ACADEMIC REGULATIONS
PROGRAM STRUCTURE
and
DETAILED SYLLABUS

Master of Technology

(Power Systems)

(Two Year Regular Programme)

(Applicable for Batches admitted from 2017)

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

ACADEMIC REGULATIONS

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

For all Postgraduate Programmes (M.Tech)
GR17 REGULATIONS

Gokaraju Rangaraju Institute of Engineering & Technology-2017 Regulations (GR 15 Regulations) are given hereunder. These regulations govern all the Post Graduate programmes offered by various departments of Engineering with effect from the students admitted to the programmes from GR17-18 academic year.

1. **Programme Offered:** The Post Graduate programme offered by the department is M.Tech, a two-year regular programme in that discipline.

2. **Medium of Instruction:** The medium of instruction (including examinations and reports) is English.

3. **Admissions:** Admission into the M.Tech Programme in any discipline shall be made subject to the eligibility and qualifications prescribed by the University from time to time. Admissions shall be made either on the basis of the merit rank obtained by the student in PGCET conducted by the APSCHE for M. Tech Programmes or on the basis of any other order of merit approved by the University, subject to reservations as prescribed by the Government from time to time.

4. **Programme Pattern:**
   a) A student is introduced to "Choice Based Credit System (CBCS)" for which he/she has to register for the courses at the beginning of each semesters as per the procedure.
   b) Each Academic year of study is divided into two semesters.
   c) Minimum number of instruction days in each semester is 90.
   d) The total credits for the Programme is 88.
   e) Grade points, based on percentage of marks awarded for each course will form the basis for calculation of SGPA (Semester Grade Point Average) and CGPA (Cumulative Grade Point Average).
   f) A student has a choice of registering for credits from the courses offered in the programme.
   g) All the registered credits will be considered for the calculation of final CGPA.

5. **Award of M.TechDegree:** A student will be declared eligible for the award of the M. Tech Degree if he/she fulfills the following academic requirements:
   a) A student shall be declared eligible for the award of M.Tech degree, if he/she pursues the course of study and completes it successfully in not less than two academic years and not more than four academic years.

B) A Student, who fails to fulfill all the academic requirements for the award of the degree within four academic years from the date of admission, shall forfeit his/her seat in M.Tech courses.

c) The Degree of M.Tech shall be conferred by Jawaharlal Nehru Technological University Hyderabad (JNTUH), Hyderabad, on the students who are admitted to the programme and fulfill all the requirements for the award of the degree.

6. Attendance Requirements

a) A student shall be eligible to appear for the semester end examinations if he/she puts in a minimum of 75% of attendance in aggregate in all the courses concerned in the semester.

b) Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in a semester may be granted. A committee headed by Dean (Academic Affairs) shall be the deciding authority for granting the condonation.

c) Students who have been granted condonation shall pay a fee as decided by the Academic Council.

d) A candidate shall get minimum required attendance at least in three theory subjects in the semester to get promoted to the next semester. In order to qualify for the award of M.Tech. Degree, the candidate shall complete all the academic requirements of the subjects, as per the course structure.

E) Students whose shortage of attendance is not condoned in any semester are detained and are not eligible to take their end examinations of that semester. They may seek re-registration for that semester when offered next with the academic regulations of the batch into which he/she gets re-registered.

7. Paper Setting, Evaluation of Answer Scripts, Marks and Assessment

a) Paper setting and Evaluation of the Answer Scripts shall be done as per the procedures laid down by the Academic Council of the College from time to time.

b) The following is the division of marks between internal and external evaluations.

S.no	Particulars	Internal	External	Total
1	Theory	30	70	100
2	Practical	30	70	100
3	Comprehensive Viva	-	100	100
4	Seminar	30	70	100
5	Project work	30	70	100

c) The marks for internal evaluation per semester per theory course are divided as follows:

i. **For Mid written examinations: 20 Marks**
ii. **For Assignment: 5 Marks**
iii. **For Attendance: 5 Marks**
iv. **Total: 30Marks**

d) Mid-Term Written Examination: There shall be two mid-term written examinations during a semester. The first mid-term written examination shall be conducted from the first

50 per cent of the syllabus and the second mid-term written examination shall be conducted from the remaining 50 per cent of the syllabus. The mid-term written examinations shall be evaluated for **20 marks** and average of the marks scored in the two mid-term written examinations shall be taken as the marks scored by each student in the mid-term written examination for that semester.

e) **Assignment:** Assignments are to be given to the students and marks not exceeding 5 (5%) per semester per paper are to be awarded by the teacher concerned.

f) **Attendance:** A maximum of 5 marks (5%) per semester per course are to be awarded on the basis of attendance one puts in. Course-wise attendance is taken for this purpose.

g) **For Internal Evaluation in Practical/Lab Subjects:** The marks for internal evaluation are 30. Internal Evaluation is done by the teacher concerned with the help of the other staff member nominated by Head of the Department. Marks Distribution is as follows:

i.	**Writing the program/Procedure:**	**10 Marks**
ii.	**Executing the program/Procedure:**	**10 Marks**
iii.	**Viva:**	**05 Marks**
iv.	**Attendance:**	**05 Marks**
v.	**Total:**	**30Marks**

h) **For External Evaluation in Practical/Lab Subjects:** The Semester end examination shall be conducted by an external examiner and a staff member of the Department nominated by Head of the Department. Marks distribution is as follows:

i.	**Writing the program/Procedure:**	**20 Marks**
ii.	**Executing the program/Procedure:**	**20 Marks**
iii.	**Viva:**	**15 Marks**
iv.	**Lab Record:**	**15 Marks**
v.	**Total:**	**70 Marks**

i) **Evaluation of Main Project Work:** A Project Review Committee (PRC) is to be constituted by the Principal/Director with Head of the Department as the Chairman and two other senior faculty members of the department.

i. **Registration for Project work:** A candidate is permitted to register for the project work after satisfying the attendance requirements of all the courses (theory and practical courses) up to III Semester.

ii. After satisfying the registration requirements, a candidate is permitted to register for the project work after satisfying, the title, objectives and plan of action of his project work to the Project Review Committee for its approval. Only after obtaining the approval of Project Review Committee of the Department, the student can initiate the project work. Any changes thereafter in the project are to be approved by PRC. The student has to work under the guidance of both internal guide (one faculty member of the department) and external guide (from Industry not below the rank of an officer). Internal guide is allotted by the Head of the Department or Coordinator of the Project Work whereas external guide is allotted by the industrial organization in which the project is undertaken.

iii. The candidate shall submit status of the report in two stages at least with a gap of 20 days between them.

iv. The work on the project shall be initiated in the beginning of the fourth semester and the duration is one semester. A candidate is permitted to submit project report only after successful completion of theory and practical courses with the approval of PRC and not earlier than 40 days from the date of registration of the project work. For the approval of PRC the candidate shall submit the draft copy of the thesis to the Head/Coordinator (through internal research guide) and shall make an oral presentation before the PRC.

v. After approval from the PRC, the final thesis is to be submitted along with ANTI-PLAGIARISM report from the approved agency with a similarity index not more than 30%.

vi. Two hardcopies and one soft copy of the project work (dissertation) certified by the research supervisors shall be submitted to the College/Institute.

vii. The thesis shall be adjudicated by one external examiner selected by the Institute out of 5-member panel, submitted by the department.

viii. The marks allotted for project work review are 100, out of which30 are for internal and 70 for external. Internal evaluation marks are awarded by the PRC on the basis of the student's performance in the three pre-submission reviews and the external evaluation is done by the external examiner.

ix. The marks allotted for project work and dissertation are 100, out of which 30 are for internal and 70 for external. Internal evaluation marks are awarded by the PRC on the basis of the student's performance in the three pre-submission reviews and the external evaluation is done by the external examiner. In both internal and external evaluations the student shall score at least 40% marks and an aggregate of 50% marks to pass in the project work. If the report of the examiner is favorable, Viva-voce examination shall be conducted by a Board consisting of the Supervisor, Head and the External Examiner who adjudicated the project work. The Board shall jointly evaluate the student's performance in the project work.

x. In case the student doesn't pass through the project work, he has to reappear for the viva-voce examination, as per the recommendations of the Board. If he fails succeed at the second Viva-voce examination also, he will not be eligible for the award of the degree, unless he is asked to revise and resubmit the Project by the Board. Head of the Department and Project coordinator shall coordinate and make arrangements for the conduct of viva-¬voce examination. When one does get the required minimum marks both in internal and external evaluations the candidate has to revise and resubmit the dissertation in the time frame prescribed by the PRC. If the report of the examiner is unfavorable again, the project shall be summarily rejected.

xi. If the report of the viva-voce is not satisfactory, the candidate will retake the viva-voce examination after three months. If he fails to get a satisfactory report at the second viva-voce examination, he will not be eligible for the award of the degree, unless the candidate is asked to revise and resubmit.

8. **Recounting of Marks in the End Examination Answer Books:** A student can request for re-counting of his/her answer book on payment of a prescribed fee.
9. **Re-evaluation of the End Examination Answer Books:** A student can request for re-evaluation of his/her answer book on payment of a prescribed fee.
10. **Supplementary Examinations:** A student who has failed in an end semester examination can appear for a supplementary examination, as per the schedule announced by the College

11. Malpractices in Examinations: Disciplinary action shall be taken in case of malpractices during Mid/ End-examinations as per the rules framed by the Academic Council.

12. Academic Requirements

a) A student shall be deemed to have secured the minimum academic requirement in a subject if he / she secures a minimum of 40% of marks in the Semester-end Examination and a minimum aggregate of 50% of the total marks in the Semester-end examination and Internal Evaluation taken together.

b) A student shall be promoted to the next semester only when he/she satisfies the requirements of all the previous semesters.

c) In order to qualify for the award of M.Tech Degree, the student shall complete the academic requirements of passing in all the Courses as per the course structure including Seminars and Project if any.

d) In case a Student does not secure the minimum academic requirement in any course, he/she has to reappear for the Semester-end Examination in the course, or re-register for the same course when next offered or re-register for any other specified course, as may be required. However, one more additional chance may be provided for each student, for improving the internal marks provided the internal marks secured by a student are less than 50% and he/she failed finally in the course concerned. In the event of taking another chance for re-registration, the internal marks obtained in the previous attempt are nullified. In case of re-registration, the student has to pay the re-registration fee for each course, as specified by the College.

E) Grade Points: A 10- point grading system with corresponding letter grades and percentage of marks, as given below, is followed

Letter Grade	Grade Point	Percentage of Marks
O (Outstanding)	10	Marks>=90 and Marks <= 100
A+ (Excellent)	9	Marks>=80 and Marks < 70
A (Very Good)	8	Marks>=70 and Marks < 80
B+ (Good)	7	Marks>=60 and Marks < 70
B (Above Average)	6	Marks>=50 and Marks < 60
F (Fail)	0	Marks < 50
Ab (Absent)	0	

Earning of Credit:

A student shall be considered to have completed a course successfully and earned the credits if he/she secures an acceptable letter grade in the range O-P. Letter grade 'F' in any Course implies failure of the student in that course and no credits earned.

Computation of SGPA and CGPA:

The UGC recommends the following procedure to compute the Semester Grade Point

Average (SGPA) and Cumulative Grade Point Average (CGPA):

i) Skthe SGPA of kth semester(1 to 4) is the ratio of sum of the product of the number of credits and grade points to the total creditsof all courses registered by a student,

$$\text{SGPA } (S_k) = \sum_{i=1}^{n} (Ci * Gi) / \sum_{i=1}^{n} Ci$$

Where Ci is the number of credits of the ith course and Gi is the grade point scored by the student in the ith course and n is the number of courses registered in that semester.

ii) The CGPA is calculated in the same manner taking into account all the courses m, registered by a student over all the semesters of a programme, i.e., upto and inclusive of Sk, where k ≥ 2.

$$\text{CGPA} = \sum_{i=1}^{m} (Ci * Gi) / \sum_{i=1}^{m} Ci$$

iii) The SGPA and CGPA shall be rounded off to 2 decimal points.

13. **Award of Class:** After a student satisfies all the requirements prescribed for the completion of the Degree and becomes eligible for the award of M. Tech Degree by JNTUH, he/she shall be placed in one of the following four classes:

	Class Awarded	CGPA Secured
3.1	First class with distinction	CGPA ≥ 7.75
3.2	First Class	CGPA ≥ 6.75 and CGPA < 7.75
3.3	Second Class	CGPA ≥ 6.00 and CGPA < 6.75

14. **Withholding of Results:** If the student has not paid dues to the Institute/ University, or if any case of indiscipline is pending against him, the result of the student (for that Semester) may be withheld and he will not be allowed to go into the next Semester. The award or issue of the Degree may also be withheld in such cases.

15. **Transfer of students from the Constituent Colleges of JNTUH or from other Colleges/ Universities:** Transfer of students from the Constituent Colleges of JNTUH or from other Colleges/ Universities shall be considered only on case-to-case basis by the Academic Council of the Institute.

16. **Transitory Regulations:** Students who have discontinued or have been detained for want of attendance, or who have failed after having undergone the Degree Programme, may be considered eligible for readmission to the same or equivalent subjects as and when they are offered.

