IPS Academy, Institute of Engineering & Science

(A UGC Autonomous Institute, Affiliated to RGPV, Bhopal)

Scheme Based on AICTE Flexible Curricula (B. Tech)

Electrical and Electronics Engineering Department

(For Batches admitted in 2022-23)

V Semester

w.e.f. July 2023

S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours/ Week			Total Credits
				Theory			Practical						
				End Sem.	Mid Sem. Exam	Quiz/ Assignment	End Sem.	Lab Work & Sessional		L	T	P	
1	EE09	PCC	Microprocessor and Microcontroller	60	25	15	-	-	100	2	1	-	3
2	EE10	PCC	Control System	60	25	15	-	-	100	2	1	-	3
3	EE11	PCC	Electrical Machine-II	60	25	15	-	-	100	2	1	-	3
4	EE12	PCC	Power System-I	60	25	15	-	-	100	2	1	-	3
5	HS05	HSMC	Humanities and Social Sciences Open Courses - I	60	25	15	-	-	100	2	1	-	2
6	FT01	IFC	Interdisciplinary Foundation Course-II	60	25	15	-	-	100	1	-	-	2
7	EE09(P)	LC	Microprocessor and Microcontroller Lab	-	-	-	60	40	100	1	-	2	1
8	EE10(P)	LC	Control System Lab	-	-	-	60	40	100	-	-	2	1
9	EE11(P)	LC	Electrical Machine-II Lab	-	-	-	60	40	100	-	-	2	1
10	EE12(P)	LC	Power System –I Lab	-	-	-	60	40	100	-	-	2	1
11	EE13(P)	LC	Seminar and Group Discussion - I	-		-	-	-	100	1	-	-	1
12	MLC03	MLC	Environmental Studies				60	40	100				NC
Total				**360**	**150**	**90**	**240**	**160**	**1100**				**21**

- **Humanities and Social Sciences Open Courses – I, HSMC-HS05 (Any One Course)**
  a) English Language Proficiency
  b) German Language
  c) French Language
  d) Japanese
- **Interdisciplinary Foundation Course-II, IFC-FT01**
  (Offered by Fire Technology & Safety Engineering Department.)

1 Hr. Lecture	1 Hr. Tutorial	2 Hr. Practical
1 Credit	1 Credit	1 Credit

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INSTITUTE OF ENGINEERING & SCIENCE

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Electrical and Electronics Engineering Department

Subject Code	Name of the Subject	L:T:P	Credits	Maximum Marks	
				Theory	
PCC - EE09	Microprocessor and Microcontroller	2:1:0	3	CIE	ESE
				40	60

Course Objective:-

Objective of this course is to introduce the students with the architecture and operation of typical microprocessors and microcontrollers and also provide strong foundation for designing real world applications using microprocessors and microcontrollers.

Pre Requisite:-

Should have basic knowledge of Digital Electronics Circuits.

Module 1(08hrs.)

Concepts of RISC and CISC Processor Architecture ,Harvard and Von-Neumann architecture, Introduction to 16-bit 8086 microprocessors, architecture of 8086,Pin Configuration, mode, timing diagram, Memory interfacing, interrupts, Instruction set of 8086, Addressing mode, Assembler directives & operations, assembly and machine language programming, subroutine call and returns, Concept of stack, Stack structure of 8086, timings and delays, and special processor.

Module 2(07hrs.)

Input-Output interfacing: Memory Mapped I/O and Peripherals I/O. PPI 8255 Architecture and modes of operation, Interfacing to 16-bit microprocessor and programming, DMA controller (8257) Architecture, Programmable interval timer 8254, USART 8251,8279 Programmable keyboard/Display Controller.

Module 3 (08hrs.)

Microcontroller 8051 Intel family of 8 bit microcontrollers, Architecture of 8051, Pin description, I/O configuration, interrupts; Interrupt structure and interrupt priorities, Port structure and operation, Accessing internal & external memories and different mode of operations, Memory organization, Addressing mode, instruction set of 8051 and programming.

Module 4 (08 hrs.)

8051 Interfacing, Applications and serial communication 8051 interfacing to ADC and DAC, Stepper motor interfacing, Timer/ counter functions, 8051 based thyristor firing circuit, 8051 connections to

RS-232, 8051 Serial communication , Serial communication modes, Serial communication programming, Serial port programming inC.

