Control System (M.Tech)

Department of Electrical and Electronics Engineering (EEE)

I Year 1st Semester

S. No.	Subject Code	Name of the Course / Laboratory	No.of Periods per week			No. of Credits
			L	T	Lab/ Practice	
1	18EE2001	Mathematical Methods in Control	3	0	0	3
2	18EE2002	Non-Linear Systems	3	0	0	3
3	18EE2003 18EE2004 18EE2005	Elective-I Robotics and Automation Digital Control Non Linear control	3	0	0	3
4	18EE2006 18EE2122 18EE2007	Elective-II Systems Biology SCADA system and Applications Design Aspects in Control	3	0	0	3
5	18HS0823	Research Methodology and IPR	2	0	0	2
6	18EE2008	Control Systems Lab	0	0	4	2
7	18EE2009	Programmable Logic Controller(PLC) Lab (Virtual Lab)	0	0	4	2
8	18HS0818 18CE1029 18HS0825 18HS0826	Audit- I English for Research Paper Writing Disaster Management Sanskrit for Technical Knowledge Value Education	3	0	0	0
			17	0	8	
Total /Week 25						**18**

I Year 2nd Semester

S. No.	Subject Code	Name of the Course / Laboratory	No.of Periods per week			No. of Credits
			L	T	Lab/ Practice	
1	18EE2010	Optimal Control Theory	3	0	0	3
2	18EE2011	Industrial Automation	3	0	0	3
3	18EE2012 18EE2013 18EE2014	Elective-III Advance Control System Advanced Robotics Adaptive Learning and Control	3	0	0	3
4	18EE2015 18EE2016 18EE2017 18EE2116	Elective-IV Model Reduction in Control Robust Control Networked and Multi-agent Control Systems Advanced Digital Signal Processing	3	0	0	3
5	18EE2019	Mini Project with Seminar	1	0	4	2
6	18EE2020	Advanced Control Systems Lab	0	0	4	2
7	18EE2111	Industrial Automation Lab (Virtual Lab)	0	0	4	2
8	18HS0829 18HS0827 18HS0828 18HS0819	Audit-II Constitution of India Pedagogy Studies Stress Management by Yoga Personality Development through Life Enlightenment Skills.	3	0	0	0
			16	0	12	
Total /Week 28						**18**

II Year 1st Semester

S. No.	Subject Code	Name of the Course / Laboratory	No.of Periods per week			No. of Credits
			L	T	Lab/ Practice	
1	18EE2021 18EE2022 18EE2023	Elective-V Machine Learning Techniques Stochastic Control Computational Methods	3	0	0	3
2	18HS0824 18ME3121 18ME3122 18CE1028 18ME3128 18EE2128	Open Elective 1. Business Analytics 2. Industrial Safety 3. Advances in Operations Research 4. Cost Management of Engineering Projects 5. Composite Materials 6. Waste to Energy	3	0	0	3
3	18EE2024	Phase-I Dissertation	0	0	20	10
			Total/week 26			**16**

II Year 2nd Semester

S. No.	Subject Code	Name of the Course / Laboratory	No.of Periods per week			No. of Credits
			L	T	Lab/ Practice	
1	18EE2025	Phase-II Dissertation	0	0	32	16
			0	0	32	16
			Total /Week 32			**16**

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

(18EE2001) MATHEMATICAL METHODS IN CONTROL

M.Tech, I Year 1st Semester (CS)

L	T	P	C
3	0	0	3

Course Objectives

1. To give the students an understanding of foundational concepts in linear algebra and randomprocesses for use in control systems
2. To understand Probability, Random variables

UNIT-I

Linear Spaces – Vectors and Matrices, Transformations, Norms, Matrix Factorization

UNIT-II

Eigenvalue, Eigenvectors and Applications, SVD and Applications, Projections and Least Square Solutions

UNIT-III

Probability, Random variables, Probability distribution and density functions, Joint density and conditional, distribution, Functions of random variables and random vectors

UNIT-IV

Characteristic functions and correlation matrices, Random Processes and properties

UNIT-V

Response of Linear systems to stochastic inputs, PSD theorem

Text Books

1. G. Strang, "Introduction to Linear Algebra", 4 th Edition, Wellesley-Cambridge Press, 2009
2. Papoulis & Pillai, "Probability, random variable and stochastic processes", Mcgraw Hill, 2002.

Reference

1. H. Stark & J.W. Woods, "Probability and random processes with application to Signal processing", Pearson Education Asia, 2002
2. J A Gubner: "Probability and Random processes for Electrical and Computer engineers", Cambridge Univ. Press. 2006

Course Outcomes

Students will be able to

1. Apply matrix properties and functions to a given problem
2. Use eigen values and eigen vectors
3. Find out responses of linear systems to any given input signal

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

(18EE2002) NON-LINEAR SYSTEMS

M.Tech, I Year 1st Semester (CS)

L	T	P	C
3	0	0	3

Course Objectives

1. Introduce fundamental concepts of nonlinear dynamical systems
2. Understanding basic tools for mathematical analysis as well as applications

UNIT-I

Linear versus nonlinear systems, Describing function analysis: Fundamentals, common physical nonlinearities (saturation, dead zone, on-off non linearity, backlash, hysteresis) and their describing functions, Describing function analysis of nonlinear systems, Reliability of describing method analysis, Compensation and design of nonlinear system using describing function method.

UNIT-II

Phase plane analysis, Phase portraits, Singular points characterization, Analysis of non-linear systems using phase plane technique

UNIT- III

Existence of limit cycles, Linearization, Exact linearization, input state linearization, input-output linearization.

UNIT-IV

Concept of stability, stability in the sense of Lyapunov and absolute stability, Zero input and BIBO stability, Second (or direct) method of Lyapunov stability theory for continuous and discrete time systems. Aizerman's and Kalman's conjecture, Construction of Lyapunov funtion, Methods of Aizerman, Zubov, Variable gradient method, Lure problem.

UNIT-V

Perturbation theory & Averaging, Singular perturbation model and stability analysis, Basic results on Lie algebra. Controllability and Observability of nonlinear systems, Bifurcations. Chaos. Synchronization

Text Books

1. H. K. Khalil, "*Nonlinear systems"*, 3rd edition, Prentice Hall, 2001
2. J. J. E. Slotine and W. Li, "*Applied nonlinear systems"*, Prentice Hall, 1991
3. A. Nijemjer and A. van der schaft, "*Nonlinear dynamical control systems"*, Springer,

Reference

1. M. Vidyasagar, "*Nonlinear Systems Analysis*, Society for Industrial and applied Mathematics", 2002
2. S. Strogatz, "*Nonlinear Dynamics and Chaos"*, Westview Press, 2001

Course Outcomes

Students will be able to

1.Explore tools for stability analysis and response evaluation of control problems with significant nonlinearities

2. Identify the design problem and distinguish between the controls strategies

3. Correlate between design parameters and the system performance

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

(18EE2003) ROBOTICS AND AUTOMATION

M.Tech, I Year 1st Semester (CS)

L	T	P	C
3	0	0	3

Course objectives

1. To study the various parts of robots and fields of robotics
2. To study the various kinematics and inverse kinematics of robots
3. To study the trajectory planning for robot
4. To study the control of robots for some specific applications

UNIT-I

BASIC CONCEPTS:

Definition and origin of robotics, different types of robotics- Various generations of robots, degrees of freedom, Asimov's laws of robotics, dynamic stabilization of robots

UNIT-II

POWER SOURCES AND SENSORS:

Hydraulic, pneumatic and electric drives- Determination of HP of motor and gearing: ratio, variable speed arrangements, path determination, micro machines in robotics-Machine vision, ranging, laser, acoustic, magnetic, fiber optic and tactile sensors

UNIT-III

MANIPULATORS, ACTUATORS AND GRIPPERS:

Construction of manipulators, manipulator dynamics and force control-Electronic and pneumatic manipulator control circuits, end effectors

UNIT-IV

KINEMATICS AND PATH PLANNING:

Solution of inverse kinematics problem-Multiple solution Jacobian work envelop, hill climbing techniques, Robot programming languages

UNIT-V

ROBOT CONTROL, MANUFACTURING AND NON MANUFACTURING APPLICATIONS:

Linear methods, Non-linear methods-manufacturing applications, robot cell design, selection of robot

Text Books

1. Mikell P. Weiss G.M., Nagel R.N., Odraj N.G. "Industrial Robotics", McGraw-Hill Singapore, 1996
2. Ghosh, "Control in Robotics and Automation: Sensor Based Integration", Allied Publishers, Chennai, 1998

Reference

1. Deb.S.R., “Robotics technology and flexible Automation”, John Wiley, USA 1992
2. Asfahl C.R., “Robots and manufacturing Automation”, John Wiley, USA 1992

Course Outcomes

Students will be able to
1. Obtain forward, reverse kinematics and dynamics model of the industrial robot arm
2. Propose and synthesize control law for a given application
3. Classify robots and decide specifications depending on the applications

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

(18EE2004) DIGITAL CONTROL SYSTEMS

M.Tech, I Year 1st Semester (CS)

L	T	P	C
3	0	0	3

Course Objectives

1. To familiarize the student with the concept of discretization
2. Introduction to discrete-time system representations and digital control
3. Learn to design controller for digital systems

UNIT-I

Introduction, Advantages of Digital control systems, Practical aspects of the choice of sampling rate and multi rate sampling, Basic discrete time signals, Quantization, Sampling theorem, Data conversion and Quantization, Sampling process, Mathematical modeling, Data reconstruction and filtering of sampled signals, zero-order hold.