17. **General Rules**

a) The academic regulations should be read as a whole for the purpose of any interpretation.
b) In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Academic Council is final.
c) In case of any error in the above rules and regulations, the decision of the Academic Council is final.
d) The college may change or amend the academic regulations or syllabi at any time and the

changes or amendments made shall be applicable to all the students with effect from the dates notified by the college.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

M.Tech (PS) PROGRAMME STRUCTURE

M.Tech (PS) **I Year-I Semester**

Sub-Code	Group	Subject	L	P	C	Int.	Ext.	Total
GR17D5058	PC	Advanced Power System Analysis	4	0	4	30	70	100
GR17D5059	PC	Advanced Power System Protection	4	0	4	30	70	100
GR17D5037	PC	Analysis of Power Electronic Converters	4	0	4	30	70	100
	OE-I	**Open Elective – I**	**4**	**0**	**4**	**30**	**70**	**100**
	Elective I							
GR17D5041	PE	HVDC Transmission	4	0	4	30	70	100
GR17D5042		Energy Conservation Systems						
GR17D5060		Power System Dynamics						
	Elective II							
GR17D5044	PE	Solar and Wind Energy	4	0	4	30	70	100
GR17D5062		Gas insulated Systems(GIS)						
GR17D5063		EHVAC Transmission						
GR17D5064	Lab	Power Systems Simulation Lab	0	4	2	30	70	100
GR17D5173	SPW	Seminar-I	-	4	2	30	70	100
		Total	**24**	**8**	**28**	**240**	**560**	**800**

M.Tech (PS) **I Year-II Semester**

Sub-Code	Group	Subject	L	P	C	Int.	Ext.	Total
GR17D5065	PC	Voltage Stability	4	0	4	30	70	100
GR17D5066	PC	PowerSystemOperationandDeregulation	4	0	4	30	70	100
GR17D5049	PC	Flexible AC Transmission Systems	4	0	4	30	70	100
	OE – II	**Open Elective – II**	**4**	**0**	**4**	**30**	**70**	**100**
	Elective III							
GR17D5051	PE	Power Quality	4	0	4	30	70	100
GR17D5052		Digital Control Systems						
GR17D5067		Electric Smart Grid						
	Elective IV							
GR17D5048	PE	Microcontrollers	4	0	4	30	70	100
GR17D5055		Programmable Logic Controllers						
GR17D5056		Reactive Power Compensation and Management						
GR17D5071	Lab	Power Systems Lab	0	4	2	30	70	100
GR17D5174	SPW	Seminar-II	-	4	2	30	70	100
		Total	**24**	**8**	**28**	**240**	**560**	**800**

II Year-I Semester

Sub-Code	Group	Subject	L	P	C	Int.	Ext.	Total
GR17D5175	SPW	Comprehensive Viva-voce	-	-	4	0	100	100
GR17D5176	SPW	Project work Review	-	-	12	30	70	100
		Total	**-**	**-**	**16**	**30**	**170**	**200**

II Year-II Semester

Sub-Code	Group	Subject	L	P	C	Int.	Ext.	Total
GR17D5177	SPW	Project work and Dissertation	-	-	16	30	70	100
		Total			**16**	**30**	**70**	**100**

A student has a choice to select one Open Elective Pool I in I Semester and one Open Elective Pool II in II Semester.

Open Elective Pool-I

Sub-Code	Group	Subject	L	P	C	Int.	Ext.	Total
GR17D5178		E- Commerce and Applications (CSE)	4	0	4	30	70	100
GR17D5179		Enterprise Resource Planning (IT)	4	0	4	30	70	100
GR17D5180		Modern Control Theory (EEE)	4	0	4	30	70	100
GR17D5181	**OE-I**	Computer - Oriented Numerical Methods in Engineering (CE)	4	0	4	30	70	100
GR17D5182		Advanced Computer Architecture (ECE)	4	0	4	30	70	100
GR17D5183		Operations Research (ME)	4	0	4	30	70	100

Open Elective Pool-II

Sub-Code	Group	Subject	L	P	C	Int.	Ext.	Total
GR17D5184		Human Computer Interaction (CSE)	4	0	4	30	70	100
GR17D5185		Big Data and Analytics (IT)	4	0	4	30	70	100
GR17D5186		Neural and Fuzzy Systems (EEE)	4	0	4	30	70	100
GR17D5187	**OE-II**	Project Management (CE)	4	0	4	30	70	100
GR17D5188		Hardware Software Co-Design(ECE)	4	0	4	30	70	100
GR17D5189		Non-Conventional Energy Resources(ME)	4	0	4	30	70	100

I- SEMESTER

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

ADVANCED POWER SYSTEM ANALYSIS

M.Tech (Power Systems) I Year - I Semester

Course Code: GR17D5058 L/P/C: 4/0/4

COURSE OBJECTIVES: The objective of this course is to provide

- Formulation of Ybus for mutually coupled branches.
- Analysis of various methods of Power Flow studies.
- Analysis of various methods of short circuit studies.
- Knowledge on Contingency analysis
- Solid foundation in mathematical and engineering fundamentals required to solve practical power system problems.

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

- Formulate Ybus for mutually coupled branches in power systems.
- Model admittance and impedance for a typical power systems
- Formulate the distribution factors at line outages in power systems.
- Understand the theory and applications of protections used in distribution systems.
- Conduct short circuit analysis
- Establish the connection and express differences between sequence components and symmetric and asymmetric components.
- Conduct contingency analysis.

UNIT-I

Admittance Model and Network Calculations, Branch and Node Admittances, Mutually Coupled Branches in YBUS , An Equivalent Admittance Network, Modification of YBUS , Network Incidence Matrix and YBUS , Method of Successive Elimination, Node Elimination, Triangular Factorization, Sparsity and Near Optimal Ordering.

UNIT-II

Impedance Model and Network Calculations, the BUS Admittance and Impedance Matrices, Thevenin's Theorem and ZBUS ,Algorithms for building ZBUS Modification of existing ZBUS, Calculation of ZBUS elements from YBUS, Power Invariant Transformations, Mutually Coupled Branches in ZBUS.

UNIT-III

Gauss Seidel method, N-R Method, Decoupled method, fast decoupled method, comparison between power flow solutions. DC load flow.

UNIT-IV

ZBUS Method in Contingency Analysis, Adding and Removing Multiple Lines, Piecewise Solution of Interconnected Systems, Analysis of Single Contingencies, Analysis of Multiple Contingencies, Contingency Analysis of DC Model, System Reduction for Contingency and Fault Studies.

UNIT-V

Fault Analysis: Symmetrical faults-Fault calculations using ZBUS- Fault calculations using ZBUS equivalent circuits –Selection of circuit breakers- Unsymmetrical faults-Problems on various types of faults.

TEACHING METHODOLOGIES

1. White board
2. PPTs
3. Seminars

TEXT BOOK

1. John J.Grainger and W.D. Stevenson," Power System Analysis "- T.M.H.Edition.

REFERENCE BOOK

1. Modern Power System Analysis – by I.J.Nagrath & D.P.Kothari Tata M Graw – Hill PublishingCompany Ltd, 2nd edition.
2. Power System Analysis by C.L.Wadhwa, Newage International-3rd Edition

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

ADVANCED POWER SYSTEM PROTECTION

M.Tech (Power Systems) I Year - I Semester
Course Code: GR17D5059 L/P/C: 4/0/4

COURSE OBJECTIVES: The objective of this course is to provide

- Knowledge on various power system protection schemes.
- Differentiation of various types of relays and their functionality.
- Analysis of various types of comparators used in relays.
- Concepts of programming on Microprocessor based protection system for the power system network.
- Technical & economical aspects of various relay technologies.
- Design protection schemes for major components of power systems.

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

- Express the functionality of different types of static relays.
- Analyze the performance of distance & differential relays.
- Compare multiple input comparators used for power system protection.
- Relate the performance characteristics of relays for the power swings.
- simulate the microprocessor based protective system.
- Compare different types of relays like electromagnetic, static and microprocessor based relays.
- Understand the application of various relays.

UNIT-I

STATIC RELAYS: Advantages of static relays-Basic construction of static relays-Level detectors-Replica impedance –Mixing circuits-General equation for two input phase and amplitude comparators-Duality between amplitude and phase comparators.
AMPLITUDE COMPARATORS: Circulating current type and opposed voltage type-rectifierbridge comparators, Direct and Instantaneous comparators.

UNIT-II

PHASE COMPARATORS: Coincidence circuit type- block spike phase comparator, techniques to measure the period of coincidence-Integrating type-Rectifier and Vector product type- Phase comparators.
STATIC OVER CURRENT RELAYS: Instantaneous over-current relay-Time over-current relays-basic principles –definite time and Inverse definite time over-current relays.

UNIT-III

STATIC DIFFERENTIAL RELAYS: Analysis of Static Differential Relays –Static Relay schemes –Duo bias transformer differential protection –Harmonic restraint relay.
STATIC DISTANCE RELAYS: Static impedance-reactance–MHO and angle impedance relay-sampling comparator –realization of reactance and MHO relay using sampling comparator.

UNIT-IV

MULTI-INPUT COMPARATORS: Conic section characteristics-Three input amplitude comparator –Hybrid comparator-switched distance schemes –Poly phase distance schemes-phase fault scheme –three phase scheme – combined and ground fault scheme.
POWER SWINGS: Effect of power swings on the performance of distance relays –Power swing analysis-Principle of out of step tripping and blocking relays-effect of line and length and source impedance on distance relays.

UNIT-V

MICROPROCESSOR BASED PROTECTIVE RELAYS: (Block diagram and flowchart approach only)-Over current relays–impedance relays-directional relay-reactance relay .Generalized mathematical expressions for distance relays-measurement of resistance and reactance –MHO and offset MHO relays-Realization of MHO characteristics-Realization of offset MHO characteristics -Basic principle of Digital computer relaying.

TEACHING METHODOLOGIES

1. White board
2. PPTs
3. Seminars

TEXT BOOKS

1. Badri Ram and D.N.Vishwakarma, “Power system protection and Switch gear “, TMH publication New Delhi 1995.

REFERENCE BOOKS

1. T.S.Madhava Rao , “Static relays”, TMH publication, second edition 1989.
2. Protection and Switchgear, Bhavesh Bhalja, R. P. Maheshwari, Nilesh G. Chothani, Oxford University Press.
3. Electrical Power System Protection, C. Christopoulos and A. Wright, Springer International.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

ANALYSIS OF POWER ELECTRONIC CONVERTERS

M.Tech (Power Systems) I Year - I Semester
Course Code: GR17D5037 L/P/C: 4/0/4

COURSE OBJECTIVES: The objective of this course is to provide

- Analysis of single and three phase ac voltage controllers and cycloconverters.
- Knowledge on different circuit evaluation parameters in single and three phase inverter circuits for practical design.
- Design of controllers for dc-dc converters in voltage and peak current mode.
- Knowledge on different pf improvement techniques in single and three phase converters.
- Simulation techniques of inverters

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

- Design power electronic converters for power control applications.
- Analyze ac voltage controllers.
- Analyze cyclo-converters.
- Design dc-dc converters.
- Express the design and control of rectifiers and inverters.
- Simulate svm method in inverters.
- Articulate the basic power electronic circuits

UNIT-I

SINGLE PHASE AC VOLTAGE CONTROLLERS: Single phase AC voltage controllers with Resistive, Resistive-inductive and Resistive-inductive-induced e.m.f. loads - ac voltage controllers with PW Control - Effects of source and load inductances - Synchronous tap changers-Applications - numerical problems.

UNIT-II

THREE PHASE AC VOLTAGE CONTROLLERS: Three phase AC voltage controllers - Analysis of controllers with star and delta Connected Resistive, Resistive-inductive loads - Effects of source and load Inductances - applications - numerical problems.

CYCLOCONVERTERS: Single phase to single phase cycloconverters - analysis of midpoint and bridge Configurations - Three phase to three phase cycloconverters - analysis of Midpoint and bridge configurations - Limitations - Advantages - Applications- numerical problems

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UNIT –III

SINGLE PHASE CONVERTERS: Single phase converters - Half controlled and Fully controlled converters -Evaluation of input power factor and harmonic factor - continuous and Discontinuous

load current - single phase dual converters - power factor Improvements - Extinction angle control - symmetrical angle control - PWM -single phase sinusoidal PWM - single phase series converters - Applications -Numerical problems.

THREE PHASE CONVERTERS: Three phase converters - Half controlled and fully controlled converters -Evaluation of input power factor and harmonic factor - continuous and Discontinuous load current - three phase dual converters - power factor Improvements - three phase PWM - twelve pulse converters - applications -Numerical problems.

UNIT -IV

D.C. TO D.C. CONVERTERS: Analysis of step-down and step-up dc to dc converters with resistive and Resistive-inductive loads - Switched mode regulators - Analysis of Buck Regulators - Boost regulators - buck and boost regulators - Cuk regulators - Condition for continuous inductor current and capacitor voltage - comparison of regulators –Multi ouput boost converters - advantages - applications - Numerical problems.

UNIT-V

PULSE WIDTH MODULATED INVERTERS (SINGLE PHASE): Principle of operation - performance parameters - single phase bridge inverter -evaluation of output voltage and current with resistive, inductive and Capacitive loads - Voltage control of single phase inverters - single PWM - Multiple PWM - sinusoidal PWM - modified PWM - phase displacement Control - Advanced modulation techniques for improved performance - Trapezoidal, staircase, stepped, harmonic injection and delta modulation - Advantage - application - numerical problems.

PULSE WIDTH MODULATED INVERTERS (THREE PHASE): Three phase inverters - analysis of 180 degree condition for output voltage And current with resistive, inductive loads - analysis of 120 degree Conduction - voltage control of three phase inverters - sinusoidal PWM - Third Harmonic PWM – 60 degree PWM - space vector modulation - Comparison of PWM techniques-harmonic reductions - Current Source Inverter - variable d.c. link inverter - boost inverter - buck and boost inverter - inverter circuit design - advantages -applications - numerical problems.

