prepare computer assisted part program and post process.
CO4	Prepare part programming applicable to CNC machines.
CO5	Use rapid prototyping and tooling concepts in any real life applications.

TE (Mechanical) Part - II

Tool Engineering

CO1	Selection of a die for a given component
CO2	Classify and explain various press tools and press tools operations
CO3	Selection of locating and clamping devices for given component
CO4	Select and design jig and fixture for given component.

Machine Design - II

	Machine Design - II
CO1	Design and analyze belts, brakes, clutches.
CO2	Understand gear drives and their applications; design procedure and introduction to gear design standard practices.
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CO4	Analyze the pressure distribution and design of journal bearings.

Power Developing Devices

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CO2	Understand and explain Combustion of SI and CI Engines.
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Mechatronics - II

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CO2	Student shall understand Basic component and design of HYDRULIC systems
CO3	Student To understand the signal conditioning phenomenon, necessity, and outline.
CO4	. Student to understand concept of PLC its industrial use, application to Mechatronics.
CO5	Student shall Development of PLC ladder programming and implementation of real life system Hydraulics+Pneumatics + Electrical Electronics +Plc.

Power Plant Engineering

COI	Ability to have adequacy with design, erection and development of Power Plant.	
CO2	Optimization of Power Plants with respect to available resources.	

B. E. (Mechanical) Part - I

Refrigeration and Air Conditioning

CO1	In order to assess the students' progress in the subject towards achieving knowledge and learning. He/She is assessed by conducting three tests in the semester, He/She is assigned minimum five assignments, homework problems, Solving University Question papers to grasp knowledge in the subject
CO2	The various experiments were performed during practical hours to understand the basic concept and working of the Refrigeration cycle. A local cold storage plant is visited to understand the cycle of Refrigeration and Air conditioning. Finally the student is examined by conducting Practical/Oral Examination based on Term Work, Test performance and finally theory paper of University level, based on the syllabus.
CO3	The student is expected to use his subject knowledge to design the Refrigeration or Air Conditioning plant and to optimize the performance of the same.

Finite Element Methods

	Time Exement Methods
CO1	Develop the finite element equations to model engineering problems
CO2	Apply the basic finite element formulation techniques to solve engineering problems.
CO3	Use commercial FEA software, to solve problems related to mechanical engineering

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Website: www.vdfengineering.co.in

(DTE Code: 2254)

Advanced Machining & Manufacturing

	Advanced Machining & Mandiacturing	
CO1	Selection of appropriate manufacturing process for Advance components.	
CO2	Characterization of work piece materials.	

Operations Research Techniques

	Operations Research Techniques
COL	Upon successful completion of this course, the student will be able to
CO2	Illustrate the need to optimally utilize the resources in various types of industries
CO3	Apply and analyze mathematical optimization functions to various applications.
CO4	Demonstrate cost effective strategies in various applications in industry

Renewable Energy

COI	Apply the technology to capture the energy from the renewable source like Sun, Wind, Ocean, Biomass and Geothermal.
CO2	Apply the direct energy conversion methods.

B. E. (Mechanical) Part - II

Automobile Engineering

CO1	Students will be able to demonstrate and explain various automobile systems
CO2	Students will be able to explain the importance of various important systems like differential, steering, Brakes, Suspensions etc.
CO3	Students will be able to explain principle of operation, construction and application of latest sensor Technology used in automobiles.

Production Planning & Control

CO1	Illustrate the types of production and use of functions of PPC on the shop floor.
CO2	Illustrate the design and development of the product on the shop floor.
СОЗ	Illustrate the optimization technique used in batch production.
CO4	To calculate the idle time and machine cycle efficiency to improve the productivity.
CO5	To develop the balanced line of production with minimum idle time.
CO6	To understand how to maintain the inventory for shop floor.



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Quality Engineering

COI	After studying the subject students will become experts in applying the various tools and
	able to operate the skill in taking sharp decisions in business.

