Academic Regulations
Programme Structure
&
Detailed Syllabus

Bachelor of Technology
(B. Tech)
(Four Year Regular Programme)
(Applicable for Batches admitted from 2020)

Electrical and Electronics Engineering

Department of Electrical and Electronics Engineering
GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING & TECHNOLOGY
Bachupally, Kukatpally, Hyderabad, Telangana, India
500 090

ACADEMIC REGULATIONS

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY, HYDERABAD

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

PROGRAMME BACHELOR OF TECHNOLOGY IN ELECTRICAL AND ELECTRONICS ENGINEERING

GR20 REGULATIONS

Gokaraju Rangaraju Institute of Engineering and Technology 2020 Regulations (GR20 Regulations) are given here under. These regulations govern the programmes offered by the Department of Electrical and Electronics Engineering with effect from the students admitted to the programmes in 2020- 21 academic year.

1. **Programme Offered:** The programme offered by the Department is B. Tech in Electrical and Electronics Engineering, a four-year regular programme.

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

3. **Admissions:** Admission to the B. Tech in Electrical and Electronics Engineering Programme shall be made subject to the eligibility, qualifications and specialization prescribed by the State Government/University from time to time. Admissions shall be made either on the basis ofthe merit rank obtained by the student in the common entrance examination conducted by the Government/University or on the basis of any other order of merit approved by the Government/University, subject to reservations as prescribed by the Government/University from time to time.

4. **Programme Pattern:**

   a) Each Academic year of study is divided in to two semesters.
   b) Minimum number of instruction days in each semester is 90.
   c) 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).
   d) The total credits for the Programme is160.
   e) Student is introduced to "Choice Based Credit System (CBCS)".
   f) A student has a choice to register for all courses in a semester / one less or one additional course from other semesters provided the student satisfies prerequisites.
   g) All the registered credits will be considered for the calculation of final CGPA.
   h) Each semester has - 'Continuous Internal Evaluation (CIE)' and 'Semester End Examination (SEE)'. Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) as indicated by UGCand course structure as suggested by AICTE are followed.
   i) **Subject / Course Classification:** All subjects/ courses offered for the under graduateprogramme in E & T (B.Tech. degree programmes) are broadly classified as follows.

S. No.	Broad Course Classification	Course Group/ Category	CourseDescription
1	BS	Basic Science Courses	Basic Science Courses
2	ES	Engineering Science Courses	Includes Engineering subjects
3	HS	Humanities and Social sciences	Includes Management courses
4	PC	Professional Core Courses	Includes core subjects related to the parent discipline/department/ branch of Engineering
5	PE	Professional Elective Courses	Includes elective subjects related to the parent discipline/ department/ branch of Engineering
6	OE	Open Elective Courses	Electives from other technical and/or emerging subjects
7	LC	Laboratory Courses	Laboratory Courses
8	MC	Mandatory Courses	Environmental Sciences, Induction training, Indian Constitution, Essence of Indian Traditional Knowledge
9	PW	Project Work	Project work, seminar and internship in industry or elsewhere

5. **Award of B. Tech Degree:** A student will be declared eligible for the award of B. Tech Degree if he/she fulfills the following academic requirements:

a) He/She pursues the course of study and completes it successfully in not less than four academic years and not more than eight academic years.

b) A student has to register for all the 160 credits and secure all credits.

c) A student, who fails to fulfill all the academic requirements for the award of the degree within eight academic years from the date of admission, shall forfeit his/her seat in B. Tech course.

d) The Degree of B. Tech in Computer Science and Engineering 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) Shortage of Attendance more than 10% (attendance less than 65% in aggregate) shall in no case becondoned.

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 reregistration for that semester when offered next with the academic regulations of the batch into which he/she getsre-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 from time to time.

b) Distribution and Weightage of marks

S. No	Components	Internal	External	Total
1	Theory	30	70	100
2	Practical	30	70	100
3	Engineering Graphics	30	70	100
4	Mini Project	30	70	100
5	Project Work	30	70	100

c) Continuous Internal Evaluation and Semester End Examinations: The assessment of the student's performance in each course will be based on Continuous Internal Evaluation (CIE) and Semester-End Examination (SEE). The marks for each of the component of assessment are fixed as shown in the following Table.

Assessment Procedure:

S. No	Component of Assessment	Marks Allotted	Type of Assessment	Scheme of Examinations
1	Theory	30	Internal Examination & Continuous Evaluation	1) Two mid semester examination shall be conducted for 20 markseach for a durationof2 hours. Average of the two mid exams shall be considered **i) Subjective - 15marks** **ii) Objective - 5marks** **2) Tutorials - 5marks** **3) Continuous Assessment– 5 marks**
		70	Semester end examination	The semester-end examination is for a duration of 3 hours
2	Practical	30	Internal Examination & Continuous Evaluation	**i) Internal Exam-10marks** **ii) Record - 5marks** **iii) ContinuousAssessment - 15 marks**
		70	Semester end examination	The semester-end examination is for a duration of 3 hours

d) Mini Project with Seminar: The Mini Project is to be taken up with relevance to Industry and is evaluated for 100 marks. Out of 100 marks, 30 marks are for internal evaluation and 70 marks are for external evaluation. The supervisor continuously assesses the students for 20 marks (Continuous Assessment – 15 marks, Report – 5 marks). At the end of the semester, Mini Project shall be displayed in the road show at the department level for the benefit of all students and staff and the same is to be evaluated by Mini Project Review Committee for 10 marks. The mini project report shall be presented before Project Review Committee in the presence of External Examiner and the same is evaluated for 70 marks. Mini Project Review Committee consists of HOD, Mini Project Coordinator and Supervisor. Plagiarism check is compulsory for mini project report as per the plagiarism policy of GRIET.

e) Summer Internship: Summer Internship shall be done by the student in the summer break after III B. Tech II Semester and shall be evaluated in IV B. Tech I Semester along with the Project Work (Phase I).

f) Project Work (Phase–I and Phase-II): The project work is evaluated for 100 marks. Out of 100, 30 marks shall be for internal evaluation and 70 marks for the external evaluation. The supervisor assesses the student for 20 marks (Continuous Assessment – 15 marks, Report –5 marks). At the end of the semester, projects shall be displayed in the road show at the department level for the benefit of all students and staff and the same is to be evaluated by the Project Review Committee for 10 marks.

The external evaluation for Project Work is a Viva-Voce Examination which is conducted by the Project Review Committee in the presence of external examiner and is evaluated for 70 marks, Project Review Committee consists of HOD, Project Coordinator and Supervisor. These rules are applicable for both Phase I and PhaseII.

Plagiarism check is compulsory for project work report (Phase I and PhaseII) as per the plagiarism policy of GRIET.

g) EngineeringGraphics:

- Two internal examinations, each is of 10 marks. The average of the two internal tests shall be considered for the award ofmarks.
- Submission of day to day work - 15marks.
- Continuous Assessment - 5marks.

8. **Recounting of Marks in the End Examination Answer Books:** A student can request for recounting 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 to secure the required creditscan appear for a supplementary examination, as per the schedule announced by the College.

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

12. **Academic Requirements and PromotionRules:**

a) A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory or laboratories if he/she secures not less than 35%of marks in the Semester-end Examination and a minimum of 40% of the sum totalof the Internal Evaluation and Semester-end Examination taken together.

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

	Promotion	Conditions to be fulfilled
1	First year first semester to first year second semester	Regular course of study of first year first semester.
2	First year second semester to second year first semester	(i) Regular course of study of first year secondsemester. (ii) Must have secured at least 50% credits up to first year second semester from all the relevant regular and supplementary examinations, whether thestudent takes those examinations or not.
3	Second year first semester to second year second semester	Regular course of study of second year first semester.
4	Second year second semester to third year first semester	(i) Regular course of study of second year secondsemester (ii) Must have secured at least 60% credits up to second year second semester from all the relevant regular and supplementary examinations, whether thestudent takes those examinations or not.
5	Third year first semester to third year second semester	Regular course of study of third year first semester.
6	Third year second semester to fourth year first semester	(i) Regular course of study of third yearsecond semester. (ii) Must have secured at least 60% credits up to third year second semester fromall the relevant regular and supplementary examinations, whether the student takes those examinations ornot.
7	Fourth year first semester to fourth year second semester	Regular course of study of fourth year first semester.

13. Grade Points: A 10 - point grading system with corresponding letter gradesand percentage of marks, as given below, is followed

Letter Grade	Grade Point	Percentage of marks
O (Outstanding)	10	Marks >= 90
A+ (Excellent)	9	Marks >= 80 and Marks < 90
A (Very Good)	8	Marks >= 70 and Marks < 80
B+ (Good)	7	Marks >= 60 and Marks < 70
B (Average)	6	Marks >= 50 and Marks < 60
C (Pass)	5	Marks >= 40 and Marks < 50
F (Fail)	0	Marks < 40
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) S_k the SGPA of k^{th} semester(1 to 8) is the ratio of sum of the product of the number of credits and grade points to the total credits of all courses registered by a student, i.e.,

$$\text{SGPA } (S_k) = \sum_{i=1}^{n} (C_i * G_i) \,/\, \sum_{i=1}^{n} C_i$$

Where C_i is the number of credits of the i^{th} course and G_i is the grade point scored by the student in the i^{th} 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 student over all the semesters of a programme, i.e., upto and inclusive of S_k, where $k \geq 2$.

$$\text{CGPA} = \sum_{i=1}^{m} (C_i * G_i) \,/\, \sum_{i=1}^{m} C_i$$

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

14. Award of Class: After a student satisfies all the requirements prescribed for the completion of the Degree and becomes eligible for the award of B. Tech Degree by JNTUH, he/she shall be placed in one of the following four classes based on CGPA secured from the160 credits.

	Class Awarded	CGPA Secured
14.1	First Class With Distinction	CGPA >= 8.00 with no F or below grade/ detention anytime during the programme
14.2	First Class	CGPA >= 8.00 with rest of the clauses of 14.1 not satisfied
14.3	First Class	CGPA ≥ 6.50 and CGPA < 8.00
14.4	Second Class	CGPA ≥ 5.50 and CGPA < 6.50
14.5	Pass Class	CGPA ≥ 5.00 and CGPA < 5.50

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

16. **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.

17. **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/re-registration to the same or equivalent subjects as and when they are offered.

18. **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 isfinal.

c) In case of any error in the above rules and regulations, the decision of the Academic Council isfinal.

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 thecollege.

Academic Regulations for B.Tech (Lateral Entry) under GR20
(Applicable for Batches Admitted from 2021-2022)

1. All regulations as applicable for B.Tech Four year degree programme (Regular) will hold good for B.Tech (Lateral Entry Scheme) except for the following rules

a) Pursued programme of study for not less than three academic years and not more than six academic years.

b) A student should register for all 120 credits and secure all credits. The marks obtained in all 120 credits shall be considered for the calculation of the final CGPA.

c) Students who fail to fulfil all the academic requirements for the award of the degree within six academic years from the year of their admission, shall forfeit their seat in B.Techprogramme.

2. Academic Requirements and Promotion Rules:

a) A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory or laboratories if he/she secures not less than 35% of marks in the Semester-end Examination and a minimum of 40% of the sum totalof the Internal Evaluation and Semester-end Examination taken together.

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

S. No.	Promotion	Conditions to be fulfilled
1	Second year first semester to second year second semester.	Regular course of study of second year first semester.
2	Second year second semester to third year first semester.	(i) Regular course of study of second year second semester. (ii) Must have secured at least 50% credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations ornot.
3	Third year first semester to third year second semester.	Regular course of study of third year first semester.
4	Third year second semester to fourth year first semester.	(i) Regular course of study of third year second semester. (ii) Must have secured at least 60% credits up to third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.

5	**Fourth year first semester to fourth year second semester.**	**Regular course of study of fourth year first semester.**

3. **Award of Class:** After a student satisfies all the requirements prescribed for the completion of the Degree and becomes eligible for the award of B. Tech Degree by JNTUH, he/she shall be placed in one of the following four classes based on CGPA secured from the 120 credits.

	Class Awarded	CGPA Secured
3.1	**First Class With Distinction**	**CGPA >= 8.00 with no F or below grade/ detention anytime during the Programme**
3.2	**First Class**	**CGPA >= 8.00 with rest of the clauses of 3.1 not satisfied**
3.3	**First Class**	**CGPA ≥ 6.50 and CGPA < 8.00**
3.4	**Second Class**	**CGPA ≥ 5.50 and CGPA < 6.50**
3.5	**Pass Class**	**CGPA ≥ 5.00 and CGPA < 5.50**

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

Bachupally, Kukatpally, Hyderabad–500090, India.

(040)65864440

ELECTRCAL AND ELECTRONICS ENGINEERING
B. Tech (EEE) – GR20 Course Structure

I B. Tech (EEE) - I Semester

S.No	BOS	Group	Course Code	Course Name	Credits				Hours				Int.	Ext	Total Marks
					L	T	P	To Tal	L	T	P	To tal			
1	Maths	BS	GR20A1001	Linear Algebra and Differential Calculus	3	1	0	4	3	1	0	4	30	70	100
2	Chemistry	BS	GR20A1005	Engineering Chemistry	3	1	0	4	3	1	0	4	30	70	100
3	EEE	ES	GR20A1008	Basic Electrical Engineering	2	1	0	3	2	1	0	3	30	70	100
4	CSE	ES	GR20A1007	Programming for Problem Solving	2	1	0	3	2	1	0	3	30	70	100
5	EEE	ES	GR20A1017	Basic Electrical Engineering Lab	0	0	1	1	0	0	2	2	30	70	100
6	Chemistry	BS	GR20A1014	Engineering Chemistry Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
7	CSE	ES	GR20A1016	Programming for Problem Solving Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
8	ME	ES	GR20A1019	Engineering Workshop	1	0	1.5	2.5	1	0	3	4	30	70	100
		TOTAL			**11**	**4**	**5.5**	**20.5**	**11**	**4**	**11**	**26**	**240**	**560**	**800**
9	Mgmt	MC		Induction Programme											
10	Mgmt	MC	GR20A1020	Design Thinking	1	0	0	1	2	0	0	2	30	70	100

I B. Tech (EEE) - II Semester

S.No	BOS	Group	Course Code	Course Name	Credits				Hours				Int.	Ext	Total Marks
					L	T	P	To Tal	L	T	P	To tal			
1	Maths	BS	GR20A1002	Differential Equations and Vector Calculus	3	1	0	4	3	1	0	4	30	70	100
2	Physics	BS	GR20A1003	Applied Physics	3	1	0	4	3	1	0	4	30	70	100
3	English	HS	GR20A1006	English	2	0	0	2	2	0	0	2	30	70	100
4	CSE	ES	GR20A1011	Data Structures	2	1	0	3	2	1	0	3	30	70	100
5	Physics	BS	GR20A1012	Applied Physics Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
6	ME	ES	GR20A1010	Engineering Graphics	1	0	2	3	1	0	4	5	30	70	100
7	CSE	ES	GR20A1018	Data Structures Lab	0	0	1	1	0	0	2	2	30	70	100
8	English	HS	GR20A1015	English Language and Communication Skills Lab	0	0	1	1	0	0	2	2	30	70	100
		TOTAL			**11**	**3**	**5.5**	**19.5**	**11**	**3**	**11**	**25**	**270**	**630**	**900**
9	Mgmt	MC	GR20A1021	Life skills and Personality Development	1	**0**	0	1	**2**	**0**	0	2	30	70	100

II B.Tech(EEE) - I Semester

S.No	BOS	Group	Course Code	Course Name	Credits				Hours				Int.	Ext	Total Marks
					L	T	P	Total	L	T	P	Total			
1	EEE	PC	GR20A2023	Electrical Circuit Analysis	2	1	0	3	2	1	0	3	30	70	100
2	EEE	PC	GR20A2024	Principles of Analog Electronics	3	0	0	3	3	0	0	3	30	70	100
3	EEE	PC	GR20A2025	DC Machines and Transformers	3	0	0	3	3	0	0	3	30	70	100
4	EEE	PC	GR20A2026	Electromagnetic Fields	3	0	0	3	3	0	0	3	30	70	100
5	EEE	PC	GR20A2033	Power Generation and Transmission	3	0	0	3	3	0	0	3	30	70	100
6	CSE	ES	GR20A2028	Java Programming for Engineers	2	0	0	2	2	0	0	2	30	70	100
7	EEE	PC	GR20A2029	Principles of Analog Electronics Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
8	EEE	PC	GR20A2030	DC Machines and Transformers Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
		TOTAL			**15**	**1**	**4**	**20**	**15**	**1**	**8**	**24**	**240**	**560**	**800**
9	Mgmt	MC	GR20A2003	Constitution of India	2	0	0	2	2	0	0	2	30	70	100
10	Mgmt	MC	GR20A2002	Value Ethics and Gender Culture	2	0	0	2	2	0	0	2	30	70	100