TEACHING METHODOLOGIES

1. White board
2. PPTs
3. Seminars

TEXT BOOKS

1. Power Electronics - Mohammed H. Rashid - Pearson Education -Third Edition - First Indian reprint 2004.
2. Power Electronics - Ned Mohan, Tore M. Undeland and William P. Robbins -John Wiley and Sons - Second Edition

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

HVDC TRANSMISSION
(Elective-I)

M.Tech (Power Systems) I Year - I Semester

Course Code: GR17D5041 L/P/C: 4/0/4

COURSE OBJECTIVES: The objective of this course is to provide

- Evaluation of technical and economical aspects of HVDC transmission.
- Covering Voltage source converter based transmission
- Development of HVDC converter analysis
- Focussing on HVDC control
- Know about VSC HVDC control
- Analysis of harmonics and their rectification.
- Impact of AC system performance on DC system

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

- compare the differences between HVDC and HVAC transmission.
- Know about VSC transmission advantages.
- Analyze the rectifer and inverter commutating circuits.
- Cover the different control strategies.
- Identification of valve firing control schemes.
- Estimate the requirement of HVDC filters.
- Address the role of AC system faults on HVDC system.

UNIT-I

HVDC Transmission: Introduction, equipment required for HVDC systems, Comparison of AC and DC Transmission, Limitations of HVDC transmission lines, reliability of HVDC systems, comparison of HVDC link with EHVAC link, HVDC convertors, HVDC –VSC transmission System: VSC system components, Control of Active and reactive power, Applications of VSC systems.

UNIT-II

HVDC Convertors operation and analysis: Thyristors and their characteristics, silicon rectifiers IGBT's ,HVDC voltage source converters principle and operation , 6 pulse convertor configuration, ideal communication process without gate control, DC output voltage , gate control of valves, analysis of voltage wave forms with overlap angle, analysis of communication circuits , equivalent circuit of rectifier, Inverter operation with overlap, Equivalent circuit of inverter , complete equivalent circuit of HVDC link, power factor and reactive power of converters, analysis of 12 pulse converter, power flow in HVDC links, Power flow and current control , power loss in DC systems, operation and analysis of VSC converters, VSC inverter operation , power flow in VSC-DC transmission, comparison between CSC(classical HVDC) and NSC-HVDC system.

UNIT-III

HVDC Converter control :AC transmission and its control , necessary of dc link control, rectifier control , inverter control , constant beta control, constant gamma control, compounding of rectifiers, current compounding of inverter , complete HVDC system characteristics , power reversal in DC link, voltage dependent current order limit(VDCOL), system control hierarchy ,individual phase control, cosine control of phase delay, linear control phase delay , equidistance pulse control, pulse frequency control , constant current control, inverter exhibition angle control, constant power control, control system for HVDC converter ,inverter operation problem, control of VSC converters.

UNIT-IV

Harmonics in HVDC system: Harmonics due to converter , characteristic current harmonics in the 12 pulse converter , harmonics in VSC converter , harmonic model and equivalent circuit ,design of AC filters , single tuned and double tuned high pass filters , second order filters and C-Type filter, Reactive power considerations of AC filters , Active filters and their applications, filters with VSC-HVDC schemes.

UNIT-V

Faults on AC side of converter station: 3-phase symmetrical fault and asymmetrical faults, commutation failure, DC circuit breaker, Multi Terminal HVDC system: series and parallel MTDC systems and their operation and control, AC-DC system interaction short circuit ratesand its effects.

TEXT BOOK

1. HVDC transmission by S Kamakshaiah and V Kamaraju, Tata McGraw Hills Publications.

REFERENCE BOOKS

1. K.R.Padiyar., HVDC Power Transmission System(English) 2nd edition.
2. Arillaga., High Voltage Direct Transmission,(London)Peter Peregrinus, 1981.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENERGY CONVERSION SYSTEMS
(Elective-I)

M.Tech (Power Systems) I Year - I Semester

Course Code: GR17D5042 L/P/C: 4/0/4

COURSE OBJECTIVES: The objective of this course is to provide

- Deep insight in to the spectral distribution of energy in solar radiation
- Analysis of test specifications for PV systems.
- Principles of MHD power generation .
- Knowledge on Wind Energy conversion systems.
- Information on OTEC systems.

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

- Define the advances in spectral distribution of energy.
- Evaluate the design and Principles of MHD power generation.
- Articulate MHD technology in power control applications.
- Evaluate the Application of OTEC systems
- Know the techniques for principles of EMF generation
- Evaluate Global energy position and environmental effects.
- Know the techniques for energy storage

UNIT-I

Photo voltaic power generation-spectral distribution of energy in solar radiation- solar cell configurations- voltage developed by solar cell- photo current and load current- practical solar cell performance- commercial photo voltaic systems- test specifications for PV systems- applications of super conducting materials in electrical equipment systems.

UNIT-II

Principles of MHD power generation- ideal MHD generator performance- practical MHD generator- MHD technology. Wind Energy conversion: Power from wind- properties of air and wind-types of wind Turbines- operating characteristics.

UNIT-III

Tides and tidal power stations- Modes of operation- tidal project examples- turbines and generators for Tidal power generation. Wave energy conversion: properties of waves and Power content- vertex motion of Waves- device applications. Types of Ocean thermal energy conversion systems Application of OTEC systems Examples..

UNIT-IV

Miscellaneous energy conversion systems: coal gasification and liquefaction- biomass conversion- geothermal energy- thermo electric energy conversion- principles of EMF generation- description of Fuel cells- Co-generation and energy storage- combined cycle co-generation- energy storage. Global energy position and environmental effects: energy units-global energy position.

UNIT-V

Types of Fuel cells-H_2O_2Fuel cells- Applications of fuel cells-Batteries- Description of Batteries-Battery application for large power. Environmental effects of energy conversion systems-pollution from coal and preventive measures steam stations and pollution- pollution free energy systems.

TEACHING METHODOLOGIES

1. White board
2. PPT's
3. Seminars

TEXT BOOKS

1. "Energy conversion systems" by Rakosh das Begamudre, New age international publishers, New Delhi - 2000.
2. Renewable Energy Resources by John Twidell and Tony Weir, second edition, Espon and Co.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

POWER SYSTEM DYNAMICS
ELECTIVE-I

M.Tech (Power Systems) I Year - I Semester

Course Code: GR17D5060 L/P/C: 4/0/4

COURSE OBJECTIVES: The objective of this course is to provide

- The concepts of steady state Stability, transient stability of Power Systems.
- Development of the capability of d-q modelling of synchronous machine.
- Capability of modelling of different types of excitation system.
- Analysis of small signal model of synchronous machine.
- Development of small signal model of single machine infinite bus system.
- The applications of eigen value analysis for SIMB system.

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

- Capable of estimating the steady state and transient stability of classical model of power systems.
- Derive the synchronous machine equations in d-q domain.
- Develop the block diagram approach of excitation systems.
- Describe the small signal model of synchronous machine and excitation system.
- Develop block diagram in laplace domain of SMIB system.
- Apply synchronizing and damping torque theory of SMIB system.
- Identify the power system stabilizer in improving of stability.

UNIT-I

BASIC CONCEPTS: Power system stability states of operation and system security - system dynamics - problems system model analysis of steady State stability and transient stability - simplified representation of Excitation control.

UNIT-II

MODELING OF SYNCHRONOUS MACHINE: Synchronous machine - park's Transformation-analysis of steady state performance per - unit quantities-Equivalent circuits of synchronous machine-determination of parameters of equivalent circuits.

UNIT-III

EXCITATION SYSTEM: Excitation system modeling-excitation systems block Diagram - system representation by state equations- Dynamics of a synchronous generator connected to infinite bus - system model Synchronous machine model-stator equations rotor equations - Synchronous machine model with field circuit - one equivalent damper winding on q axis (model 1.1) - calculation of Initial conditions.

UNIT-IV

ANALYSIS OF SINGLE MACHINE SYSTEM: Small signal analysis with block diagram - Representation Characteristic equation and application of Routh Hurwitz criterion-synchronizing and damping torque analysis-small signal model - State equations.

UNIT-V

APPLICATION OF POWER SYSTEM STABILIZERS: Basic concepts in applying PSS - Control signals - Structure and tuning of PSS - Washout circuit - Dynamic compensator analysis of single machine infinite bus system with and without PSS.

TEACHING METHODOLOGIES

1. White board
2. PPTs
3. Seminars

TEXT BOOK

1. K.R. PADIYAR," Power system dynamics "- B.S. Publications.

REFERENCE BOOKS

1. P.M. Anderson and A.A. Fouad,"Power system control and stability ",IEEE Press
2. R. Ramanujam, "Power Systems Dynamics"- PHI Publications.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

SOLAR AND WIND ENERGY
(Elective-II)

M.Tech (Power Systems) I Year - I Semester

Course Code: GR17D5044 L/P/C: 4/0/4

COURSE OBJECTIVES: The objective of this course is to provide

- Introduction of the basic concepts of solar and wind energies.
- Knowledge on the solar power extraction and collection.
- Information and installation of wind and photo voltaic systems.
- Knowledge of PV solar panels and wind generators.
- Applications of wind and solar power technologies for hybrid power generation

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

- Explain the principles that underlie the ability of various natural phenomena to deliver solar energy.
- Outline the technologies that are used to harness the power of solar energy.
- Discuss the positive and negative aspects of solar energy in relation to natural and human aspects of the environment.
- Explain the principles that underlie the ability of various natural phenomena to deliver wind energy.
- Outline the technologies that are used to harness the power of wind energy.
- Discuss the positive and negative aspects of wind energy in relation to natural and human aspects of the environment.
- Know about the usage of both wind and solar power for hybrid power generation.

UNIT-I

Solar Energy Basics: The sun as a source of energy, The Earth Sun, Earth Radiation Spectrums, Extra-terrestrial and Terrestrial Radiations, Spectral Energy Distribution of Solar Radiation, Depletion of Solar Radiation, Solar Radiation Data, Measurement of Solar Radiation, Solar Time(Local Apparent Time), Solar Radiation Geometry, Solar Day Length, Empirical Equations for Estimating Solar Radiation Availability on Horizontal Surface For Cloudy skies, Hourly Global, Diffuse and Beam Radiation on Horizontal Surface Under Cloudless Skies, Solar Radiation on Inclined Plane Surface

UNIT-II

Solar Thermal Systems: Solar Collectors, Solar Water Heater, Solar Passive Space-Heating and Cooling Systems, Solar Ustrial Heating Systems, Solar Refrigeration and Air-Conditioning Systems, Solar Cookers, Solar Furnaces, Solar Green House, Solar Dryer, Solar Distillation(or Desalination of Water), Solar Thermo-Mechanical Systems.

UNIT-III

Solar Photovoltaic Systems: Solar Cell Fundamentals, Solar Cell Characteristics, Solar Cell Classification, Solar Cell, Module, Panel and Array Construction, Maximizing The Solar PV Output and Load Matching, Maximizing Power point tracker(MPPT),Balance of System Components, Solar PV Systems, Solar PV Applications

UNIT-IV

Wind Energy: Origin of Winds, Nature of Winds, Wind Turbine Siting, Major Applications of Wind Power, Basics of Fluid Mechanics, Wind Turbine Aerodynamics.

UNIT-V

Wind Energy Conversion Systems: Wind Energy Conversion Systems (WECS), Wind-Diesel Hybrid System, Effects of Wind Speed and Grid Condition (System Integration), Wind Energy Storage, Environmental Aspects.

TEACHING METHODOLOGIES

1. White board
2. PPTs
3. Seminars

TEXT BOOKS

1. B.H.Khan, “Non- Conventional Energy Resources”, 2nd edition, Tata McGraw-Hill, New Delhi

REFERENCE BOOK

1. SP Sukhatme, Solar Energy - Principles of thermal collection and storage, 2nd edition, Tata McGraw-Hill, New Delhi

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

GAS INSULATED SYSTEMS
(Elective-II)

M.Tech (Power Systems) I Year - I Semester

Course Code: GR17D5062 L/P/C: 4/0/4

COURSE OBJECTIVES: The objective of this course is to provide

- The importance of Gas Insulated Systems (GIS).
- Knowledge on advancement of GIS and its requirements for installation.
- Awareness of design and construction of GIS.
- Knowledge of transient phenomenon in GIS.
- Information on problems occurs in GIS.
- Knowledge of imperfections in insulation.
- Awareness on insulation diagnostic methods.

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

- Understand the importance of Gas insulation and its physical, chemical & electrical properties.
- Understand the different layouts of GIS with respect to its planning and installation.
- Get the knowledge of design and construction of GIS station with respect to voltage and thermal conditions.
- Extend the knowledge of transient phenomenon in GIS.
- Get the awareness of the problems in GIS with respect to particles effect and their control.
- Understand the characteristics of imperfections in insulation.
- Get the knowledge of PD measurement and UHF diagnostic methods.

UNIT-I

INTRODUCTION TO GIS AND PROPERTIES OF SF6 Characteristics of GIS- Introduction to SF6 - Physical properties-Chemical properties - Electrical properties-Specification of SF6 gas for GIS application - Handling of SF6 gas before use - Safe handling of SF_6 gas in electrical equipment - Equipment for handling the SF6 Gas - SF6 and environment.

UNIT-II

LAYOUT OF GIS STATIONS: Advancement of GIS station - Comparison with Air Insulated Substation - Economics of GIS - User Requirements for GIS - Main Features for GIS - Planning and Installation components of a GIS station.

UNIT-III

DESIGN AND CONSTRUCTION OF GIS STATION: Introduction - Rating of GIS components - Design Features - Estimation of different types of Electrical Stresses -Design Aspects of GIS components - Insulation Design for Components - Insulation Design for GIS - Thermal

Considerations in the Design of GIS - Effect of very Fast Transient Over-voltages (VFTO) on the GIS design - Insulation Coordination systems - Gas handling and Monitoring System Design.