	Automation & Robotics
CO1	Acquire the skills in understanding Automation in Industry & Robot programming Language.
CO2	Acquire the skill in robot task planning for problem solving.
• CO3	Develop skills in understanding various sensors, robot peripherals and their use.
CO4	Develop skills in identifying areas in manufacturing, where robotics can be deployed for enhancing productivity.

IQAC Coordinator

H.O.D.

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PO CO OF MECHANICAL ENGINEERING DEPARTMENT OF ACADEMIC YEAR 2018-19

Vision

The vision of the department is to achieve excellence in teaching, learning, research and transfer of technology and overall development of students.

Mission

Imparting quality education, looking after holistic development of students and conducting need based research and extension.

Graduate Attributes

The Graduate Attributes are the knowledge skills and attitudes which the students have at the time of graduation. These Graduate Attributes identified by National Board of Accreditation are as follows:

- 1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
- 2. Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
- 3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- 4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- 5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

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- 7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate Vision The vision of the department is to achieve excellence in teaching, learning, research and transfer of technology and overall development of students. Mission Imparting quality education, looking after holistic development of students and conducting need based research and extension. The knowledge of, and need for sustainable development.
- 8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- 9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- 10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- 11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- 12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Educational Objective

PEO1	Graduates should excel in engineering positions in industry and other organizations that emphasize design and implementation of engineering systems and devices.
PEO2	Graduates should excel in best post-graduate engineering institutes, acquiring advanced degrees in engineering and related disciplines.
PEO3	Alumni should establish a successful career in an engineering-related field and adapt to changing technologies.
PEO4	Graduates are expected to continue personal development through professional study and self-learning.
PEO5	Graduates should be good citizens and cultured human beings, with full appreciation of the importance of professional, ethical and societal responsibilities.



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Course Outcomes:

SE (Mechanical) Part - I

Engineering Mathematics - III

100000000000000000000000000000000000000	Engineering Mathematics - 111
CO1	Student will demonstrate basic knowledge of L.D.E., P.D.E., Vector & F.T
CO2	Student will show the understanding of impact of Engg.Mathematics on Mech
CO3	Student will Demonstrate their understanding of mathematical ideas from multiple perspectives, such as by (a) using the internal connections between geometry, algebra, and numerical computation, (b) applying the connections between theory and applications, or (c) distinguishing between a formal proof and a less formal arguments and understanding the different roles these play in mathematics.

Engineering Thermodynamics

CO1	Apply fundamental concepts of thermodynamic to solve real life engineering problems
CO2	Identify problems & analyse power producing and consuming devices.
CO3	To apply fundamentals of engineering thermodynamics to compressors

Engineering Metallurgy

CO1	Apply fundamental concepts of Metallurgy to solve real life engineering problems.
CO2	Identify problems and suggest suitable material/ heat treatment to get the requisite mechanical properties for a given application
CO3	To apply advanced Metallurgical techniques to solve numerous engineering problems

Mechanical Measurement And Metrology

COI	After going through basic study of generalized measurement system, students will be able to understand the stepwise working of all instruments and will be able to find out the output factors.
CO2	They will be able to know the importance of all factors affecting on output of instruments i.e. errors
СОЗ	They can suggest some points in the design & working of instruments after studying the basics if metrology.
CO4	Students will be able to differentiate between all types of measurements i.e. Direct & indirect type, contact & non-contact type as well as they can design the components with provisions of operance in manufacturing through the concepts of metrology

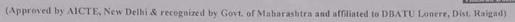
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Strength of Materials

	Sirvingia of France and
COI	Student will be able to effectively use the concepts of shear force and bending moment diagrams in design of machine elements.
CO2	Will be able to compute the principal stresses and Strains by analytical and graphical methods (Mohr's circle of stress 2-D.
СОЗ	Able to use expressions for estimation of deformation in axially loaded members under gradual, sudden and impact loads.
CO4	Able to estimate the Slope and Deflection in determinate beams.
CO5	This subject enables the student to understand the important concepts of stress and strain, their significance in concept with engineering applications and is useful while studying the subjects like, Machine Design, Theory of machines, Dynamics of Machines.