Module 5 (07 hrs.)

Introduction to Embedded System, Basics of Embedded System, Application of Embedded System, and learn about ARDUINO, ARDUINO History and Family, Controlling embedded system based devices using Arduino.

Course Outcomes: After successful completion of course students will be able to

CO1: Explain about 8086 microprocessor and its application.

CO2: Discuss various controllers like DMA, USART and interface with 8086 microprocessor

CO3: Explain about 8051 microcontroller and its application

CO4: Discuss and interface with various controllers like ADC & DAC with 8051 microcontroller.

CO5: Understand basic concept of embedded systems and aurdino.

Text/ Reference books:

1. D.V. Hall, Microprocessors and Interfacing. TMH, 2nd edition 2006.
2. Advanced microprocessors and peripherals-A.K ray and K.M. Bhurchandani, TMH, 2nd edition 2006.
3. Embedded Systems- Architecture, Programming and Design by Rajkamal, 2007, TMH.
4. SimonMonk, Programming Arduino ™ Getting Started with Sketches , 2012 McGraw-Hill

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Subject Code	Name of the Subject	L:T:P	Credits	Maximum Marks	
				Theory	
PCC –EE10	Control System	2:1:0	3	CIE	ESE
				40	60

Course Objective:-

This course introduces students to foundation of frequency-domain design methods for analysis and design of continuous-time control systems, which form the essentials for industrial practice.

Pre Requisite:-Should have basic knowledge of Ordinary differential equations,Matrix, Laplace and Fourier Series & transform .

Module 1(11hrs.)

Modeling of dynamic systems: Electrical, Mechanical systems, Concept of transfer function, Laplace Transform,: Open and closed loop systems, Signal flow graph, Mason's formula, Components of control systems: Error detectors (Synchros& Potentiometer), Servomotors (AC & DC), tacho-generators, power amplifier, steeper motors. State space description of dynamic systems Solution of state equation: Eigen values & eigenvectors digitalization state transitive matrix.

Module 2(07hrs.)

Time – domain analysis of closed loop systems: Test signals, time response of first and second order systems, Time domain performance specifications, Steady state error & error constants Feedback control actions: Proportional, derivative and integral control.

Module 3 (07 hrs.)

Stability: Routh-Hurwitz stability analysis Characteristics equation of closed loop system root loci, construction of loci, Effect of adding, poles and Zeros on the loci, Stability by root loci.

Module 4 (08 hrs.)

Frequency, Domain analysis, Bode plots, Effect of adding, poles and Zeros, Polar plot, Nyquist stability analysis, Relative stability: Gain and phase margins.

Module 5 (07 hrs.)

Design of control systems with PD/PI/PID Control in time domain and Frequency domain, lead- lag, Lag-lead compensation, Design of compensating networks. Concepts of state variables. State space model. Diagonalization of State Matrix. Solution of state equations. Eigen values and Stability Analysis. Concept of controllability and observe ability.

Course Outcomes:-After successful completion of course students will be able to:

- **CO1:** Develop block diagrams and obtain model of a given physical systems, such as, voltage control, speed control of motor, etc. and obtain input-output relationship through block diagram reduction/SFG techniques.
- **CO2:** Analyze control systems in time domain by applications of classical control and modern control theory (State Space Technique).
- **CO3:** Investigate stability of control system using root loci.
- **CO4:** Analyze the frequency response and investigate stability using Bode/Nyquist plots.
- **CO5:** Design lag/lead/lag-lead compensator in frequency domain for improvement in system performance.

Text/ Reference books:

1. Nagrath and Gopal , 'Control Systems Engineering' , new age publication
2. K. Ogata, 'Modern Control Engineering', Pearson
3. Stefani Shahian Savant, Hostetter, 'Design of feedback control systems' Oxford
4. S Hasan Saeed ,Automatic Control System, Katson books
5. B.S.Manke, Control system Engineering, Khanna Publishers.

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Electrical and Electronics Engineering Department

Subject Code	Name of the Subject	L:T:P	Credits	Maximum Marks	
				Theory	
PCC –EE11	Electrical Machine-II	2:1:0	3	CIE	ESE
				40	60

Course Objective: To teach students basic principle of operation, construction and application of static and rotating electrical machines.