UNIT-IV

FAST TRANSIENT PHENOMENON IN GIS: Introduction- Disconnector Switching in Relation to Very fast Transients-Origin of VFTO-Propagation and Mechanism of VFTO-VFTO Characteristics-Effects of VFTO-Testing of GIS for VFTO.

UNIT-V

SPECIAL PROBLEMS IN GIS AND GIS DIAGNOSTICS: Introduction - particles their effects and their control- Insulating Spacers and their Reliability - SF6 Gas Decomposition - Characteristics of imperfections in insulation - Insulation Diagnostic methods - PD Measurement and UHF Method.

TEACHING METHODOLOGIES

1. White board
2. PPTs
3. Seminars

TEXT BOOK

1. M. S. Naidu," Gas Insulated Substations"- IK International Publishing House.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

EHV AC TRANSMISSION
(Elective-II)

M.Tech (Power Systems) I Year - I Semester

Course Code: GR17D5063 L/P/C: 4/0/4

COURSE OBJECTIVES: The objective of this course is to provide

- Present trends of transmission line and their aspects.
- Deep in sight of electrostatic fields and its effect.
- Awareness of measurement of field and voltage gradients.
- Information on the issues related to over voltages in ehv lines
- Knowledge of corona in ehv lines.
- Awareness about traveling waves and its characteristics.
- Concepts of the design of ehv lines.

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

- Understand the importance of estimating the line parameters of EHV AC transmission lines.
- Do the calculation of electrostatic field of AC lines and able to understand their effect on voltage gradients.
- Get the knowledge of energized & un-energized EHV lines.
- Understand the requirement of VAR compensation in the context of shunt and series compensation methods.
- Emphasize on the effect of corona with respect to its characteristics, properties and losses.
- Extend the knowledge of corona phenomenon and its effects like traveling waves and audio noise.
- Get the awareness of the design of EHV lines with respect to steady & transient limits.

UNIT- I

E.H.V.A.C. Transmission line trends and preliminary aspect standard transmission voltages – Estimation at line and ground parameters-Bundle conductor systems-Inductance and Capacitance of E.H.V. lines – Positive, negative and zero sequence impedance – Line Parameters for Modes of Propagation.

UNIT-II

Electrostatic field and voltage gradients – Calculations of electrostatic field of AC lines – Effect of high electrostatic field on biological organisms and human beings - Surface voltage gradients and Maximum gradients of actual transmission lines – Voltage gradients on sub conductor.

UNIT-III

Electrostatic induction in un energized lines – Measurement of field and voltage gradients for three phase single and double circuit lines – Un energized lines. Power Frequency Voltage control and over-voltages in EHV lines: No load voltage – Charging currents at power frequency-Voltage control – Shunt and Series compensation – Static VAR compensation.

UNIT-IV

Corona in E.H.V. lines – Corona loss formulae- Attention of traveling waves due to Corona – Audio noise due to Corona, its generation, characteristic and limits. Measurements of audio noise radio interference due to Corona - properties of radio noise – Frequency spectrum of RI fields – Measurements of RI and RIV.

UNIT-V

Design of EHV lines based on steady state and transient limits - EHV cables and their characteristics.

TEACHING METHODOLOGIES

1. White board
2. PPTs
3. Seminars

TEXT BOOKS

1. EHVAC Transmission Engineering by R. D. Begamudre, New Age International (p) Ltd.
2. HVAC and DC Transmission by S. Rao.

REFERENCE BOOKS

1. Rokosh Das Begamudre,"Extra High Voltage AC Transmission Engineering"– Wiley Eastern LTD., NEW DELHI 1987.
2. Edison,"EHV Transmission line"- Electric Institution (GEC 1968).

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

POWER SYSTEMS SIMULATION LAB

M.Tech (Power Systems) I Year - I Semester

Course Code: GR17D5064 L/P/C: 4/0/4

COURSE OBJECTIVES: The objective of this course is to provide

- The solutions for power systems under short circuit conditions.
- Analysis of synchronous machine characteristics, and synchronization of machine to the power line voltage and frequency.
- Design solutions for power system problems.
- Analysis of load-flow studies which are important tools of numerical analysis applied to a power system.
- Modelling of transmission lines.

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

- Understand power industry practices for design, operation, and planning.
- Use mathematical tools that are essential for system analysis and design.
- Use commercial software packages in designing solutions to problems.
- Have group participation in design and problem solving.
- Analyse the performance of synchronous machine
- Apply knowledge of load flows for planning and future expansion of existing as well as non-existing power systems.
- Do modelling of transmission lines.

CONTENTS

1. Sinusoidal Voltages and Currents
2. Computation of line parameters
3. Modelling of transmission lines
4. Formation of bus Admittance matrix
5. Load Flow solution using Gauss Siedal method.
6. Load flow solution using Newton Raphson method in Rectangular coordinates
7. Transient and small signal stability analysis of single-machine infinite bus system
8. Power flow solution of 3 – bus system
9. Power flow analysis of slack bus connected to different loads
10. Load flow analysis of 3 motor systems connected to slack bus
11. Power flow analysis of wind power system with different buses
12. Power Flow analysis using continuation power flow method
13. Unsymmetrical fault Analysis: LG, LL, LLG Fault
14. Z–Bus Building Algorithm
15. (a) Obtain Symmetrical Components of a set of Unbalanced currents.

(b)Obtain the original Unbalanced phase voltages from Symmetrical Components.

16. Short circuit Analysis of a power system with 12 buses.
17. Determination of natural oscillations of rotor angle and grid frequency for a given synchronous machine.

OPEN ELECTIVE - I

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

E - COMMERCE AND APPLICATIONS
(Open Elective I)

M.Tech (CSE) I Year - I Semester

Course Code: GR17D5178 L/P/C: 4/0/4

Course Objectives

- To understand the interest and opportunity of e-commerce
- To know and understand the critical success factors in implementing an ecommerce
- System
- To know how to plan and how to manage e-commerce solutions
- To have hands on, real-life experience with electronic commerce applications
- To analyze and understand the human, technological and business environment
- Associated with e-commerce

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

- Understand the trends in e-Commerce and the use of the Internet.(Level 2)
- Analyze, Understand and Comparethe principles of E-commerce and basics of World Wide Web.(Level 2&4)
- Analyze, Understandthe concept of electronic data interchange and its legal, social and technical aspects.(Level 2&4)
- Understandand Evaluate the security issues ssssover the web, the available solutions and future aspects of e-commerce security .(Level 2&5)
- Understanding and Validating the concept of E-banking, electronic payment system.(Level 2&5)
- Understand, Analyze and Comparethe capabilities and limitation of agents, Web based marketing and various security Issues. (Level 2&4)
- Understandingand Evaluation of online advertisements, website design issues and Creating a business transaction using an e commerce site.(Level 2,5 &6)

UNIT-I

INTRODUCTION Traditional commerce and E commerce – Internet and WWW – role of WWW – value chains – strategic business and Industry value chains – role of E commerce, advantages of E commerce, anatomy of e commerce applications.

UNIT-II

INFRASTRUCTURE FOR E COMMERCE Packet switched networks – TCP/IP protocol script – Internet utility programmes – SGML, HTML and XML – web client and servers – Web client/server architecture – intranet and extranets.

UNIT-III

WEB BASED TOOLS FOR E COMMERCE Web server – performance evaluation - web server software feature sets – web server software and tools – web protocol – search engines – intelligent agents –EC software – web hosting – cost analysis

UNIT- IV

SECURITY Computer security classification – copy right and Intellectual property – electronic commerce threats – protecting client computers – electronic payment systems and risks involved in it –electronic cash __ micro payment system– strategies for marketing – sales and promotion – cryptography –authentication.

UNIT-V

INTELLIGENT AGENTS Definition and capabilities – limitation of agents – security – web based marketing – search engines and Directory registration – online advertisements – Portables and info mechanics – website design issues.

TEXT BOOKS

1. Ravi Kalakota, " Electronic Commerce", Pearson Education,
2. Gary P Schneider "Electronic commerce", Thomson learning & James T Peny Cambridge USA, 2001.

REFERENCES BOOK

1. EfraimTurvanJ.Lee, David kug and chung, "Electronic commerce" Pearson Education Asia 2001.
2. Brenda Kienew E commerce Business Prentice Hall, 2001.
3. Manlyn Greenstein and Miklos "Electronic commerce" McGraw-Hill, 2002.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENTERPRISE RESOURCE PLANNING
(Open Elective-I)

M.Tech (IT) I Year - I Semester

Course Code: GR17D5179 L/P/C: 4/0/4

PREREQUISITES

- Fundamentals of enterprise resource planning (ERP) systems concepts
- Importance of integrated information systems in an organization.

COURSE OBJECTIVES: The objective of the course is to provide the student

- Understanding of the basic concepts of ERP systems for manufacturing or service companies, and the differences among MRP, MRP II, and ERP systems
- Thinking in ERP systems: the principles of ERP systems, their major components, and the relationships among these components
- Capability to adapt in-depth knowledge of major ERP components, including material requirements planning, master production scheduling, and capacity requirements planning
- Understanding knowledge of typical ERP systems, and the advantages and limitations of implementing such systems
- Understanding the business process of an enterprise
- Grasp the activities of ERP project management cycle
- Understanding the emerging trends in ERP developments

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

- Examine systematically the planning mechanisms in an enterprise, and identify all components in an ERP system and the relationships among the components
- Understand production planning in an ERP system, and systematicallydevelop plans for an enterprise
- Use methods to determine the correct purchasing quantity and right time to buy an item, and apply these methods to material management
- Understand the difficulties of a manufacturing execution system, select a suitable performance measure for different objectives, and apply priority rules to shop floor control
- Knowledge of ERP implementation cycle
- Awareness of core and extended modules of ERP
- Apply emerging trends in ERP

UNIT-I

Introduction: Overview – Benefits of ERP – ERP and Related Technologies – Business Process Reengineering – Data Warehousing – Data Mining – On–line Analytical Processing – Supply Chain Management.

UNIT-II

IMPLEMENTATION: Implementation Life Cycle – Implementation Methodology – Hidden Costs – Organizing Implementation – Vendors, Consultants and Users – Contracts – Project Management and Monitoring.

UNIT- III

BUSINESS MODULES: Business Modules in an ERP Package – Finance – Manufacturing – Human Resource –Plant Maintenance – Materials Management – Quality Management – Sales and Distribution.

UNIT- IV

ERP MARKET: ERP Market Place – SAP AG – PeopleSoft – Baan Company – JD Edwards World Solutions Company – Oracle Corporation – QAD – System Software Associates.

UNIT- V

ERP-Present and future : Turbo Charge the ERP System – EIA – ERP and E–Commerce – ERP and Internet – Future Directions in ERP.

TEXT BOOKS

1. Alexis Leon, “ERP Demystified”, Tata McGraw Hill, 1999.
2. Joseph A. Brady, Ellen F. Monk, Bret J. Wangner, “Concepts in Enterprise Resource Planning” , Thomson Learning, 2001.
3. Vinod Kumar Garg and N.K .Venkata Krishnan, “Enterprise Resource Planning – concepts and Planning”, Prentice Hall, 1998.
4. Jose Antonio Fernandz, “ The SAP R /3 Hand book”, Tata McGraw Hill

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

MODERN CONTROL THEORY
(Open Elective-I)

M.Tech (EEE) I Year - I Semester

Course Code: GR17D5180 L/P/C: 4/0/4

PREREQUISITE: Control Systems, Mathematics.

COURSE OBJECTIVES

- To familiarize students with the modelling of systems
- To familiarize the students with the state space analysis of dynamic systems and observe their controllability and Observability.
- To make students understand the concepts of describing function analysis of nonlinear systems and analyze the stability of the systems.
- To analyze the stability of the nonlinear systems.

COURSE OUTCOMES

- Ability to obtain the mathematical model of any system.
- Ability to obtain the state model for dynamic systems.
- Ability to analyze the controllability and Observability for various types of control systems.
- Ability to understand the various types of nonlinearity.
- Ability to analyze the stability of the nonlinear systems.
- Ability to synthesize the nonlinear systems.

UNIT-I

MATHEMATICAL PRELIMINARIES: Fields, Vectors, Vector Spaces — Linear combinations and Bases — Linear Transformations and Matrices — Scalar Product and Norms ,Eigenvalues, Eigen Vectors and a Canonical form representation of linear operators, The concept of state — State Equations for Dynamic systems, Time invariance and Linearity Non uniqueness of state model — State diagrams for Continuous-Time State models.

UNIT-II

STATE VARIABLE ANALYSIS: linear Continuous time models for Physical systems-- Existence and Uniqueness of Solutions to Continuous- time State Equations — Solutions of Linear Time Invariant Continuous-Time State Equations—State transition matrix and it's properties.

CONTROLLABILITY AND OBSERVABILITY-General concept of controllability— General concept of Observability—Controllability tests for Continuous-Time Invariant Systems ---
Observability tests for Continuous-Time Invariant Systems— Controllability and Observability of State Model in Jordan Canonical form— Controllability and Observability Canonical forms of State model.

UNIT- III

NON LINEAR SYSTEMS -I

Introduction to Non Linear Systems - Types of Non-Linearities-Saturation-Dead-Zone - Backlash Jump Phenomenon etc;— Singular Points-Introduction to Linearization of nonlinear systems, Properties of Non Linear systems-Describing function-describing function analysis of nonlinear systems-Stability analysis of Non-Linear systems through describing functions.

UNIT-IV

NON LINEAR SYSTEMS-II

Introduction to phase-plane analysis, Method of Isoclines for Constructing Trajectories, singular points, phase- plane analysis of nonlinear control systems.