SE (Mechanical) Part - II

Engineering Mathematics - IV

CO1	Student will demonstrate basic knowledge of Functions of Complex Variable & Numerical Technique.
CO2	Student will show the understanding of impact of Engg.Mathematics on Mech.
CO3	Student will Demonstrate their understanding of mathematical ideas from multiple perspectives, such as by (a) using the internal connections between geometry, algebra, and numerical computation, (b) applying the connections between theory and applications, or (c) distinguishing between a formal proof and a less formal arguments and understanding the different roles these play in mathematics.

	Theory of Machines
COI	Identify the basic relations between distance, time, velocity, and acceleration.
CO2	Apply vector mechanics as a tool for problem solving techniques.
CO3	Distinguish the basics of kinematics and kinetics of motion
CO4	Develop familiarity with application of kinematics theories to real-world machines.
CO5	Understand analytical linkage analysis
CO6	Determine cam profiles
CO7	Understand gear trains
CO8	Use the techniques to study the motions of machines and their components.
CO9	Use the techniques, skills, and modern engineering tools necessary for engineering practice.

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Manufacturing Technology - I

CO1	Ability to classify and apply the knowledge gained for applicability of processes for different product manufacturing.
CO2	To compare and select best suitable manufacturing process based on requirements, advantages, limitations and applications

Fluid Mechanics & Hydraulics Machines

	Find Mechanics & Hydraunes Machines
COI	An ability to identify, formulate and solve problems related to fluids at rest and in motion.
CO2	Knowledge to design pipeline systems, floating bodies and hydraulic gates.
CO3	Knowledge to design hydraulic turbines and pumps.

Machine Drawing and CAD

	material Control of the Control of t
CO1	Able to create drawings as per BIS standards.
CO2	Visualize & prepare detail drawing of a given object.
CO3	Read & interpret a given drawing
CO4	Able to create assembly models of simple machine

Professional Communication Skill

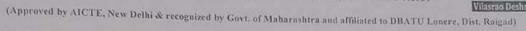
	Frotessional Communication
COI	Students would understand the concept, process and importance of Professional Communication
CO2	Students would acquire English Speaking and Writing Skills
CO3	Students would develop Presentation Skills

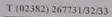


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TE (Mechanical) Part - I

Manufacturing Technology - II

CO1	The students will be able to understand the details about machines used in production
CO2	The students will be able to understand the mechanics behind metal cutting.
CO3	The students will be able to understand the finishing and super finishing processes.
CO4	The students will be able to understand the Physics of material removal behind the various non-conventional machining processes.

Machine Design- I

	Take me besign t
COI	Ability to analyze the stress and strain of mechanical components and understand, identify and quantify failure modes for mechanical part
CO2	Ability to decide optimum design parameters for mechanical systems.
CO3	Ability to design mechanical system for fluctuating loads.
CO4	Acquire skill in preparing production drawing pertaining to various designs

Heat Transfer

	Home 2.7 doings.
CO1	Understand the modes of heat transfer and basic laws of heat transfer
CO2	Analyze the problems involving steady state heat conduction with and without internal heat generation.
CO3	Develop solutions for transient heat conduction.
CO4	Understand and Evaluate heat transfer coefficients for natural and forced convection
CO5	Analyze the heat exchanger and fins performance.
CO6	Calculate radiation heat transfer between black body and gray body surfaces.

Mechatronics - I

	Mechatronics - 1
CO1	Develop the skill to identify the suitable sensor and actuator for a Mechatronic system.
CO2	Develop the skill required for interfacing the electronic and electro-mechanical systems.
СОЗ	Develop the skill to indigenously design and develop a Mechatronic system.
CO4	Develop the skill to model a complete automated electro-mechanical system.
CO5	Understand the working and use of hydraulic and pneumatic actuators.

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CAD/CAM

	S. I.D. C. A. I.
CO1	Identify proper computer graphics techniques for geometric modeling.
CO2	Transform, manipulate objects, store and manage data.
CO3	Prepare computer assisted part program and post process.
CO4	Prepare part programming applicable to CNC machines.
CO5	Use rapid prototyping and tooling concepts in any real life applications.