II B.Tech(EEE) - II Semester

S.No	BOS	Group	Course Code	Course Name	Credits				Hours				Int.	Ext	Total Marks
					L	T	P	Total	L	T	P	Total			
1	Maths	BS	GR20A2005	Probability and Statistics	3	0	0	3	3	0	0	3	30	70	100
2	EEE	PC	GR20A2031	AC Machines	2	1	0	3	2	1	0	3	30	70	100
3	EEE	PC	GR20A2032	Control Systems	3	0	0	3	3	0	0	3	30	70	100
4	EEE	PC	GR20A2027	Principles of Digital Electronics	3	0	0	3	3	0	0	3	30	70	100
5	EEE	PC	GR20A2034	Power Distribution and Protection	0	0	2	2	0	0	4	4	30	70	100
6	EEE	PC	GR20A2035	Principles of Digital ElectronicsLab	0	0	2	2	0	0	4	4	30	70	100
7	EEE	PC	GR20A2036	AC Machines Lab	0	0	2	2	0	0	4	4	30	70	100
8	EEE	PC	GR20A2037	Control Systems Lab	0	0	2	2	0	0	4	4	30	70	100
		TOTAL			**11**	**1**	**8**	**20**	**11**	**1**	**16**	**28**	**240**	**560**	**800**
9	Chemistry	MC	GR20A2001	Environmental Science	2	0	0	2	2	0	0	2	30	70	100
10	CSE	MC	GR20A2006	Data Base for Engineers	2	0	0	2	2	0	0	2	30	70	100

III YEAR I SEMESTER

S.No	BOS	Group	Course Code	Course Name	Credits				Hours				Int.	Ext	Total Marks
					L	T	P	Total	L	T	P	Total			
1	EEE	PC	GR20A3012	Power System Analysis	2	1	0	3	2	1	0	3	30	70	100
2	EEE	PC	GR20A3013	Power Electronics	3	0	0	3	3	0	0	3	30	70	100
3	EEE	PC	GR20A3014	Microprocessors and Microcontrollers	3	0	0	3	3	0	0	3	30	70	100
4	EEE	PE		Professional Elective I	3	0	0	3	3	0	0	3	30	70	100
5	EEE	OE		Open Elective I	3	0	0	3	3	0	0	3	30	70	100
6	EEE	PC	GR20A3020	Power Systems Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
7	EEE	PC	GR20A3021	Power Electronics Lab	0	0	2	2	0	0	4	4	30	70	100
8	EEE	PC	GR20A3022	Microprocessors and Microcontrollers Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
		TOTAL			**14**	**1**	**5**	**20**	**14**	**1**	**10**	**25**	**240**	**560**	**800**

Professional Elective –I			
S.No	**BOS**	**Course Code**	**Course Name**
1	EEE	GR20A3015	Electrical and Hybrid Vehicles
2	EEE	GR20A3016	Solar and Wind Energy Systems
3	EEE	GR20A3017	Electrical Machine Design
4	MECH	GR20A3018	Optimization Techniques

Open Elective I			
S.No.	**BOS**	**Course Code**	**COURSE**
1	EEE	GR20A3019	Non-Conventional Energy Sources

III YEAR II SEMESTER

S.No	BOS	Group	Course Code	Course Name	Credits				Hours				Int.	Ext	Total Marks
					L	T	P	Total	L	T	P	Total			
1	EEE	PC	GR20A3091	Programmable Logic Controllers	3	0	0	3	3	0	0	3	30	70	100
2	EEE	PC	GR20A3092	Sensors Measurements and Instrumentation	2	1	0	3	2	1	0	3	30	70	100
3	Mgnt	HS	GR20A2004	Economics and Accounting for Engineers	3	0	0	3	3	0	0	3	30	70	100
4	EEE	PE		Professional Elective II	3	0	0	3	3	0	0	3	30	70	100
5	EEE	OE		Open Elective II	3	0	0	3	3	0	0	3	30	70	100
6	EEE	PC	GR20A3096	Power System Analysis Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
7	EEE	PC	GR20A3097	Sensors Measurements and Instrumentation Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
8	EEE	PW	GR20A3141	Mini Project with Seminar	0	0	2	2	0	0	4	4	30	70	100
		TOTAL			**14**	**1**	**5**	**20**	**14**	**1**	**10**	**25**	**240**	**560**	**800**

Professional Elective -II			
S.No	**BOS**	**Course Code**	**Course Name**
1	EEE	GR20A3093	Modern Power Electronics
2	EEE	GR20A3094	HVDC Transmission Systems
3	EEE	GR20A3095	Advanced Control Systems
4	CSE	GR20A2075	Operating Systems

Open Elective II

S.No.	BOS	Course Code	COURSE
1	CSE	GR20A3123	Machine Learning

IV YEAR I SEMESTER

S.No	BOS	Group	Course Code	Course Name	Credits				Hours				Int.	Ext	Total Marks
					L	T	P	Total	L	T	P	Total			
1	PC	ES	GR20A4014	Power Semiconductor Drives	2	1	0	3	2	1	0	3	30	70	100
2	EEE	PE		Professional Elective III	3	0	0	3	3	0	0	3	30	70	100
3	EEE	PE		Professional Elective IV	3	0	0	3	3	0	0	3	30	70	100
4	Mgnt	HS	GR20A3140	Fundamentals of Management and Entrepreneurship	3	0	0	3	3	0	0	3	30	70	100
5	EEE	OE		Open Elective III	3	0	0	3	3	0	0	3	30	70	100
6	EEE	PC	GR20A4023	Programmable Logic Controllers lab	0	0	2	2	0	0	4	4	30	70	100
7	EEE	PC	GR20A4024	Power Semiconductor Drives Lab	0	0	2	2	0	0	4	4	30	70	100
8	EEE	PW	GR20A4129	Project Work Phase-I	0	0	6	6	0	0	12	12	30	70	100
		TOTAL			**14**	**1**	**10**	**25**	**14**	**1**	**20**	**35**	**240**	**560**	**800**

Professional Elective -III			
S.No	**BOS**	**Course Code**	**Course Name**
1	EEE	GR20A4015	Wide Band Gap Power Devices
2	EEE	GR20A4016	High Voltage Engineering
3	EEE	GR20A4017	Digital Control Systems
4	EEE	GR20A4018	Fundamentals of Digital Signal Processing
Professional Elective -IV			
S.No	**BOS**	**Course Code**	**Course Name**
1	EEE	GR20A4019	Power Quality and FACTS
2	EEE	GR20A4020	Electrical Energy Audit
3	EEE	GR20A4021	Special Electrical Machines
4	ECE	GR20A3108	VLSI Design

Open Elective III			
S.No.	**BOS**	**Course Code**	**COURSE**
1	EEE	GR20A4022	Artificial Intelligence Techniques

IV YEAR II SEMESTER

S.No	BOS	Group	Course Code	Course Name	Credits				Hours				Int.	Ext	Total Marks
					L	T	P	Total	L	T	P	Total			
1	EEE	PC	GR20A4092	Power System Monitoring and Control	2	1	0	3	2	1	0	3	30	70	100
2	EEE	PE		Professional Elective V	3	0	0	3	3	0	0	3	30	70	100
3	EEE	PE		Professional Elective VI	3	0	0	3	3	0	0	3	30	70	100
4	EEE	PW	GR20A4130	Project Work Phase-II	0	0	6	6	0	0	12	12	30	70	100
		TOTAL			**8**	**1**	**6**	**15**	**8**	**1**	**12**	**21**	**120**	**280**	**400**

Professional Elective -V			
S.No	**BOS**	**Course Code**	**Course Name**
1	EEE	GR20A4093	Advanced Electric Drives
2	EEE	GR20A4094	Big Data Applications in Power Systems
3	EEE	GR20A4095	Modern Control Theory
4	EEE	GR20A4096	Industrial IoT
Professional Elective -VI			
S.No	**BOS**	**Course Code**	**Course Name**
1	EEE	GR20A4097	Applications of AI and ML in Power Electronics
2	EEE	GR20A4098	Electric Smart Grid
3	ECE	GR20A4099	Embedded Systems
4	CSE	GR20A3131	Big Data Analytics

PROFESSIONAL ELECTIVES – 4 THREADS

S. No.	Thread 1: Power Electronics	Thread 2: Power Systems	Thread 3: Machines and Control Systems	Thread 4: Computer and Electronics
1	Electrical and Hybrid Vehicles	Solar and Wind Energy Systems	Electrical Machine Design	Optimization Techniques
2	Modern Power Electronics	HVDC Transmission Systems	Advanced Control Systems	Operating Systems
3	Wide Band Gap Power Devices	High Voltage Engineering	Digital Control Systems	Fundamentals of Digital Signal Processing
4	Power Quality and FACTS	Electrical Energy Audit	Special Electrical Machines	VLSI Design
5	Advanced Electric Drives	Big Data Applications in Power Systems	Modern Control Theory	Industrial IoT
6	Applications of AI and ML in Power Electronics	Electric Smart Grid	Embedded Systems	Big Data Analytics

OPENELECTIVESFORGR20REGULATIONS:

THREAD1	THREAD 2	OFFEREDBY
1. Soft Skills and Interpersonal Communication 2. Human Resource Development And Organizational Behavior 3. Cyber Law and Ethics 4. Economic Policies in India	1.Principles of E-Commerce 2.BusinessAnalytics 3.AugmentedRealityandVirtualReality	**CSE**
	1. Internet of Things 2. Augmented Reality and Virtual Reality 3. Human Computer Interaction	**CSE(AIML)**
	1.Augmented Reality and Virtual Reality 2. Internet of Things 3. Human Computer Interaction	**CSE (DS)**
	1. Services Science and Service Operational Management 2. IT Project Management 3. Marketing Research and Marketing Management	**CSBS**
	1.Artificial Intelligence 2. Introduction to Data Science 3.HumanComputerInteraction	**IT**
	1.Non-Conventional Energy Sources 2.Machine Learning 3.Artificial Intelligence Techniques	**EEE**
	1.Principles of Communication 2.Sensor Technology 3.Cellular and Mobile Communications	**ECE**
	1.Robotics 2. Composite Materials	**ME**

	3.Operations Research	
	1.EngineeringMaterials forSustainability 2.Geographic Information Systems and Science 3.EnvironmentalImpactAssessment and Life Cycle Analyses	**CE**

I YEAR
I SEMESTER

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

LINEAR ALGEBRA AND DIFFERENTIAL CALCULUS

Course Code: GR20A1001 **L/T/ P/C: 3/1/0/4**

I Year I Semester

Course Objectives

1. Apply ideas to solve linear systems, at the core of many engineering concepts.
2. Apply concept of latent values of a matrix which is critical in many engineering applications.
3. Take part in, function approximation using the tools of mean value theorems.
4. Compose optimal values of multi-variable functions.
5. Utilize definite integral concept for various geometrical applications.

Course Outcomes

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

1. Compile the rank of a matrix to determine the existence of solutions of a linear algebraic system
2. Determine the eigenvalues and eigenvectors of a square matrix which arise in several engineering applications
3. Determine approximate solution of over determined systems using the pseudo inverse.
4. Develop the skill of determining optimal values of multivariable functions using classical method**s.**
5. Apply the definite integral concept for various computational problems in geometry.

UNIT I

VECTOR AND MATRIX ALGEBRA

Vector space (definition and examples), linear independence of vectors, orthogonality of vectors, projection of vectors, Symmetric, Hermitian, skew-symmetric, skew-Hermitian, orthogonal and unitary matrices; Rank of a matrix by echelon reduction, Solution of a linear algebraic system of equations (homogeneous and non-homogeneous)

UNIT II

MATRIX EIGENVALUE PROBLEM AND QUADRATIC FORMS

Determination of eigenvalues and eigenvectors of a matrix, properties of eigenvalues and eigenvectors (without proof), diagonalization of a matrix, orthogonal diagonalization of symmetric matrices, Similarity of matrices.

Quadratic Forms: Definiteness and nature of a quadratic form, reduction of quadratic form to canonical form by orthogonal transformation

UNIT III

MATRIX DECOMPOSITION AND PSEUDO INVERSE OF A MATRIX

Spectral decomposition of a symmetric matrix, L-U decomposition, Gram-Schmidt orthonormalization of vectors, Q-R factorization, Singular value decomposition

Moore-Penrose pseudo inverse of a matrix, least squares solution of an over determined system of equations using pseudo inverse

UNIT IV

MULTIVARIABLE DIFFERENTIAL CALCULUS AND FUNCTION OPTIMIZATION

Partial Differentiation: Total derivative. Jacobian; Functional dependence

Unconstrained optimization of functions using the Hessian matrix, constrained optimization using Lagrange multiplier method

UNIT V

SINGLE VARIABLE CALCULUS

Mean value theorems: Rolle's Theorem, Lagrange's Mean value theorem and Taylor's theorem (without proof), their geometrical interpretation, approximation of a function by Taylor's series Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (for Cartesian coordinates)

TEXTBOOKS

1. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa publishing house, Fourth edition 2014
2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thedition, Pearson, Reprint.

REFERENCES:

1. GRIET reference manual
2. Paras Ram, Engineering Mathematics, 2nd Edition, CBS Publishes
3. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ENGINEERING CHEMISTRY

Course Code:GR20A1005 **L/T/P/C: 3/1/0/4**
I Year I Semesters

Course Objectives:

1. To relate how the basic concepts and principles of chemistry can be applied to practical utility in a broader perspective of the society.
2. To distinguish the ranges of electromagnetic spectrum and its interaction with matter and to develop knowledge of various spectroscopic techniques at atomic and molecular levels.
3. To identify and apply various principles of electrochemistry, corrosion and water treatment which are essential for an engineer in industry
4. To acquire knowledge of existence of different organic molecules in different stereo chemical orientations useful for understanding reaction pathways.
5. To bring adaptability to the concepts of chemistry and to acquire the required skills to become a perfect engineer.

Course Outcomes:

1. Analyze microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
2. Relate electromagnetic spectra used for exciting different molecular energy levels in various spectroscopic techniques and their application in medicine and other fields.
3. Recognize various problems related to electrochemistry and corrosion in industry and is able to explain different prevention techniques and apply concepts of chemistry in engineering.
4. Know the origin of different types of engineering materials used in modern technology and Interpret different problems involved in industrial utilization of water.
5. Understand the processing of fossil fuels for the effective utilization of chemical energy.

UNIT I

ATOMIC AND MOLECULAR STRUCTURE: (8 Lectures)

Atomic and molecular orbitals, Linear Combination of Atomic Orbitals (LCAO), Molecular orbitals of homo-nuclear diatomic molecules, MO energy diagrams of N_2, and O_2.

Metallic bonding, Valence Bond Theory, Crystal Field Theory, Crystal Field Splitting of transition metal ion d-orbitals in tetrahedral, octahedral, and square planar geometries.

UNIT II

SPECTROSCOPIC TECHNIQUES AND APPLICATIONS: (10 Lectures)

Regions of electromagnetic spectrum, Molecular spectroscopy Rotational Spectroscopy: Rotation of molecules, rotational spectra of rigid diatomic molecules, selection rules.

Vibrational Spectroscopy: The vibrating diatomic molecule, simple and an harmonic oscillators of a diatomic molecule, selection rules, applications of IR spectroscopy.

NMR Spectroscopy: criteria for NMR activity (Magnetic and nonmagnetic nuclei), basic concepts and principle of 1H NMR spectroscopy, Chemical shift, Magnetic Resonance Imaging.

UNIT III

ELECTROCHEMISTRY AND CORROSION: (12 Lectures)

Electrochemistry**:** Electrode potential, types of electrodes: calomel and glass electrodes-construction and working, electrochemical series and applications, electrochemical cells:

Galvanic & electrolytic cells, Nernst equation- applications, numerical problems, Batteries: primary and secondary types, lithium metal, lithium ion and lead acid batteries. Types of Fuel cells: hydrogen-oxygen fuel cell - applications and advantages, microbial fuel cell.
Corrosion: Definition ,causes and effects of corrosion, The ories of chemical and electro chemical corrosion with mechanism, Types of corrosion - Galvanic, concentration cell and pitting corrosions, factors affecting corrosion (Nature of metal & Nature of Environment), corrosion control methods: Proper designing, cathodic protection (sacrificial anodic and impressed current cathodic protection), Metallic coatings: Hot dipping- Galvanization and tinning, electroplating, electroless plating of nickel.