UNIT-V

STABILITY ANALYSIS

Stability in the sense of Lyapunov, Lyapunovs stability and Lyapunov's instability theorems - StabilityAnalysis of the Linear continuous time invariant systems by Lyapunov second method — Generation of Lyapunov functions Variable gradient method — Krasooviski's method.

TEACHING METHODOLOGIES

1. White board
2. PPTs
3. Seminars

EXT BOOKS

1. Modern Control System Theory by M.Gopal — New Age International -1999
2. Modern Control Fngineering by Ogata:K — Prentice Hall – 1997

REFERENCE BOOK

1. Control Systems Engineering, N. S. Nise: 4th Ed., Wiley, 2004.Engineering, 4th Ed., Wiley, 2004.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

COMPUTER–ORIENTED NUMERICAL METHODS IN ENGINEERING
(Open Elective-I)

M.Tech (Civil) I Year - I Semester

Course Code: GR17D5181 L/P/C: 4/0/4

COURSE OBJECTIVES

- To develop the skill of solving linear algebraic systems by direct and iteration methods.
- To illustrate advanced matrix techniques in the determination of Eigen values and Eigen vectors of square matrix.
- To analyze the performance of various interpolation technique and perform error analysis.
- To compare various numerical differentiation and integration techniques. •
- To explain the various techniques to study Initial and Boundary value problems in ODE.
- To solve a range of problems on applicable software.

COURSE OUT COMES: At the end of the course the student will be able to

- Solve linear algebraic system by direct and iteration methods.
- Apply the knowledge of Eigen values and Eigen vectors to some contents in engineering.
- Develop the skill of working with symmetric matrices in the study of Engineering problems.
- Apply the knowledge of interpolation and extrapolation of uniform and non uniform data to certain contents of Civil Engineering.
- Apply the knowledge of numerical differentiation and integration to some contents of Civil Engineering
- Learn grid based methods to solve Initial and Boundary value problems that arise in engineering problems.
- Develop the skill of solving computational problems using software.

UNIT-I

Solutions of linear equations: Direct method – Cramer's rule, Guass – Elimination method-Gauss Jordan elimination – Triangulation (LU Decomposition) method – Iterative methods Jacobi – Iteration method – Gauss – Siedel iteration, Successive over –relaxation method.

Eigen values and eigen vectors: Jacobi method for symmetric matrices- Given's method for symmetric matrices-Householder's method for symmetric matrices-Rutishauser method of arbitrary matrices –Power method.*Demonstration of solutions using open source software in Numerical Methods.

UNIT-II

Interpolation: Linear Interpolation - Higher order Interpolation - Lagrange Interpolation – Interpolating polynomials using finites differences- Hermite Interpolation -piece-wise and spline Interpolation.*Demonstration of solutions using open source software in Numerical methods.

UNIT - III

Finite Difference and their Applications: Introduction- Differentiation formulas by Interpolating parabolas – Backward and forward and central differences- Derivation of Differentiation formulae using Taylor series- Boundary conditions- Beam deflection – Solution of characteristic value problems- Richardson's extrapolation- Use of unevenly spaced pivotal points- Integration formulae by interpolating parabolas- Numerical solution to spatial differential equations. *Demonstration of solutions using open source software in Numerical Methods.

UNIT-IV

Numerical Differentiation: Difference methods based on undetermined coefficients- optimum choice of step length– Partial differentiation. Numerical Integration: Method based on interpolation-method based on undetermined coefficient – Gauss – Lagrange interpolation method- Radaua integration method- composite integration method – Double integration using Trapezoidal and Simpson's method.*Demonstration of solutions using open source software in Numerical Methods.

UNIT-V

Ordinary Differential Equation: Euler's method – Backward Euler method – Mid point method – single step method, Taylor's series method- Boundary value problems-case studies. *Demonstration of solutions using open source software in Numerical Methods.

***NOTE:** Demonstration of solutions using open source software in Numerical Methods only for the knowledge of students to apply in their Project Works. Not for examination.

TEXT BOOKS

1. M.K.Jain-S.R.K.Iyengar, R.K.Jain Numerical methods for scientific and engineering computations, Willey Eastern Limited, 1987
2. S.S.Shastry, Numerical methods.
3. Curtis I.Gerala, Applied numerical analysis, Addisson Wasley published campus.

REFERENCES BOOKS

1. C.Chopra, Raymond P.Canal, Numerical methods for Engineers Stevan, Mc. Graw Hill book Company, 4th edition, 2002.
2. C.Xavier, C Language and Numerical methods, New age international publisher, 2003.
3. Dr. M.Shanta Kumar, Computer based numerical analysis, Khanna Book publishers, New Delhi.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

ADVANCED COMPUTER ARCHITECTURE
(Open Elective-I)

M.Tech (ECE) I Year - I Semester

Course Code: GR17D5182 L/P/C: 4/0/4

COURSE OBJECTIVES

- To learn how to build the best processor/computing system understanding the underlying tradeoffs and ramifications.
- To identify and analyze the attributes of computer architecture design with recent trend technology.
- To identify the techniques to improve the speed and performance of computers – Parallelism in Instruction level – Hardware approaches - pipelining,dynamic scheduling, superscalar processors, and multiple issue of instructions.
- To implement the design aspects and categorize various issues , causes and hazards due to parallelisms.
- To examine and compare the performance with benchmark standards.
- To understand the framework for evaluating design decisions in terms of application requirements and performance measurements.
- To learn the design and analysis of complex and high performance multiprocessors and supporting subsystems from the quantitative aspect.

COURSE OUTCOMES: After going through this course the student will be able to

- An ability to discuss the organisation of computer-based systems and how a range of design choices are influenced by applications.
- An ability to understand the components and operation of a memory hierarchy and the range of performance issues influencing its design.
- An ability to interpret the organisation and operation of current generation parallel computer systems, including multiprocessor and multicore systems.
- An ability to understand the various techniques to enhance a processors ability to exploit instruction-level parallelism (ILP), and its challenges.
- An ability to know the classes of computers, and new trends and developments in computer architecture.
- An ability to develop the applications for high performance computing systems.
- An ability to undertake performance comparisions of modern and high performance computers.

UNIT -I

Fundamentals of Computer Design: Fundamentals of Computer design, Changing faces of computing and task of computer designer, Technology trends, Cost price and their trends, measuring and reporting performance, Quantitative principles of computer design, Amdahl's law.

Instruction set principles and examples- Introduction, classifying instruction set- memory addressing type and size of operands, Operations in the instruction set.

UNIT-II

Pipelines: Introduction, basic RISC instruction set, Simple implementation of RISC instruction set, Classic five stage pipe lined RISC processor, Basic performance issues in pipelining, Pipeline hazards, Reducing pipeline branch penalties.

Memory Hierarchy Design: Introduction, review of ABC of cache, Cache performance, Reducing cache miss penalty, Virtual memory.

UNIT-III

Instruction Level Parallelism (ILP) - The Hardware Approach: Instruction-Level parallelism, Dynamic scheduling, Dynamic scheduling using Tomasulo's approach, Branch prediction, High performance instruction delivery- Hardware based speculation.

ILP Software Approach:

Basic compiler level techniques, Static branch prediction, VLIW approach, Exploiting ILP, Parallelism at compile time, Cross cutting issues - Hardware verses Software.

UNIT-IV

Multi Processors and Thread Level Parallelism: Multi Processors and Thread level Parallelism-Introduction, Characteristics of application domain, Systematic shared memory architecture, Distributed shared – Memory architecture, Synchronization.

UNIT-V

Inter Connection and Networks: Introduction, Interconnection network media, Practical issues in interconnecting networks, Examples of inter connection, Cluster, Designing of clusters.
Intel Architecture: Intel IA-64 ILP in embedded and mobile markets Fallacies and pit falls.

TEXT BOOKS

1. John L. Hennessy, David A. Patterson - Computer Architecture: A Quantitative Approach, 3rd Edition, an Imprint of Elsevier.

REFERENCE BOOKS

1. John P. Shen and Miikko H. Lipasti -, Modern Processor Design : Fundamentals of Super Scalar Processors
2. Computer Architecture and Parallel Processing - Kai Hwang, Faye A.Brigs., MC Graw Hill.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

IOPERATIONS RESEARCH
(Open Elective-I)

Mtech(ME) I Year - I Semester

Course Code: GR17D5183 L/P/C: 4/0/4

COURSE OBJECTIVES: The Objective of this course is to provide

- Analysis of quantitative methods and techniques for effective Decision–making.
- Constructing models that are used in solving business decision problems.
- Introduce the students to the use of basic methodology for the solution of linear programs and integer programs.
- Introduce the students to methods for solving large-scale transportation and assignment problems.
- Illustrate how sequencing is carried out in assigning jobs to machines
- Understand the concept of Inventory and apply different models in optimizing the same.
- Apply PERT/CPM: [Project scheduling and allocation of resources] to schedule and control construction of dams, bridges, roads etc. in an optimal way.

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

- Apply various linear programming techniques for optimal allocation of limited resources such as machine, materials and money
- Solve transportation problems to minimize cost and understand the principles of assignment of jobs and recruitment polices.
- Solve game theory problems.
- Solve problems of inventory and develop proper inventory policies.
- Apply PERT/CPM: [Project scheduling and allocation of resources] to schedule and control construction of dams, bridges, roads etc in a optimal way.
- Solve sequencing problems.
- Develop optimum replacement policy

UNIT-I

Introduction: Definition and scope of operations research(OR),ORmodel, solving the O**R** model, art of modeling, phases of OR study.

Linear Programming:

Two variable Linear Programming model and Graphical method of solution, Simplex method, Dual Simplex method, special cases of Linear Programming, duality, sensitivity analysis.

UNIT-II

Transportation Problems: Types of transportation problems, mathematical models, transportation algorithms

Assignment: Allocation and assignment problems and models, processing of job through machines.

UNIT-III

Network Techniques: Shortest path model, minimum spanning Tree Problem, Max-Flow problem and Min-cost problem.
Project Management: Phases of project management, guidelines for network construction, CPM and PERT.

UNIT-IV

Theory of Games: Rectangular games, Min-max theorem, graphical solution of 2xnormx2 games, game with mixed strategies, reduction to linear programming model.
Quality Systems: Elements of Queuing model, generalized Poisson queuing model.

UNIT-V

Inventory Control: Models of inventory, operation of inventory system, quantity discount.
Replacement models: Equipments that deteriorate with time, equipments that fail with time.

Text/ Reference Books:

1. Wayne L. Winston,"OperationsResearch", Thomson Learning, 2003.
2. Hamdy H. Taha, "Operations Research - An Introduction", Pearson Education, 2003.
3. R. Panneer Seevam, "Operations Research", PHI Learning, 2008.
4. V. K. Khanna, "Total Quality Management", New Age International, 2008.

Teaching Methodology:

- Lecture is delivered on blackboard, preparing OHP sheets and by preparing Power point presentations.
- Seminars are conducted on new technologies related to subject.
- Assignments are given.
- Group discussions are conducted on familiar topics related to subject.
- Industrial visits for practical exposure to understand and explore things.

II- SEMESTER

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

VOLTAGE STABILITY

M.Tech (Power Systems) I Year - II Semester
Course Code: GR17D5065 L/P/C: 4/0/4

COURSE OBJECTIVES: The objective of this course is to provide

- Focus on Reactive power role in voltage regulation.
- Concepts of voltage stability and voltage collape .
- Importance of PV and QV curves in estimation of voltage stability.
- Devolopment of different Load models.
- Methods to improve voltage stability

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

- Know the role of reactive power in transmission line performance.
- Develop the relation between real power and angle, reactive power and voltage.
- Address the concept of voltage stability and voltage collapse.
- Evaluate the voltage stability of Single machine load bus system
- Covering voltage stability evaluation with power flow methods.
- Identify of voltage stability indices.
- Deal with different methods to improve voltage stability

UNIT-I

Power transmission in uncompensated AC lines, operation of transmission lines under no load and heavy load conditions, voltage regulation and line loadability. Reactive power-voltage (Q-V) coupling concept. Reactive power flow effects. Real and Reactive power static stability. Relation between voltage and reactive power at a node in a power systems.

UNIT-II

Voltage stability concepts, Reactive power and voltage collapse, Factors contributing voltage collapse, Stability of transmission system. Relation between voltage stability and rotor angle stability. Voltage stability definitions and classifications. Mechanism of voltage collapse, voltage stability analysis. Modelling of voltage collapse

UNIT-III

Power transfer at voltage stability limit, Receiving end bus voltage in weak transmission line and reactive power variation and its effect and stability. Reactive power sensitivity on voltage stability. Load flow solutions and voltage stability.

UNIT-IV

Voltage stability indicators, P-V, Q-V curves and criteria for voltage stability. Load voltage indicator

for voltage stability. A direct indicator of voltage stability. Effect of load increase on voltage stability. Voltage stability index. Singular value decomposition. Different voltage security indicators. Effect of system reactance on voltage stability. Voltage stability and its relation with off-nominal tap ratio. Of load side transformer (OLTC).power system security analysis.

UNIT-V

Voltage stability improvement, Voltage control using OLTC. Effect of OLTC on voltage stability. Shunt compensation and series compensation. Synchronous condenser at load bus. Series connected FACTS controllers (SSSC, TCSC).power flow model of TCSC. Shunt connected FACTS controllers (SVC).power flow model of SVC, STATCOM.