Pre Requisite: Fundamentals of electrical engineering and Electrical machine-I

Module 1 (08 hrs.)

D.C. Machine-I Basic construction of DC machines; types of DC machines and method of excitation; lap and wave windings; Emf equation; armature reaction and methods of limiting armature reaction; Commutation process and methods for improving commutation; Basic performance of DC generators and their performance characteristics; Metadyne and Amplidyne.

Module 2 (08 hrs.)

D.C. Machine-II Basic operation of DC motors; Torque equation; Operating characteristics of DC motors, Starting of DC motors- 2point, 3 point and 4 point starters; speed control of DC motors; losses and efficiency of DC machines; testing of DC machines, direct testing, Swinburne's test and Hopkinson's test. Application of DC machines.

Module 3 (8 hrs.)

Synchronous Machine-I Construction; types of prime movers; emf equation, generation of harmonics and their elimination; armature reaction; synchronous reactance and impedance, equivalent circuit of alternator, relation between generated voltage and terminal voltage, voltage regulation of alternators using synchronous impedance, mmf, zpf .

Module 4 (08 hrs.)

Salient pole machines; two reaction theory equivalent circuit model and phasor diagram; determination of Xd and Xq by slip test; SCR and its significance; regulation of salient pole alternator, power angle equation and characteristics; synchronizing of alternator with infinite busbar; parallel

operation and load sharing; synchronizing current, synchronizing power and synchronising torque coefficient; synchro scopes and phase sequence indicator.

Module 5 (08 hrs.)

Synchronous machine-II Synchronous motor operation, starting and stopping of synchronous motor, pull in torque, motor under load power and torque, reluctance torque, effect of excitation, effect of armature reaction, power factor adjustment, V curves, inverted V curves, synchronous motors as power factor correcting device, hunting and damper winding efficiency and losses.

Course Outcomes:-After successful completion of course students will be able to:

CO1: Explain working principle, Construction and characteristics of DC Machine

CO2: Explain and analyze starting methods & sketch the speed control Characteristics DC Motor

CO3: Analyze Synchronous generator construction and characteristics, evaluate voltage regulation.

CO4: Analyze Synchronous generator by equivalent circuit model and phasor diagram, regulation, power angle equation and parallel operation, load sharing.

CO5: Analyze Synchronous motor, describe operation, starting and stopping of synchronous motor

Text/ Reference books

1. Electrical Machines by P.S. Bimbhra, Khanna Publishers
2. Electrical Machinery by A. E. Fitzgerald McGraw-Hill
3. Special Electrical Machine by E.G. Janardanan, PHI Learning
4. Brushless Permanent Magnet & Reluctance Motor Drives – T.J.E. Miller
5. V.Del Toro, “Electrical Machines & Power Systems”, 1985, Prentice-Hall, Inc., Englewood Cliffs
6. Ashfaq Hussain, Electrical Machines, DhanpatRai & Co
7. Electrical Machine D. P. Kothari & I. J. Nagrath McGraw-Hill

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Subject Code	Name of the Subject	L:T:P	Credits	Maximum Marks	
				Theory	
PCC-EE12	Power System -I	2:1:0	3	CIE	ESE
				40	60

Course Objective: The course deals with exploring the knowledge of Power generation, transmission and distribution. Also to expose the students to the different electrical & mechanical aspects of the power network.

Pre Requisite: Student should be aware about inductance, capacitance, KCL-KVL and fundamentals of Electrical Machines.

Module 1 (08hrs.)

An overview of Electrical Energy Generation General background, structure and components of power network. Power generation – Introduction to conventional, non-conventional & distributed generation, Effect of transmission voltage on power system economy. Power Plant Economics - Load curves, base load, peak load, load factor, demand factor, diversity factor, capacity factor, utilization factor, cost of electricity, capital cost, fuel and operation cost.

Module 2 (10hrs.)

Transmission Line Components & Under Ground Cabling

Inductance resistance and capacitance of transmission line, Calculation of inductance for 1-Φ and 3-Φ, Single and double circuit line, Concept of GMR and GMD, Symmetrical & asymmetrical conduction configuration, Calculation of capacitance for 2 wire and 3 wire systems, Effect of ground or capacitance, Capacitance calculation for symmetrical and asymmetrical 1-phase and three phase, Single and double circuit line, Charging current, Transposition of line, Composite conductor, bundle conductor, Skin and proximity effect,. Underground Cable Comparison of cables and overhead transmission lines, Classification of cables, construction of cable, capacitance of single and multi-core cable, economic core diameter, dielectric stress in cable, Grading of cables, ionization of Heating of cables, Phenomena of dielectric losses and sheath loss in cables, Thermal resistance of cables

Module 3 (08hrs.)