UNIT-II

z-transform and inverse z-transform, Relationship between s-plane and z-plane Difference equation, Solution by recursion and z-transform, pulse transfer functions of the zero, order Hold and relationship between G(s) and G(z), Bilinear transformation

UNIT-III

Digital control systems, Pulse transfer function, z-transform analysis of open loop, closed loop systems, Modified z-Transform, transfer function, Stability of linear digital control systems, Stability tests, Root loci, Frequency domain analysis, Bode plots, Gain margin and phase margin , Design of Digital Control Systems based on Root Locus Technique.

UNIT-IV

Cascade and feedback compensation by continuous data controllers, Digital controllers Design using bilinear transformation, Realization of Digital PID controllers. State equations of discrete data systems, solution of discrete state equations, State transition Matrix: z-transform method. Relation between state equations and transfer functions.

UNIT-V

Concepts on Controllability and Observability, Digital state observer: Design of the full order and reduced order state observer, Pole placement design by state feed back, Design of Dead beat Controller, case studies, Stability analysis of discrete time systems based on Lyapunov approach.

Text books

1. K. Ogata, Discrete Time Control Systems, PHI/Addison, Wesley Longman Pte. Ltd., India, Delhi, 1995.
2. B.C Kuo, Digital Control Systems, 2nd Edition, Oxford Univ Press, Inc., 1992.

Reference

1. F. Franklin, J.D. Powell, and M.L. Workman, Digital control of Dynamic Systems, Addison, Wesley Longman, Inc., Menlo Park, CA, 1998.
2. Gopal, Digital Control and State Variable Methods, Tata McGraw Hill, India,1997.
3. C. H. Houpis and G.B. Lamont, Digital Control Systems, McGraw Hill, 1985.
4. John S. Baey, Fundamentals of Linear State Space Systems, Mc. Graw,Hill, 1st edition

Course Outcomes

Students will be able to

1. Model digital filters and systems
2. Analyse digital systems in time domain and frequency domain
3. Model and analyse digital systems in state space representation
4. Design controllers for digital systems in state space representation

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

(18EE2005) NON- LINEAR CONTROL

M.Tech, I Year 1st Semester (CS)

L	T	P	C
3	0	0	3

Course Objectives

1. To study concepts and techniques for stability analysis
2. Learning control design of nonlinear systems

UNIT-I

Overview of nonlinear Control-Introduction to Advanced Calculus, Elementary notions of Topology, Smooth Manifolds, Sub-manifolds, Tangent Vectors, Vector Fields

UNIT-II

Lyapunov stability for autonomous and non-autonomous systems, Input-Output Stability and Input-to-State Stability Absolute Stability

UNIT-III

Passivity analysis and applications to control design,Lyapunov-based feedback, control design. Feedback linearization and backstepping

UNIT-IV

Sussmann‘s Theorem and global Decompositions, The Control Lie Algebra, the observation space, Local Co-ordinates, Transformations, Exact Linearization Via Feedback , The Zero dynamics, Local Asymptotic Stabilization, Asymptotic Output Tracking

UNIT-V

Disturbance Decoupling, High Gain Feedback, Additional Results on Exact Linearization, Observers with Linear Error Dynamics

Text Books

1. H. K. Khalil, “Nonlinear Systems”, 3rd edition, Prentice Hall, 2001
2. H. K. Khalil, “Nonlinear Control”, Pearson, 2015
3. J. J. E. Slotine and W. Li, “Applied nonlinear systems”, Prentice Hall, 1991

Reference

1. A. Nijemjer and A. van der schaft, “Nonlinear dynamical control systems”, Springer, 1989
2. M. Vidyasagar, “Nonlinear Systems Analysis, Society for Industrial and Applied Mathematics”, 2002
3. Alberto Isidori, “Nonlinear Control Systems”, Third Edition, Springer, 1995

Course Outcomes

Students will be able to

1. Application of deeper ideas from mathematics and specifically from geometry to engineeringproblems
2. Analyze and design nonlinear controllers with the aid of software tools

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

(18EE2006) SYSTEMS BIOLOGY

M.Tech, I Year 1st Semester (CS)

L	T	P	C
3	0	0	3

Course Objectives

1. Introduction to Mathematical Model and Frame Work
2. Learning of core –Process ,Pulses and Oscillations
3. Introduction to Feed Forward Loops, Fundamental trade offs

UNIT-I

Mathematical models and frameworks: Law of mass action, Master Equation. Deterministic vs stochastic, Spatial aspects.

UNIT-II

Examples of core processes: Gene expression, Protein degradation, Phosphorylation Equilibrium solutions & their Bifurcations Switches & Bistability.

UNIT-III

Pulses and Oscillations, Circadian Rhythms and Clocks Spatial patterns, Morphogenesis and Development

UNIT-IV

Robustness to Perturbations, Integral Feedback Control, Homeostasis and Perfect Adaptation

UNIT-V

Feed-forward Loops, Fold Change Detection. Fundamental Tradeoffs, Internal Model Principle.

Text Books

1. N. G. van Kampen, “Stochastic Processes in Physics and Chemistry”, North-Holland 3rd edition 2007
2. U. Alon, “An Introduction to Systems Biology, Chapman & Hall/ CRC Mathematical and Computational Biology”, 2006

Reference Books:

1. J. D. Murray, “Mathematical Biology parts I & II”, Springer 3rd edition, 2007
2. E. Klippet. al, “Systems Biology”, Wiley-Blackwell, 2009
3. S. Strogatz, “Nonlinear Dynamics and Chaos”, Westview Press, 2001
4. D. D. Vecchio & R. M. Murray, “Biomolecular Feedback Systems”, Princeton University Press, 2014

Course Outcomes

Students will be able to

1. Understand and apply mathematical models to design a particular system
2. Apply feed-forward loops to design a biological control system

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

(18EE2122) SCADA SYSTEM AND APPLICATIONS

M.Tech, I Year 1st Semester (CS)

L	T	P	C
3	0	0	3

UNIT-I

INTRODUCTION TO PLC

PLC basics: PLC system, I/O modules and interfacing, CPU processor, programming equipment, programming formats, construction of PLC ladder diagrams, devices connected to I/O modules

UNIT-II

INTRODUCTION TO SCADA

Introduction to SCADA , Data acquisition systems, Evolution of SCADA, Communication technologies, Monitoring and supervisory functions, SCADA applications in Utility Automation, SCADA System Components.

UNIT-III

COMPUTER CONTROL OF POWER SYSTEMS

Need of computer control of power systems, concept of energy control center (or) load dispatch center and the functions, system monitoring, data acquisition and control, system hardware configuration, SCADA and EMS functions, network topology, state estimation, security analysis and control, operating states.

UNIT-IV

INDUSTRIES SCADA SYSTEM COMPONENTS

SCADA System Components: Schemes- Remote Terminal Unit (RTU), Intelligent Electronic Devices (IED), Programmable Logic Controller (PLC), Communication Network, SCADA Server, SCADA/HMI Systems.

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UNIT-V

SCADA APPLICATIONS

Utility applications- Transmission and Distribution sector -operations, monitoring, analysis and improvement. Industries - oil, gas and water. Case studies,

Implementation, Simulation Exercises.

Text books

1. Stuart A. Boyer: “SCADA-Supervisory Control and Data Acquisition”, Instrument Society of America Publications,USA,2004
2. Gordon Clarke, Deon Reynders: “Practical Modern SCADA Protocols: DNP3, 60870.5 and Related Systems”, Newnes Publications, Oxford, UK,2004
3. William T. Shaw, “Cybersecurity for SCADA systems”, PennWell Books, 2006
4. David Bailey, Edwin Wright, “Practical SCADA for industry”, Newnes, 2003

5. Michael Wiebe, “A guide to utility automation: AMR, SCADA, and IT systems for electric power”, PennWell 1999

References

1. P.Kundur ; “Power System Stability and Control”, EPRI Publications, California 1994.
2. Nagrath, I.J. and Kothari D.P., ‘Modern Power System Analysis’, TMH, New Delhi, 1980
3. D.P.Kothari & J.S.Dhillon, Power System Optimization, PHI, 2004

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

(18EE2007) DESIGN ASPECTS IN CONTROL

M.Tech, I Year 1st Semester (CS)

L	T	P	C
3	0	0	3

Course Objectives

1. The student is introduced to the tools and techniques of control system design
2. Introduction to various aspects of controller design philosophy
3. Learning PID Controller

UNIT-I

System Modelling-review of concepts,Modeling Concepts,State Space Models,Modeling Methodology,Modeling Examples,

UNIT-II

State space based identification, State space analysis of systems, Identification of simple systems, Identification of FOPDT model Identification of second order plus dead time model, Identification of SOPDT model with pole multiplicity Existence of limit cycle for unstable system, Identification procedures Identification of under damped systems identification Smith Predictor and its variations.

UNIT-III

PID Controllers – review PID Tuning – Ziegler Nichols, Cohen-Coon techniques

UNIT-IV

State feedback review – pole placement, Eigen structure assignment, Eigen structure – time response relation, Controller gain selection, controller robustness, disturbance rejection

UNIT-V

Frequency Domain Loop Shaping Lag, Lead and Lag-lead compensators Zero dynamics in servo control, Unstable zero dynamics – control design Observer – concept and design, Case studies – Applications

Text Books:

1. Karl J. Astrom, Richard M. Murray, “Feedback Sytems : An Introduction for Scientists and Engineers”, Princeton University Press, 2010.
2. Thomas Kailath : “Linear Systems”, Prentice-Hall

Course Outcomes

Students will be able to

1. Model a control system given its parameters
2. Decide gains of the controllers like PI,PID in a given control system

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

(18HS0823)RESEARCH METHODOLOGY AND INTELLECTUAL PROPERTY RIGHTS

M.Tech, I Year 1st Semester (CS)

L	T	P	C
0	0	4	2

Course outcomes:

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

- Understand research problem formulation. Analyze research related information Follow research ethics
- Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
- Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
- Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

UNIT I:

Meaning of research problem, Sources of research problem, Criteria Characteristics ofa good research problem, Errors in selecting a research problem, Scope and objectives of research problem.

Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

UNIT II:

Effective literature studies approaches, analysisPlagiarism, Research ethics,

UNIT III:

Effective technical writing, how to write report, Paper

Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

UNIT IV:

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process ofPatenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

UNIT V: Patent Rights: Scope of Patent Rights. Licensing and transfer of technology.Patentinformation and databases.Geographical Indications.New Developments in IPR: Administration of Patent System. New developments inIPR; IPR of Biological Systems, Computer Software etc.Traditional knowledge Case Studies, IPR and IITs.

Text Book

1. Stuart Melville and Wayne Goddard, “Research methodology: an introduction for science & engineering students’”

2. Wayne Goddard and Stuart Melville, “Research Methodology: An Introduction”
3. Ranjit Kumar, 2nd Edition, “Research Methodology: A Step by Step Guide for beginners” Halbert, “Resisting Intellectual Property”, Taylor & Francis Ltd ,2007.

References

1. Mayall, “Industrial Design”, McGraw Hill, 1992. Niebel , “Product Design”, McGraw Hill, 1974.
2. Asimov , “Introduction to Design”, Prentice Hall, 1962.
3. Robert P. Merges, Peter S. Menell, Mark A. Lemley, “ Intellectual Property in New Technological Age”, 2016.
4. T. Ramappa, “Intellectual Property Rights Under WTO”, S. Chand, 2008

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

(18EE2008) CONTROL SYSTEM LAB

M.Tech, I Year 1st Semester (CS)

L	T	P	C
0	0	4	2

List of Experiments

1. Determination of Transfer functions of an Electrical System.
2. Time Response Characteristics of a Second order System (Typical RLC network).
3. Characteristics of Synchros:
   (a) Synchro transmitter characteristics.
   (b) Implementation of error detector using synchro pair.
4. Determination of Magnetic Amplifier Characteristics with different possible connections.
5. Process Control Simulator:
   (a) To determine the time constant and transfer function of first order process.
   (b) To determine the time response of closed loop second order process with Proportional Control.
   (c) To determine the time response of closed loop second order process with Proportional,Integral Control.
   (d) To determine the time response of closed loop second order process with Proportional,Integral,Derivative Control.
   (e) To determine the effect of disturbances on a process.
6. To study the compensation of the second order process by using:
   (a) Lead Compensator.
   (b) Lag Compensator.
   (c) Lead, Lag Compensator
7. Realization of AND, OR, NOT gates, other derived gates and ladder logic on Programmable Logic Controller with computer interfacing.
8. To determination of AC servomotor Characteristics.
9. To study the position control of DC servomotor with P, PI control actions.
10. Analog Computer:
    (a) To examine the operation of potentiometer and adder.
    (b) To examine the operation of integrator.To solve a second order differential equation.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

(18EE2009) PROGRAMMABLE LOGIC CONTROLLER (PLC) LAB

(Virtual Lab)

M.Tech, I Year 1st Semester (CS)

L	T	P	C
0	0	4	2

List of Experiments

1. Study hardware and software used in PLC
2. Implementation Logic Gates
3. Implementation Of DOL Starter
4. Implementation Of On-Delay Timer
5. Implementation Of Off-Delay Timer
6. Implementation Of Up-Down Counter
7. Implementation Of PLC Arithmatic Instructions
8. Implementation Of PID Controller

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

(18HS0818) ENGLISH FOR RESEARCH PAPER WRITING

(AUDIT COURSE-I)

M.Tech, I Year 1st Semester (CS)	**L**	**T**	**P**	**C**
	3	**0**	**0**	**0**

Course objectives:

Students will be able to:

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

UNIT-I

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

UNIT-II

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

UNIT-III

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

UNIT-IV

Key skills needed when writing a Title, key skills needed when writing abstract, key skills needed when writing an Introduction, skills when writing a Review of the Literature.

UNIT-V

Skills needed when writing the Methods, skills needed when writing the Results, skills needed when writing the Discussion, skills needed when writing the Conclusions.

Text Books

1. Goldbort R (2006) Writing for Science, Yale University Press.
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press

Reference

1. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman's Books.
2. Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht.Heidelberg London, 2011.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

(18CE1029) DISASTER MANAGEMENT

(AUDIT COURSE-I)

M.Tech, I Year 1st Semester (CS)	**L**	**T**	**P**	**C**
	3	**0**	**0**	**0**

Course *Objective:*-*The objectives of this* ***subject*** *is to give the basic knowledge of Environmental Hazards and disasters. The syllabus includes the basics of Endogenous and Exogenous hazards and gives a suitable picture on the different types of hazard and disaster mitigation methods.*

Course Outcomes:

On completion of the course the students will have knowledge on

1. Types of disasters and their effects on environment

2. Causes of disasters

3. Disaster management through engineering applications

UNIT-I

Environmental Hazards & Disasters: Meaning of Environmental hazards, Environmental Disasters and Environmental stress. Concept of Environmental Hazards, Environmental stress & Environmental Disasters. Different approaches & relation with human Ecology - Landscape Approach - Ecosystem Approach - Perception approach - Human ecology & its application in geographical researches.

UNIT –II

Types of Environmental hazards & Disasters: Natural hazards and Disasters – Man induced hazards & Disasters - Natural Hazards- Planetary Hazards/ Disasters – Extra Planetary Hazards/ disasters - Planetary Hazards- Endogenous Hazards – Exogenous Hazards

UNIT–III

Endogenous Hazards - Volcanic Eruption – Earthquakes – Landslides – Volcanic Hazards/ Disasters - Causes and distribution of Volcanoes - Hazardous effects of volcanic eruptions - Environmental impacts of volcanic eruptions – Earthquake Hazards/ disasters - Causes of Earthquakes - Distribution of earthquakes – Hazardous effects of - earthquakes - Earthquake Hazards in India - - Human adjustment, perception & mitigation of earthquake.

UNIT –IV

Exogenous hazards/ disasters - Infrequent events- Cumulative atmospheric hazards/ disasters infrequent events: Cyclones – Lightning – Hailstorms Cyclones: Tropical cyclones & Local storms - Destruction by tropical cyclones & local storms (causes, distribution human adjustment, perception & mitigation) Cumulative atmospheric hazards/ disasters: - Floods- Droughts- Cold waves- Heat waves. Floods:- Causes of floods- Flood hazards India- Flood control measures (Human adjustment, perception & mitigation).Droughts:- Impacts of droughts- Drought hazards in India- Drought control measures- Extra Planetary Hazards/

Disasters- Man induced Hazards /Disasters- Physical hazards/ Disasters-Soil Erosion Soil Erosion:-- Mechanics & forms of Soil Erosion- Factors & causes of Soil Erosion- Conservation measures of Soil Erosion. Chemical hazards/ disasters: Release of toxic chemicals, nuclear explosion- Sedimentation processes. Sedimentation processes: - Global Sedimentation problems- Regional Sedimentation problems- Sedimentation & Environmental problems- Corrective measures of Erosion & Sedimentation. Biological hazards/ disasters: - Population Explosion.

UNIT –V

Emerging approaches in Disaster Management- Three Stages

1. Pre- disaster stage (preparedness)
2. Emergency Stage
3. Post Disaster stage-Rehabilitation

Text books:

1. Disaster Management by Rajib Shah, Universities Press, India, 2003
2. Disaster Science and Management by Tushar Bhattacharya, TMH Publications.
3. Disaster Mitigation: Experiences and Reflections by Pardeep Sahni
4. Natural Hazards & Disasters by Donald Hyndman & David Hyndman – Cengage Learning

References:

1. The Environment as Hazards by Kates, B.I & White, G.F, Oxford Publishers, New York, 1978
2. Disaster Management by R.B. Singh (Ed), Rawat Publication, New Delhi, 2000
3. Disaster Management by H.K. Gupta (Ed), Universiters Press, India, 2003
4. Space Technology for Disaster Mitigation in India (INCED) by R.B. Singh, University of Tokyo, 1994.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

(18HS0825) SANSKRIT FOR TECHNICAL KNOWLEDGE

(AUDIT COURSE-I)

M.Tech, I Year 1st Semester (CS)

L	T	P	C
3	0	0	0

Course Objectives:

1. To get a working knowledge in illustrious Sanskrit, the scientific language in the world.
2. Learning of Sanskrit to improve brain functioning.
3. Learning of Sanskrit to develop the logic in mathematics, science & other subjects Enhancing the memory power.
4. The engineering scholars equipped with Sanskrit will be able to explore the huge knowledge from ancient literature.

UNIT-I

Alphabets in Sanskrit, Past/Present/Future Tenses, Simple Sentences

UNIT-II

Order, Introduction of roots, Technical information about Sanskrit Literature

UNIT-III

Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics

Text Books

1. "Abhyaspustakam" – Dr.Vishwas, Samskrita-Bharti Publication, New Delhi

2. "Teach Yourself Sanskrit" Prathama Deeksha-VempatiKutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication

References

1. "India's Glorious Scientific Tradition" Suresh Soni, Ocean books (P) Ltd., New Delhi.