UNIT IV

ENGINEERING MATERIALS AND WATER TECHNOLOGY: (8 Lectures)

Semiconductors: Si and Ge, preparation, purification and crystal growth by zone refining and Czochralski pulling methods, doping.
Polymeric Materials: plastics-classification, types of polymerization, properties of polymers- crystallinity, Compounding and fabrication by compression moulding and injection moulding, conducting polymers – definition, classification, applications of conducting polymers in mobile phones and displays.
Water: impurities, hardness-causes of hardness, types, Units, Total Dissolved Solids (TDS), Boiler troubles-scales and sludges, caustic embrittlement, water purification by reverse osmosis (RO)method.

UNIT V

STEREOCHEMISTRY AND ENERGY RESOURCES (8 Lectures)

Stereo chemistry: Representations of 3D structures for organic molecules, stereo isomers: Conformational and Configurational isomers. Conformational isomers: conformational analysis of n-butane. Configurational isomers: geometrical isomers (E, Z isomers) and optical isomers. Optical isomers: symmetry, chirality, enantiomers, diastereomers, optical activity. Structure, synthesis and pharmaceutical applications of aspirin and ibuprofen.
Energy sources: Fossil Fuels: Coal –types, analysis of coal- proximate and ultimate analysis and their significance, Petroleum-its composition-synthetic petrol – Fischer Tropsch's process, cracking - Definition and its significance, knocking and its mechanism in Internal Combustion engine, Octane rating, Composition and Uses of Natural gas, LPG and CNG, biodiesel synthesis, biogas.

Text Books:

1. Engineering chemistry by P.C. Jain and M. Jain; Dhanpat Rai Publishing Company (P) Ltd., New Delhi.
2. Textbook of Engineering Chemistry by A. Jayashree, Wiley Publications

References:

1. Organic Chemistry by Morrison, Boyd & Bhattacharjee (Pearson Pubs)
2. Solomons' Organic Chemistry, Wiley pubs
3. Fundamentals of Molecular Spectroscopy, by C.N. Banwell. McGraw Hill Publication
4. A Textbook of Engineering Chemistry by Shashi Chawla, Dhanpat Rai Publishing Company (P) Ltd., New Delhi.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
BASIC ELECTRICAL ENGINEERING

Course Code: GR20A1008 **L/T/P/C: 2/1/0/3**

I Year I semester

Course Objectives:

1. Introduce the fundamentals of Electrical Engineering.
2. Understand magnetic circuits, DC circuits and AC single phase & three phase circuits
3. Provide foundation in theory and applications of Transformers and DC machines
4. Understand the basic principles of AC Electrical machinery and their applications.
5. Impart the knowledge of Electrical Installations.

Course Outcomes:

At the end of this course, students will able to

1. Understand and analyze basic electric circuits with suitable theorems.
2. Solve 1-phase and 3-phase balanced sinusoidal systems.
3. Interpret the working principle of Electrical machines.
4. Appraise the applications of Induction motors and synchronous generators used in Industries.
5. Identify the components of Low Voltage Electrical Installations.

UNIT I
D.C. CIRCUITS

Electrical circuit elements (R, L and C), voltage and current sources, KVL&KCL, analysis of simple circuits with dc excitation. Thevenin's and Norton's theorems, Super position and Reciprocity theorems. Time-domain analysis of first-order RL and RC circuits.

UNIT II
A.C. CIRCUITS

Representation of sinusoidal waveforms, average and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase AC circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance in series RLC circuit. Locus Diagram. Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT III
DC MACHINES AND TRANSFORMERS

DC Motor and Generator: Construction, Principle of operation and Applications. Ideal and practical transformer, equivalent circuit, losses in transformers and efficiency, regulation. Autotransformer and three-phase transformer connections.

UNIT IV
AC MACHINES

Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic, Loss components and efficiency. Single-phase induction motor, Construction, working, torque-speed characteristics. Construction and working of synchronous generators.

UNIT V
ELECTRICAL INSTALLATIONS

Power system overview. Components of LT Switchgear: Switch Fuse Unit (SFU), MCB,

ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

Text Books:

1. Basic Electrical Engineering - D.P. Kothari and I.J. Nagrath, 3rd edition 2010, Tata McGraw Hill.
2. D.C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
3. L.S. Bobrow, Fundamentals of Electrical Engineering", Oxford University Press, 2011
4. Electrical and Electronics Technology, E. Hughes, 10th Edition, Pearson, 2010
5. Electrical Engineering Fundamentals, Vincent Deltoro, Second Edition, Prentice Hall India, 1989

Reference Books:

1. C. K. Alexander and M. N. O. Sadiku, "Electric Circuits", McGraw Hill Education, 2004.
2. K. V. V. Murthy and M. S. Kamath, "Basic Circuit Analysis", Jaico Publishers, 1999.
3. Circuit Theory (Analysis and Synthesis) by A.Chakrabarti-DhanpatRai& Co.
4. P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

PROGRAMMING FOR PROBLEM SOLVING

Course Code: GR20A1007 **L/T/P/C: 2/0/0/2**

I Year I Semester

Course Objectives:

1. To interpret the various steps in program development.
2. To recall and recite the fundamentals, syntax and semantics of C programming language.
3. To illustrate problem solving using arrays, strings, structures and pointers.
4. To demonstrate using of structured and modular programming approach in solving problems.
5. To code, Interpret and debug the given program using files.

Course Outcomes:

1. To write algorithms and to draw flowcharts and remember and reuse the fundamentals of C language.
2. To apply decision making statements and arrays to solve problems.
3. To illustrate the need for strings and functions in problem solving.
4. To implement pointers and structures in writing programs.
5. To illustrate working with files and preprocessor directives in c.

UNIT I

INTRODUCTION TO PROGRAMMING: INTRODUCTION TO ALGORITHMS: Representation of Algorithm, Flowchart, Pseudo code with examples, Compiling &executing program, Syntax and logical errors.

Introduction to C Programming Language: Structure of c program,Variables, Data types,Constants,Operators, Expressions and precedence, Expression evaluation,Type conversion.

I/O: Simple input and output with formatted I/O and unformatted I/O.

UNIT II

DECISION MAKING AND ARRAYS: CONDITIONAL BRANCHING AND LOOPS: Conditional branching with if,if-else,nestedifelse, else if ladder, switch-case, Loops:for, while, do-while, Jumping statements: goto, break,continue.

Arrays: One and Two dimensional arrays, creating, Accessing and manipulating elements of arrays

Searching: Basic searching in an array of elements, Linear and Binary search.

UNIT III

STRINGS AND FUNCTIONS: Strings: Introduction to strings, Operations on characters, Basic string functions available in C (strlen, strcat, strcpy, strrev,strcmp), String operations without string handling functions, Arrays of strings.

Functions: Designing structured programs, declaring a function, Signature of a function, Parameters and return type of a function(categories of functions), call by value,call by reference,passing arrays to functions, recursion, merits and demerits of recursive functions, Storage classes.

UNIT IV

POINTERS AND STRUCTURES: Pointers: Idea of pointers, Defining pointers, Pointer to pointer, void pointer, Null pointer, Pointers to Arrays and Structures, Function pointer.

Structures and unions: Defining structures, Initializing Structures, Array of structures, Arrays within structures, Nested structures, Passing structures to functions, Unions, typedef.

UNIT V

FILE HANDLING AND PREPROCESSOR IN C

Files: Text and Binary files, Creating and Reading and writing text and binary files, Random access to files, Error Handling in files, Command line arguments, Enumeration data type.

Preprocessor: Commonly used Preprocessor commands like include, define, undef, if, ifdef, ifndef,elif.

TEXT BOOKS:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)

REFERENCE BOOKS:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, PrenticeHall of India
2. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
3. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
4. Herbert Schildt, C: The Complete Reference, McGraw Hill, 4th Edition

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
BASIC ELECTRICAL ENGINEERING LAB

Course Code: GR20A1017 **L/T/P/C: 0/0/2/1**
I Year I Semester

Course Objectives:

1. Introduce the use of measuring instruments.
2. Analyze a given network by applying various electrical laws
3. Measure and know the relation between basic electrical parameters.
4. Understand the response of electrical circuits for different excitations
5. Summarize the performance characteristics of electrical machines.

Course Outcomes:

At the end of this course, students will able to

1. Get an exposure to common electrical components and their ratings.
2. Get an exposure to basic electrical laws.
3. Understand the measurement and relation between the basic electrical parameters
4. Understand the response of different types of electrical circuits to different excitations.
5. Compare the basic characteristics of Electrical machines

LIST OF EXPERIMENTS:

TASK-1: Verification of Ohms Law , KVL and KCL

TASK-2: Verification of Thevenin's and Norton's Theorems

TASK-3: Verification of Superposition and Reciprocity Theorems.

TASK-4: Transient Response of Series RL, RC and RLC circuits using DC excitation ,

TASK-5: Resonance in series RLC circuit

TASK-6: Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits

TASK-7: Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)

TASK-8: Three Phase Transformer: Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta-star, Star-Star)

TASK-9: Measurement of Active and Reactive Power in a balanced Three-phase circuit

TASK-10: Performance Characteristics of a Separately Excited DC Shunt Motor

TASK-11: Torque-Slip Characteristics of a Three-phase Induction Motor

TASK-12: No-Load Characteristics of a Three-phase Alternator

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGINEERING CHEMISTRY LAB

Course Code: GR20A1014 **L/T/P/C: 0/0/3/1.5**

I Year I Semesters

Course Objectives:

1. Introduce practical applications of chemistry concepts to solve engineering problems.
2. To determine the rate constant of reactions from concentrations as a function of time.
3. Measure the molecular or ionic properties such as conductance, redox potentials
4. Synthesize a drug molecule to learn how organic compounds are prepared in industry.
5. Know the laboratory practices implemented in a research and industrial chemistry laboratory setting.

Course Outcomes:

1. Ability to perform experiments illustrating the principles of chemistry relevant to the study of science and engineering.
2. Determination of parameters like hardness and chloride content in water, measurement of redox potentials and conductance.
3. Understand the kinetics of a reactions from a change in concentrations of reactants or products as a function of time.
4. Synthesize a drug molecule as an example of organic synthesis methods widely used in industry.
5. Determination of physical properties like adsorption and viscosity.

List of Experiments: (any 12 experiments out of 14)

1. Determination total hardness of water by complexometric method using EDTA.
2. Determination of chloride content of water by Argentometry.
3. Redox titration: Estimation of ferrous iron using standard $KMnO_4$
4. Estimation of HCl by Conduct ometrictitrations
5. Estimation of Acetic acid by Conduct ometrictitrations
6. Estimation of Ferrous iron by Potentiometry using dichromate
7. Determination of rate constant of acid catalyzed reaction of methylacetate
8. Determination of acid value of coconut oil.
9. Adsorption of acetic acid by charcoal
10. Determination of surface tension of liquid by using stalagmometer
11. Determination of viscosity of liquid by using Ostwald'sviscometer.
12. Determinationofpartitioncoefficientofaceticacidbetweenn-butanolandwater.
13. Synthesis of Aspirin
14. Synthesis of Paracetamol.

Reference Books:

1. Vogel's text book of Practical organic chemistry, 5^{th}Edition.
2. Senior Practical Physical Chemistry, B.D. Khosala, A. Gulati and V. Garg (R. Chand &Co.,Delhi)
3. Text book on experiments and Calculations in Engineering Chemistry-S.S.Dara.
4. An introduction to practical chemistry, K.K. Sharma and D.S. Sharma (Vikas Publications, NewDelhi)

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

PROGRAMMING FOR PROBLEM SOLVING LAB

Course Code: GR20A1016 **L/T/P/C: 0/0/3/1.5**

I Year I Semester

Course Objectives:

1. To work with an IDE to create, edit, compile, run and debug programs
2. To analyze the various steps in program development.
3. To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
4. To develop modular, reusable and readable C Programs using the concepts like functions, arrays etc.
5. To write programs to create, read from and write to text and binary files.

Course Outcomes:

1. Formulate the algorithms for simple problems and translate algorithms to a working and correct program.
2. Identify, analyse and correct syntax and logical errors encountered during coding.
3. Interpret and implement programs using branching and looping statements.
4. Represent and manipulate data with arrays, strings and structures and use pointers.
5. Create, read and write to and from simple text and binary files and modularize the code with functions so that they can be reused

TASK 1

a. Write a C program to implement operators in c?
b. Write a C program to find greatest and smallest among three numbers using conditional operator.
c. Write a C program to implicit and explicit type conversion in c?

TASK 2

a. Write a C program to swap two numbers using the following .
   i. Using third variable
   ii. Without using third variable
   iii. Using bitwise operators
b. Write a C program to add two numbers without using arithmetic operators in c?

TASK 3

a. Write a C program to find the roots of a quadratic equation using if-else.
b. The program should request the user to input two numbers and display one of the following as per the desire of user. (a). Sum of numbers (b) difference of numbers (c) product of the numbers (d)division of the numbers. Write a C program using switch statement to accomplish the above task.

TASK 4

a. Write a C Program check whether a given number is perfect number or not.
b. Write a C Program check whether a given number is palindrome number or not.
c. Write a C Program check whether a given number is Armstrong numberor not.

.

TASK 5

a. Write a C program to display the following patterns.

i) 1
2 3
4 5 6

ii. 1
2 3
4 5 6

7 8 9 10 7 8 9 10

b. Write a C program to generate the prime numbers between x and y where x and y are starting and ending values to be supplied by the user.
c. Write a C program to calculate the following Sum:
    a. Sum=1+x/1!-x2/2!+x3/3!-x4/4!+…..xn/n!

TASK 6

1) Write a C program to find sum, average and minimum and maximum in a list of numbers.
2) Write a C program to implement linear search.
3) Write a C program to implement binary search.

TASK 7

a. Write a C program to implement matrix addition
b. Write a C program to implement matrix multiplication.

TASK 8

a. Write a C program to implement the following string handling functions.
    i.strlen() ii.strcpy() iii.strcmp() iv.strcat()
b. Write a C program to read first name , middle name and last name of a student and display a string full name without using string handling functions.

TASK 9

a. Write a C program to determine if a String is Palindrome or not.

b. Write a C program to sort the names of n students in the alphabetical order.

TASK 10

a. Write a C program to implement the following using recursive and non-recursive functions to find the factorial of a given integer.
b. Write a C program to implement the following using recursive and non-recursive functions to find the GCD (greatest common divisor) of two given integers

TASK 11

a. Write a C program to implement transpose of a matrix using functions.
b. Write a C program to display binary equivalent of a given decimal number.

TASK 12

a. Create a structure student with name, roll no, marks of 3 subjects as members . Write a c program to sort student details based on total using structures and functions .
b. Write a C program that uses structures and functions to perform the following operations:
    i. Addition of two complex numbers
    ii. Subtraction of two complex numbers
    iii. Multiplication of two complex numbers

TASK 13

a. Write a C program using functions and pointers that compares two strings to see whether they are identical. The function returns 1 if they are identical, 0 otherwise.
b. Write a C program to sort list of numbers using pointers.

TASK 14

a. Write a C program to implement following pre-processor directives.

i. define ii. ifdef iii. undef iv. ifndef.

b. Write a C program to create a user defined header file to find sum, product and greatest of two numbers ?

TASK 15

a. Write a C program to merge two files into a third file.
b. Write a C program to find some of n numbers using command line arguments.

TEXTBOOKS:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)

REFERENCE BOOKS:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, PrenticeHall of India
2. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
3. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
4. HerbertSchildt, C: The Complete Reference, McGraw Hill, 4th Edition

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ENGINEERING WORKSHOP

Course Code: GR20A1019 **L/T/P/C: 1/0/3/2.5**
I Year I Semester

Course objectives:

1. To prepare and practice of scientific principles underlying the art of manufacturing in workshop/manufacturing practices.
2. To demonstrate basic knowledge of various tools and their use in different sections.
3. To make students to execute applications of various tools in carpentry.
4. To make students recognize applications of manufacturing methods casting, forming machining, joining and advanced manufacturing methods.
5. To develop generate safety rules, safe practices and workshop dress code.