Transmission systems & performance of transmission line

Various systems of transmission, effect of system voltage, comparison of conductor materials required for various overhead systems. Short, Medium & long transmission line and their representation, Nominal T, Nominal Л, Equivalent T and equivalent Л, network models, ABCD constants for symmetrical & asymmetrical network, Mathematical solution to estimate regulation & efficiency of all types of lines. Surge Impedance, loading, Interpretation of long line equation and its equivalent equation. Tuned power lines. Power flow through transmission line.

Module 4 (08hrs.)

Insulator & Mechanical design

Mechanical Design Types of conductors used in overhead transmission line, Types of line supports and towers, Distribution of conductors over transmission towers, Spacing between conductors, Length of span and sag- tension calculation for transmission line, Wind & ice loading, support of line at two different levels, string chart, Sag template, Stringing of conductor, Vibration and Vibration dampers. Insulator Materials used for transmission line insulations, Types of insulator for overhead transmission line failure of insulator, Voltage distribution of suspension insulator, String efficiency, Shielding and grading

Module 5 (08hrs.)

Voltage control & Distribution system

Ac single phase, 3 phase, 3wire & 4 wire distribution, Types of distribution system Kelvin's law for most economical size of conductor, Substation layout showing substation equipment, Selection of size of feeder, bus bar single bus bar and sectionalized bus bar, main and transfer for bus bar system, sectionalized double bus bar system, ring mains

List of Experiments

1. To study the Thermal PowerStation.
2. To study the Hydro PowerStation.
3. To study the Nuclear PowerStation.
4. To study & draw Towers used in Transmission lines.
5. To study & draw the different types of insulator.
6. To study & design Electrical Power Transmission line.
7. Determination of Transmission Parameters of a transmission line
8. Study of Ferranti Effect.

Course Outcomes: After successful completion of course students will be able to

CO1: Understand the electrical energy generation power plant economics.

CO2: Analyze the transmission line components & under Ground Cabling.

CO3: Analyze the transmission systems & performance of transmission line.

CO4: Understand insulator & mechanical design of conductors used in overhead transmission line

CO5: Understand voltage control & distribution system.

Text/ Reference books

1. William Stevenson, Elements of Power System Analysis, McGraw Hill.
2. C.L. Wadhwa, Electrical Power System Analysis, New Age International.
3. D.P. Kothari, I.J. Nagrath, Modern Power System Analysis TMH, III Ed. Reprint2008.
4. John Grainger and William Stevenson, Power system Analysis, McGraw Hill.
5. Ashfaq Husain, Electrical Power Systems, Vikas Publishing House.

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Subject Code	Name of the Subject	L:T:P	Credits	Maximum Marks	
				Theory	
HSMC-HS05	Humanities and Social Science Open Courses-I English language Proficiency	2:0:0	2	CIE	ESE
				40	60

Course Objectives:

Make students proficient in English language to meet their futuristic professional purposes.

Course Contents:

Module-1

Basics of Grammar and Vocabulary Development:

Articles, Tenses, Types of Sentences, Subject-Verb Agreement, Prefixes and Suffixes in English, Synonyms, Antonyms, One Word Substitution, Homophones, Homonyms, Analogy, Idioms, Proverbs and Phrasal Verbs, Jargon (Business, Political, Financial, Linguistic, Military, Legal, Workplace, Medical, Technical, Foreign Affairs)

Module-2
Fundamentals of Communication:

Definition of Communication, Process of Communication, 7C's of Communication, Types of Communication: Verbal and Non-Verbal Communication and its types, Barriers to Communication and ways to overcome it.