Course Output

Students will be able to

1. Understanding basic Sanskrit language

2. Ancient Sanskrit literature about science & technology can be understood

3. Being a logical language will help to develop logic in students

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

(18HS0826) VALUE EDUCATION

(AUDIT COURSE-I)

M.Tech, I Year 1st Semester (CS)

L	T	P	C
3	0	0	0

Course Objectives

Students will be able to

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

UNIT-I

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

UNIT-II

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

UNIT-III

Personality and Behavior Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline,Punctuality, Love and Kindness,Avoid fault Thinking,Free from anger, Dignity of labour,Universal brotherhood and religious tolerance,True friendship,Happiness Vs suffering, love for truth,Aware of self-destructive habits,Association and Cooperation,Doing best for saving nature

UNIT-IV

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

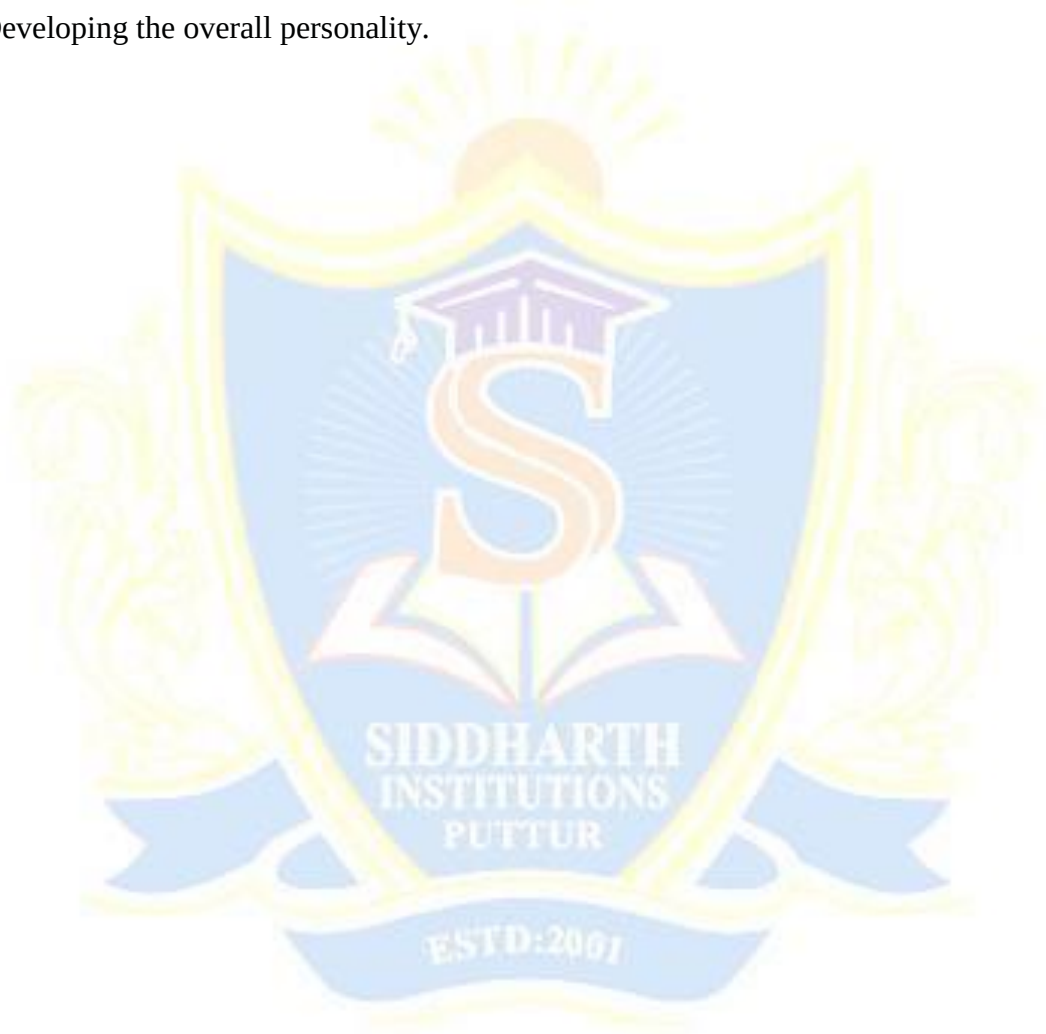
Text Books

1. Chakroborty, S.K. “Values and Ethics for organizations Theory and practice”, Oxford University Press, New Delhi.

Course outcomes

Students will be able to:

1. Knowledge of self-development.
2. Learn the importance of Human values.
3. Developing the overall personality.



SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

(18EE2010) OPTIMAL CONTROL THEORY

M.Tech, I Year 2nd Semester (CS)

L	T	P	C
3	0	0	3

Course Objectives

1. Introduce the basic and fundamental concepts of optimal control theory controller design
2. Introduction to computational aspects of optimal control

UNIT I

INTRODUCTION: The Mathematical Model of a Process, Physical Constraints. The Performance Measure , the Optimal Control Problem , Forms of the Optimal Control, State Variable Representation of System – System Classification and Output Equations , Solution of State Equation – Linear Systems, Typical Control Problems, Selection of Performance Measure , Controllability and Observability.

UNIT II

THE CALCULUS OF VARIATIONS – I: Fundamental Concepts, Maxima and Minima of Functions, Fundamental Theorem of Calculus of Variations. Functional of Single Function, The Simplest Variation Problem- Euler's Equation, Fixed End Point Problem- Free End Point Problem.

UNIT III

THE CALCULUS OF VARIATIONS – II: Functional Involving Several Independent Functions –Problem with Fixed End Points – Problems with Free End Points, Constrained Extreme a Constrained Minimization of Function and Functional.

UNIT IV

VARIATIONAL APPROACH TO OPTIMAL CONTROL PROBLEMS: Necessary Conditions for Optimal Control Hamiltonian Function- Boundary Conditions in Optimal Control Problems – Linear Regulator Problems – Matrix Ricalti Equation – Linear Tracking Problem.

PONTRYAGIN'S MINIMUM PRINCIPLE: State un Equality Constraints – Minimum Time Problem- Minimum Control Effort Problem- Minimum Fuel Problem – Minimum Energy Problem.

UNIT V

DYNAMIC PROGRAMMING: The Optimal Control Law, The principal of Optimality, Dynamic Programming applied to Routing Problems, An Optimal Control Systems-A recurrence Relation of Dynamic Programming – Computational Procedure for Solving Optimal Control Problems – Discrete Linear Regulator Problems, Hamilton – Jacobian-Bellman Equation Continuous Linear Regulator Problems.

Text Books:

1. Donald E. Krik: Optimal Control Theory, Library of Congress Cataloging in

Publication Data.
2. M.Gopal: Modern Control Systems Theory, New age International Publishers, 5th Edition, 1984

***References*:**

1. A.P.Sage: Optimal System Control, Pearson Education Canada, 1977.

2. Ogata: Modern Control Systems Theory, Prentice Hall, 2010

Course Outcomes

Students will be able to

1. Combine the mathematical methods used in optimal control to derive the solution to variations of the problems studied in the course
2. Use the standard algorithms for numerical solution of optimal control problems and use Matlab to solve fairly simple but realistic problems
3. Integrate the tools learnt during the course and apply them to more complex problems

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

(18EE2011) INDUSTRIAL AUTOMATION

M.Tech, I Year 2nd Semester (CS)

L	T	P	C
3	0	0	3

Course Objectives

1. To introduce fundamental concepts of Automation in Production System, Material Handling Systems, Principles and Design Consideration
2. To introduce Traditional and Modern Quality Control Methods, Industrial Control Systems

UNIT-I

Automation in Production System, Principles and Strategies of Automation, BasicElements of an Automated System, Advanced Automation Functions, Levels of Automations. Flow lines & Transfer Mechanisms, Fundamentals of Transfer Lines. (SLE: Analysis of Transfer Lines)

UNIT- II

Overview of Material Handling Systems, Principles and Design Consideration, Material Transport Systems, Storage Systems, Overview of Automatic Identification Methods. (SLE: Material Identification Methods).

UNIT- III

Components, Classification and Overview of Manufacturing Systems, Manufacturing Cells, GT and Cellular Manufacturing, FMS, FMS and its Planning and Implementation. Quality Control Systems: Traditional and Modern Quality Control Methods, SPC Tools, Inspection Principles and Practices, Inspection Technologies. (SLE: Usage of SPC tools using excel or Minitab).

UNIT-IV

Industrial Control Systems, Process Industries Versus Discrete-Manufacturing Industries, Continuous Versus Discrete Control, Computer Process and its Forms. (SLE: Sensors, Actuators and other Control System

UNIT-V

Computer Based Industrial Control: Introduction & Automatic Process Control, Building Blocks of Automation Systems: LAN, Analog & Digital I/O Modules, SCADA Systems& RTU. Distributed Control System: Functional Requirements, Configurations & some popular Distributed Control Systems (SLE: Display Systems in Process Control Environment.)

Text Books:

1. Automation, Production Systems and Computer Integrated Manufacturing- M.P.Groover, Pearson Education.5th edition, 2009
2. Computer Based Industrial Control- Krishna Kant, EEE-PHI,2nd edition,2010

References

1. An Introduction to Automated Process Planning Systems- Tiess Chiu Chang & Richard A. Wysk
2. Performance Modeling of Automated Manufacturing Systems,-Viswanandham, PHI, 1st Edition,2009.