Course Outcomes:

At the end of the course students will be able to

1. Develop various trades applicable to industries / Manufacturing practices.
2. Create Hands on experience for common trades.
3. Improve to fabricate components with their own hands.
4. Develop practical knowledge on the dimensional accuracies and dimensional tolerances possible with various manufacturing processes.
5. To build the requirement of quality of work life on safety and organizational needs.

TRADES FOR EXERCISES: At least two exercises from each trade:

1. Carpentry
2. Fitting Shop
3. Tin-Smithy
4. Casting
5. Welding Practice
6. House-wiring
7. Black Smithy
8. **VIDEO LECTURES:** Carpentry, Fitting operations, Tin-Smithy, Casting, Welding, Electrical and Electronics, Black Smithy, Plumbing, Power tools in construction and Wood Working, Manufacturing Methods,

Text/ Reference Books:

1. Workshop Practice /B. L. Juneja / Cengage
2. Workshop Manual / K. Venugopal /Anuradha.
3. Work shop Manual - P. Kannaiah/ K. L. Narayana/SciTech
4. Workshop Manual / Venkat Reddy/BSP
5. Workshop Manual/K. Venugopal/Dr.V. Prabhu Raja/G.Sreekanjan

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
DESIGN THINKING

Course Code: GR20A1020 **L/T/P/C: 2/0/0/1**
I Year I Semester

Course Objectives:

1. Study a problem from multiple perspectives
2. Learn how to frame the design challenge properly.
3. Learn how to ideate, prototype and Iterate solutions.
4. Learn from the overall design process how to create value as entrepreneurs
5. Learn how to design successful products or enterprises

Course Outcomes:

1. Students will be able to identify an Opportunity from a Problem
2. Students will be able to frame a Product/Service Idea
3. Students will be able to empathize with the customers
4. Students will be able to design and develop a Prototype
5. Students will be able to pitch their idea

UNIT I
INTRODUCTION TO DESIGN THINKING
LRI Assessment, Introduction to Design Thinking, Understanding the Mindsets-Empathy, Optimism, Embrace Ambiguity, Make it, Learn from Failure, Iterate, Create Confidence, Creativity Convergent & Divergent Thinking

UNIT II
DESIGN THINKING METHODOLOGY
The 5 Stages of the Design Thinking Process-Empathise, Define (the problem), Ideate, Prototype, and Test,

UNIT III
IDEATION TOOLS & EXERCISES
Sample Design Challenge, Introduction to the Design Challenge Themes, Story telling and Tools for Innovation

UNIT IV
EMPATHIZE
Understand customers, Empathy Maps, Empathise-Step into customers shoes- Customer Journey Maps, Define- Analysis & Drawing Inferences from Research

UNIT V
THE DESIGN CHALLENGE
Define the Design Challenge, Prototyping & Iteration- Feasibility Study, Testing-Documentation and the Pitch

TEXT BOOK :

Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School - IdrisMootee.

REFERENCE BOOKS:

1. Zero to One: Note on Start-Ups, or How to Build the Future
2. The Lean Startup: How Constant Innovation Creates Radically Successful Businesses
3. Start With Why: How Great Leaders Inspire Everyone To Take Action

I YEAR
II SEMESTER

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

Course Code: GR20A1002 **L/T/P/C: 3/1/0/4**

I Year II Semester

Course Objectives:

1. Knowledge to solve engineering problems governed by differential equations
2. The skill of evaluating multiple integrals needed for applications in mechanics and electro-magnetic field theory
3. The knowledge to interpret the functions arising in vector field theory and utilize mathematical tools for some computations
4. The skill of evaluating work done by a field and flux across a surface
5. The skill of utilizing specialized theorems for fast evaluation of work and flux

Course Outcomes: After learning the contents of this paper the student must be able to

1. Classify the differential equations of first order and solve them analytically by suggested methods
2. Solve linear differential equations of higher order under various forcing functions
3. Evaluate double and triple integrals and apply them to some problems in geometry and mechanics
4. Apply vector differential operators on scalar and vector fields and apply them to solve some field related problems
5. Apply classical vector integral theorems for fast evaluation of work done around closed curves and flux across closed surfaces

UNIT I

ORDINARY DIFFERENTIAL EQUATIONS OF THE FIRST ORDER

LDE of the first order: Solution of Exact, Linear and Bernoulli equations, modelling Newton's law of cooling, growth and decay models, modelling of R-L circuit

UNIT II

ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDER

LDE with constant coefficients: Complementary function, over damping, under damping and critical damping of a system, Particular integrals for *f(x)* of the form $e^{ax}, x^n, cosax, sinax, e^{ax}V(x)$ *and* $x\,V(x)$where $V(x) \equiv cosax$ *and* $sinax$, the method of variation of parameters

LDE with variable coefficients: Cauchy's homogeneous equation, Legendre's homogeneous equations

UNIT III

MULTIPLE INTEGRALS

Double integrals: Evaluation of Double Integrals, change of order of integration (only Cartesian form), change of variables (Cartesian and polar coordinates)

Triple Integrals: Evaluation of triple integrals, Change of variables (Cartesian to Spherical and Cylindrical polar coordinates)

Applications: Area using the double integral –Volume of a solid using the double and triple integral- Mass, Centre of mass and Centre of gravity using double and triple integrals

UNIT IV

VECTOR DIFFERENTIATION AND LINE INTEGRATION

Vector differentiation: Scalar and vector point functions, Concepts of gradient, divergence and curl of functions in cartesian framework, solenoidal field, irrotational field, scalar potential

Vector line integration: Evaluation of the line integral, concept of work done by a force field, Conservative fields

UNIT V

SURFACE INTEGRATION AND VECTOR INTEGRAL THEOREMS

Surface integration: Evaluation of surface and volume integrals, flux across a surface

Vector integral theorems: Green's, Gauss and Stokes theorems (without proof) and their applications

TEXTBOOKS:

1. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa publishing house,
Fourth edition 2014
2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
3. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006
4.. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition, Pearson, Reprint, 2002.

REFERENCES:

1. GRIET reference manual
2. Paras Ram, Engineering Mathematics, 2nd Edition, CBS Publishes
3. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
APPLIED PHYSICS

Course Code: GR20A1003 **L/T/P/C: 3/1/0/4**
I Year II Semester

Course Objectives:

1. Understand the dualistic nature of radiation and matter waves with experimental validation.
2. Outline the properties of semiconductor materials for specific applications.
3. Develop basic understanding of optoelectronic devices.
4. Discuss the use of lasers as light sources in optical fiber applications.
5. Study the properties of dielectric, magnetic and superconducting materials for various applications.

Course Outcomes:

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

1. Solve engineering problems involving quantum nature of radiation and matter waves.
2. Comprehend the characteristics of semiconductor devices such as transistors and diodes.
3. Familiarize with operation of optoelectronic devices and its applications.
4. Analyze the properties of Laser and its propagation in different types of optical fibers.
5. Identify dielectric, magnetic and superconducting materials based on their properties for specific applications.

UNIT I
QUANTUM MECHANICS

Introduction, Black body radiation, Planck's law, Photoelectric effect- Einstein's Photoelectric equation, Compton effect (Qualitative), Wave-Particle duality, de Broglie hypothesis, Davisson and Germer experiment, Heisenberg's uncertainty principle, Born's interpretation of the wave function, Schrodinger's time independent wave equation, Particle in one dimensional infinite potential box.

UNIT II
SEMICONDUCTOR PHYSICS

Intrinsic and extrinsic semiconductors, Estimation of carrier concentration, Dependence of Fermi level on carrier concentration and variation with temperature, Carrier transport: diffusion and drift, Hall Effect, p-n junction diode: I-V Characteristics, Zener diode: I-V Characteristics, Bipolar Junction Transistor (BJT): Construction and principle of operation (n-p-n and p-n-p) in common base configuration.

UNIT III
OPTOELECTRONICS

Radiative transitions: Absorption, Spontaneous and Stimulated emission, Non-radiative transitions: Auger recombination, Surface recombination and recombination at defects, Generation and recombination mechanism in semiconductors, LED and Semiconductor lasers: Device structure, Materials, Characteristics, Semiconductor photo-detectors: PIN and Avalanche detectors and their structure, Materials, Working principle and Characteristics, Solar cell: Structure and Characteristics.

UNIT IV
LASERS

Introduction, Characteristics of lasers, Einstein coefficients, Resonating cavity, Active medium-Meta stable state, Pumping, Population inversion, Construction and working of Ruby laser and He-Ne laser, Applications of lasers.

Fiber Optics: Introduction, Principle and Structure of an optical fiber, Basic components in optical fiber communication system, Comparison of optical fibers over conventional cables, Acceptance angle-Numerical aperture, Types of optical fibers, Losses associated with optical fibers, Applications of optical fibers.

UNIT V

DIELECTRIC MATERIALS

Introduction, Types of polarizations (Electronic, Ionic and Orientational Polarizations) and calculation of Electronic and Ionic polarizability.

Magnetic Materials: Introduction, Bohr magneton, classification of dia, para and ferro magnetic materials on the basis of magnetic moment, Hysteresis curve based on domain theory, Soft and hard magnetic materials, Properties of anti-ferro and ferri magnetic materials.

Superconducting materials: Introduction to superconductors, General properties, Meissner effect, Type I and Type II superconductors, Applications of superconducting materials.

Teaching methodologies:

- White board and marker
- Power Point Presentations
- Video lectures

Text books:

1. Engineering Physics, B.K. Pandey, S. Chaturvedi - CengageLearing.
2. Halliday and Resnick, Physics - Wiley.
3. Engineering Physics, P.K Palanisamy, Scitech Publishers.
4. A textbook of Engineering Physics, Dr. M. N. Avadhanulu, Dr. P.G. Kshirsagar - S. Chand.
5. Applied Physics, T. Bhīma Sankaram, BSP Publishers.

References:

1. Richard Robinett, Quantum Mechanics
2. Fundamentals of Semiconductor Devices, Second Edition, Anderson and Anderson, McGraw Hill.
3. J. Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw- Hill Inc.(1995)
4. Semiconductor Physics and Devices, 4e, Neamen and Biswas, McGraw Hill.
5. Online Course: “Optoelectronic Materials and Devices” by Monica Katiyar and Deepak Gupthaon NPTEL.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ENGLISH

Course Code: GR20A1006 **L/T/P/C:2/0/0/2**
I Year II Semester

Course Objectives:
The course will help to

1. Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
2. Equip students to study academic subjects more effectively and critically using the theoretical and practical components of English syllabus.
3. Develop study skills and communication skills in formal and informal situations.
4. Understand the importance of defining, classifying and practice the unique qualities of professional writing style.
5. Employ the acquired knowledge in classroom with reference to various social and professional spheres thus leading to a life-long learning process

Course Outcomes:

Students will be able to

1. Use English Language effectively in spoken and written forms.
2. Comprehend the given texts and respond appropriately.
3. Communicate confidently in various contexts and different cultures.
4. Acquire proficiency in English including reading and listening comprehension, writing and speaking skills.
5. Demonstrate the skills needed to participate in a conversation that builds knowledge collaboratively by listening carefully and respect others point of view

UNIT I

Where the Mind is without Fear poem by Rabindranath Tagore

Vocabulary Building: The Concept of Word Formation-- The Use of Prefixes and Suffixes.
Grammar: Identifying Common Errors in Writing with Reference to Articles and Prepositions.
Reading: Reading and Its Importance- Techniques for Effective Reading
Basic Writing Skills: Sentence Structures -Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation- Techniques for writing precisely – Paragraph writing – Types, Structures and Features of a Paragraph - Creating Coherence-Organizing Principles of Paragraphs in Documents.

UNIT II

The Last Leaf by O. Henry

Vocabulary: Synonyms and Antonyms.
Grammar: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.
Reading: Sub-skills of Reading- Skimming and Scanning
Writing: Note Making, Précis Writing, Writing an Abstract, Nature and Style of Sensible Writing- **Defining- Describing** Objects, Places and Events – **Classifying**- Providing Examples or Evidence

UNIT III

'Blue Jeans' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary: Acquaintance with Prefixes and Suffixes from Foreign Languages in English to form Derivatives-Words from Foreign Languages and their Use in English.

Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers-Verbs and Tenses.

Reading: Improving Comprehension Skills – Techniques for Good Comprehension
Writing: Format of a Formal Letter-Writing Formal Letters E.g. Letter of Complaint, Letter of Requisition, Use of phrases for formal and informal letter writing.

UNIT IV

'What Should You Be Eating' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.
Vocabulary: Standard Abbreviations in English and Phrasal Verbs
Grammar: Redundancies and Clichés in Oral and Written Communication.
Reading: Comprehension- Intensive Reading and Extensive Reading
Writing: Writing Introduction and Conclusion -Essay Writing-Types of Essays- Picture Composition

UNIT V

'How a Chinese Billionaire Built Her Fortune' from the prescribed textbook 'English for Engineers' published by Cambridge University Press. Vocabulary: Technical Vocabulary and their usage
Vocabulary: One Word Substitutes, Technical vocabulary and their usage
Grammar: Common Errors in English
Reading: Reading Comprehension-Exercises for Practice
Writing: Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Report.

Text Books:

1. Sudarshana, N.P. and Savitha, C. (2018). English for Engineers. Cambridge University Press.

References:

1. Swan, M. (2016). Practical English Usage. Oxford University Press.
2. Kumar, S and Lata, P. (2018). Communication Skills. Oxford University Press.
3. Wood, F.T. (2007). Remedial English Grammar. Macmillan.
4. Zinsser, William. (2001). On Writing Well. Harper Resource Book.
5. Hamp-Lyons, L. (2006). Study Writing. Cambridge University Press.
6. Exercises in Spoken English. Parts I –III. CIEFL, Hyderabad. Oxford University Press.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

DATA STRUCTURES

Course Code: GR20A1011 **L/T/P/C: 2/1/0/3**

I Year II Semester

Course Objectives:

1. To impart the basic concepts of data structures, algorithms and various searching and sorting techniques.
2. To demonstrate operations of linear data structures like stacks and queues.
3. To develop algorithms to implement operations on linked lists.
4. To demonstrate operations of non-linear data structures trees and graphs.
5. To realize the merits and demerits and applications of various data structures.

Course Outcomes:

After completion of the course, the student will be able to

1. Analyze basic concepts of data structures, computation complexity and implement various searching and sorting techniques.
2. Apply various operations on linear data structures Stack and Queue and their applications.
3. Develop algorithms for operations on linked lists and convert them to programs.
4. Apply various operations on non-linear data structure tree.
5. Implement various graph traversals techniques and idea of hashing

UNIT I

SORTING: Bubble sort, Insertion Sort, Selection Sort, Quick Sort, Merge Sort (Algorithms and implementation)

Algorithms: Analysis of algorithms, Basic concept of order of complexity, Asymptotic Notations: Big Oh notation, Omega notation, Theta notation, Little oh notation and Little omega notation.

UNIT II

STACKS: Introduction to Data Structures: Basic Stack Operations-pop, push, display, delete. Representation of a Stack, Implementation of stack using Arrays, Stack Applications: Recursion, Infix to postfix Transformation, Evaluating Post-fix Expressions

Queues: Basic Queue Operations-enqueue, dequeue, Representation of a Queue using array, Implementation of Queue Operations using arrays, Applications of Queues, Circular Queue.

UNIT III

LIST: Introduction, Dynamic memory allocation, single linked list, Advantages and disadvantages of Single linked list ,Single linked list VS Arrays, Representation of a linked list in memory, Operations-insertion, deletion, display, search, Implementation of stack, queue using linked list.Circular linked list, Double linked list.

UNIT IV

TREES: Basic tree concepts, Binary Trees: Properties, Representation of Binary Trees using arrays and linked lists, Operations on a Binary Search Tree, Binary Search Tree Traversals (recursive), Creation of binary tree from traversals.

UNIT V

Graphs: Definition, Basic Terminology, Representation of Graphs, Graph Traversal Techniques –Breadth First Traversal, Depth First Traversal. Introduction to Hashing (no implementation).