Module- 3

Reading Skills:
Introduction and Benefits of Reading, Types of Reading, Techniques of Reading (SQ3R method), Reading Comprehension, Cloze Passages, Para Jumbled

Module-4

Writing Skills:

Planning, Drafting and Editing, Précis writing, Structure of formal letter, Types of letters: Enquiry, Quotation, Order, Complaint, Adjustment, Resume, CV & Cover letter (Job Application)

Module –5

Learning Language through Literature:

1. **Non-Fiction**: Atomic Habits by James Clear
2. **Literary Book**: Wise and Otherwise by Sudha Murthy
3. **Poem**: The Night of the Scorpion by Nissim Ezekiel
   Student will select literature and do the assigned work under the mentorship of a teacher individually or in group.

Course Outcomes:

CO1: To apply functional grammar and to enrich vocabulary of the students by learning the formation of new words through suffixes-prefixes, synonyms-antonyms.

CO2: To understand and apply communication theory, practice and ready for better presentation in professional life.

CO3: To help comprehend, interpret and develop reading comprehension.

CO4: To identify and apply the skills, element of business letter writing and drafting in office communication.

CO5: To analyze, interpret, summarize and paraphrase through selected literature (book review).

Text Books

1. Murphy's English Grammar by Raymond and Murphy: Cambridge University, New Delhi, 2008.
2. Remedial English Grammar by F.T. Wood, Macmillan, 2007.
3. Essential English Grammar by Raymond and Murphy, Cambridge University, New Delhi, 2012.
4. English for Effective Communication by Sanjay Kumar and Pushp Lata: Oxford University Press, New Delhi 2015.
5. English Language Skills by Aruna Koneru: McGraw Hills Education (India) Pvt. Ltd., New Delhi, 2015.
6. Collected Poem 1952-1988,Nizim Ezekiel, Oxford University Press,1989
7. A Brief History of Humankind by Yuval Noah Harari HarperCollins Publishers,2017
8. Animal Farm by George Orwell, Standard Edition,1996

Reference Books

1. Aarts, Bas (2011). Oxford Modern English Grammar, New York: Oxford University Press
2. Ajmani, J. C. Good English: Getting it Right. New Delhi: Rupa Pubications, 2012.
3. Collins, Patrick. Speak with Power and Confidence. New York: Sterling, 2009.
4. Dhanavel, S.P. (2010). English and soft skills (V-1). Chennai: Orient Blackswan.
5. Fitikides, T. J. Common Mistakes in English. London: Orient Longman, 1984.
6. Rutherford, Andrea J. Basic Communication Skills for Technology: Second Edition. Delhi: Pearson Education, 2007.

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Subject Code	Name of the Subject	L:T:P	Credits	Maximum Marks	
				Theory	
HSMC-HS05	Humanities and Social Science Open Courses-I Japanese Language	2:0:0	2	CIE	ESE
				40	60

Course Objectives:

This course enables the students to develop the basic skills in Japanese at a beginner level. The students will be able to learn basic Japanese grammar, sentence structure, polite expressions, titles, vocabulary in daily life, and common basic conversation on topics related to Japanese culture**.**

Course Outcomes:

The course, with its interactive modules will groom the personality of an individual with the knowledge and learning about Japanese language.

Course Contents:

Module-I

Introduction of Japanese Language:

Origin of language, Basic overview of all the three scripts, Basic greetings like good morning, good day etc, making students understand the similarities between Japanese and Hindi grammar, Introduction to Hiragana Script, numbers from 1-1000

Module II

Basics of Japanese Language:

Counting from 1000-10000, Days of a week, Days of a month, Name of the Months , Writing date in Japanese way, Time, learning to write words like ginkou, gakkou, jidoushya.....

Module – III

Basic Grammar:

This, That (for living and non-living things), Prepositions, Construction of small sentences by making use of prepositions, Five Counters, Basic Verbs, Adjectives.Using counters, verbs, adjectives in sentence construction

Module - IV

General Conversations:

Asking a person his/ her name, nationality, profession, date of birth, friends, school, college, teachers

Module - V

Introduction to the Pictorial Script- Kanji:

Origin of kanjis, What does a kanji symbolise, Learning first 10 kanjis

Topic based writing**,** Lets know Japanese Culture, the way they meet and greet, food culture, Japanese festivals, Japanese customs

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Subject Code	Name of the Subject	L:T:P	Credits	Maximum Marks	
				Theory	
HSMC-HS05	Humanities and Social Science Open Courses-I French Language	2:0:0	2	CIE	ESE
				40	60

Course Objective: To acquaint students with French and impart an understanding of the language at the beginner level.