Course Outcomes

Students will be able

1. To identify potential areas for automation and justify need for automation
2. To select suitable major control components required to automate a process or an activity
3. To translate and simulate a real time activity using modern tools and discuss the benefits of automation.
4. To identify suitable automation hardware for the given application.
5. To recommend appropriate modeling and simulation tool for the given manufacturing application.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

(18EE2012) ADVANCED CONTROL SYSTEMS

M.Tech, I Year 2nd Semester (CS)

L	T	P	C
3	0	0	3

Course Objectives

1. The course provides glimpses into the advanced methods of modeling and analysis of thedynamical systems
2. The course is a strong step in inculcating the research aptitude in the students

UNIT-I:

Modelling of Dynamical Systems:

Newtonian and Lagrangian approaches, Concept of dynamical state of a system, Concept of equilibrium point, linearization of non-linear model Review of Linear Algebra concepts: Field, Vector space, linear combination, linear independence, bases of a vector space, representation of any vector on different basis, matrix representation of a linear operator, change of basis, rank, nullity, range space and null space of a matrix, Eigen value and Eigen vector of a matrix, similarity transform, Diagonalisation

UNIT-II:

Modern Control Analysis: Concept and computation of systems modes, controllability theorem and its proof. Observability theorem and its proof, Controllable and observable subspaces

UNIT-III:

Stability Analysis: Stability of linear systems, stability types and their definitions for any general system, Stability of an equilibrium point, Lyapunov stability theory for LTI systems, Quadratic forms and Lyapunov functions

UNIT-IV:

Modern Control Design: Converting the math model to controllable canonical form and its use for pole placement, Concept of linear observer and its design, Design of reduced order observer, Compensator design using separation principle, Poles of compensator, Open loop and close-loop systems

UNIT-V:

Optimal Control Theory: Introduction to the philosophy of optimal control, formulation of optimal control problem, different performance criterion, Linear quadratic regulator (LQR) and optimum gain matrix, Riccati equations, conceptual models and statistical models for random processes, Kalman filter

1. Bernard Friedland, “Control System Design: An Introduction to State-Space Methods”, Dover Publications, Inc. Mineola, New York, 2012
2. Thomas Kailath, “Linear Systems”, Prentice-Hall Inc., New Jersey, 1986

References:

1. M. Gopal, “Modern Control System Theory”, , New Age International (P) Limited, New Delhi, 2000

Course Outcomes

Students will be able to

1. Apply the concepts of linear algebra and their applications to control system
2. Analyze the system dynamics and Lyapunov stability theory
3. Design linear quadratic controller

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

(18EE2013) ADVANCED ROBOTICS

M.Tech, I Year 2nd Semester (CS)

L	T	P	C
3	0	0	3

Course Objectives

1. This course gives an in-depth view into the mathematical methods for modeling and control of
   Robotic manipulator
2. Introduction to spatial descriptions and transformation
3. Analysis of Robots control
4. Introduction to various linear controls of manipulators
5. Introduction to robot programming and language systems

UNIT-I
INTRODUCTION
Background-The Mechanics and Control of Mechanical Manipulators – Notation

UNIT-II
SPATIAL DESCRIPTIONS AND TRANSFORMATIONS
Descriptions: Positions, Orientations, and Frames -Mappings: Changing Descriptions From Frame to Frame -Operators: Translations, Rotations, and Transformations - Summary of Interpretations -Transformation Arithmetic-Transform Equations-Computational Considerations

UNIT-III
ROBOT CONTROL
Linear Control Techniques-Nonlinear Control Techniques-Holonomic and Non-holonomic Systems- Vision based Robotic Control

UNIT-IV
LINEAR CONTROL OF MANIPULATORS
Introduction-Feedback and Closed-Loop Control-Second-order Linear Systems-Control of Second-order Systems -Control-Law Partitioning-Trajectory-Following Control-Disturbance Rejection

UNIT-V
ROBOT PROGRAMMING LANGUAGES AND SYSTEMS
Introduction- The Three Levels of Robot Programming- A Sample Application-Requirements of A Robot Programming Language-Problems Peculiar To Robot Programming Languages

Textbooks

1. Mark W. Spong, Seth Huchinson and M. Vidyasagar, "Robot Modeling and Control", John Wiley and Sons, Inc., 2005

2. John J. Craig, “Introduction to Robotics: Mechanics & Control”, 3rd Edition, Prentice Hall, 2004.

References

1. Richard Murray, A. Lee, S. Sastry, “A Mathematical Introduction to Robotic Manipulation”, CRC Press, 1994

Course Outcomes

Students will be able to

1. Able to design a robotic control
2. Able to apply non-linear techniques to any control problem
3. Able to model mobile robot

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

(18EE2014) ADAPTIVE LEARNING CONTROL

M.Tech, I Year 2nd Semester (CS)

L	T	P	C
3	0	0	3

Course Objectives

1. To introduce adaptive and learning techniques for control design for uncertain dynamicalsystems
2. Introduction to learning based control

UNIT-I

Introduction, use of Adaptive control, definitions, essential aspects, classification, Model Reference Adaptive Systems, different configurations, classification, mathematical description, Equivalent representation as a nonlinear time varying system, direct and indirect MRAC.

UNIT-II

Continuous time MRAC systems, Model Reference Adaptive System Design based on Gradient method, Design of stable adaptive controllers based on Kalman, Meyer, Yakubovich Lemma, Lyapunov theory, Hyper stability theory, Narendra's error model approach.

UNIT-III

Discrete time MRAC systems, Hyper stability approach, Narendra's error model approach, Introduction, stability theorem, Relation to other algorithms, hybrid adaptive control, Self Tuning Regulators (STR), different approaches to self tuning, Recursive parameter estimation, implicit STR, Explicit STR.

UNIT-IV

STR design based on pole, placement technique and LQG theory, Gain scheduling, Stability of adaptive control algorithms, Adaptive control of a nonlinear systems, Adaptive predictive control, Robustness of adaptive control systems, Instability phenomena in adaptive systems.

UNIT-V

Concept of learning control systems, Different types of learning control schemes, LTI learning control via parameter estimation schemes, Convergence of learning control, Case Studies: Robotic manipulators, Aerodynamic curve identification, Electric drives,Satellite altitude control.

Text Books

1. K.J.Astrom and Bjorn Wittenmark, Adaptive control, Pearson Edu., 2nd Edn.
2. Sankar Sastry, Adaptive control.

References

1. V.V.Chalam, Adaptive Control System, Techniques & Applications, Marcel DekkerInc.
2. Miskhin and Braun, Adaptive control systems, MC Graw Hill
3. Karl Johan Åström, Graham Clifford Goodwin, P. R. Kumar, Adaptive Control, Filtering and Signal Processing
4. G.C. Goodwin, Adaptive control.
5. Narendra and Anna Swamy, Stable Adaptive Systems.

Course Outcomes

Students will be able to

1. Understand detailed knowledge of classical system identification and the development and properties of various methods
2. Understand detailed knowledge of on-line parameter estimation
3. Understand knowledge of adaptive control systems and their development and properties
4. Understand knowledge of methods and tools for stability analysis of adaptive systems

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

(18EE2015) MODEL REDUCTION IN CONTROL

M.Tech, I Year 2nd Semester (CS)

L	T	P	C
3	0	0	3

Course Objectives

1. Introduce the concept of model reduction of large scale dynamics models which from variousengineering disciplines.
2. Introduction to model reduction in control

UNIT-I

Introduction to Model Reduction, Source of Large Models – Circuits, EM systems, Mechanical Systems

UNIT-II

Classical Model Reduction Methods – Modal reduction

UNIT-III

Pade approximation and moment matching, Routh Approximants

UNIT-IV

Modern Methods - SVD (Grammian) based methods , Krylov based methods , SVD-Krylov based methods , MOR for Nonlinear Systems – SVD & POD Methods

UNIT-V

Model Reduction in Control, Sliding Mode Control – Review,SMC as model reducing control,Higher Order Sliding Mode.

Text Books

1. A. C. Antoulas, “Approximation of Large Scale Dynamical Systems”, SIAM, 2005
2. Ed. AlfioQuarteroni&GianluigiRozza, “Reduced Order Methods for Modeling and ComputationalReduction”, Springer, 2014
3. M. Jamshidi, “Large-scale systems: modelling & control”, North Holland, New York, 1983.

References

1. C. Edwards and S. Spurgeon, “Sliding Mode Control : Theory and Applications”, CRC Press,1998
2. B. Bandyopadhyay, S. Janardhanan and S. Spurgeon, “Advances in Sliding Mode”, Springer, 2013

Course Outcomes

Students will be able to

1. Apply model reduction techniques for a given control design problem
2. Design control loops for all techniques
3. Know modern methods

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

(18EE2017) NETWORKED AND MULTI-AGENT CONTROL SYSTEMS

M.Tech, I Year 2nd Semester (CS)

L	T	P	C
3	0	0	3

Course Objectives

1. To analyze and design control systems for networked and multi-agent systems
2. Understand network optimization techniques

UNIT-I

Overview of networked systems, Graph Theory Fundamentals

UNIT-II

Graph-based Network Models, Network Optimization

UNIT-III

Consensus Problem: cooperative control, leader-follower architecture

UNIT-IV

Control under Communication Constraints, Formation Control, Swarming and Flocking, Collision Avoidance

UNIT-V

Game Theoretic Control of Multi-Agent Systems, Applications: Multi-robot/vehicle coordination, Sensor Networks, Social Networks, Smart Grids, Biological Networks.

Text Books

1. C. Godsil and G. Royle, “Algebraic Graph Theory”, Springer, 2001
2.M. Mesbahi and M. Egerstedt , “Graph Theoretic Methods in Multi-Agent Networks”, Princeton University Press, 2010 .

References

1.F. Bullo, J. Cortes, and S. Martinez, “Distributed Control of Robotic Networks”, Princeton, 2009
2.Wei Ren, Randal W. Beard, “Distributed Consensus in Multi-vehicle Cooperative Control, Communications and Control Engineering Series”, Springer-Verlag, London, 2008

Course Outcomes

Students will be able to

1. Understand multi-agent control systems
2. Know network optimization techniques and its applications
3. Design multi-robot or vehicle coordination systems

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

(18EE2116) ADVANCED DIGITAL SIGNAL PROCESSING

M.Tech, I Year 2nd Semester (CS)

L	T	P	C
3	0	0	3

Course Objectives

1. To understand the difference between discrete-time and continuous-time signals
2. To understand and apply Discrete Fourier Transforms (DFT)

UNIT-I

Short introduction, Analog to digital and Digital to Analog conversion, sampled and Hold circuit, Continuous time Fourier Transforms, Discrete time signals and systems, Discrete time Fourier transform, its properties and applications, Fast Fourier Transform (in time domain and Frequency domain), IDFT and its properties.