TEXT BOOKS:

1. Data Structures, 2/e, Richard F, Gilberg, Forouzan, Cengage
2. Data Structures and Algorithms, 2008, G. A. V. Pai, TMH

REFERENCE BOOKS:

1. Data Structure with C, Seymour Lipschutz, TMH
2. Classic Data Structures, 2/e, Debasis, Samanta, PHI, 2009
3.Fundamentals of Data Structure in C, 2/e, Horowitz, Sahni, Anderson Freed, UniversityPrees

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
APPLIED PHYSICS LAB

Course Code: GR20A1012 **L/T/P/C: 0/0/3/1.5**

I Year II Semester

Course Objectives:

1. Outline the characteristics of various semiconducting devices.
2. Identify the behavioral aspects of magnetic and electric fields.
3. Demonstrate the quantum nature of radiation through photoelectric effect.
4. Apply the theoretical concepts of Lasers and optical fibers in practical applications.
5. Recall the basic concepts of LCR and RC circuits through hands on experience.

Course Outcomes:

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

1. Compare the behavior of p-n junction diode, Solar cells and LED.
2. Analyze the behavior of magnetic and electric fields with the help of graphs.
3. Determine the work function of a material through photoelectric effect.
4. Asses the characteristics of Lasers and infer the losses in optical fibers.
5. Estimate the time constant of RC circuit and resonance phenomenon in LCR circuit.

LIST OF EXPERIMENTS:

1. Energy gap of P-N junction diode: To determine the energy gap of a semiconductor diode.
2. Solar Cell: To study the V-I Characteristics of solar cell.
3. Light emitting diode: Plot V-I and P-I characteristics of light emitting diode.
4. Stewart – Gee's experiment: Determination of magnetic field along the axis of a current carrying coil.
5. Hall effect: To determine Hall co-efficient of a given semiconductor.
6. Photoelectric effect: To determine work function of a given material and Planck's constant.
7. LASER: To study the V-I and P-I characteristics of LASER sources.
8. Optical fiber: To determine the bending losses of Optical fibers.
9. LCR Circuit: To determine the resonant frequency and Quality factor of LCR Circuit in series and parallel.
10. R-C Circuit: To determine the time constant of R-C circuit during charging and discharging.

Note: Any 8 experiments are to be performed.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGINEERING GRAPHICS

Course Code: GR20A1010 **L/T/P/C: 1/0/4/3**

I Year II Semester

Course Objectives:

1. Provide basic conventions and standards used in Engineering Graphics.
2. Impart knowledge on various Engineering curves and their significance.
3. To draw orthographic, sectional and pictorial views of a given solid.
4. To develop skills in three dimensional visualization of engineering components.
5. To inculcate CAD packages on modelling and drafting.

Course Outcomes:

1. Familiarize with BIS standards and conventions used in engineering graphics.
2. Draw various engineering curves e.g., ellipse, parabola, cycloids and involutes etc and construct various reduced scales e.g., plain, diagonal and Vernier scales.
3. Differentiate between first angle and third angle methods of projection and distinguish parallel and perspective projection.
4. Visualize different views like elevation and plan for a given line, plane figures or solid objects.
5. Apply drafting techniques and use 2D software e.g., AutoCAD to sketch 2D plane figures.

UNIT I

INTRODUCTION TO ENGINEERING GRAPHICS

Principles of Engineering Graphics and their Significance; **Conic Sections-** ellipse, parabola and hyperbola – General method only. **Cycloidal curves** –cycloid**,** epi-cycloid and hypo-cycloid; **Scales**– plain and diagonal.

UNIT II

PROJECTIONS OF POINTS, LINES AND PLANES

Introduction to principal planes of projections, **Projections of the points** located in same quadrant and different quadrants, **Projections of line** with its inclination to one reference plane and with two reference planes. True length and inclination with the reference planes.**Projections of regular planes** (polygons, circle and Square etc.,) with its inclination to one reference plane and with two reference planes, Concept of auxiliary plane method for projections of the plane.

UNIT III

PROJECTIONS OF SOLIDS (REGULAR AND RIGHT SOLIDS ONLY) - Classification of solids, Projections of solids (Cylinder, Cone, Pyramid and Prism) **Intersection of solids** – concept of lines of intersection and curves of intersection, intersection of solids (Prism Vs Prism and Cylinder Vs Cylinder) with their axes perpendicular to each other.

UNIT IV

SECTION OF SOLIDS

Sectional views of solids (Cylinder, Cone, Pyramid and Prism) and the true shape of the section, **Development of surfaces-** Development of surfaces of solids (Cylinder, Cone, Pyramid and Prism).

UNIT V

ORTHOGRAPHIC PROJECTIONS

Fundamental of projection along with classification, Projections from the pictorial view of the object on the principal planes for view from front, top and sides using first angle projection method and third angle projection method;

Isometric Projections and Isometric View: Principles of Isometric Projection – Isometric Scale – Isometric Views –Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts, Conversion of Isometric Views to Orthographic Views and Vice-versa –Conventions

Introduction to CAD: (**For Internal Evaluation Weightage only**): Introduction to CAD Software Package Commands.- Free Hand Sketches of 2D- Creation of 2D Sketches by CAD Package

Text /Reference Books:

1. Engineering Drawing by N.D.BHATT/CHAROTAR PUBLISHING HOUSE PVT LTD
2. Engineering Drawing by BasanthAgrawal/ C M Agrawal/ McGraw Hill Education
3. Engineering Drawing by K.VenuGopal/New Age Publications.
4. Engineering Graphics Essentials with AutoCAD 2018 Instruction by KirstiePlatenberg/SDC publications.
5. Computer Aided Engineering Drawing / K Balaveerareddy et al-CBS publishers
6. Engineering Graphics and Design by Kaushik Kumar / Apurbakumar Roy / Chikesh

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
DATA STRUCTURES LAB

Course Code: GR20A1018 **L/T/P/C: 0/0/2/1**
I Year II Semester

Course Objectives:

1. To work with sorting techniques.
2. To translate algorithms to programs.
3. To develop programs to implement basic data structures.
4. To develop modular, reusable and readable C Programs.
5. To implement tree and graph traversals.

Course Outcomes:

1. Formulate the algorithms for sorting problems and translate algorithms to a working and correct program.
2. Implement stack and queue data structures and their applications.
3. Interpret linked list concept to produce executable codes.
4. Develop working procedure on trees using structures, pointers and recursion.
5. Implements graph traversal techniques

TASK 1

a. Implement Bubble sort using a C program.
b. Implement Selection sort using a C program.
c. Implement Insertion Sort using a C program.

TASK 2

a. Implement Quick sort using a C program.
b. Implement Merge sort using a C program.

TASK 3

a. Implementation of Stack operations using arrays in C.
b. Implementation of Queue operations using arrays in C.

TASK 4

a. Write a c program to convert Infix to Postfix expression.
b. Write a c program to evaluate a Postfix expression

TASK 5

a. Implement Circular Queue operations in C.

TASK6

a. Implement Single Linked List operations in C.

TASK 7

a. Implement Circular Linked List operations in C.

TASK 8

a. Implement Double Linked List operations in C.

TASK 9

a. Implement the following operations on BinarySearch Tree.

i. Create
ii. Insert
iii. Search

TASK 10

a. Implement Preorder, Inorder and Postordertraversals of Binary Search Tree using recursion in C.

TASK 11

a. Implement Depth First Traversal on graphs inC.

TASK 12

a. Implement Breadth First Traversal on graphs in C.

Teaching methodologies:

- Power Point Presentations
- Tutorial Sheets
- Assignments

Text Books:

1. Data Structures, 2/e, Richard F, Gilberg ,Forouzan, Cengage
2. Data Structures and Algorithms, 2008, G. A.V.Pai, TMH

References:

1. Data Structure with C, Seymour Lipschutz, TMH
2. Classic Data Structures, 2/e, Debasis,Samanta,PHI,2009
3.Fundamentals of Data Structure in C, 2/e, Horowitz, Sahni, Anderson Freed, University Press

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB

Course Code: GR20A1015 L/T/P/C: 0/0/2/1

I Year II Semester

Course Objectives:

1. Facilitate computer-assisted multi-media instruction enabling individualized and independent language learning
2. Sensitize students to the nuances of English speech sounds, word accent, intonation rhythm and Neutralization of accent for intelligibility
3. Bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking
4. Improve the fluency of students in spoken English and neutralize their mother tongue influence
5. Train students to use language appropriately for public speaking and interviews

Course Outcomes:

Students will be able to

1. Interpret the role and importance of various forms of communication skills.
2. Demonstrate the skills needed to participate in a conversation that builds knowledge collaboratively by listening carefully and respect others point of view.
3. Utilize various media of verbal and non-verbal communication with reference to various professional contexts.
4. Recognise the need to work in teams with appropriate ethical, social and professional responsibilities.
5. Evaluate and use a neutral and correct form of English.

English Language and Communication Skills Lab (ELCS) shall have two parts:

a. Computer Assisted Language Learning (CALL) Lab
b. Interactive Communication Skills (ICS) Lab

Exercise I

CALL Lab:

Understand: Introduction to Phonetics – Speech Sounds – Consonant and Vowel Sounds.

Practice: Introduction to Phonetics– Speech Sounds – Vowels and Consonants.

ICS Lab:

Understand: Ice Breaking and JAM.

Practice: Ice-Breaking Activity and JAM Session. Introducing oneself and others

Exercise II

CALL Lab:

Understand: Structure of Syllables – Word Stress and Rhythm– Weak Forms and Strong Forms in Context.

Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms in Context.

ICS Lab:

Understand: Features of Good Conversation – Non-verbal Communication.

Practice: Situational Dialogues – Role-Play- Expressions in Various Situations –Making Requests and Seeking Permissions- Telephone Etiquette

Exercise III

CALL Lab: -Errors in Pronunciation-the Influence of Mother Tongue (MTI).

Understand: Intonation--Errors in Pronunciation-the Influence of Mother Tongue (MTI).

Practice: Common Indian Variants in Pronunciation – Differences in British and American Pronunciation.
ICS Lab:
Understand: Debates- argumentative vs persuasive - Public Speaking – Exposure to Structured Talks.
Practice: Debates- Making a Short Speech – Extempore.

Exercise IV
CALL Lab:
Understand: Listening Skills and its importance-– Purpose- Process- Types- Barriers of Listening.
Practice: Listening Comprehension Tests.
ICS Lab:
Understand: How to make informal and Formal Presentations
Practice: Collages / Poster Presentations-Power point presentations

Exercise V
CALL Lab:
Understand: Listening for General/Specific Details.
Practice: Listening Comprehension Tests.
ICS Lab:
Understand: Story Telling – Narrating a story – Using appropriate language elements
Practice: Weaving Stories

Minimum Requirement of infrastructural facilities for ELCS Lab:

1. **Computer Assisted Language Learning (CALL) Lab**
2. **Interactive Communication Skills (ICS) Lab**

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
LIFE SKILLS AND PERSONALITY DEVELOPMENT (LSPD)
Course Code: GR20A1021 **L/T/P/C: 2/0/0/1**
I Year II Semester

Course Objectives:
Students undergoing the course are expected to
1. Understand the concepts such as "Time Management", "Managing Information Overload" and "How to cope with Peer pressure".
2. Become familiar with concepts like how to master "English Language Skills" and "Communication skills".
3. Be thorough with the '"science behind personal health management and addictions" and stress management.
4. Appreciate the importance of cultivating good hobbies, need for forming good habits and discarding bad habits and how to hold difficult conversations in crisis situations.
5. Understand the importance of creative thinking, continuous and lifelong learning and cross culture sensitization. They will know what is meant by collaboration and team working.

Course Outcomes:
At the end of the course, student should be able to
1. Apply the concept of Time Management to his own day to day life. They will also learn to cope with Information Overload, which has become a serious problem for the digital generation. They will be in a position to withstand harmful peer pressure, and steer themselves towards attaining their own objectives in the four years time they spend in the college.
2. Apart from understanding the importance of English language skills in a globalized world, they will learn the methodologies as to how they can master English Language skills. They will become familiar with the communication skills and etiquette, body language, non-verbal communication and they will start applying these concepts in their day to day life. This will help them to become thorough professionals in their career.
3. Large number of students are ignorant about the need for personal health management and the need to stay away from addictions. After this course, they will get a complete understanding of the biological basis behind these concepts. This will help them to maintain a robust health trough out their life and it will also keep them away from addictions like drug addiction, alcohol addiction & video games addiction. They will learn the techniques of stress management as well.
4. They would start cultivating some good hobbies which will help them to maintain ideal work-life balance throughout their life. The students would start discarding bad habits & will start picking up good habits. Further, they will learn the techniques of holding difficult conversations and negotiations, which is an important skill set in the 21st century world.
5. They will develop the aptitude for finding creative solutions to problems and they will come to realize the importance of continuous and lifelong learning in a fast changing technological landscape. They will appreciate why collaboration and team working skills are important for success in a modern world.

UNIT I
Introduction to life skills: Why life skills are important for students. Highly competitive job market; companies test not only Engineering knowledge but also life skills; Fast paced changes in technologies; proliferation of electronic gadgets and harmful online content; Even to perform well in B.Tech, students need basic life skills.
Time management: What is meant by time management; Impulsive behaviorVs goal directive behavior; The concept of time log; What are the usual time wasters for students; How to

minimize time wasters.

Information overload and how to cope with it: ICT revolution; proliferation of electronic media; Exponential growth in online content; Impact of information overload on human brain; How information overload interferes with student learning.

UNIT II

How to master English Language Skills: Importance of English in a globalized world; For any engineer, the whole world is his job market; Companies conduct exams, interviews & group discussions in English; Interdependence of communication skills & language skills; Entrance exams to foreign universities test English language skills; What are the various language skills; Practical strategies to improve one's English language skills.

Communication Skills: What is communication; Various types of communication's; Why communication skills are important in the modern world; Importance given to communication by companies during recruitment; Barriers to effective communication; Practical strategies to improve one's communication skills.

Body language, Etiquette and Non-Verbal communication: What is etiquette, grooming, attire & body language? Why these are important in the modern world; What kind of etiquette is expected by companies; How success in career & life is interlinked to etiquette, grooming, attire & body language; practical steps to improve one's etiquette, grooming, attire & body language.

UNIT III

Science behind personal health management: Widespread ignorance in society on health issues; WHO definition of Health; Human evolution; Hunting & Gathering lifestyle; Importance of physical work for human body & mind; Dangers of sedentary lifestyle; Germ diseases Vs Lifestyle diseases; How to integrate physical exercise into daily life.

Science behind Addictions: What is an addiction? Neurology and hormonal basics of addictive behavior; How addictions are formed; Harmful effects of addictions on physical health & mental health; How to recognize the addictions in oneself; How to come out of addictions.

Stress management: What is stress; Various stressors faced by a student; Fight & Flight response of humans; Harmful effects of chronic stress; Symptoms of poor coping skills of stress; Stress & Psychiatric problems; Easy coping strategies for stress.

UNIT IV

Need for cultivating good hobbies: Why hobbies are important for maintaining work-life balance; how hobbies help in maintaining good physical and mental health, what are various hobbies.

What is habit? Why it is so important. How to cultivate good habits & discard bad habits: Why habits are critical for successful life; How habits forms; How to analyze one's own habits; How to recognize useless & harmful habits; How to cultivate &Sustain useful habits; Difference between hobby & habit.

Peer pressure and how to cope with it: Human being is a social animal; Physical pain & social pain; How to be aware of harmful social pressure; Role of prefrontal cortex in judgment and decision making; why teenagers are vulnerable to peer pressure; strategies to overcome harmful peer pressure.

UNIT V

Continuous & lifelong learning: Accelerated change in technology landscape; shorter & shorter life cycles of technologies; Need for continuous learning ; Engineering knowledge alone is not enough to solve the real-life problems.

Cross culture sensitization: What is culture; why there are different cultures; How to understand culture; Today all workplaces are multi-cultural; How stereotypes develop in the

mind about other cultures; Dangers of stereotypes & culture hatred prevailing society; How to overcome the culture prejudices.

Collaboration & team working skills. Why collaboration is important to succeed in one's own career, Today's workplace is all about teams, what is team working, what are various team working skills, how to be a good team member.

Textbooks:

1. The story of the human body by Daniel E Lieberman, Published by Pantheon Books, 2013
2. Spark by Dr. John J Ratey, *Publisher* Little Brown *Spark* 01-01-2013.
3. Creative thinking by Edward De Bono, Publisher: Penguin UK (25 October 2016).