Course Content:

Module 1
Se présenter et présenter sa famille, Saluer, Les nationalites, Les nombres, Décrire une personne (son physique et son caractère)
Grammaire - Les verbes au présent, Les adjectifs possessifs

Module 2
Décrire et situer un logement, Parler d'une ville et de ses commerces

Grammaire - Les pronoms interrogatifs où et combien de, Les articles contractés, Les prépositions de situation

Module 3
Exprimer les goûts et les préférences, Décrire des vêtements et des couleurs, Parler des activités de loisirs

Grammaire - Les adjectifs démonstratifs, Les quantités

Module 4
Indiquer l'heure ou la date (le calendrier), Indiquer la fréquence d'une activité, Parler des préférences alimentaires (plats et boissons), Commander dans un restaurant

Grammaire - Les verbes pronominaux

Module 5
Décrire le temps, Parler des vacances, Réserver un billet et une chambre d'hôtel

Grammaire - Le passé compose

Course Outcome:

CO 1: Students will be able to recognize French language and apply its grammar to describe themselves and their family.

CO 2: Students will apply French vocabulary to describe and locate accommodation in a city and also its commerce.

CO 3: Students will be able to use French to express their tastes and preferences as well as describe their hobbies.

CO 4: Students will be able to apply their knowledge in practical situations like ordering in a restaurant and interpret time and dates.

CO 5: Students will be able to describe the weather and their vacations as well as schedule and book tickets and a room and compute bills.

Reference Books and Internet resources:

1. Saison 1 Methode de Francais
2. Les Cles de Nouveau A1
3. https://www.lawlessfrench.com
4. https://www.youtube.com/user/learnfrenchwithalexa

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Subject Code	Name of the Subject	L:T:P	Credits	Maximum Marks	
				Theory	
IFC	Interdisciplinary Foundation Courses -II (Disaster Management)			CIE	ESE

Course Objective:

To understand the fundamentals approaches of disaster risk reduction & relationship between vulnerability, disaster, disaster prevention and risk reduction.

Course Content:

Module 1 Types and consequence of major accident hazards, Role of management, Local authorities and public, Disaster Management rehabilitation Cycle - Prevention, Mitigation, Preparedness, Disaster impact, Response, Restoration, Reconstruction, Onsite & offsite emergency planning; Emergency preparedness, rehearsal & exercises.

Module 2 Role of Insurance in Disaster Management, Role of International co-operation (i.e. NGO & UN Agencies), Effect on environment due to disaster. Need for National Capacity Building and Disaster Knowledge Network

Module 3 The Disaster Management Act:: Need for technological input in disaster mitigation, community based disaster preparedness program; Preparation of Disaster Management; Plan Early Warning System; Role of Information Technology (IT)

Module 4 Natural Disaster like Earthquake, Mine fire, flood etc, Dangerous properties of some highly hazardous chemicals, Industrial Disaster due to toxic gas release, Fire or Explosion, Case - Studies.

Module 5 Accident related Disasters (Forest fires, Air, road, & Rail Accidents, Rural & Urban Fires, Oil Spills, Major building collapse etc, Case Studies.

Course Outcome:

CO 1: Student will able to evaluate the principles and practices of disaster risk reduction and management.

CO 2: Student will able to know the basic role of public, national/international organizations in disaster management.

CO 3: Student will able to prevention, mitigation preparedness, response and recovery process in disaster management.

CO 4: Students will able to understand distinguish between the different approaches needed to manage pre-during and post disaster periods.

CO 5: Student will able to apply the knowledge in conducting independent DM study including data search and analysis from disaster case study.

Evaluation:

Evaluation will be continuous an integral part of the class as well through external assessment.

References:

1. Disaster Management Act 2005
2. Industrial Security Management S.C. Dey
3. Dangerous Properties of Industrial Material Irvin Sex.
4. Encyclopedia of occupational Health & Safety (OSHA) IV edition.
5. Safe Handling of Hazardous Chemicals by Rohatgi.
6. Industrial Fire Hazards Hand Book (NFPA)
7. Major Hazard Control I.L.O. Geneva.
8. What went wrong-Trevor Kletz.
9. Chemical process safety Daniel . A. Crawl, Joseph F Louver.
10. Madhya Pradesh Control of Industrial Major Accident Hazards rules 1999.