UNIT-II

z-Transform: Definition and properties, Rational z-transforms, Region of convergence of a rational z-Transform, The inverse z-Transform, z-Transform properties, Computation of the convolution sum of finite, length sequences, The transfer function.

UNIT-III

Digital filter structures: Block Diagram representation, Equivalent structures, Basic FIR Digital Filter structures, Basic IIR Digital Filter structures, Realization of Basic structures using MATLAB, All pass filters, Computational complexity of Digital filter structures.

UNIT-IV

IIR Digital filter design: Preliminary considerations, Bilinear transformation method of IIR Filter design, Design of low pass IIR Digital filters, Design of High pass, Band pass and band stop IIR digital filters, Spectral Transformations of IIR filter, IIR digital filter design using MATLAB, Computer aided design of IIR digital filters.

FIR digital filter design: Preliminary considerations, FIR filter design based on windowed Fourier series, Computer aided design of Equiripple Linear phase FIR filters, Design of Minimum phase FIR filters, FIR digital filter design using MATLAB, Design of computationally efficient FIR digital filters.

UNIT-V

Analysis of Finite word length effects: The quantization process and errors, quantization of Fixed point numbers, Quantization of floating point numbers, Analysis of coefficient quantization effects, Analysis of arithmetic round off errors, Low sensitivity digital filters, Reduction of product round off errors using error feedback, Round off errors in FFT algorithms.The basic sample rate alteration devices, Multi rate structures for sampling rate conversion, Multistage design of decimator and interpolator, The Polyphase decomposition, Arbitrary rate sampling rate converter, Nyquist Filters and some applications of digital signal processing.

Text Books

1. Digital Signal Processing, S.K. Mitra, Tata McGraw,Hill, Third Edition, 2006.
2. Principle of Signal Processing and Linear Systems, B.P. Lathi, Oxford International Student Version, 2009
3. Continuous and Discrete Time Signals and Systems, M. Mondal and A Asif, Cambridge, 2007

References

1. Digital Signal Processing, Fundamentals and Applications,LiTan-Indian reprint,Elsevier,2008.
2. Discrete-Time Signal Processing, Alan V. Oppenheim, Ronald, W. Schafer, and John R.Buck, Pearson Education, 2008.

Course Outcomes

Students will be able to

1. Gain knowledge about the time domain and frequency domain representations as well analysis ofdiscrete time signals and systems
2. Study the design techniques for IIR and FIR filters and their realization structures.
3. Acquire knowledge about the finite word length effects in implementation of digital filters.
4. Acquire knowledge about the various linear signal models and estimation of power spectrum of stationary random signals
5. Design of optimum FIR and IIR filters

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

(18EE2020) ADVANCED CONTROL SYSTEMS LAB

M.Tech, I Year 2nd Semester (CS)

L	T	P	C
0	0	4	2

List of Experiments

The following experiments may be implemented in MATLAB/SIMULINK environment.

1. Preliminary Transformations:
   (a) Transfer function to State space models vice, versa.
   (b) Conversion of Continuous to Discrete time systems vice, versa.
   (c) Verification of controllability and observablity of a given system.
2. Design of state feedback controllers.
3. Stability analysis of a given system using:
   (a) Root Locus.
   (b) Bode plot.
   (c) Lyapunov stability.
4. Implementation of Kalman Filter.
5. Implementation of Least squares error method.
6. Implementation of PID controller and its effects on a given system.
7. Design of Lead, Lag, Lead, Lag compensators using frequency domain analysis.
8. Construction of Simulink model for an Induction motor.

Note: At least four problems may be implemented from the following

9. Solving steady state Ricatti Equation.
10. Construction of Simulink model foe single area and multi area Power system.
11. Solving an optimal control problem using Ricatti equation.
12. Implementation of Full order and minimum order Observer.
13. Implementation of Back,Propagation Algorithm.
14. Implementation of simple Fuzzy controller.
15. Implementation of storage and recall algorithm of Hopfield network model.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

(18EE2111) INDUSTRIAL AUTOMATION LAB
(Virtual Lab)

M.Tech, I Year 2nd Semester (CS)

L	T	P	C
0	0	4	2

LIST OF EXPERIMENTS

1. Study hardware and software platforms for DCS
2. Simulate analog and digital function blocks
3. Study, understand and perform experiments on timers and counters
4. Logic implementation for traffic Control Application
5. Logic implementation for Bottle Filling Application
6. Tune PID controller for heat exchanger using DCS
7. FBD for autoclavable laboratory fermenter
8. Develop graphical user interface for the fermenter plant

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

(18HS0829) CONSTITUTION OF INDIA

(AUDIT COURSE-II)

M.Tech, I Year 2nd Semester (CS)

L	T	P	C
3	0	0	0

Course Objectives:

Students will be able to:

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

UNIT-1

History of Making of the Indian Constitution:

History, Drafting Committee, (Composition & Working)

UNIT-1I

Philosophy of the Indian Constitution: Preamble, Salient Features.

UNIT-1II

Contours of Constitutional Rights & Duties:

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

Unit-4

Organs of Governance:

Parliament,Composition,Qualifications and Disqualifications, Powers and Functions,

Executive.President,Governor,Council of Ministers,Judiciary, Appointment and Transfer of Judges, Qualifications,Powers and Functions.

Unit-5

Local Administration: District's Administration head: Role and Importance,Municipalities: Introduction, Mayor and role of Elected Representative,CEO of Municipal Corporation.

Pachayati raj: Introduction, PRI: Zila Pachayat.Elected officials and their roles, CEO ZilaPachayat: Position and role.Block level: Organizational Hierarchy (Different departments),Village level: Role of Elected and Appointed officials,Importance of grass root democracy.

Election Commission:

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

Text Books

1. The Constitution of India, 1950 (Bare Act), Government Publication.

2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.

References

1. M. P. Jain, Indian Constitution Law, 7th Edn. Lexis Nexis, 2014.

2. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

(18HS0827)PEDAGOGY STUDIES

(AUDIT COURSE-II)

M.Tech, I Year 2nd Semester (CS)

L	T	P	C
3	0	0	0

Course Objectives:

Students will be able to:

4. Review existing evidence on the review topic to inform programme design and policy making undertaken by the DfID, other agencies and researchers.

5. Identify critical evidence gaps to guide the development.

Unit-1

Introduction and Methodology:

Aims and rationale, Policy background, Conceptual framework andTerminology.Theories of learning, Curriculum, Teacher education.Conceptual framework, Research questions**.** Overview of methodology and Searching.

Unit-2

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

Unit-3

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

Unit-4

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

Unit-5

Research gaps and future directions,Research design.Contexts,

Pedagogy, Teacher education, Curriculum and assessment,Dissemination and research impact.

Textbooks

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261.
2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.
3. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.

References

1. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282.
2. Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.
3. Chavan M (2003) Read India: A mass scale, rapid, 'learning to read' campaign.
4. www.pratham.org/images/resource%20working%20paper%202.pdf.

Course Outcomes

Students will be able to understand:

1. What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries?
2. What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?
3. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

(18HS0828) STRESS MANAGEMENT BY YOGA

(AUDIT COURSE-II)

M.Tech, I Year 2nd Semester (CS)

L	T	P	C
3	0	0	0

Course Objectives:

1. To achieve overall health of body and mind
2. To overcome stress

UNIT-I

Definitions of Eight parts of yoga (Ashtanga)

UNIT-II

Yam and Niyam. Do`s and Don'ts in life:

Ahinsa, satya, astheya, bramhacharya and aparigraha, Shaucha, santosh, tapa, swadhyay, ishwarpranidhan.

UNIT-III

Asan and Pranayam:

Various yog poses and their benefits for mind & body, Regularization of breathing techniques and its effects-Type of pranayam.

Textbooks

1. 'Yogic Asanas for Group Tarining-Part-I" :Janardan Swami Yogabhyasi Mandal, Nagpur Model Curriculum of Engineering & Technology PG Courses [Volume-I] [47].
2. "Rajayoga or conquering the Internal Nature" by Swami Vivekananda, AdvaitaAshrama (Publication Department) Kolkata.

Course Outcomes:

Students will be able to:

1. Develop healthy mind in a healthy body thus improving social health also
2. Improve efficiency.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

(18HS0819)PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS

(AUDIT COURSE-II)

M.Tech, I Year 2nd Semester (CS)

L	T	P	C
3	0	0	0

Course Objectives:

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

UNIT-I

Neetisatakam-Holistic development of personality

Verses- 19,20,21,22 (wisdom), Verses- 29, 31, 32 (pride & heroism), Verses- 26,28,63,65 (virtue), Verses- 52, 53, 59 (dont's), Verses- 71,73,75,78 (do's).

UNIT-II

Approach to day to day work and duties. Shrimad BhagwadGeeta : Chapter 2-Verses 41, 47,48, Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23, 35,Chapter 18-Verses 45, 46, 48.

UNIT-III

Statements of basic knowledge.Shrimad BhagwadGeeta: Chapter2-Verses 56, 62, 68

Chapter 12 -Verses 13, 14, 15, 16, 17, 18 Personality of Role model. Shrimad BhagwadGeeta:

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

Textbooks

1. "Srimad Bhagavad Gita" by Swami SwarupanandaAdvaita Ashram (Publication Department), Kolkata.
2. Bhartrihari's Three Satakam (Niti-sringar-vairagya) by P.Gopinath, 4. Rashtriya Sanskrit Sansthanam, New Delhi.

Course Outcomes

Students will be able to:

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

(18EE2021) MACHINE LEARNING TECHNIQUES

M.Tech, II Year 1st Semester (CS)

L	T	P	C
3	0	0	3

Course Objectives

1. To introduce students to the basic concepts and techniques of Machine Learning.
2. To have a thorough understanding of the Supervised and Unsupervised learning techniques
3. To study the various probability based learning techniques
4. To understand graphical models of machine learning algorithms

UNIT-I

Learning – Types of Machine Learning – Supervised Learning – The Brain and the Neuron – Design a Learning System – Perspectives and Issues in Machine Learning – Concept Learning Task – Concept Learning as Search – Finding a Maximally Specific Hypothesis – Version Spaces and the Candidate Elimination Algorithm – Linear Discriminants – Perceptron – Linear Separability – Linear Regression.