Reference:

1. The power of positive confrontation by Barbara Pachter; Publisher: Da Capo Lifelong Books (November 28, 1999) ...
2. Habit by Charles Duhigg, Publisher: Random House Trade Paperbacks,2012
3. Communication skills for engineers and scientists by Sangeetha Sharma and Binod Mishra, PHI Learning, 2009.
4. Time management by Brian Tracy, Publisher: AMACOM, 2014

II Year
I Semester

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ELECTRICAL CIRCUIT ANALYSIS

Course Code: GR20A2023 **L/T/P/C:2/1/0/3**

II Year I Semester

Course Objectives:

1. Explain the various properties of Fourier series and Fourier transforms.
2. Simplify the transient state analysis of a circuit.
3. Evaluate the steady state analysis(three-phase) and dot convention of a given circuit.
4. Apply the Laplace Transforms to electrical circuits.
5. Develop the network parameters of the circuits.

Course Outcomes:

1. Apply Fourier Series, network theorems for the analysis of electrical circuits.
2. Develop the transient response of electrical circuits.
3. Analyze three-phase and mutually coupled circuits.
4. Solve electrical circuits using Laplace and Inverse Laplace transform and mark poles and zeros.
5. Simplify network by two port parameters.

UNIT I

FOURIER SERIES AND FOURIER TRANSFORM

Representation of continuous-time periodic signals by Fourier series; Dirichlet's conditions; Properties of Fourier series, Parseval's theorem; Trigonometric and Exponential Fourier series; Complex Fourier spectrum; Fourier transform via Fourier series; Fourier transform of periodic and aperiodic signals; Convergence of Fourier transform; Properties of Fourier transforms, Parseval's theorem; Fourier transforms involving impulse function and Signum function; Introduction to Hilbert Transform.

UNIT II

NETWORK THEOREMS

Maximum Power Transfer theorem, Reciprocity theorem, Millman theorem, Compensation theorem, Telligence Theorem, Concept of duality and dual networks.

Solution of First and Second order networks

Solution of first and second order differential equations for Series and parallel RL, RC, RLC circuits, initial and final conditions in network elements, forced and free response, time constants, steady state and transient state response.

UNIT III

THREE PHASE CIRCUITS AND COUPLED CIRCUITS

Three-phase circuits, star-star, delta-delta analysis of balanced circuits, unbalanced analysis of three phase 3 wire, 4 wire, delta circuits, measurement of power by three and two watt meters, measurement of reactive power by single wattmeter, Mutual coupled circuits, Dot Convention in coupled circuits.

UNIT IV

ELECTRICAL CIRCUIT ANALYSIS USING LAPLACE TRANSFORMS

Review of Laplace Transform, Analysis of electrical circuits using Laplace Transform for standard inputs, convolution integral, Inverse Laplace Transform, transformed network with initial conditions, Transfer function representation, Poles and Zeros.

UNIT V

TWO PORT NETWORKS

Two Port Networks, terminal pairs, relationship of two port variables, impedance, admittance,

hybrid and transmission parameters, condition for symmetry and reciprocity, interrelationship between various parameters, interconnections of two port networks (series, parallel and cascade)

Text Books

1. W. H. Hayt and J. E. Kemmerly, “Engineering Circuit Analysis”, McGraw Hill Education, 2013.
2. C. K. Alexander and M. N. O. Sadiku, “Fundamentals of Electric Circuits”, McGraw Hill Education, 2004.
3. M. E. Van Valkenburg, “Network Analysis”, Prentice Hall, 2006.

References

1. Circuit Theory (Analysis and Synthesis) by A.Chakrabarti-Dhanpat Rai & Co.
2. Network Theory by N.C.Jagan and C.Lakshminarayana, BS Publications.
3. K. V. V. Murthy and M. S. Kamath, “Basic Circuit Analysis”, Jaico Publishers, 1999.
4. D. Roy Choudhury, “Networks and Systems”, New Age International Publications, 1998.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
PRINCIPLES OF ANALOG ELECTRONICS

Course Code: GR20A2024 **L/T/P/C: 3/0/0/3**
II Year I Semester

Course Objectives:

1. To understand the diode principle, to analyze applications
2. To comprehend the principle and characteristics of BJT, MOSFETcircuits
3. To emphasis the working of OperationalAmplifiers
4. To study the linear & non-linear applications ofOp-Amps
5. To study the functioning of Op-Amp basedDigital to analog and Analog to digital converters

Course Outcomes:

1. Analyze the diode principle and analyse rectifier, clipping and clamping circuits.
2. Understand the characteristics of BJT, MOSFET transistors.
3. Explain the various Op-Amp circuits in different applications.
4. Define the principle and operation of Waveform generators and Multivibrator circuits.
5. Functioning of Op-Amp basedDigital to analog and Analog to digital converters.

UNIT I
DIODE CIRCUITS

P-N junction diode, biasing, V-I characteristics of a diode, diode equivalent circuits, static resistance, dynamic resistance, diffusion capacitance and transition capacitance. Breakdown mechanisms in diode, Zener breakdown, & Avalanche breakdown. Working of Half-wave and full-wave rectifiers, Clipping, types of clipping circuits, series. Clipper, Shunt Clipper, Clamping, types of clamping circuits

UNIT II
BJT AND MOSFET CIRCUITS

Structure, Principle and Operation of BJT, Common Emitter, Common Base and Common Collector Configurations, Input characteristics and Output Characteristics of a BJT; BJT as a switch, and amplifier, Operating point, DC & AC load lines, Transistor Hybrid parameter model, Common-emitter, common-base and common collector amplifiers, small-signal model, Small signal equivalent circuits, Biasing Circuits : Fixed Bias, Collector to Base bias, Self Biascircuits.MOSFET Structure, principle, enhancement mode and depletion mode devices, drain current - characteristics.

UNIT III
OPERATIONAL AMPLIFIERS

Introduction to Operational Amplifier, block diagram of operational amplifier, ideal characteristics of op-amp, practical op-amp, idealized analysis of op-amp circuits. Inverting , non-inverting amplifier and Voltage Follower Circuit.

Non-ideal characteristics in an op-amp Output offset voltage, input bias current, input offset current, thermal drift, slew rate, gain bandwidth product.

UNIT IV
LINEAR & NONLINEAR APPLICATIONS OF OP-AMP

Inverting summing amplifier, Non-Inverting Summing amplifier, differential amplifier, instrumentation amplifier, integrator, differentiator, Oscillators: Basic principle of an Oscillator, RC Phase shift and Wein bridge Oscillators, Schmitt Trigger Circuit, Zero Crossing Detector, Square-wave(AstableMuitivibrator) and triangular-wave generators. Precision rectifier, peak detector, Monostable Muitivibrator.

UNIT V

DIGITAL TO ANALOG AND ANALOG TO DIGITAL CONVERTERS

Digital to Analog converters: Weighted resistor D/A converter, R-2R Ladder D/A Converter, Specifications for D/A converters.Analog to digital converters: Sample and hold circuit, Quantization and encoding, Parallel comparator A/D converter, Successive approximation A/D converter, Counter Type A/D converter, Specifications of A/D converters.

Text/References Books:

1. S. Sedra and K. C. Smith, "Microelectronic Circuits", New York, Oxford University Press,1998.
2. D Roy Choudhury, Shail B Jain, "Linear Integrated Circuits", New Age International Pvt. Ltd., FourthEdition.
3. J. V. Wait, L. P. Huelsman and G. A. Korn, "Introduction to Operational Amplifier theory and applications", McGraw Hill U. S.,1992.
4. P. R. Gray, R. G. Meyer and S. Lewis, "Analysis and Design of Analog Integrated Circuits", John Wiley & Sons,2001.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
DC MACHINES AND TRANSFORMERS
Course Code: GR20A2025 L/T/P/C: 3/0/0/3
II Year I Semester

Course Objectives:

1. Knowledge on the concepts of magnetic circuits and principals of generators and motors.
2. Explain the operation of dc machines.
3. Analyse the differences in operation of different dc machine configurations.
4. Understanding the testing of different DC machines
5. Analyse single phase and three phase transformers circuits.

Course Outcomes:

1. Analyze linear and non-linear magnetic circuits
2.Summarize concepts of generators and motors
3.Select the appropriate DC generator or DC motor for the given application
4.Explain the different types of materials used in transformers.
5. Distinguish the performance of Transformers.

UNIT I
ELECTROMECHANICAL ENERGY CONVERSIONS
Review of magnetic circuits - MMF, flux, reluctance, inductance; B-H curve of magnetic materials; flux-linkage vs current characteristic of magnetic circuits; linear and nonlinear magnetic circuits; energy stored in the magnetic circuit; force as a partial derivative of stored energy with respect to position of a moving element; torque as a partial derivative of stored energy with respect to angular position of a rotating element. Examples galvanometer coil, relay contact, lifting magnet, rotating element with eccentricity or saliency

UNIT II
DC MACHINES
Basic construction of a DC machine, magnetic structure - stator yoke, stator poles, pole-faces or shoes, air gap and armature core, visualization of magnetic field produced by the field winding excitation with armature winding open, air gap flux density distribution, flux per pole, induced EMF in an armature coil. Armature winding and commutation – Elementary armature coil and commutator, lap and wave windings, construction of commutator, linear commutation Derivation of back EMF equation, armature MMF wave, derivation of torque equation, armature reaction, air gap flux density distribution with armature reaction.

UNIT III
DC MACHINE - MOTORING AND GENERATION
Armature circuit equation for motoring and generation, Types of field excitations – separately excited, self excited. Open circuit characteristic of separately excited DC generator, back EMF with armature reaction, voltage build-up in a shunt generator, critical field resistance and critical speed. Significance of back EMF, V-I characteristics and torque-speed characteristics of separately excited and self excited. Speed control methods, Losses, load testing and testing of DC machines. Brushless Dc Motor.

UNIT IV
TRANSFORMERS
Principle, construction and operation of single-phase transformers, equivalent circuit, phasor diagram, voltage regulation, losses and efficiency Testing - open circuit and short circuit tests, polarity test, back-to-back test, separation of hysteresis and eddy current losses. Autotransformers - construction, principle, applications and comparison with two winding

transformer, Magnetizing current, effect of nonlinear B-H curve of magnetic core material, harmonics in magnetization current.

UNIT V

3-PHASE TRANSFORMERS

Three-phase transformer - construction, types of connection and their comparative features, Parallel operation of single-phase and three-phase transformers, Phase conversion - Scott connection, three-phase to six-phase conversion, Tap-changing transformers - No-load and on-load tap-changing of transformers, Three-winding transformers. Cooling of transformers.

Text Books:

1. " Principles of Electric Machines and Power Electronics " P C SEN Second Edition.
2. P. S. Bimbhra, “Electrical Machinery”, Khanna Publishers, 2011.
3. I.J. Nagrath and D. P. Kothari, “Electric Machines”, McGraw Hill Education, 2010.

Reference Books:

1. A.E. Clayton and N. N. Hancock, “Performance and design of DC machines”, CBS Publishers, 2004.
2. M. G. Say, “Performance and design of AC machines”, CBS Publishers, 2002

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ELECTROMAGNETIC FIELDS

Course Code: GR20A2026 **L/T/P/C: 3/0/0/3**

II Year I Semester

Course Objectives:

1. Apply vector Calculus and different coordinates systems for Electro and Magnetic systems.
2. Understand the knowledge of Electro field theory for Point, Line, Surface Charge.
3. Understand the concept of conductors, dielectrics, inductance, capacitance.
4. Ability to do Calculations of MFI for Line, Surface Conductors with different Shapes.
5. Ability of mathematical representation and analysis of EM waves at media interfaces.

Course Outcomes:

1. Solve the problems in different EM fields using Different Coordinates Systems.
2. Evaluate the Electric Field Density and Intensity for Different Charges.
3. Understand the Electromagnetic Relation using Maxwell Formulae.
4. Analyze circuits using Conductors in Time Varying Fields.
5. Analyze and solve problems of EM wave propagation at media interfaces.

UNIT I

STATIC ELECTRIC FIELD

Coulomb's law- Electric Field Intensity-Electrical Field due to Point charge, Line, Surface and Volume Charge distributions. Gauss Law and its Applications. Absolute Electric potential-Potential difference-Calculation of potential differences for different configurations. Electric Dipole- Electrostatic Energy density.

UNIT II

CONDUCTORS

Dielectrics and Capacitance Current and current density- Ohms Law in Point form- Continuity of current- Boundary conditions of perfect dielectric materials. Permittivity of dielectric materials- Capacitance-Capacitance of a two-wire line- Poisson's equation- Laplace's equation- Solution of Laplace and Poisson's equation- Application of Laplace's and Poisson's equations.

UNIT III

STATIC MAGNETIC FIELDS- Biot-Savart Law- Ampere Law-Magnetic flux and Magnetic Flux Density- Scalar and Vector Magnetic Potentials. Steady Magnetic Fields produced by current carrying conductors. Magnetic Forces-Materials and Inductance Force ona moving charge-Force on a differential current element- Force between differential current elements-Nature of magnetic materials- Magnetization and Permeability- magnetic boundaryconditions-Magnetic Circuits- inductances and mutual inductances.

UNIT IV

TIME VARYING FIELDS and Maxwell's Equations Faraday's law for Electromagnetic induction- Displacement current- Point form of Maxwell's equation- Integral form of Maxwell's equations- Motional Electromotive forces, Boundary Conditions.

UNIT V

WAVE EQUATIONS AND SOLUTIONS, Time-harmonic fields, Plane waves in lossless media, Plane waves in lossy media (low-less dielectrics and good conductors), Group Velocity, Electromagnetic power flow and poynting vector, Normal incidence at a plane conducting boundary, Normal incidence at a plane dielectric boundary.

Text/Reference Books:

1. Matthew N.O.Sadiku, "Principles of Electromagnetics", Oxford University Publication, 2014.
2. W.Hayt, John A.Buck "Engineering Electromagnetics", McGraw Hill Education, 2012.
3. Pramanik, "Electromagnetism-Problems with solution", Prentice Hall India, 2012.
4. G. W. Carter, "The electromagnetic field in its engineering aspects", Longmans, 1954.
5. Pramanik, "Electromagnetism - Theory and applications", PHI Learning Pvt. Ltd, New Delhi, 2009

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

POWER GENERATION AND TRANSMISSION

Course Code: GR20A2033 **L/T/P/C: 3/0/0/3**

II Year I Semester

Course Objectives: -

The objective of this course is to provide the student:

1. Basic Concepts of Power Generation resources
2. Knowledge about economics of power generation
3. With various power transmission lines models and their performance
4. Mechanical design of Power Transmission lines and concept of Corona
5. Study of overhead lines insulators and cables

Course Outcomes:

At the end of this course, students able to

1. Explainthe basic concepts of Power Generation.
2. Calculate economics of power generation.
3. Recall various power system components, line models and its performance.
4. Outline the different concepts related to mechanical design of transmission lines and corona
5. Demonstrate on overhead lines insulator and cables

UNIT-I: GENERATION OF ELECTRIC POWER

Conventional Sources (Qualitative): Hydro station, Steam Power Plant, Nuclear Power Plant and Gas Turbine Plant. Non-Conventional Sources (Qualitative): Ocean Energy, Tidal Energy, Wave Energy, wind Energy, Fuel Cells, and Solar Energy, Cogeneration and energy conservation and storage.

UNIT-II: ECONOMICS OF POWER GENERATION

Introduction, definitions of connected load, maximum demand, demand factor, load factor, diversity factor, Load duration curve, number and size of generator units. Base load and peak load plants. Cost of electrical energy-fixed cost, running cost, Tariff on charge to customer.

UNIT-III: TRANSMISSION LINE PARAMETERS AND PERFORMANCE

Line conductors, inductance and capacitance of single phase and three phase lines with symmetrical and unsymmetrical spacing, Composite conductors-transposition, bundled conductors, and effect of earth on capacitance. Representation of lines, short transmission lines, medium length lines, nominal T and PI- representations, long transmission lines. The equivalent circuit representation of a long Line, A, B, C, D constants, Ferranti Effect. Sending end and receiving end power circle diagrams.

UNIT-IV: MECHANICAL DESIGN OF OVERHEAD TRANSMISSION LINES AND CORONA

Tension and sag calculations, Factors affecting Sag, Sag template, Stringing charts, Vibrations and vibration damper.

Corona: Introduction, disruptive critical voltage, corona loss, Factors affecting corona loss and methods of reducing corona loss, Disadvantages of corona, interference between power and Communication lines.