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Subject Code	Name of the Subject	L:T:P	Credits	Maximum Marks	
				Practical	
LC-EE09 (P)	Microprocessor and Microcontroller Lab	1:0:2	1	CIE	ESE
				40	60

Course Objective:-

Objective of this course is to introduce the students with the architecture and operation of typical microprocessors and microcontrollers and also provide strong foundation for designing real world applications using microprocessors and microcontrollers.

List of Experiments

1. Addition of two binary number of 8 byte length.
2. To find the maximum no. in a given string (16 bytes long) and store it in location 0310.
3. To sort a string of a no. of bytes in descending order.
4. To multiply an ASCII string of eight numbers by a single ASCII digit. The result is a string of unpacked BCD digits.
5. To study architecture and pin out diagram of 8086.
6. To study architecture and pin out diagram of 8051.
7. Write an 8051 C program to ON/OFF the Buzzer.
8. Write an 8051 C program LEDs blinking.
9. Write a LCD program for character move.
10. Write a C program to read the keypad and display the result on the LCD.
11. Write a program on Stepper Motor's Movement in Forward and Reverse Directions.
12. Write a program to display two different digits at a time on seven segment display.
13. To study architecture and pin out diagram of 8251A (USART).
14. To study architecture and pin out diagram of DMA Controller (8257).

Course Outcomes: After successful completion of course students will be able to

CO1: Explain about 8086 microprocessor and its application.

CO2: Discuss various controllers like DMA, USART and interface with 8086 microprocessor

CO3: Explain about 8051 microcontroller and its application

CO4: Discuss and interface with various controllers like ADC & DAC with 8051 microcontroller.

CO5: Understand basic concept of embedded systems and aurdino.

Text/ Reference books:

1. D.V. Hall, Microprocessors and Interfacing. TMH, 2nd edition 2006.
2. Advanced microprocessors and peripherals-A.K ray and K.M. Bhurchandani, TMH, 2nd edition 2006.
3. Embedded Systems- Architecture, Programming and Design by Rajkamal, 2007, TMH.
4. SimonMonk, Programming Arduino ™ Getting Started with Sketches , 2012 McGraw-Hill

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Subject Code	Name of the Subject	L:T:P	Credits	Maximum Marks	
				Practical	
LC-EE10 (P)	Control System Lab	0:0:2	1	CIE	ESE
				40	60

Course Objective:-

This course introduces students to foundation of frequency-domain design methods for analysis and design of continuous-time control systems, which form the essentials for industrial practice.

List of Experiments

1. Time response of second order system.
2. Characteristics of Synchros.
3. Effect of feedback on servo motors.
4. Determination of transfer function of A-C servomotor
5. Determination of transfer functions of D-C motor.
6. Formulation of PI & PD controller and study of closed loop responses of 1^{st} and 2^{nd} order dynamic systems.
7. State space model for classical transfer function using MATLAB.
8. Simulation of transfer function using operational amplifier.
9. Design problem: Compensating Networks of lead and lag.
10. Temperature controller using PID.
11. Transfer function of a DC generator.
12. Characteristics of AC servomotor.
13. Use of MATLAB for root loci and Bode plots of type-1, type-2systems.
14. Study of analog computer and simulation of 1st order and 2nd order dynamic equations.
15. Formulation of proportional control on 1st order and 2^{nd} order dynamic systems.
16. Feedback control of 3rd order dynamic Systems
17. Study of lead and lag compensating networks.
18. Effect of adding poles & zeros on root loci and bode plots oftype-1, type-2 systems through MATLAB.

Course Outcomes:-After successful completion of course students will be able to:

CO1: Develop block diagrams and obtain model of a given physical systems, such as, voltage control, speed control of motor, etc. and obtain input-output relationship through block diagram reduction/SFG techniques.

CO2: Analyze control systems in time domain by applications of classical control and modern control theory (State Space Technique).

CO3: Investigate stability of control system using root loci.

CO4: Analyze the frequency response and investigate stability using Bode/Nyquist plots.

CO5: Design lag/lead/lag-lead compensator in frequency domain for improvement in system performance.

Text/ Reference books:

1. Nagrath and Gopal , 'Control Systems Engineering' , new age publication
2. K. Ogata, 'Modern Control Engineering', Pearson
3. Stefani Shahian Savant, Hostetter, 'Design of feedback control systems' Oxford
4. S Hasan Saeed ,Automatic Control System, Katson books
5. B.S.Manke, Control system Engineering, Khanna Publishers.