UNIT-II

Multi-layer Perceptron – Going Forwards – Going Backwards: Back Propagation Error – Multilayer Perceptron in Practice – Examples of using the MLP – Overview – Deriving BackPropagation – Radial Basis Functions and Splines – Concepts – RBF Network – Curse of Dimensionality – Interpolations and Basis Functions – Support Vector Machines

UNIT-III

Learning with Trees – Decision Trees – Constructing Decision Trees – Classification and Regression Trees – Ensemble Learning – Boosting – Bagging – Different ways to Combine Classifiers – Probability and Learning – Data into Probabilities – Basic Statistics – Gaussian Mixture Models – Nearest Neighbor Methods – Unsupervised Learning – K means Algorithms –Vector Quantization – Self Organizing Feature Map

UNIT-IV

Dimensionality Reduction – Linear Discriminant Analysis – Principal Component Analysis – Factor Analysis – Independent Component Analysis – Locally Linear Embedding – Isomap – Least Squares Optimization – Evolutionary Learning – Genetic algorithms – Genetic Offspring: - Genetic Operators – Using Genetic Algorithms – Reinforcement Learning – Overview – Getting Lost Example – Markov Decision Process

UNIT-V

Markov Chain Monte Carlo Methods – Sampling – Proposal Distribution – Markov Chain Monte Carlo – Graphical Models – Bayesian Networks – Markov Random Fields – Hidden Markov Models – Tracking Methods

Text Books

1. Ethem Alpaydin, ―Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series)‖, Third Edition, MIT Press, 2014
2. Jason Bell, ―Machine learning – Hands on for Developers and Technical Professionals‖, First Edition, Wiley, 2014.

References

1. Peter Flach, ―Machine Learning: The Art and Science of Algorithms that Make Sense of Data‖,First Edition, Cambridge University Press, 2012.
2. Stephen Marsland, ―Machine Learning – An Algorithmic Perspective‖, Second Edition,

Course Outcomes

Students will be able to

1. Distinguish between, supervised, unsupervised and semisupervised learning
2. Apply the appropriate machine learning strategy for any given problem
3. Suggest supervised, unsupervised or semi-supervised learning algorithms for any given problem
4. Design systems that uses the appropriate graph models of machine learning
5. Modify existing machine learning algorithms to improve classification efficiency

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

(18EE2022) STOCHASTIC CONTROL

M.Tech, II Year 1st Semester (CS)

L	T	P	C
3	0	0	3

Course Objectives

1. To understand dynamics of stochastic systems and their control strategies
2. Introduction to Filtering

UNIT-I

Overview of stochastic systems with examples, Modelling of Stochastic Systems: Continuous and Discrete-time models subjected to noise, Markov Decision Processes.

UNIT-II

Introduction to Stochastic Calculus and Stochastic Differential Equations.

UNIT-III

Stochastic Stability, Stochastic Optimal Control with complete and partial observations, finite and infinite horizon problems.

UNIT-IV

Linear and Nonlinear Filtering, Separation Principle, Linear quadratic Gaussian Problem.

UNIT-V

Linear and Nonlinear Filtering, Separation Principle, Linear quadratic Gaussian Problem.

UNIT-V

Applications: Finance, operations research, biology.

Text Books

1. Dimitri P. Bertsekas, “Dynamic Programming and Optimal Control”, Vol I (2005), Vol II (2012), Athena Scientific
2. Karl J. Astrom, “Introduction to Stochastic Control Theory”, Dover, 2006.

Referencs

1. B. Oeksendal, “Stochastic Differential Equations: An Introduction with Applications”, 2003.
2. P.R. Kumar, P. Varaiya, “Stochastic Systems: Estimation, Identification and Adaptive Control”, Prentice Hall,1986.

Course Outcomes

Students will be able to

1. Apply design Schotastic models for a given system
2. Design Stochastic Stability problems
3. Design linear and non-linear filtering systems

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(18EE2023) COMPUTATIONAL METHODS

M.Tech, II Year 1st Semester (CS)

L	T	P	C
3	0	0	3

Course Objectives

1. Understand mathematical models of lower level engineering problems
2. Learn how to solve nonlinear equations numerically
3. Introduction to fundamental matrix algebra concepts
4. Solving simultaneous linear equations numerically

UNIT-I

Formulation and solution of linear system of equations, Gauss elimination,LU, QR decomposition, iteration methods (Gauss-Seidal), convergence of iteration methods. Singular value decomposition and the sensitivity of rank to small perturbation.

UNIT-II

Newton‘s divided difference, interpolation polynomials, Lagrange interpolation polynomials. Non-linear regression, multiple linear regression, general linear least squares.

UNIT-III

Vector spaces, Basis vectors, Orthogonal/Unitary transform, Fourier transform, Laplace transform.

UNIT-IV

Local and global minima, Line searches, Steepest descent method, Conjugate gradient method, Quasi Newton method, Penalty function.

UNIT-V

Graphs and Matrices, simple graph, cyclic graph, complete graph, properties of the Laplacian matrix and relation with graph connectivity Non-negative matrices. Applications of graph theory to engineering problems.

Text Books

1. Steven C. Chapra and Raymond P. Canale “Numerical Methods for Engineers”, McGrawHill
2. Hines and Montrogmery, John“Probability and Statistics in Engineering and Management Studies”,

Referencs

1. R. B. Bapat “Graphs and Matrices”, , TRIM Series, Hindustan Book Agency, 2011

Course Outcomes

Students will be able to

1. Know the concept and steps of problem solving - mathematical modelling , solution and implementation
2. Knowledge and understanding of, and the ability to use, mathematical techniques
3. Understand and apply mathematical reasoning

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(18HS0824)BUSINESS ANALYTICS

M.Tech, II Year 1st Semester (CS)

L	T	P	C
3	0	0	3

Course Objective: The course is to understand the management and administration, functions of management, formal and informal organization, staffing, creativity and innovation, process of communication.

Course Outcomes:

CO -1: Design, device, and query relational databases for operative data.
CO - 2: Design, implement, populate and query data warehouses for informational data.
CO - 3: To integrate very large data sets to make business decisions.
CO - 4: Evaluate the use of data from acquisition through cleansing, warehousing, analytics, and visualization to the ultimate business decision.
CO - 5: Evaluate the key concepts of business analytics.
CO - 6: Determine when to implement relational versus document oriented database structures.
CO -7: Outline the relationship of the business analytics process within the organisation's decision-making process.
CO - 8: Examine and apply appropriate business analytic techniques and methods.
CO – 9: Execute real-time analytical methods on streaming datasets to react quickly to customer needs.
CO -10: To critically analyze the predictive analysis methods.

UNIT-I

Introduction to Descriptive analytics, Descriptive Statistics, Probability Distributions, Inferential Statistics through hypothesis tests, Permutation & Randomization Test

UNIT-II

Regression, ANOVA (Analysis of Variance), Machine Learning Introduction and ConceptsDifferentiating, algorithmic and model based frameworks, Regression: Ordinary Least Squares, Ridge Regression, Lasso Regression, K Nearest Neighbors', Regression &Classification

UNIT-III

Supervised Learning with Regression and Classification techniques- Bias-Variance Dichotomy, Model Validation Approaches, Logistic Regression, Linear DiscriminantAnalysis, Quadratic Discriminant Analysis, Regression and Classification Trees, Support Vector Machines, Ensemble Methods: Random Forest, Neural Networks, Deep learning

UNIT-IV

Unsupervised Learning and Challenges for Big Data Analytics- Clustering, Associative Rule Mining, Challenges for big data analytics

UNIT- V

Prescriptive analytics Creating data for analytics through designed experiments, creating data for analytics through Active learning, creating data for analytics through Reinforcement learning, Graph Visualization, Data Summaries, Model Checking & Comparison.

Textbooks

1. Hastie, Trevor, et al. The elements of statistical learning.Vol.2.No. 1. New York: springer, 2009.

2. Montgomery, Douglas C., and George C. Runger. Applied statistics and probability for Engineers. John Wiley & Sons, 2010

3. Bekkerman et al. Scaling up Machine Learning

References

1. Tom White "Hadoop: The Definitive Guide" Third Edition, O"reilly Media, 2012.

2. AnandRajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.

3. Vincent Granville, Developing Analytic Talent: Becoming a Data Scientist, wiley, 2014.

7. Jeffrey Stanton & Robert De Graaf, Introduction to Data Science, Version 2.0, 2013.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
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(18ME3121) INDUSTRIAL SAFETY

M.Tech, II Year 1st Semester (CS)

L	T	P	C
3	0	0	3

***Course Objectives*:**

- *To learn about mechanical and electrical hazards.*
- *To learn about P mechanical and electrical hazards.*
- *To learn about Wear and Corrosion and their prevention.*
- *To learn about Periodic and preventive maintenance*

***Course Outcomes*:**

Students undergoing this course are able to

- *Understand the points of factories act 1948 for health and safety.*
- *Understand the cost & its relation with replacement economy.*
- *Understand the concepts of sequence of fault finding activities*
- *Understand the Program and schedule of preventive maintenance of mechanical and electrical equipment.*

UNIT-I:

Industrial Safety: Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc., Safety color codes. Fire prevention and firefighting, equipment and methods.

UNIT-II:

Fundamentals of Maintenance Engineering: Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.

UNIT-III:

Wear and Corrosion and their Prevention: Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication,

Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.