TEACHING METHODOLOGIES

1. White board
2. PPTs
3. Seminars

TEXT BOOKS

1. An introduction to reactive power control and voltage stability in power transmission systems -Abhijit chakrabarti,D.P.kothari,A.K.Mukhopadhyay Abhinandan De. PHI learning private limited 2011.
2. “power system voltage stability”-C.W.Taylor,MC Grawhill 1994.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

POWER SYSTEM OPERATION AND DEREGULATION

M.Tech (Power Systems) I Year - II Semester
Course Code: GR17D5066 L/P/C: 4/0/4

COURSE OBJECTIVES: The objective of this course is to provide

- Knowledge on optimization techniques on power systems.
- Knowledge on power system security.
- The importance of sensitivity analysis in power systems.
- Knowledge on power system state estimation.
- Information on power system deregulation.
- The importance of power market.
- Knowledge on the available transfer capability in deregulated power systems.

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

- Apply optimization techniques on power systems.
- Analyse power system security.
- Detect the network problems in power systems.
- Apply state estimation to power system.
- Understand the concept of deregulated power systems.
- Understand the operations in power markets.
- Determine the available transfer capability in deregulated power systems.

UNIT-I

OPTIMAL POWER FLOW Introduction- Solution to the optimal power flow-gradient method-Newton's method-Linear sensitivity analysis- Linear programming methods- Security constrained OPF-Interior point algorithm- Bus incremental costs

UNIT-II

POWER SYSTEM SECURITY Introduction –Factors affecting power system security-Contingency analysis-Detection of network problems-Linear sensitivity analysis-AC power flow methods-contingency selection-concentric relaxation-Bounding area method

UNIT-III

STATE ESTIMATION IN POWER SYSTEMS Introduction- Power system state estimation-Maximum likelihood Weighted Least squares estimation-Matrix formulation- State estimation of AC network- State estimation by orthogonal decomposition- detection and identification of Bad measurements- Estimation of quantities not being measured- Network observability and pseudo measurements

UNIT-IV

POWER SYSTEM DEREGULATION Introduction- motivation for restructuring of power systems-Electricity market entities model-benefits of deregulation- terminology-deregulation in Indian power sector-Operations in power markets-power pools-transmission networks and electricity markets.

UNIT-V

AVAILABLE TRANSFER CAPABILITY Introduction Methods: of determination of ATC - ATC calculation considering the effect of contingency analysis- Transmission open access and pricing-cost components of transmission system- transmission pricing methods-Incremental cost based transmission pricing.

TEACHING METHODOLOGIES

1. White board
2. PPTs
3. Seminars

TEXT BOOKS

1. A.J.Wood & B.F.Woollenberg- John Wiley Power Generation, "Operation and Control"-2nd edition.
2. P.Venkatesh. B.V.Manikandan, S.Charles Raja- A.Srinivasan, "Electrical power systems: Analysis, security, Deregulation"– PHI 2012.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

FLEXIBLE AC. TRANSMISSION SYSTEMS

M.Tech (Power Systems) I Year - II Semester
Course Code: GR17D5049 L/P/C: 4/0/4

COURSE OBJECTIVES: The objective of this course is to provide

- Basic concepts of FACTS.
- Knowledge on Voltage source converters.
- Concepts of static shunt compensation.
- Knowledge on SVC,STATCOM in improving dynamic performance of power system.
- Concepts of series compensation and controlling methods of TCSC,TSSC,GSC.

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

- Express different types of FACTS controllers and their role in improving power system performance.
- Understand the operating principles of various FACTS devices.
- Know the importance of compensation methods in power system network.
- Relate the performance and applications of VSI & CSI.
- Extend the knowledge of active & reactive power and voltage control with FACTS devices.
- Analyse role of SVC&STATCOM in improving the power system dynamics.
- Analyze the use of control schemes of TCSC,TSSC,GSC in improving the power quality.

UNIT-I

FACTS CONCEPTS: Transmission interconnections Power flow in an AC system, loading capability limits, Dynamic stability considerations, importance of controllable parameters basic types of FACTS controllers, benefits from FACTS controllers.

UNIT-II

VOLTAGE SOURCE CONVERTERS: Single phase three phase full wave bridge converters transformer connections for 12 pulse 24 and 48 pulse operation. Three level voltage source converter, pulse width modulation converter, basic concept of current source Converters, comparison of current source converters with voltage Source converters.

UNIT-III

STATIC SHUNT COMPENSATION: Objectives of shunt compensation, midpoint voltage regulation voltage instability prevention, improvement of transient stability, Power oscillation damping, Methods of controllable var generation, variable impedance type static var generators switching converter type var generators hybrid var generators.

UNIT-IV

SVC and STATCOM: The regulation and Slope transfer function and dynamic performance, transient Stability enhancement and power oscillation damping operating point control and summary of compensator control.

UNIT-V

STATIC SERIES COMPENSATORS: Concept of series capacitive Compensation improvement of transient stability, power oscillation damping Functional requirements GTO thyristor controlled series capacitor (GSC), thyristor switched series capacitor (TSSC) and thyristor controlled series capacitor (TCSC)control schemes for GSC, TSSC and TCSC.

TEACHING METHODOLOGIES

1. White board
2. PPTs
3. Seminars

TEXT BOOKS

1. "Understanding FACTS Devices' N.G. Hingorani and L.Guygi IEEE Press Publications 2000.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

POWER QUALITY
(Elective-III)

M.Tech (Power Systems) I Year - II Semester

Course Code: GR17D5051 L/P/C: 4/0/4

COURSE OBJECTIVES: The objective of this course is to provide

- A deep insight in to the various power quality issues arise in power systems.
- Information on effect of pq issues on various electrical devices
- Analysis and the operation of mitigation equipment for power quality issues.
- Monitoring techniques for pq problems
- Measurement techniques for pq problems

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

- Understand various power quality issues and their remedial measures.
- Express what an interruption is, where it originates, what the causes, limits, their costs are and how to predict the number of interruptions.
- Gain knowledge on Voltage sag and its characterization in single-phase and three phase networks
- Know the behaviour of various equipment to voltage sags.
- Apply the knowledge to design mitigation equipment
- Discuss about the standards of Power Quality and EMC Standards
- Measure sags in radial and non-radial networks

UNIT-I

INTRODUCTION: Introduction of the Power Quality (PQ) problem, Terms used in PQ: Voltage. Sag, Swell, Surges, Harmonics, over voltages, spikes, Voltage fluctuations, Transients, Interruption, overview of power quality phenomenon, Remedies to improve power quality, power quality monitoring.

UNIT-II

LONG INTERRUPTIONS: Interruptions-Definition-Difference between failure, outage, Interruptions-causes of Long Interruptions-Origin of Interruptions-Limits for the Interruption frequency-Limits for the interruption duration-costs of Interruption-Overview of Reliability evaluation to power quality, comparison of observations and reliability evaluation.

SHORT INTERRUPTIONS: Short interruptions-definition, origin of short interruptions, basic principle, fuse saving, voltage magnitude events due to re-closing, voltage during the interruption, monitoring of short interruptions, difference between medium and low voltage systems. Multiple events, single phase tripping-voltage and current during fault period, voltage and current at post fault period, stochastic prediction of short interruptions.

UNIT-III

VOLTAGE SAG CHARACTERIZATION-SINGLE PHASE: Voltage sag-definition, causes of voltage sag, voltage sag magnitude, monitoring, theoretical calculation of voltage sag magnitude, voltage sag calculation in non-radial systems, meshed systems, voltage sag duration.

VOLTAGE SAG-CHARACTERIZATION-THREE PHASE: Three phase faults, phase angle jumps, magnitude and phase angle jumps for three phase unbalanced sags, load influence on voltage sags.

UNIT-IV

PQ CONSIDERATIONS IN INDUSTRIAL POWER SYSTEMS: Voltage sag-equipment behaviour of Power electronic loads, induction motors, synchronous motors, computers, consumer electronics, adjustable speed AC drives and its operation. Mitigation of AC Drives, adjustable speed DC drives and its operation, mitigation methods of DC drives.

UNIT –V

MITIGATION OF INTERRUPTIONS AND VOLTAGE SAGS: Over view of mitigation methods-from fault to trip, reducing the number of faults, reducing the fault clearing time changing the power system, installing mitigation equipment, improving equipment immunity, different events and mitigation methods. System equipment interface voltage source converter, series voltage controller, shunt controller, combined shunt and series controller.

POWER QUALITY AND EMC STANDARDS: Introduction to standardization, IEC Electromagnetic compatibility standards, European voltage characteristics standards, PQ surveys.

TEACHING METHODOLOGIES

1. White board
2. PPTs
3. Seminars

TEXT BOOKS

1. “Understanding Power Quality Problems” by Math HJ Bollen. IEEE Press
2. “Electrical power systems quality,3rd edition,Roger C.Dugan,Marle F.F Mcgranaghan,Surya Santoso,H.Waybe Beaty,Mc CrawHill professional.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

DIGITAL CONTROL SYSTEMS
(Elective-III)

M.Tech (Power Systems) I Year - II Semester

Course Code: GR17D5052 L/P/C: 4/0/4

COURSE OBJECTIVES: The objective of this course is to provide

- Basic concepts of sampling and reconstruction of the continuous time signals.
- State space analysis of discrete control systems.
- Information about the transform analysis of discrete time control systems.
- Concepts of digital control system design and their stability analysis.
- Design techniques of state feedback controllers and observers

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

- Define the advances in digital control systems.
- Evaluate z-transforms of linear control systems.
- Articulate the need of state space analysis.
- Evaluate the design and control discrete time control system
- Analize the techniques and design of resonant inverters.
- Evaluate the design and control of stability analysis of discrete systems.
- Design state feedback controllers and observers.

UNIT-I

SAMPLING AND RECONSTRUCTION: Introduction, sample and hold operations, Sampling theorem, Reconstruction of original sampled signal to continuous - time signal.

Z - TRANSFORMS Introduction, Linear difference equations, pulse response, Z-transforms, Theorems of Z Transforms, the inverse Z-transforms, and Modified Z- Transforms.

Z-PLANE ANALYSIS OF DISCRETE-TIME CONTROL SYSTEM: Z-Transform method for solving difference equations; Pulse transforms function, block diagram analysis of sampled — data systems, mapping between s-plane and z-plane: Primary strips and Complementary Strips.

UNIT - II

STATE SPACE ANALYSIS: State Space Representation of discrete time systems, Pulse Transfer Function Matrix solving discrete time state space equations, State transition matrix and it's Properties, Methods for Computation of State Transition Matrix, Discretization of continuous time state-space equations.

CONTROLLABILITY AND OBSERVABILITY: Concepts of Controllability and Observability, Tests for controllability and Observability. Duality between Controllability and Observability, Controllability and Observability conditions for Pulse Transfer Function.

UNIT-III

STABILITY ANALYSIS: Stability Analysis of closed loop systems in the Z-Plane.Jury's stability test- Stability Analysis by use of the Bilinear Transformation and Routh Stability criterion. Stability analysis using Liapunov theorems.

UNIT-IV

DESIGN OF DISCRETE TIME CONTROL SYSTEM BY CONVENTIONAL METHODS: Design of digital control based on the frequency response method-Bilinear Transformation and Design procedure in the w-plane. Lead, Lag and Lead-Lag compensators and digital PID controllers. Design digital control through deadbeat response method.

UNIT-V

STATE FEEDBACK CONTROLLERS AND OBSERVERS: Design of state feedback controller through pole placement - Necessary and sufficient conditions, Ackerman's formula. State Observers-Full order and Reduced order observers.

TEACHING METHODOLOGIES

1. White board
2. PPTs
3. Seminars

TEXT BOOKS

I. Discrete-Time Control systems - K. Ogata, Pearson Education/PHI. 2nd Edition
2. Digital Control and State Variable Methods by M.Gopal, TMH

REFERENCE BOOKS

I. Digital Control Systems, Kuo, Oxford University Press, 2d Edition, 2003.
2. Digital Control Engineering, M.Gopal
3. Computerised Control Systems, K.J. Astrom.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

ELECTRIC SMART GRID
(Elective-III)

M.Tech (Power Systems) I Year - II Semester

Course Code: GR17D5067 L/P/C: 4/0/4

COURSE OBJECTIVES: The objective of this course is to provide

- Knowledge on smartgrid concepts and information on necessity of SCADA in power systems.
- The concepts of SCADA communication systems .
- Integration of smart devices for substation automation .
- Description of Energy management systems and framework.
- Exposure on Distribution automation and management systems.

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

- Apply the concepts of smart grid architecture , dynamic energy systems , energy port in real time applications
- Apply smart grid policies and programs to encourage end – use energy efficiency.
- Explore the SCADA communication systems.
- Get acquainted with the SCADA and smart grid protocols.
- Extend knowledge of substation automation functions and benefits of data warehousing.
- Interpret the load forecasting and transmission operations and management in real time applications.
- Integrate DMS framework and real time DMS applications.

UNIT-I

SCADA fundamentals: Introduction, Open system: Need and advantages, Building blocks of SCADA systems, Remote terminal unit (RTU),Intelligent electronic devices (IEDs),Data concentrators and merging units, SCADA communications systems, Master station, Human-machine interface(HMI),Building the SCADA systems, legacy, hybrid and new systems, Classification of SCADA systems.

UNIT-II

SCADA communication: Introduction, SCADA communication requirements, Smart grid communication infrastructure, SCADA communication topologies, SCADA data communication techniques, Data communication, SCADA communication protocol architecture, Evolution of SCADA communication protocols, SCADA and smart grid protocols, Media for SCADA and smart grid communication, Guided media, Unguided (wireless) media, Communication media, Security for SCADA and smart grid communication, Challenges for SCADA and smart grid communication.

UNIT-III

Substation automation(SA): Conventional substations: Island of automation, New smart devices for substation automation, The new integrated digital substation, Substation automation: Technical issues, The new digital substation, Substation automation architectures, New versus existing substations, Substation automation(SA) application functions, Data analysis benefits of data warehousing.