UNIT-V: OVERHEAD LINE INSULATORS & INSULATED CABLES

Introduction, types of insulators, Potential distribution over a string of suspension insulators, Methods of equalizing the potential, testing of insulators. Introduction, insulation, insulating

materials,Under-Ground Cables: Types of Cables, grading of cables, insulation resistance of a cable, Capacitance of a single core and three core cables, Overhead lines versus underground cables, types of cables**.**

TEXTBOOKS

1. A Text Book on Power Systems Engineering by Sony, Gupta, Bhatnagar and Chakrabarti, Dhanapatrai& Co.
2. C.L. Wadhwa Generation, Distribution and Utilization of Electrical Energy, Second Edition, New AgeInternational,2009
3. C.L.Wadhwa " Electrical Power systems:New age Publishers 7th Edition 2017

References:

1. H.Cotton& H. Barber-The Transmission and Distribution of Electrical Energy, Third Edition, ELBS,B.I.Pub.,1985
2. Power generation technologies by Paul Breeze, Third Edition, Elsevier Publishers 2019

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
JAVA PROGRAMMING FOR ENGINEERS

Course Code: GR20A2028 **L/T/P/C: 2/0/0/2**
II Year I Semester

Course Objectives:

1. The Java programming language: its syntax, idioms, patterns, and styles.
2. Object oriented concepts in Java and apply for solving the problems.
3. How exception handling and multithreading makes Java robust
4. Explore java Standard API library such as io, util, applet, awt
5. Building of applications using Applets and Swings

Course Outcomes: Upon the successful completion of the course, the student will be able to:

1. Identify the model of Object-Oriented Programming: Abstract data types, Encapsulation, Inheritance and Polymorphism
2. Summarize the fundamental features like Interfaces, Exceptions and Collections
3. List the advantages of Multi-threading.
4. Design interactive programs using Applets, AWT and Swings
5. Develop real time applications using the features of Java

UNIT I

INTRODUCTION TO OOP: Introduction, Need of object-oriented programming, principles of object-oriented languages, Applications of OOP, history of JAVA, Java Virtual Machine, Java features, Program structures, Installation of JDK.

UNIT II

PROGRAMMING CONSTRUCTS: Variables, Primitive data types, Identifiers- Naming Conventions, Keywords, Literals, Operators- Binary, Unary and Ternary, Expressions, Primitive Type conversion and casting, flow of control- branching, conditional, loops.
Classes and Objects- Classes, Objects, Creating objects, methods, constructors- constructor overloading, cleaning up unused objects- Garbage collector, class variable and methods- static keyword, this keyword, arrays, Command line arguments.

UNIT III

INHERITANCE: Types of Inheritance, Deriving classes using extends keyword, method overloading, super keyword, final keyword, abstract class.
Interfaces: Interface, Extending interface, interface Vs Abstract classes.

UNIT IV

PACKAGES- Creating Packages, using Packages, Access protection, java I/O package. Exploring java.io and String classes.
Exceptions - Introduction, Exception handling techniques - try, catch, throw, throws, finally block, user defined Exception.

UNIT V

MULTITHREADING:java.lang. Thread, the main Thread, creation of new Threads, Thread priority, multiThreading- using isalive() and join(), Synchronization, suspending and resuming Threads, Communication between Threads.

Text/Reference Books:

1. Java: The Complete Reference, 10th edition, Herbert Schildt, McgrawHill.
2. Java Fundamentals: A Comprehensive Introduction, Herbert Schildt and Dale Skrien, TMH.
3. Java for Programming, P.J.DietelPearsonEducation
4. Object Oriented Programming through Java, P.Radha Krishna, UniversitiesPress.
5. Thinking in Java, Bruce Eckel, PearsonEducation
6. Programming in Java, S.Malhotra and S.Choudhary, Oxford University Press

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
PRINCIPLES OF ANALOG ELECTRONICS LAB
Course Code: GR20A2029 L/T/P/C: 0/0/3/1.5
II Year I Semester

Course Objectives: After completion of this course, Students must be able to

1. Classify the types of active components.
2. Describe the operations of Diode, BJT and MOSFET
3. Analyse different Configuration types of Operational Amplifier.
4. Implement the mathematical operation on signals.
5. Make conversant with Digital to Analog and Analog to Digital Converters

Course Outcomes: After completion of this course, Students will be able to

1. Recall types of active components.
2. Draw characteristics of Diode, BJT and MOSFET
3. Design Operational Amplifiers as inverting and non-inverting amplifier
4. Apply mathematical operation on signals using Operational Amplifier
5. Explain operation of Analog to Digital Conversion (ADC) and Digital to Analog Conversion (DAC)

LIST OF EXPERIMENTS:

1. Obtain characteristics of PN junction Diode i) Forward biased ii) Reverse Biased.
2. Design half wave rectifier circuit using diodes and draw Input and output graphs.
3. Design Clippers and Clampers using Diode
4. Obtain input and output characteristics of CE Configuration of BJT
5. Obtain input and output characteristics of CB Configuration of BJT
6. Obtain drain current characteristics for MOSFET
7. Design and implement Operational Amplifier as Inverting,
8. Design and implement Operational Amplifier as Non-Inverting Amplifier
9. Design and implement Subtractor
10. Design and implement Operational Amplifier as an Integrator
11. Design and implement Operational Amplifier as a Differentiator
12. Design and implement a precision rectifier using Operational Amplifier
13. Execute Analog to Digital Converters
14. Execute Digital to Analog Converters

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
DC MACHINES AND TRANSFORMERS LAB

Course Code: GR20A2030 **L/T/P/C: 0/0/3/1.5**

II Year I Semester

Course Objectives:

1. Strong background in different types of DC generators, Motors and Transformers, their construction, operation and applications
2. Understanding the various lab experiments connected with dc generators and there by achieve the design concepts.
3. Knowledge on application of dc motor concepts with respect to the performance characteristics of dc motors.
4. Knowledge on application of dc generator concepts with respect to the performance characteristics of dc generators.
5. Concept of back to back connection of a transformer and three phase to two phase conversion by Scott connection.

Course Outcomes:

1. Identify various parts of electrical DC machines and Transformers.
2. Develop knowledge helpful for application of DC machines and Transformers.
3. Explain and control of different DC Machines.
4. Distinguish the performance of different machines using different testing methods.
5. Determine the parameters of equivalent circuit of single phase transformer and performance.

LIST OF EXPERIMENTS

Task-1: Swinburne's test and Speed Control of a D.C Shunt Motor
Task-2: Brake Test on a DC Shunt Motor
Task-3: Brake Test on a DC Compound Motor
Task-4: Open Circuit Characteristics and Load test on a D.C. Shunt Generator
Task-5: Load test on a D.C. Series Generator
Task-6: Load test on D.C. Compound Generator
Task-7: Hopkinson Test
Task-8: Fields Test
Task-9: Separation of Core Losses of DC machine
Task-10: OC, SC and Load tests on single phase transformer.
Task-11: Sumpner's test.
Task-12: Scott connection.

In addition to the above experiments, at least any two of the following experiments are required to be conducted from the following list

Task-13: Heat run test on transformer.
Task-14: Separation of core losses of a single phase transformer
Task-15: Hysteresis loss determination. Parallel Operation of Transformers.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
CONSTITUTION OF INDIA

Course Code: GR20A2003 **L/T/P/C : 2/0/0/2**
II Year I Semester

Course objectives:

1. To create an awareness about the Constitution of India, Fundamental Rights and Duties, Directive Principles
2. To Learn the role of Prime Minister, President and the Council of Ministers and the State Legislature
3. To learn the divisions of executive, legislative and judiciary and so on.
4. To know how a municipal office, panchayat office etc. works
5. To understand the importance and role of Election Commission Functions.

Course Outcomes:

1. Students will be able to know the importance of Constitution and Government
2. Students will be able to become Good Citizens and know their fundamental rights, duties and principles.
3. Students will learn about the role of PM, President, Council of Ministers etc and it will help students learn about Local Administration.
4. The Students understand the importance of Election Commission and the Students will become aware of how a Country and State are run in Democracy.
5. They will know about Secularism, Federalism, Democracy, Liberty, Freedom of Expression, Special Status of States etc.,

UNIT I

INTRODUCTION: Constitution' meaning of the term, Indian Constitution: Sources and constitutional history, Features: Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy

UNIT II

UNION GOVERNMENT AND ITS ADMINISTRATION: Structure of the Indian Union: Federalism, Centre State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha

UNIT III

STATE GOVERNMENT AND ITS ADMINISTRATION: Governor: Role and Position, CM and Council of ministers, State Secretariat: Organization, Structure and Functions

UNIT IV

LOCAL ADMINISTRATION: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation, Pachayati raj: Introduction, PRI: ZillaPachayat, Elected officials and their roles, CEO ZillaPachayat: Position and role, Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials.

UNIT V

ELECTION COMMISSION

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

REFERENCE BOOKS :

1. 'Indian Polity' by Laxmikanth 5th Edition, McGraw Hill Edition.
2. Indian Constitution by Subhash C. Kashyap, Vision Books Publisher
3. 'Introduction to Indian Constitution' by D.D. Basu, 21st Edition, LexisNexis Publisher
4. 'Indian Administration by Avasthiand Avasthi-by lakshminarainagarwalpublication

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

VALUE ETHICS AND GENDER CULTURE

Code: GR20A2002 **L/T/P/C :2/0/0/2**

II Year I Semester

Course Objectives:

1. To understand about the importance of ethical values
2. To understand the significance of human conduct and self-development
3. To enable students to imbibe and internalize the value and Ethical behaviour in personal and professional lives.
4. To provide a critical perspective on the socialization of men and women.
5. To create an awareness on gender violence and condemn it.

Course Outcomes

1. To enable the student to understand the core values that shapes the ethical behaviour. And Student will be able to realize the significance of ethical human conduct and self-development.
2. Students will be able to inculcate positive thinking, dignity of labour and religious tolerance.
3. The students will learn the rights and responsibilities as an employee and a team member.
4. Students will attain a finger grasp of how gender discrimination works in our society and how to counter it.
5. Students will develop a better understanding on issues related to gender and Empowering students to understand and respond to gender violence.

UNIT I

VALUES AND SELF-DEVELOPMENT

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

- A Case study on values and self-development

UNIT II

PERSONALITY AND BEHAVIOUR DEVELOPMENT

positive thinking, punctuality, avoiding fault finding, Free from anger, Dignity of labour, religious tolerance, Aware of self-destructive habits.

- A Case study on Personality

Unit III

INTRODUCTION TO PROFESSIONAL ETHICS

Basic Concepts, Governing Ethics, Personal & Professional Ethics, Ethical Dilemmas, Life Skills, Emotional Intelligence, Thoughts of Ethics, Value Education, Dimensions of Ethics, Profession and professionalism, Professional Associations, Professional Risks, Professional Accountabilities, Professional Success, Ethics and Profession.

- A Case study on professional ethics

Unit IV

INTRODUCTION TO GENDER

Definition of Gender, Basic Gender Concepts and Terminology, Attitudes towards Gender, Social Construction of Gender.

- A Case study/ video discussion on attitudes towards gender

UNIT V

GENDER-BASED VIOLENCE

The concept of violence, Types of Gender-based violence, the relationship between gender, development and violence, Gender-based violence from a human rights perspective.

❖ A Case study/ video discussion on gender-based violence in view of human rights

TEXTBOOKS

1. Professional Ethics: R. Subramanian, Oxford University Press, 2015.
2. Ethics in Engineering Practice & Research, Caroline Whit beck, 2e, Cambridge University Press 2015.
3. A Bilingual Textbook on Gender" written by A. Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, GoguShyamala, Deepa Sreenivas and Susie Tharu and published by Telugu Akademi, Hyderabad,Telangana State in the year 2015.

REFERENCE BOOKS

1. Menon, Nivedita. Seeing like a Feminist. New Delhi: Zubaan-Penguin Books, 2012
2. Abdulali Sohaila. "I Fought For My Life…and Won."Available online at: http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdulal/
3. Engineering Ethics, Concepts Cases: Charles E Harris Jr., Michael S Pritchard, Michael J Rabins, 4e , Cengage learning, 2015.
4. Business Ethics concepts & Cases: Manuel G Velasquez, 6e, PHI, 2008

II YEAR
II SEMESTER

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

PROBABILITY AND STATISTICS

Course Code: GR20A2005 **L/T/P/C: 3/0/0/3**

II Year II Semester

Course Objectives

1. Interpret the measures of central tendency and dispersion.
2. Distinguish between explanatory and response variables and analyze data using correlation and regression.
3. Apply various probability distributions.
4. Apply tests of hypothesis.
5. Employ basic analysis of time series data.

Course Outcomes

The expected outcomes of the Course are:

1. Compute and interpret descriptive statistics.
2. Evaluate random processes which occur in engineering applications governed by the Binomial, Poisson, Normal and Exponential distributions.
3. Fit the models using Regression Analysis.
4. Apply Inferential Statistics to make predictions or judgments about the population from which the sample data is drawn.
5. Interpret Time series data.

UNIT I

RANDOM VARIABLES, BASIC STATISTICS, CORRELATION AND REGRESSION

Notion of Randomness, Random Experiment, Random variables – Discrete and Continuous, Probability mass function and density function, constants of r.v.s (Mean, Variance, Monents about mean), Concept of Bivariate distributions and Covariance.

Measures of central tendency and moments.

Correlation : Karl-Pearson's correlation coefficient and Spearman's Rank correlation, Statements of their properties and problems, Simple and Multiple Linear Regression (three variables case only), Statements of properties of Regression coefficients and problems.

UNIT II

PROBABILITY DISTRIBUTIONS

Discrete Distributions: Binomial and Poisson distributions - definition, real life examples, Statements of their Mean and Variance, related problems, evaluation of statistical parameters.

Continuous Distributions: Normal, Exponential and Gamma distributions - definition, real life examples, Statements of their Mean and Variance and related problems, evaluation of statistical parameters for Normal distribution.

UNIT III

TESTING OF HYPOTHESIS-1 (LARGE SAMPLE)

Concept of Sampling distribution and Standard error, tests for single proportion, difference of proportions, single mean, difference of means and Chi-square test for independence of attributes. Estimation of confidence interval for population mean and population proportions.

UNIT IV

TESTING OF HYPOTHESIS-2 (SMALL SAMPLE)

Tests for single mean, difference of means, Population variance, ratio of variances, ANOVA 1-way and 2-way. Estimation of confidence interval for Population mean.

UNIT V

TIME SERIES ANALYSIS

Components of Time series, Additive and Multiplicative Decomposition of Time series components, Measuring trend by method of Moving averages, Straight line and Second degree parabola, Measuring seasonal variation by Ratio to Trend method and Ratio to Moving averages method.

Text / References:

1. S. C.Gupta&V.K.Kapoor, "Fundamentals of Mathematical Statistics", S.Chand.
2. Richard A.Johnson," Probability and Statistics for Engineers", Pearson Education.
3. Jay Devore, "Probability and Statistics for Engineering and the Sciences",Cengage learning.
4. Murat Kulahci,"Time series analysis and forecasting by example",John Wiley & Sons
5. S. C.Gupta&V.K.Kapoor, "Fundamentals of Applied Statistics", S.Chand.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

AC MACHINES

Course Code: GR20A2031 **L/T/P/C: 2/1/0/3**

II Year II Semester

Course Objectives:

1. Know the applications of single phase induction motor
2. Provide a foundation in the theory and application of Ac machines.
3. Train to have the solid foundation in technical concepts required to control the speed of 3-phase IM .
4. Provide with a strong back ground in 3-phase induction motor, speed control techniques and its Characteristics.
5. Provide Sufficient background in synchronous motor, testing of different types of rotors viz salient Pole & cylindrical pole machines

Course Outcomes: The Students are able to

1. Understand the concepts of rotating magnetic fields.
2. Importance of application of electrical Ac machines.
3. Demonstrate working of single and three phase AC machines.
4. Evaluate Machine Variables in direct and quadrature axis form for salient pole type,
5. Summarize the concept of harmonic created in supply system, need for reduction and design of synchronous machines for reducing them

UNIT 1

FUNDAMENTALS OF AC MACHINE WINDINGS

Physical arrangement of windings in stator and cylindrical rotor; slots for windings; single turn coil - active portion and overhang; full-pitch coils, concentrated winding, distributed winding, winding axis, 3D visualization of the above winding types, Air-gap MMF distribution with fixed current through winding - concentrated and distributed, sinusoidally distributed winding, winding distribution factor

UNIT II

PULSATING AND REVOLVING MAGNETIC FIELDS

Constant magnetic field, pulsating magnetic field - alternating current in windings with spatial displacement, Magnetic field produced by a single winding - fixed current and alternating current Pulsating fields produced by spatially displaced windings, Windings spatially shifted by 90 degrees, Addition of pulsating magnetic fields, Three windings spatially shifted by 120 degrees (carrying three-phase balanced currents), revolving magnetic field.