UNIT-IV:

Fault Tracing: Fault tracing-concept and importance, decision tree concept, need and applications, sequence of fault finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic, automotive, thermal and electrical equipment's like, Any one machine tool, Pump, Air compressor, Internal combustion engine, Boiler, Electrical motors, Types of faults in machine tools and their general causes.

UNIT-V:

Periodic and Preventive Maintenance: Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: Machine tools, Pumps, Air compressors, Diesel generating (DG) sets Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance

Text Books:

1. *Maintenance Engineering Handbook*, Higgins & Morrow, Da Information Services, 2002
2. *Maintenance Engineering*, H. P. Garg, S. Chand and Company, 2008

Reference Books:

1. *Pump-hydraulic Compressors*, Audels, Mcgrew Hill Publication, 2009
2. *Foundation Engineering Handbook*, Winterkorn, Hans, Chapman & Hall London, 2010

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

(18ME3122)ADVANCES IN OPERATIONS RESEARCH

M.Tech, II Year 1st Semester (CS)

L	T	P	C
3	0	0	3

***Course Objectives*:**

- *To learn about Optimization Techniques.*
- *To learn about Graphical solution revised simplex method*
- *To learn about Non linear programming problem.*
- *To learn about Scheduling and sequencing and Competitive Models*

***Course Outcomes*:**

Students undergoing this course are able to

- *Understand the Inventory Control Models*
- *Understand the Graphical solution revised simplex method*
- *Understand the concepts of Kuhn-Tucker conditions min cost flow.*
- *Understand the Probabilistic inventory control models and Dynamic Programming*

UNIT-I:

Optimization Techniques, Model Formulation, models, General L.R Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models.

UNIT-II:

Formulation of a LPP - Graphical solution revised simplex method - duality theory - dual simplex method - sensitivity analysis - parametric programming

UNIT-III:

Nonlinear programming problem - Kuhn-Tucker conditions min cost flow problem - max flow problem - CPM/PERT

UNIT-IV:

Scheduling and sequencing - single server and multiple server models - deterministic inventory models - Probabilistic inventory control models - Geometric Programming.

UNIT-V:

Competitive Models, Single and Multi-channel Problems, Sequencing Models, Dynamic Programming, Flow in Networks, Elementary Graph Theory, Game Theory Simulation

Text Books:

1. *Operations Research, An Introduction*, H.A. Taha, PHI, 2008
2. *Principles of Operations Research*, H.M. Wagner, PHI, Delhi, 1982.
3. *Introduction to Optimization: Operations Research*, J.C. Pant, Jain Brothers, Delhi, 2008

Reference Books:

1. *Operations Research*: Hitler Liebermann McGraw Hill Pub. 2009
2. *Operations Research*: Pannerselvam, Prentice Hall of India 2010

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
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(18CE1028) COST MANAGEMENT OF ENGINEERING PROJECTS

M.Tech, II Year 1st Semester (CS)

L	T	P	C
3	0	0	3

Course Objectives:

- *To study fundamentals of engineering project economics*
- *To understand dynamics of money over time*
- *To understand the significance of Benefit & Cost Analysis*
- *To get familiarised with depreciation, inflation and taxes*
- *To know the procedures of equipment costing*
- *To understand the basic concepts of Financial Management*

Course Outcomes:

- *Student can access the present value and future value for money*
- *Student can apply the principals of Benefit & Cost Analysis and*
- *Break-Even comparison*
- *Student can calculate the depreciation cost for construction equipment and can estimate the cost for construction equipment*
- *Can prepare profit and loss, balance sheets etc*

UNIT – I

Engineering economics : Basic principles – Time value of money, Quantifying alternatives for decision making, Cash flow diagrams, Equivalence- Single payment in the future (P/F, F/P), Present payment compared to uniform series payments (P/A, A/P), Future payment compared to uniform series payments (F/A, A/F), Arithmetic gradient, Geometric gradient.

UNIT – II

Comparison of alternatives: Present, future and annual worth method of comparing alternatives, Rate of return, Incremental rate of return, Break-even comparisons, Capitalized cost analysis, Benefit-cost analysis.

UNIT – III

Depreciation, Inflation and Taxes: Depreciation, Inflation, Taxes.

Equipment economics: Equipment costs, Ownership and operating costs, Buy/Rent/Lease options, Replacement analysis.

UNIT – IV

Cost Estimating: Types of Estimates, Approximate estimates – Unit estimate, Factor estimate, Cost indexes, parametric estimate, and Life cycle cost.

UNIT – V

Financial management: Construction accounting, Chart of Accounts, Financial statements – Profit and loss, Balance sheets, Financial ratios, Working capital management.

Text Books / Reference Books:

1. Blank, L. T. and Tarquin, A. J., "Engineering Economy", Fourth Edition, WCB/McGraw-Hill, 1998.
2. Bose, D. C., "Fundamentals of Financial management", 2nd ed., PHI, New Delhi, 2010.
3. Boyer, C. B. and Merzbach, U. C., "A History of Mathematics", 2nd ed., John Wiley & Sons, New York, 1989.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

(18ME3128) COMPOSITE MATERIALS

M.Tech, II Year 1st Semester (CS)

L	T	P	C
3	0	0	3

***Course Objectives*:**

- *To learn about Classification and characteristics of Composite materials*
- *To learn about layup method and Mechanical Behavior of composites*
- *To learn about Manufacturing of Metal Matrix Composites and Manufacturing of Polymer Matrix Composites*
- *To learn about Laminar Failure Criteria and Laminate strength-ply discount truncated maximum strain criterion*

***Course Outcomes*:**

Students undergoing this course are able to

- *Understand the need of composite materials.*
- *Understand the Properties and applications of whiskers, particle reinforcements. Mechanical Behavior of composites.*
- *Understand the concepts of Manufacturing of Ceramic Matrix Composite and Metal Matrix Composite.*
- *Understand the various manufacturing method of composites.*

UNIT–I:

Introduction: Definition – Classification and characteristics of Composite materials. Advantages and application of composites. Functional requirements of reinforcement and matrix. Effect of reinforcement (size, shape, distribution, volume fraction) on overall composite performance.

UNIT – II:

Reinforcements: Preparation-layup, curing, properties and applications of glass fibers, carbon fibers, Kevlar fibers and Boron fibers. Properties and applications of whiskers, particle reinforcements. Mechanical Behavior of composites: Rule of mixtures, Inverse rule of mixtures. Isostrain and Isostress conditions.

UNIT – III:

Manufacturing Of Metal Matrix Composites: Casting – Solid State diffusion technique, Cladding – Hot isostatic pressing. Properties and applications. Manufacturing of Ceramic Matrix Composites: Liquid Metal Infiltration – Liquid phase sintering. Manufacturing of Carbon – Carbon composites: Knitting, Braiding, Weaving. Properties and applications.

UNIT–IV:

Manufacturing Of Polymer Matrix Composites: Preparation of Moulding compounds and prepress – hand layup method – Autoclave method – Filament winding method – Compression moulding – Reaction injection moulding. Properties and applications.

UNIT – V:

Strength: Laminar Failure Criteria-strength ratio, maximum stress criteria, maximum strain criteria, interacting failure criteria, hydro thermal failure. Laminate first play failure-insight strength; Laminate strength-ply discount truncated maximum strain criterion; strength design using caplet plots; stress concentrations.

Text Books:

1. *Material Science and Technology* – Vol 13 – Composites by R.W.Cahn – VCH, West Germany, 2003
2. *Materials Science and Engineering*, An introduction. WD Callister, Jr., Adapted by R. Bala Subramanian, John Wiley & Sons, NY, Indian edition, 2007.

References:

1. *Hand Book of Composite Materials*-ed-Lubin. 2010
2. *Composite Materials* – K.K.Chawla. 2009
3. *Composite Materials Science and Applications* – Deborah D.L. Chung, 2012
4. *Composite Materials Design and Applications* – Danial Gay, Suong V. Hoa, and Stephen W. Tasi, 2012

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

(18EE2128) WASTE TO ENERGY

M.Tech, II Year 1st Semester (CS)

L	T	P	C
3	0	0	3

UNIT-I

Introduction to Energy from Waste:

Classification of waste as fuel – Agro based, Forest residue, Industrial waste - MSW – Conversion devices – Incinerators, gasifiers, digestors.

UNIT-II

Biomass Pyrolysis:

Pyrolysis – Types, slow fast – Manufacture of charcoal – Methods -Yields and application – Manufacture of pyrolytic oils and gases, yields and applications.

UNIT-III

Biomass Gasification:

Gasifiers – Fixed bed system – Downdraft and updraft gasifiers –Fluidized bed gasifiers – Design, construction and operation – Gasifier burner arrangement for thermal heating – Gasifier engine arrangement and electrical power – Equilibrium and kinetic consideration in gasifier operation.

UNIT-IV

Biomass Combustion:

Biomass stoves – Improved chullahs, types, some exotic designs, fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation - Operation of all the above biomass combustors.

UNIT-V

Properties of biogas (Calorific value and composition) - Biogas plant technology and status - Bio energy system - Design and constructional features - Biomass resources and their classification - Biomass conversion processes - Thermo chemical conversion - Direct combustion - biomass gasification - pyrolysis and liquefaction - biochemical conversion - anaerobic digestion - Types of biogas Plants – Applications - Alcohol production from biomass - Bio diesel production - Urban waste to energy conversion - Biomass energy programme in India.

Textbooks

1. Non Conventional Energy, Desai, Ashok V., Wiley Eastern Ltd., 1990.
2. Biogas Technology - A Practical Hand Book - Khandelwal, K. C. and Mahdi, S. S., Vol. I & II, Tata McGraw Hill Publishing Co. Ltd., 1983.

References

1. Food, Feed and Fuel from Biomass, Challal, D. S., IBH Publishing Co. Pvt. Ltd., 1991.
2. Biomass Conversion