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INSTITUTE OF ENGINEERING & SCIENCE

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Electrical and Electronics Engineering Department

Subject Code	Name of the Subject	L:T:P	Credits	Maximum Marks	
				Practical	
LC-EE11 (P)	Electrical Machine -II Lab	0:0:2	1	CIE	ESE
				40	60

Course Objective: To teach students basic principle of operation, construction and application of static and rotating electrical machines.

List of Experiments

Experiments can cover any of the above topics, following is a suggestive list:

1. To plot magnetisation characteristic of a separately excited DC generator
2. To perform load test on DC generators.
3. To perform load test on DC series and shunt motor
4. To perform Swinburn's test on a DC machine and find out its efficiency under full load condition.
5. To conduct Hopkinson's test on a pair of DC shunt machine.
6. To perform OCC and SCC test on an alternator and determine its regulation.
7. To determine regulation of alternator using mmf method.
8. To synchronise alternator with infinite bus bar.
9. To plot V and inverted V curves for a synchronous motor
10. Perform BLDC motor for 60 sec with the help of PLC.

Course Outcomes:-After successful completion of course students will be able to:

CO1: Explain working principle, Construction and characteristics of DC Machine

CO2: Explain and analyze starting methods & sketch the speed control Characteristics DC Motor

CO3: Analyze Synchronous generator construction and characteristics, evaluate voltage regulation.

CO4: Analyze Synchronous generator by equivalent circuit model and phasor diagram, regulation, power angle equation and parallel operation, load sharing.

CO5: Analyze Synchronous motor, describe operation, starting and stopping of synchronous motor.

Text/ Reference books

1. Electrical Machines by P.S. Bimbhra, Khanna Publishers
2. Electrical Machinery by A. E. Fitzgerald McGraw-Hill
3. Special Electrical Machine by E.G. Janardanan, PHI Learning
4. Brushless Permanent Magnet & Reluctance Motor Drives – T.J.E. Miller
5. V.Del Toro, “Electrical Machines & Power Systems”, 1985, Prentice-Hall, Inc., Englewood Cliffs
6. Ashfaq Hussain, Electrical Machines, DhanpatRai & Co
7. Electrical Machine D. P. Kothari & I. J. Nagrath McGraw-Hill.

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Subject Code	Name of the Subject	L:T:P	Credits	Maximum Marks	
				Practical	
LC-EE12 (P)	Power System – I Lab	0:0:2	1	CIE	ESE
				40	60

Course Objective: The course deals with exploring the knowledge of Power generation, transmission and distribution. Also to expose the students to the different electrical & mechanical aspects of the power network.

List of Experiments

1. To study the Thermal PowerStation.
2. To study the Hydro PowerStation.
3. To study the Nuclear PowerStation.
4. To study & draw Towers used in Transmission lines.
5. To study & draw the different types of insulator.
6. To study & design Electrical Power Transmission line.
7. Determination of Transmission Parameters of a transmission line
8. Study of Ferranti Effect.

Course Outcomes: After successful completion of course students will be able to.

CO1: Understand the electrical energy generation power plant economics.

CO2: Analyze the transmission line components & under Ground Cabling.

CO3: Analyze the transmission systems & performance of transmission line.

CO4: Understand insulator & mechanical design of conductors used in overhead transmission line

CO5: Understand voltage control & distribution system.

Text/ Reference books

1. William Stevenson, Elements of Power System Analysis, McGrawHill.
2. C.L. Wadhwa, Electrical Power System Analysis, New AgeInternational.
3. D.P. Kothari, I.J. Nagrath, Modern Power System Analysis TMH, III Ed. Reprint2008.
4. John Grainger and William Stevenson, Power system Analysis, McGrawHill.
5. Ashfaq Husain, Electrical Power Systems, Vikas Publishing House.

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Subject Code	Name of the Subject	L:T:P	Credits	Maximum Marks	
				Theory	
LC-EE13 (P)	Seminar and Group Discussion - I	1:0:0	1	CIE	ESE

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Subject Code	Name of the Subject	L:T:P	Credits	Maximum Marks	
				Theory	
MLC013	Environmental Studies			CIE	ESE