TE (Mechanical) Part - II

Tool Engineering

CO1	Selection of a die for a given component
CO2	Classify and explain various press tools and press tools operations
CO3	Selection of locating and clamping devices for given component
CO4	Select and design jig and fixture for given component.

Machine Design - II

	Machine Design 11
COI	Design and analyze belts, brakes, clutches.
CO2	Understand gear drives and their applications; design procedure and introduction to gear design standard practices.
СОЗ	The construction, working, important features and selection process from manufacturers catalogue for rolling contact bearings
CO4	Analyze the pressure distribution and design of journal bearings.

Power Developing Devices

CO1	Differentiate between SI and CI Engines	
CO2	Understand and explain Combustion of SI and Cl Engines.	
CO3	Plot and analyze Performance Characteristics of SI and CI Engines	
CO4	Explain Gas Turbine and its performance.	D .



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Mechatronics - II

CO1	Student shall understand Basic component and design of pneumatic systems.
CO2	Student shall understand Basic component and design of HYDRULIC systems
CO3	Student To understand the signal conditioning phenomenon, necessity, and outline.
CO4	Student to understand concept of PLC its industrial use, application to Mechatronics.
CO5	Student shall Development of PLC ladder programming and implementation of real life system Hydraulics+Pneumatics + Electrical Electronics +Plc.

Power Plant Engineering

CO1	Ability to have adequacy with design, erection and development of Power Plant.
	Optimization of Power Plants with respect to available resources.

B. E. (Mechanical) Part - I

Refrigeration and Air Conditioning

	Terrigoration and the Constituting
CO1	In order to assess the students' progress in the subject towards achieving knowledge and learning. He/She is assessed by conducting three tests in the semester, He/She is assigned minimum five assignments, homework problems, Solving University Question papers to grasp knowledge in the subject
CO2	The various experiments were performed during practical hours to understand the basic concept and working of the Refrigeration cycle. A local cold storage plant is visited to understand the cycle of Refrigeration and Air conditioning. Finally the student is examined by conducting Practical/Oral Examination based on Term Work, Test performance and finally theory paper of University level, based on the syllabus.
СОЗ	The student is expected to use his subject knowledge to design the Refrigeration or Air Conditioning plant and to optimize the performance of the same.

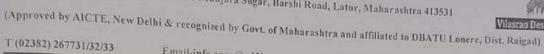
Finite Element Methods

CO1	Develop the finite element equations to model engineering problems
CO2	Apply the basic finite element formulation techniques to solve engineering problems.
CO3	Use commercial FEA software, to solve problems related to mechanical engineering

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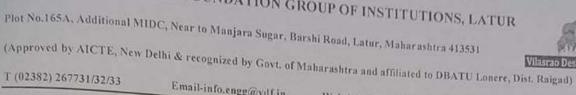
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PO CO OF MECHANICAL ENGINEERING DEPARTMENT OF ACADEMIC YEAR 2017-18

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Course Outcomes:

SE (Mechanical) Part - I

Engineering Mathematics - III

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Strength of Materials

	Strength of Materials
CO1	Student will be able to effectively use the concepts of shear force and bending moment diagrams in design of machine elements.
CO2	Will be able to compute the principal stresses and Strains by analytical and graphical methods (Mohr's circle of stress 2-D.
CO3	Able to use expressions for estimation of deformation in axially loaded members under gradual, sudden and impact loads.
CO4	Able to estimate the Slope and Deflection in determinate beams.
CO5	This subject enables the student to understand the important concepts of stress and strain, their significance in concept with engineering applications and is useful while studying the subjects like, Machine Design, Theory of machines, Dynamics of Machines.

SE (Mechanical) Part - II

Engineering Mathematics - IV

	Engineering Mathematics - 1V
CO1	Student will demonstrate basic knowledge of Functions of Complex Variable & Numerical Technique.
CO2	Student will show the understanding of impact of Engg.Mathematics on Mech.
соз	Student will Demonstrate their understanding of mathematical ideas from multiple perspectives, such as by (a) using the internal connections between geometry, algebra, and numerical computation, (b) applying the connections between theory and applications, or (c) distinguishing between a formal proof and a less formal arguments and understanding the different roles these play in mathematics.