UNIT-IV

Energy management systems(EMS) for control centers: Introduction, operating states of the power systems and sources of grid vulnerability, Energy control centers, EMS frame work, Data acquisition and communication(SCADA systems), Generation operation and management, Transmission operations and management: Real time, Study-mode simulations, Post-event analysis and energy scheduling and accounting, Dispatcher training simulator, Smart transmission, EMS with WAMS, Future trends in EMS and DMS with WAMS, Case studies in EMS and WAMS.

UNIT-V

Smart grid concepts: Introduction, Smart grid definition and development, old grid versus new grid, Stakeholders in smart grid development, Smart grid solutions, Smart distributions, Smart transmission.

TEACHING METHODOLOGIES

1. White board
2. PPTs
3. Seminars

TEXT BOOKS

1. Mini S.Thomas, John D. Mc Donald, " Power System SCADA and Smart Grids", CRC Press, Taylor & Francis Group.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

MICROCONTROLLERS
(Elective-IV)

M.Tech (Power Systems) I Year - II Semester

Course Code: GR17D5048 L/P/C: 4/0/4

COURSE OBJECTIVES: The objective of this course is to provide

- Fundamental concepts of Micro Controllers and their architecture.
- Efficient programs in assembly Level language of the 8051family of Microcontrollers.
- Techniques of interfacing between processors and peripheral devices so that they them selves can design and develop a complete Microcontroller based system.
- Solid foundation on interfacing the external devices to the microcontroller according to the user requirements to create novel products and solutions for the real time problems.
- Applications involving Microcontrollers.

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

- Express architecture of Micro Controllers
- Program a microcontroller system in assembly code and C.
- Understand Serial Data Transfer Technique
- Build and test a microcontroller based system.
- Interface the system to A/D and D/A converters.
- Interface the system to switches,keypads,and displays.
- Use 8051 timers and interrupts.

UNIT-I

Introduction and 8051 Architecture: Introduction to micro controllers, comparing micro processors and micro controllers, 4,8,16 and 32 bit micro controllers, Development systems for Micro controllers, Architecture; Architecture of 8051, pin configuration of 8051 micro controller, hardware input pins, output pins ports and external memory, counters and timers, serial data input and output and interrupts.

UNIT-II

Moving Data and Logical Operations: Introduction, Addressing modes, External Data moves, Code Memory Read-only Data Moves, PUSH and POP Op codes, Data Exchanges, Logical Operations; Byte-Level Logical Operations, Bit- Level Logical Operations, Rotate and Swap Operations.

UNIT-III

Arithmetic Operations, Jump and Call Op codes: Introduction, Flags, Incrementing and Decrementing, Addition, Subtraction, Multiplication and Division, Decimal Arithmetic, Jump and

Call op codes; The jump and call program range, Jumps, Calls and Subroutines, call and returns, Interrupts and Returns.

UNIT-IV

8051 Microcontroller Design: Introduction, micro controller specification, micro controller Design, Testing the Design, Timing sub routines, Lookup Tables for the 8051, Serial Data Transmission.

UNIT-V

Applications and Serial Data Communication: Introduction, Key boards, Displays, Pulse Measurement, D/A and A/D Conversions, Multiple Interrupts, Serial data Communication; Network Configurations, 8051 Data Communication Modes.

TEACHING METHODOLOGIES

1. White board
2. PPTs
3. Seminars

TEXT BOOKS

1. "The Intel Microprocessors" Architecture Programming &Interfacing by Barry b Brey.
2. Advanceed Microprocessors by kenrith J Ayala, Thomson publishers.
3. Microcontrollers by kentrith J ayala, Thomson publishers.

REFERENCE BOOKS

1. Microprocessors & Interfacing Programming & Hard ware by DOUGLASV.Hall
2. Microprocessors & Microcontrollers by Prof. C.R.Sarma

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

PROGRAMMABLE LOGIC CONTROLLERS
(Elective-IV)

M.Tech (Power Systems) I Year - II Semester

Course Code: GR17D5055 L/P/C: 4/0/4

COURSE OBJECTIVES: The objective of this course is to provide

- Knowledge on different PLCs and their usage in control of drives.
- Knowledge on PLC architecture
- Implementation of ladder diagrams for practical applications.
- Analysis of analog devices used in PLC operations.
- Knowledge on interfacing PLC with HMI

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

- Perform different types of PLC programming schemes.
- Implement ladder diagrams for process control.
- Control the robots using PLC.
- Tune the PLC for different applications.
- Analyse the PLC internal architecture.
- Extend knowledge of PLC in analog operations.
- Interface PLC with other technologies like HMI, SCADA.

UNIT- I

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

PLC PROGRAMMING: PLC Programming input instructions, outputs, operational procedures, programming examples using contacts and coils. Drill press operation.
Digital logic gates programming in the Boolean algebra system, conversion examples Ladder diagrams for process control Ladder diagrams and sequence listings, ladder diagram construction and flow chart for spray process system.

UNIT -III

PLC REGISTERS: Characteristics of Registers module addressing holding registers input registers, output registers PLC Functions Timer functions and industrial applications counters counter function industrial applications. Architecture functions, Number comparison functions, number conversion functions.

UNIT -IV

DATA HANDLING FUNCTIONS: SKIP, Master control Relay Jump Move FIFO, FAL, ONS, CLR and Sweep functions and their applications.

Bit Pattern and changing a bit shift register, sequence functions and applications, controlling of two axis and three axis Robots with PLC, Matrix functions.

UNIT-V

ANALOG PLC OPERATION: Analog modules and systems Analog signal processing multi bit data processing, analog output application examples. PID principles position indicator with PID control, PID modules, PID tuning, PID functions.

TEACHING METHODOLOGIES

1. White board
2. PPTs
3. Seminars

TEXT BOOKS:

1. Programmable Logic Controllers — Principle and Applications by John W Webb and Ronald A Reiss Filth edition, PHI
2. Programmable Logic Controllers — Programming Method and Applications by JR Hackworth and ED Hackworth — Jr- Pearson, 2004.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

REACTIVE POWER COMPENSATION AND MANAGEMENT (Elective-IV)

M.Tech (Power Systems) — I Year - II Semester
Course Code: GR17D5056 — L/P/C: 4/0/4

COURSE OBJECTIVES: The objective of this course is to provide

- A deep insight in load compensation with respect to their characteristics.
- Analysis of steady state and transient state reactive power compensation in transmission system.
- Knowledge on reactive power coordination.
- Knowledge on demand side and distribution side reactive power management .
- Information on typical layout of traction systems.

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

- Define the advances in power compensation.
- Evaluate the design and control of different types of compensation
- Articulate User side reactive power management
- Articulate steady state and transient state reactive power compensation.
- Techniques for analyzing of reactive power management
- Evaluate reactive power control requirements
- Evaluate the design and Typical layout of traction systems

UNIT-I

LOAD COMPENSATION: Objectives and specifications – reactive power characteristics – inductive and capacitive approximate biasing – Load compensator as a voltage regulator – phase balancing and power factor correction of unsymmetrical loads- examples.

UNIT-II

STEADY – STATE REACTIVE POWER COMPENSATION IN TRANSMISSION SYSTEM: Uncompensated line – types of compensation – Passive shunt and series and dynamic shunt compensation –examples

TRANSIENT STATE REACTIVE POWER COMPENSATION IN TRANSMISSION SYSTEMS: Characteristic time periods – passive shunt compensation – static compensations- series capacitor compensation –compensation using synchronous condensers – examples.

UNIT-III

REACTIVE POWER COORDINATION: Objective – Mathematical modeling – Operation planning – transmission benefits – Basic concepts of quality of power supply – disturbances- steady – state variations – effects of under voltages – frequency –Harmonics, radio frequency and electromagnetic interferences.

UNIT-IV

DEMAND SIDE MANAGEMENT: Load patterns – basic methods load shaping – power tariffs-KVAR based tariffs penalties for voltage flickers and Harmonic voltage levels

DISTRIBUTION SIDE REACTIVE POWER MANAGEMENT: System losses –loss reduction methods – examples – Reactive power planning – objectives – Economics Planning capacitor placement – retrofitting of capacitor banks

UNIT-V

USER SIDE REACTIVE POWER MANAGEMENT: KVAR requirements for domestic appliances – Purpose of using capacitors – selection of capacitors – deciding factors – types of available capacitor, characteristics and Limitations

REACTIVE POWER MANAGEMENT IN ELECTRIC TRACTION SYSTEMS AND ARE FURNACES: Typical layout of traction systems – reactive power control requirements – distribution transformers- Electric arc furnaces – basic operations- furnaces transformer –filter requirements – remedial measures –power factor of an arc furnace

TEACHING METHODOLOGIES

1. White board
2. PPTs
3. Seminars

TEXT BOOKS

1. Reactive power control in Electric power systems by T.J.E.Miller, John Wiley and sons, 1982 (Units I to IV)
2. Reactive power Management by D.M.Tagare,Tata McGraw Hill,2004.(Units V toVIII)

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

POWER SYSTEMS LAB

M.Tech (Power Systems) I Year - II Semester

Course Code: GR17D5071 L/P/C: 0/4/2

COURSE OBJECTIVES : The objective of this course is to provide

- knowledge in the area of power systems hardware.
- Analysis of characteristics of various relays.
- analysis various types of faults and its protection.
- knowledge of various power factor correction systems.
- knowledge on the concepts of arc flash, load flow, short circuit, transient stability, relay coordination.
- knowledge on Power Management System Software in Real-Time applications.

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

- Know the power systems hardware.
- Analyse the characteristics of various relays.
- Design and analyse the transmission line.
- Analyse various types of faults and its protection.
- Implement various power factor correction systems.
- Perform load flows,short circuit analysis for power generation, transmission and distribution networks.
- Integrate software for applications that provides intelligent power monitoring, energy management, system optimization, advanced automation, and real-time prediction.

Content

1. Tripping Characteristics of an MCB of 1Ampere rating
2. Tripping sequence of protective devices
3. Tripping characteristics of protective devices
4. Testing of Instantaneous Over Current relay
   a) Phase Faults b) Earth Faults
5. Testing of differential relay
6. Testing of Negative sequence Relay
7. Model of a Transmission Line with Lumped Parameters
8. Characteristics of Bimetallic Thermal Over Load relays
9. a) Testing of Over Voltage Relay b)Testing of Under Voltage Relay
10. Current time Characteristics of Induction Disc type relay
11. Short circuit Analysis
12. Protection of Motor, transformer and bus
13. Protection of generator in parallel configuration

14. Transient Analysis

OPEN ELECTIVE - II

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

HUMAN COMPUTER INTERACTION
(Open Elective-II)

M.Tech (CSE) I Year - II Semester

Course Code: GR17D5184 L/P/C: 4/0/4

COURSE OBJECTIVES: Students undergoing the course are expected to:

- Demonstrate an understanding of guidelines, principles, and theories influencing human computer interaction.
- Recognize how a computer system may be modified to include human diversity.
- Select an effective style for a specific application.
- Design mock ups and carry out user and expert evaluation of interfaces.
- Carry out the steps of experimental design, usability and experimental testing, and
- Evaluation of human computer interaction systems.
- Use the information sources available, and be aware of the methodologies and technologies supporting advances in HCI.

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

- Describe what interaction design is and how it relates to human computer interaction and other fields.
- Describe the social mechanisms that are used by people to communicate and collaborate.
- Describe how technologies can be designed to change people's attitudes and behavior.
- Discuss how to plan and run a successful data gathering program.
- Discuss the difference between qualitative and quantitative data and analysis.
- Discuss the conceptual, practical, and ethical issues involved in evaluation.
- Describe how to perform two types of predictive techniques, GOMS and Fitts Law, and when to use them.

UNIT-I

Introduction: Importance of user Interface –definition, importance of good design. Benefits of good design. A brief history of Screen design. The graphical user interface –popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics-Principles of user interface.

UNIT-II

Design process: Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, Understanding business junctions.

UNIT-III

Screen Designing: Design goals –Screen planning and purpose, organizing screen elements, ordering of screen data and content –screen navigation and flow –Visually pleasing composition

–amount of information –focus and emphasis –presentation information simply and meaningfully –information retrieval on web –statistical graphics –Technological consideration in interface design.

UNIT-IV

Develop System Menus and Navigation Schemes-Select the proper kinds of Windows, -Select the proper Device based Controls, Choose the proper screen based controls.

UNIT-V

Mobile Ecosystem: Platforms, Application frameworks- Types of Mobile Applications: Widgets, Applications, Games- Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools.

Interaction Devices – Keyboard and Function Keys – Pointing Devices – Speech Recognition Digitization and Generation – Image and Video Display – Drivers.

TEXT BOOKS

1. The essential guide to user interface design, Wilbert O Galitz, Wiley Dreamtech.
2. Designing the user interface. 3rd Edition Ben Shneidermann, Pearson Education Asia
3. Brian Fling, “Mobile Design and Development”, First Edition, Reilly Media Inc., 2009

REFERENCE BOOKS

1. Human – Computer Interaction. Alan Dix, Janet Fincay, GreGoryd, Abowd, Russell Bealg, Pearson Education
2. Interaction Design Prece, Rogers, Sharps. Wiley Dreamtech.
3. User Interface Design, Soren Lauesen, Pearson Education.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

BIG DATA ANALYTICS
(Open Elective-II)

M.Tech (IT) I Year - II Semester

Course Code: GR17D5185 L/P/C: 4/0/4

COURSE OBJECTIVES: The objective of the course is to provide the student:

- Understanding about big data for business intelligence
- Learning business case studies for big data analytics
- Learning about the cloud and big data
- Knowledge about risk management involved in big data
- Understandingnosql big data management
- Understanding about map reduce work flows.
- Capability to Perform map-reduce analytics using Hadoop and related tools

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

- Understand the importance of big data
- Understand challenges with big data
- Knowledge about the technological developments in big data environment
- Understanding about map reduce work flows
- Knowledge about nosql data environment.
- Analysis with Hadoop and related tools
- Capability of understanding the usage of big data in context to cloud and other technologies.

UNIT-I

INTRODUCTION TO BIG DATA What is big data, why big data, convergence of key trends , unstructured data ,industry examples of big data ,web analytics, big data and marketing, fraud and big data ,risk and big data ,credit risk management, big data in medicine, introduction to Hadoop open source technologies , cloud and big data

UNIT-II

UNDERSTANDING BIG DATA Types of digital data, characteristics of data, challenges with big data, definition of big data, big data analytics,data science, technologies in big data environments, CAP theorem.

UNIT-III

NOSQL DATA MANAGEMENT Introduction to NoSQL, aggregate data models, aggregates, key-value and document data Models, relationships, graph databases , schemaless databases ,materialized views, distribution models, sharding ,master-slave replication, peer-peer replication, sharing and replication

UNIT-IV

BASICS OF HADOOP Data format ,features of Hadoop, analyzing data with Hadoop , design of Hadoop distributed file system (HDFS) ,HDFS concepts, scaling out ,Hadoop streaming , Hadoop pipes, Hadoop related tools

UNIT- V

MAPREDUCE APPLICATIONS MapReduce workflows, unit tests with MRUnit , test data and local tests, anatomy of MapReduce job run ,classic Map-reduce, YARN ,failures in classic Map-reduce and YARN , job scheduling , shuffle and sort ,task execution, MapReduce types ,input formats, output formats

TEXT BOOKS

1. Seema Acharya,S.Chellappan,"Big Data and Analytics",Wiley,2014

REFERENCE BOOK

1. Michael Minelli, Michelle Chambers, and AmbigaDhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013.
2. P. J. Sadalage and M. Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence", Addison-Wesley Professional, 2012.
3. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilley, 2012.
4. Eric Sammer, "Hadoop Operations", O'Reilley, 2012.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

NEURAL AND FUZZY SYSTEMS
(Open Elective-II)

M.Tech (EEE) I Year - II Semester

Course Code: GR17D5186 L/P/C: 4/0/4

PRE–REQUISITE: Control Systems, Power Systems, Mathematics, Physics.

COURSE OBJECTIVES: The objective of this course is to provide

- The concepts of learning methods.
- Knowledge on the artificial neural networks and their architecture.
- Applications of artificial neural networks.
- The concepts of the fuzzy logic control and their real time applications.
- Design concepts of associative memories.

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

- Define the advances in neural networks
- Evaluate the design and control of fuzzy systems.
- Articulate the applications of fuzzy control block sets.
- Evaluate the design of various models in neural networks
- Analyze the techniques of various types of neural networks
- Evaluate the design and control of associative memories
- Design fuzzy logic system.

UNIT-I

Introduction to Neural Networks: Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Hodgkin-Huxley Neuron Model, Integrate-and- Fire Neuron Model, Spiking Neuron Model, Characteristics of ANN, McCulloch-Pitts Model, Historical Developments, Potential Applications of ANN.

UNIT-II

Essentials of Artificial Neural Networks: Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN – Connectivity, Neural Dynamics (Activation and Synaptic), Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules, Types of Application

Feed Forward Neural Networks

Introduction, Perceptron Models: Discrete, Continuous and Multi-Category, Training Algorithms: Discrete and Continuous Perceptron Networks, Perceptron Convergence theorem, Limitations of the Perceptron Model, Applications.

UNIT-III

Multilayer Feed forward Neural Networks

Credit Assignment Problem, Generalized Delta Rule, Derivation of Backpropagation (BP) Training, Summary of Backpropagation Algorithm, Kolmogorov Theorem, Learning Difficulties and Improvements.

Associative Memories

Paradigms of Associative Memory, Pattern Mathematics, Hebbian Learning, General Concepts of Associative Memory (Associative Matrix, Association Rules, Hamming Distance, The Linear Associator, Matrix Memories, Content Addressable Memory), Bidirectional Associative Memory (BAM) Architecture, BAM Training Algorithms: Storage and Recall Algorithm, BAM Energy Function, Proof of BAM Stability Theorem Architecture of Hopfield Network: Discrete and Continuous versions, Storage and Recall Algorithm, Stability Analysis, Capacity of the Hopfield Network.

UNIT-IV

Self-Organizing Maps (SOM) and Adaptive Resonance Theory (ART)

Introduction, Competitive Learning, Vector Quantization, Self-Organized Learning Networks, Kohonen Networks, Training Algorithms, Linear Vector Quantization, Stability-Plasticity Dilemma, Feed forward competition, Feedback Competition.

UNIT-V

Classical and Fuzzy Sets and Fuzzy Logic System Components

Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions. Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods.

Applications Neural network applications: Process identification, Function Approximation, control and Process Monitoring, fault diagnosis and load forecasting.

Fuzzy logic applications: Fuzzy logic control and Fuzzy classification.

TEACHING METHODOLOGIES

1. White board
2. PPTs
3. Seminars

TEXT BOOK

1. Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications by Rajasekharan and G.A.VijayalakshmiPai – PHI Publication.

REFERENCE BOOKS

1. Introduction to Artificial Neural Systems - Jacek M. Zuarda, Jaico Publishing House, 1997.
2. Neural Engineering by C.Eliasmith and CH.Anderson, PHI
3. Neural Networks and Fuzzy Logic System by Bork Kosko, PHI Publications

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

PROJECT MANAGEMENT

M.Tech (Civil) I Year - II Semester
Course Code: GR17D5187 L/P/C: 4/0/4

COURSE OBJECTIVES: On completion of this Subject/Course, following objectives shall get accomplished

- To provide students about the basics of Management in general and Project Management in particular.
- To train the students about the Monitoring of Projects.
- To make understand the students about the Planning of projects.
- To make understand the students about the Scheduling of projects.
- To train the students about the drawing of CPM & PERT Networks.
- To train the students about teaching of Project Management to UG & PG students
- To motivate the students about the Research Development activities of Project Management which results in timely completion of projects without time and cost over runs.

Course outcomes: On completion of this Subject/Course the student shall be able to

- Perform the Project Management functions effectively.
- Plan the projects.
- Schedule the various activities of Projects.
- Monitor the actual progress with planned progress.
- Draw the CPM & PERT Networks/
- Handle Resources planning including levelling & smoothing.
- Interpret the Indian Contract Act and understand the litigations involved for better Contract Management.

UNIT- I

PROJECT PLANNING: Prime Objectives of Project Management, Main Functions of Project Management, Planning, Principles of Planning, Objectives of Planning, Steps involved in Planning, Stages of Planning, Advantages & limitations of Planning, Failures of Projects & Construction Projects.

UNIT-II

PROJECT SCHEDULING: Scheduling, Project/Construction Schedules, Steps involved in Scheduling, Methods of Scheduling, Bar Charts, Steps involved in Bar Charts, Limitations of Bar Charts, Milestone Charts and Limitations of Milestone Charts.

UNIT-III

PROJECT MONITORING: Network Techniques, Prime Objectives of Networks, Network Terminology, Types of Networks, CPM & PERT, Differences between CPM & PERT, Rules to draw the Network, Drawing of Networks, Advantages of Network , Critical Path, Float and its Types, Slack and Types of Slack.

UNIT-IV

PROJECT COST CONTROL: Direct Costs, Indirect Costs, Total Project Cost, Optimisation of Cost and Steps involved, Resources, Resources Smoothing and Resources Levelling, Crashing of Activities, Time and Cost Over runs of Project.

UNIT-V

PROJECT QUALITY & CONTRACTS:

Quality, Quality Control, Quality Assurance, Project Quality Plans in Construction Projects, Inspection & Test Plans, Method Statements, ISO Certification; Project Contracts, Contract Law, Types of Contracts and Indian Contract Act.

TEXT BOOKS

1. Project Planning and Control with PERT & CPM – BC Punmia, KK Khandielwala.
2. Project Scheduling & Monitoring in Practice – S Chowdhury

REFERENCE BOOKS

1. Project Management Handbook – Lock, Gower
2. Project Management – NJ Smith- Blackwell Publication.

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

HARDWARE - SOFTWARE CO-DESIGN
(Open Elective-II)

M.Tech (ECE) I Year - II Semester

Course Code: GR17D5188 L/P/C: 4/0/4

Course Objectives

- Describe an embedded system design flow from specification to physical realization
- Describe structural behavior of systems.
- Master complex systems.
- Devise new theories, techniques, and tools in design, implementation and testing.
- Master contemporary development techniques.

Course Outcomes: After going through this course the student will be able to

- Gain knowledge of contemporary issues and algorithms used.
- Know the interfacing components, different verification techniques and tools.
- Demonstrate practical skills in the construction of prototypes.
- Understand the use of modern hardware and software tools for building prototypes of embedded systems.
- Apply embedded software techniques to satisfy functional and response time requirements.
- Apply verification tools.
- Understand design representation for system level synthesis.

UNIT-I:

Co- Design Issues: Co- Design Models, Architectures, Languages, A Generic Co-design Methodology.

Co- Synthesis Algorithms:

Hardware software synthesis algorithms: hardware – software partitioning distributed system cosynthesis.

UNIT –II:

Prototyping and Emulation: Prototyping and emulation techniques, prototyping and emulation environments, future developments in emulation and prototyping architecture specialization techniques, system communication infrastructure

Target Architectures: Architecture Specialization techniques, System Communication infrastructure, Target Architecture and Application System classes, Architecture for control dominated systems (8051-Architectures for High performance control), Architecture for Data dominated systems (ADSP21060, TMS320C60), Mixed Systems.

UNIT-III

Compilation Techniques and Tools for Embedded Processor Architectures: Modern embedded architectures, embedded software development needs, compilation technologies, practical consideration in a compiler development environment.

UNIT-IV

Design Specification and Verification: Design, co-design, the co-design computational model, concurrency coordinating concurrent computations, interfacing components, design verification, implementation verification, verification tools, interface verification

UNIT-V

Languages for System – Level Specification and Design-I: System – level specification, design representation for system level synthesis, system level specification languages,

Languages for System – Level Specification and Design-II:

Heterogeneous specifications and multi language co-simulation, the cosyma system and lycos system.

TEXT BOOKS

1. Hardware / Software Co- Design Principles and Practice – Jorgen Staunstrup, Wayne Wolf –2009, Springer.
2. Hardware / Software Co- Design - Giovanni De Micheli, Mariagiovanna Sami, 2002, Kluwer Academic Publishers

REFERENCE BOOKS

1. A Practical Introduction to Hardware/Software Co-design -Patrick R. Schaumont - 2010 –Springer

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

NON CONVENTIONALENERGYRESOURCES

(Course Objectives)

M.Tech (ME) I Year - II Semester
Course Code: GR17D5189

Course Objectives: The Objective of this course is to provide the student to

- Interduce the need of the non-convectional energy sources.
- Impart the role of non-convectional energy for the environment.
- Identify the energy resources utilization systems.
- Recognise the source and potential of wind energy and understand the classifications of wind mills.
- Summarize the principles of bio-conversion, ocean energy and geo thermal energy.

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

- Choose the appropriate renewable energy as an alternate for conventional power in any application.
- Analyze the environmental and cost economics of using renewable energy sources compared to fossil fuels.
- Apply the principles of various energy systems in day to day life.
- Analyze the industrial needs and convert theoretical model to practical circuits with wide range of specifications.
- Evaluate the importance of the renewable resources of energy as the fossil fuels are depleting in the world very fast express about clean and green energy for next generation.
- Analyse large scale demand of heat energy for meeting day to day domestic, institutional and industrial requirements can be met by utilizing solar thermal systems, biogas, PV cells, wind energy, Geothermal, MHD etc.
- Design the various techniques and models fabricated in utilizing the above said sources of energy.

UNIT-I

Introduction: Various non-conven tionalenergy resources-Introduction, availability, classification, relative merits and demerits.
Solar Cells: Theory of solarcells. solarcell materials, solarcellarray, solar callower plant, limitations.

UNIT-II

Solar Thermal Energy: Solar radiation, floatplane collectors and their materials, applications and performance, focusing of collectors and their materials, applications and performance; solar thermal power plants, thermal energy storage for solar heating and cooling, limitations.

UNIT-III

Geothermal Energy: Resources of geothermal energy, thermodynamics of geo-thermal energy conversion-electricalconversion, non-electricalconversion,environmentalconsiderations.
Magneto-hydrodynamics (MHD):
Principle of working of MHD Power plant, performance and limitations

FuelCells:

Principle of working of various type souffle cell sand their working, performance and limitations.

UNIT-IV

Thermos and the rmionic Conversions:
Principle of working, performance and limitations.
Wind Energy: Wind power and it surcease, sites election, criterion, momentum theory, classification of rotors, concentrations and augments, wind characteristics. Performance and limitation sofenergy conversion systems.

UNIT-V

Bio-mass: Availability of bio-massand its conversion theory.
Ocean Thermal Energy Conversion (OTEC):
Availability, theory and working principle, per formance and limitations.
Wave and Tida lWave:
Principle of working, performance and limitations.Waste RecyclingPlants.

TEXT/REFERENCESBOOKS

1. John Twideu and TonyWeir, “Renewal Energy Resources” BSP Publications, 2006.
2. M.V.R.KoteswaraRao, “Energy Resources: Conventional&Non-Conventional “ BSPPublications,2006.
3. D.S.Chauhan, ”Non-conventional Energy Resources” New Age International.
4. C.S. Solanki, “Renewal Energy Technologies: A Practical Guidefor Beginners” PHILearning.