Theory of Machines

	Theory of Machines
CO1	Identify the basic relations between distance, time, velocity, and acceleration.
CO2	Apply vector mechanics as a tool for problem solving techniques.
CO3	Distinguish the basics of kinematics and kinetics of motion
CO4	Develop familiarity with application of kinematics theories to real-world machines.
CO5	Understand analytical linkage analysis
CO6	Determine cam profiles
CO7	Understand gear trains
CO8	Use the techniques to study the motions of machines and their components.
CO9	Use the techniques, skills, and modern engineering tools necessary for engineering practice.
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Manufacturing Technology - I

	Manufacturing Technology - 1
COI	Ability to classify and apply the knowledge gained for applicability of processes for different product manufacturing.
CO2	To compare and select best suitable manufacturing process based on requirements, advantages, limitations and applications

Fluid Mechanics & Hydraulics Machines

	Fluid Mechanics & Hydraulies Machines
COI	An ability to identify, formulate and solve problems related to fluids at rest and in motion.
CO2	Knowledge to design pipeline systems, floating bodies and hydraulic gates.
CO3	Knowledge to design hydraulic turbines and pumps.

Machine Drawing and CAD

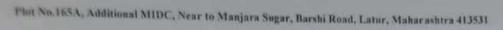
	Machine Drawing and CAD
COI	Able to create drawings as per BIS standards.
CO2	Visualize & prepare detail drawing of a given object.
CO3	Read & interpret a given drawing
CO4	Able to create assembly models of simple machine

Professional Communication Skill

	Professional Communication Skiii
COL	Students would understand the concept, process and importance of Professional Communication
CO2	Students would acquire English Speaking and Writing Skills
CO3	Students would develop Presentation Skills



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TE (Mechanical) Part - I

Manufacturing Technology - II

CO1	The students will be able to understand the details about machines used in production
CO2	The students will be able to understand the mechanics behind metal cutting.
CO3	The students will be able to understand the finishing and super finishing processes.
CO4	The students will be able to understand the Physics of material removal behind the various non-conventional machining processes.

Machine Design- I

COI	Ability to analyze the stress and strain of mechanical components and understand, identify and quantify failure modes for mechanical part
CO2	Ability to decide optimum design parameters for mechanical systems.
CO3	Ability to design mechanical system for fluctuating loads.
CO4	Acquire skill in preparing production drawing pertaining to various designs

Heat Transfer

	Heat Transfer
CO1	Understand the modes of heat transfer and basic laws of heat transfer
CO2	Analyze the problems involving steady state heat conduction with and without internal heat generation.
CO3	Develop solutions for transient heat conduction.
CO4	Understand and Evaluate heat transfer coefficients for natural and forced convection
CO5	Analyze the heat exchanger and fins performance.
CO6	Calculate radiation heat transfer between black body and gray body surfaces.

Mechatronics - I

	Mechatronics - 1
CO1	Develop the skill to identify the suitable sensor and actuator for a Mechatronic system.
CO2	Develop the skill required for interfacing the electronic and electro-mechanical systems.
CO3	Develop the skill to indigenously design and develop a Mechatronic system.
CO4	Develop the skill to model a complete automated electro-mechanical system.
CO5	Understand the working and use of hydraulic and pneumatic actuators.

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CAD/CAM

CO1	Identify proper computer graphics techniques for geometric modeling.	
CO2	Transform, manipulate objects, store and manage data.	
CO3	Prepare computer assisted part program and post process.	
CO4	Prepare part programming applicable to CNC machines.	
CO5	Use rapid prototyping and tooling concepts in any real life applications.	

TE (Mechanical) Part - II

Tool Engineering

	1001 Engineering
CO1	Selection of a die for a given component
CO2	Classify and explain various press tools and press tools operations
CO3	Selection of locating and clamping devices for given component
CO4	Select and design jig and fixture for given component.

Machine Design - II

COI	Design and analyze belts, brakes, clutches.
CO2	Understand gear drives and their applications; design procedure and introduction to gear design standard practices.
СОЗ	The construction, working, important features and selection process from manufacturers catalogue for rolling contact bearings
CO4	Analyze the pressure distribution and design of journal bearings.

Power Developing Devices

CO1	Differentiate between SI and CI Engines
CO2	Understand and explain Combustion of SI and CI Engines.
CO3	Plot and analyze Performance Characteristics of SI and CI Engines
CO4	Explain Gas Turbine and its performance.



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Mechatronics - II

Mechatronics - 11
Student shall understand Basic component and design of pneumatic systems.
Student shall understand Basic component and design of HYDRULIC systems
Student To understand the signal conditioning phenomenon, necessity, and outline.
Student to understand concept of PLC its industrial use, application to incentar ones.
Student shall Development of PLC ladder programming and implementation of real life system Hydraulics+Pneumatics + Electrical Electronics +Plc.

Power Plant Engineering

	Power Plant Engineering
COI	Ability to have adequacy with design, erection and development of Power Plant.
CO2	Optimization of Power Plants with respect to available resources.

B. E. (Mechanical) Part - I

Refrigeration and Air Conditioning

COI	In order to assess the students' progress in the subject towards achieving knowledge and learning. He/She is assessed by conducting three tests in the semester, He/She is assigned minimum five assignments, homework problems, Solving University Question papers to grasp knowledge in the subject
CO2	The various experiments were performed during practical hours to understand the basic concept and working of the Refrigeration cycle. A local cold storage plant is visited to understand the cycle of Refrigeration and Air conditioning. Finally the student is examined by conducting Practical/Oral Examination based on Term Work, Test performance and
CO3	The student is expected to use his subject knowledge to design the Refrigeration or Air Conditioning plant and to optimize the performance of the same.

Finite Element Methods

	Finite Element Methods
COI	Develop the finite element equations to model engineering problems
CO2	Apply the basic finite element formulation techniques to solve engineering problems.
CO3	Use commercial FEA software, to solve problems related to mechanical engineering

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Advanced Machining & Manufacturing

4		rear anced machining & manufacturing
L	CO1	Selection of appropriate manufacturing process for Advance components.
1	CO2	Characterization of work piece materials.

Operations Research Techniques

	Operations Research Techniques
COI	Upon successful completion of this course, the student will be able to
CO2	Illustrate the need to optimally utilize the resources in various types of industries
CO3	Apply and analyze mathematical optimization functions to various applications.
CO4	Demonstrate cost effective strategies in various applications in industry

Renewable Energy

		Renewable Energy	н
1	COI	Apply the technology to capture the energy from the renewable source like Sun, Wind, Ocean, Biomass and Geothermal.	1
1	CO2	Apply the direct energy conversion methods.	

B. E. (Mechanical) Part - II

Automobile Engineering

		Automobile Engineering
C	01	Students will be able to demonstrate and explain various automobile systems
C	02	Students will be able to explain the importance of various important systems like differential, steering, Brakes, Suspensions etc.
C	03	Students will be able to explain principle of operation, construction and application of latest sensor Technology used in automobiles.

Production Planning & Control

Production Planning & Control
Illustrate the types of production and use of functions of PPC on the shop floor.
Illustrate the design and development of the product on the shop floor.
Illustrate the optimization technique used in batch production.
To calculate the idle time and machine cycle efficiency to improve the productivity.
To develop the balanced line of production with minimum idle time.
To understand how to maintain the inventory for shop floor.



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Quality Engineering

COI	After studying the subject students will become experts in applying the various tools and able to operate the skill in taking sharp decisions in business.

Automation & Robotics

	Automation & Robotics
COI	Acquire the skills in understanding Automation in Industry & Robot programming Language.
CO2	Acquire the skill in robot task planning for problem solving.
CO3	Develop skills in understanding various sensors, robot peripherals and their use.
CO4	Develop skills in identifying areas in manufacturing, where robotics can be deployed for enhancing productivity.

Zino Tota info **IQAC** Coordinator

H.O.D.



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