UNIT III

INDUCTION MACHINES

Construction, Types (squirrel cage and slip-ring), Torque Slip Characteristics, Starting and Maximum Torque. Equivalent circuit. Phasor Diagram, Losses and Efficiency. Effect of parameter variation on torque speed characteristics (variation of rotor and stator resistances, stator voltage, frequency). Methods of starting, braking and speed control for induction motors. Generator Operation. Self-Excitation. Doubly-Fed Induction Machines.

UNIT IV

SINGLE-PHASE INDUCTION MOTORS

Constructional features-double revolving field theory, equivalent circuit, determination of parameters. Split-phase starting methods and applications

UNIT V
SYNCHRONOUS MACHINES

Synchronous Generator: Basic principle of operation, construction of salient & non-salient pole synchronous machines, generated EMF, effect of distribution and chording of winding, harmonics-causes, reduction and elimination. Armature reaction, synchronous reactance, leakage reactance, phasor diagram of non-salient type alternator. Voltage regulation-EMF, MMF, ZPF and ASA Methods. Two reaction theory-direct and quadrature axis reactances, phasor diagram, slip test, synchronizing to infinite bus bars and parallel operation, steady state power-angle characteristics.

Synchronous Motor: Principle of operation, phasor diagrams, torque and torque angle, effect of change in load, effect of change in excitation, V and inverted V curves. Synchronous condensor, hunting and damping. Methods of starting synchronous motors.

Text/References Books:

1. A. E. Fitzgerald and C. Kingsley, "Electric Machinery", McGraw Hill Education, 2013.
2. M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.
3. P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011.
4. I. J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010.
5. A. S. Langsdorf, "Alternating current machines", McGraw Hill Education, 1984.
6. P. C. Sen, "Principles of Electric Machines and Power Electronics", John Wiley & Sons, 2007.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

CONTROL SYSTEMS

Course Code: GR20A2032 **L/T/P/C: 3/0/0/3**

II Year II Semester

Course Objectives:

1. Outline of the fundamental concepts of Control Systems and block diagram algebra.
2. Analyze time response of second order systems.
3. Interpret the stability of a system by Root locus technique.
4. Develop Nyquist and Bode plots for the stability of a system.
5. Apply the concepts of Controllability and Observability.

Course Outcomes:

1. Summarize the basic elements and structures of feedback control systems.
2. Analyze the concept of time response, steady state response, errors.
3. Formulate Routh-Hurwitz table, rootlocus for the linear time-invariant systems.
4. Determine the stability of the system using Nyquist and Bode plots.
5. Develop control system models on state space models, to express state transition matrix and calculation of variables.

UNIT I
CONCEPTS OF CONTROL SYSTEMS AND TRANSFER FUNCTION REPRESENTATION

Open loop and closed loop control systems, different examples of control systems, classification of control systems, characteristics and effects of feedback, impulse response and transfer functions, translational and rotational mechanical systems, Transfer function of DC and AC Servomotor, Synchro transmitter and receiver, Block diagram reduction techniques, signal flow graphs, reduction using Mason's gain formula.

UNIT II
TIME RESPONSE ANALYSIS

Standard test signals, time response of first order systems, characteristic equation of feedback control systems, transient response of second order systems-time domain specifications, steady state response-steady state errors and error constants, effects of proportional derivative, proportional integral systems.

UNIT III
STABILITY ANALYSIS &ROOT LOCUS TECHNIQUE

Concept of stability, Routh stability criterion, Root locus concept, construction of root loci, effects of adding poles and zeros to G(s)H(s) on the root loci.

UNIT IV
STABILITY ANALYSIS IN FREQUENCY DOMAIN

Frequency domain specifications, Bode diagrams, Determination of frequency domain specifications and transfer function from the Bode diagram- Phase and Gain margin, stability analysis from Bode plots. Polar plots, Nyquist plots and applications of Nyquist criterion to find the stability.

UNIT V
STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS

Concepts of state, state variables and state vector, derivative of state model from transfer function, derivative of transfer function from state model, diagonalization, Eigenvalues and Stability Analysis, solving the time invariant state equations, state transition matrix and its properties, Controllability and Observability.

Text Books

1. Control Systems by A. Anand Kumar, 2nd edition, PHI Learning PrivateLimited
2. AutomaticControlSystems8theditionbyB.C.Kuo2003JohnWileyandSon‟s

References

1. Control Systems Engineering by I. J. Nagrath and M. Gopal, New Age International (P) Limited Publishers, 2ndedition
2. Control Systems Engineering by NISE 3rd Edition JohnWiley
3. Modern Control Engineering by Katsuhiko Ogata Prentice Hall of India Pvt Ltd, 3rd edition,1998.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
PRINCIPLES OF DIGITAL ELECTRONICS

Course Code: GR20A2027 **L/T/P/C: 3/0/0/3**

II Year II semester

Course Objectives:

1. Express the function of logic gates through diodes and transistors and their classifications.
2. Design of arithmetic and logic operations using Boolean postulates and K-Maps
3. Classify the types of Flip-Flops and steps involved in designing registers
4. Design of Synchronous, Asynchronous Counters including State diagram
5. Describe the classification of Memories and importance of PLD with example.

Course Outcomes:

1. Summarize the working of logic gates with applications, design of logic gates with diodes and transistors
2. Design the application using Combinational logic circuits by minimizing the function using K-Map
3. Analyze the types of Flip Flops and design procedure of synchronous and asynchronous sequential circuits
4. Design different types of counters and simplify state diagram for simplicity
5. Discuss the types of Memories and use of PLD's

UNIT I

NUMBER SYSTEMS AND LOGIC FAMILIES

Digital signals, logic gates NOR and Exclusive-OR operations, Boolean algebra, Boolean Postulates, number systems, one's and two's complements arithmetic, Binary codes: BCD, Weighted codes -2421,8421, gray code, error detecting and correcting codes, Hamming code.

UNIT II

MINIMIZATION TECHNIQUES: Standard and Canonical form representation for logic functions, minimization of logical functions using Boolean Postulates and Theorems, K-map representation, and simplification of logic functions using K-Map, don't care terms.

Combinational Logic Circuits: Multiplexer, De-Multiplexer/Decoders, Adders, Subtractors, carry look ahead adder, popular MSI chips, digital comparator, parity checker/generator, priority encoders.

UNIT III

SEQUENTIAL CIRCUITS: A 1-bit memory, the clocked SR flip flop, J- K, T and D types flipflops, Triggering of Flip Flops, Analysis of Clocked Sequential Circuits, Flip-Flop Excitation Tables, Conversion from one Flip-Flop to other.

Design Analysis And Registers: Analysis procedure, Circuits with Latches, Design Procedure. Registers with parallel load, Shift registers; Serial Transfer, Serial Addition, Universal Shift Register

UNIT IV

COUNTERS DESIGN: Ripple Counters; Binary Ripple Counter, BCD Ripple Counter, Synchronous Counters; Binary Counter, Up-Down Counter, BCD Counter, Binary Counter with Parallel Load, Counter with Unused States, Ring Counter, Johnson Counter,

Finite State Machine: State diagram, State Assignment, Capabilities and Limitations, Mealy and Moore models

UNIT V

SEMICONDUCTOR MEMORY: Memory organization and operation, expanding memory size, classification and characteristics of memories, sequential memory, read only memory (ROM), read and write memory (RAM).**ProgrammableLogicDevices**: ROM as a Programmable Logic Device, Programmable Array Logic and Programmable Logic Array.

TEXT/REFERENCES BOOKS:

1. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.
2. M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016.
3. A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.
4. Charles H. Roth, Jr and Lizy Kurian John's, "Digital Systems Design Using VHDL", Cengage Learning

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
POWER DISTRIBUTION AND PROTECTION

Course Code: GR20A2034 **L/T/P/C:3/0/0/3**
II Year II Semester

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

1. Concepts of Power Distribution Systems
2. With the classification of different types of Substations and layout models
3. Operating principles of Power Protective Relays
4. With different protection Schemes and circuit breakers
5. Knowledge about the generation of overvoltage and insulation coordination

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

1. Explainthe concepts of Power Distribution system.
2. Recall various substation layouts.
3. Outline the operation and identify the applications of Protective Relays.
4. Discuss about protection schemes and operation of circuit breakers.
5. Illustrate the generation of over-voltages and insulation coordination.

UNIT I
A.C. DISTRIBUTION&DC DISTRIBUTION
Classification of DC Distribution Systems. - Comparison of DC vs. AC and Under-Ground vs. Over- Head Distribution Systems. - Requirements and Design features of Distribution Systems. -Voltage Drop Calculations (Numerical Problems) in D.C Distributors for the following cases: Radial D.C Distributor fed one end and at the both the ends (equal/unequal Voltages) and Ring Main Distributor**.**
Introduction, AC distribution, Single phase, 3-phase, 3 phases 4 wire system, bus bar arrangement, Selection of site for substation. Voltage Drop Calculations (Numerical Problems) in A.C. Distributors for the following cases: Power Factors referred to receiving end voltage and with respect to respective load voltages**.**

UNIT II
SUBSTATIONS
Classification of Substations, Comparison between Outdoor and Indoor Sub-stations, Transformer Sub-stations, Pole mounted Sub-stations, Underground Sub-station, Symbols for equipment in Sub-stations, Equipment in a transformer sub-station, Bus-bar Arrangements in Sub-stations, Terminal and Through Sub-stations, Key diagram of 66/11 kV Sub-station, Key diagram of 11 kV/400 V indoor Sub-station

UNIT III
PROTECTIVE RELAYS
Fundamental requirements of Protective Relaying, Principle of Operation and Construction of Attracted armature, Balanced Beam, induction Disc and Induction Cup relays.
Relays Classification: Instantaneous, DMT and IDMT types.
Application of relays: Over current/ Under voltage relays, Direction relays, Differential Relays and Percentage Differential Relays. Universal torque equation, Distance relays: Impedance, Reactance and Mho and Off-Set Mho relays, Characteristics of Distance Relays and Comparison.

UNIT IV

CIRCUIT BREAKERS

Physics of arcing phenomenon and arc interruption – DC and AC circuit breaking – re-striking voltage and recovery voltage – rate of rise of recovery voltage – resistance switching – currentchopping – interruption of capacitivecurrent – Types of circuit breakers – air blast, air break, oil, SF6, MCBs, MCCBs and vacuum circuit breakers – comparison of different circuit breakers – Rating and selection of Circuit breakers.

UNIT V

OVERVOLTAGE PROTECTION AND INSULATION COORDINATION Over voltage due to arcing ground and Peterson coil, lightning, horn gaps, surge diverters, rod gaps, expulsion type lightning arrester, valve type lightning arrester, ground wires, ground rods, counter poise, surge absorbers, insulation coordination, volt-time curves.

TEXTBOOKS:

1. C.L.Wadhwa " Electrical Power systems:New age Publishers 7th Edition 2017
2. D. P. Kothari and I. J. Nagrath, "Modern Power System Analysis", McGraw Hill Education, 2003.
3. Badri Ram and Vishwakarma, D.N., 'Power System Protection and Switchgear', Tata McGraw Hill Publishing Company Ltd., 2nd Edition, 2011

REFERENCES:

1. B. M. Weedy, B. J. Cory, N. Jenkins, J. Ekanayake and G. Strbac, "Electric Power Systems", Wiley, 2012
2. Sunil S. Rao, 'Protective Switch Gear', Khanna Publishers, New Delhi, 13th Edition, 2008.

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
PRINCIPLES OF DIGITAL ELECTRONICS LAB

Course Code : GR20A2035 **L/T/P/C : 0/0/4/2**
II Year II Semester

Course Objectives:

1. Understand the types of logic gates and their families.
2. Design the arithmetic and logic operations using digital IC's.
3. Discuss, how the memory is created using sequential circuits.
4. Classify the types of Flip-Flops and their applications.
5. Discuss the importance of PLD with example.

Course Outcomes:

1. Understand working of logic families and logic gates.
2. Design and implement Combinational and Sequential logic circuits.
3. U3nderstand the process of Analog to Digital conversion and Digital to Analog conversion.
4. Analyze the types of Flip-Flops used in designing the registers.
5. Discuss the types of Memories and their advantages and application

LIST OF EXPERIMENTS

Task-1: Design and verification of basic logic gates.
Task-2: Simplify the given Boolean expression realize them using universal gates.
Task-3: Design and implementation of half/full adder
Task-4: Design and implementation of half subtractor/full subtractor
Task-5: Design and implementation of parallel adder
Task-6: Design and implementation of subtractor
Task-7: Design and implementation of multiplexer
Task-8: Design and implementation of Decoder
Task-9: Design and implementation of one bit magnitude comparator.
Task-10: Design and implementation of two bit magnitude comparators
Task-11: Implementation and verification of truth table for R-S, J-K, D and T flip-flops.
Task-12: Implementation and verification of truth table for J-K flip-flop, Master-slave.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
AC MACHINES LAB

Course Code: GR20A2036 **L/T/P/C: 0/0/4/2**
II Year II Semester

Course Objectives:

1. Demonstrate various parts of three phase induction motors.
2. Demonstrate various parts of single phase induction motors.
3. Demonstrate various parts of alternators.
4. Test for induction generator.
5. Design any electrical machine.

Course Outcomes:

1. Explain the concepts of rotating magnetic fields.
2. Solve the parameters of equivalent circuit of single phase induction motor.
3. Analyze performance characteristics of AC machines
4. Apply various characteristics of three phase induction motor.
5. Experiment with synchronous machine to find direct and quadrature axis reactance.

LIST OF EXPERIMENTS:

Task-1: Brake Test on Slip Ring Induction Motor.

Task-2: No load and Blocked Rotor Tests on Squirrel Cage Induction Motor.

Task-3: Equivalent Circuit of a Single Phase Induction Motor.

Task-4: Regulation of Alternator by Synchronous Impedance Method and MMF Method.

Task-5: Determination of X_d and X_q of a Salient Pole Synchronous Machine from Slip Test.

Task-6: V and inverted V curves of a 3-Phase Synchronous Motor.

Task-7: Induction Generator.

Task-8: Determination of sub-transient reactances of Salient Pole Synchronous Machine.

Task-9: Determination of sequence impedances of Salient Pole Synchronous Machine.

Task-10: Rotor-resistance starter for Slip Ring Induction Motor.

Task-11: Star-delta starter for Squirrel Cage Induction Motor.

Task-12: Parallel operation of Alternators.

Task-13: Regulation of Alternator by ZPF Method.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
CONTROL SYSTEMS LAB

Course Code: GR20A2037 **L/T/P/C: 0/0/4/2**
II Year II Semester

Course Objectives:

1. Develop hands-on experience in analysing, designing and carrying out experiments in control systems.
2. Familiarize the stability analysis techniques and their applications in control systems.
3. Analyze and simulate different transfer functions with variety of inputs.
4. Describe the principle of PID controller.
5. Conduct experiments with dc servomotor and synchros.

Course Outcomes:

1. Make use of simulation packages for simple control system programs.
2. Illustrate the characteristics of synchros.
3. Analyze the root locus and bode plots.
4. Determine the transfer function of DC motor/generator.
5. Design the lead and lag compensators and Discuss the performance of servomotor and PID controller.

LIST OF EXPERIMENTS:

Task-1: Transfer function from zeros and poles and vice versa.

Task-2: Step response, Ramp response and Impulse response of a given transfer function.

Task-3: Root Locus from a Transfer function.

Task-4: Bode Plot and Nyquist Plot from a Transfer function.

Task-5: State Model from a Transfer function.

Task-6: Zeros and poles from state model.

Task-7: Transfer function of DC motor/Generator.

Task-8: Transfer function of Magnetic Levitation system

Task-9: Time Response of second order system.

Task-10: DC Servomotor.

Task-11: PID Controller.

Task-12: Characteristics of Synchros.

Task-13: Lag& Lead Compensator.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ENVIRONMENTAL SCIENCE

Course Code: GR20A2001 **L/T/P/C:2/0/0/2**
II Year II Semester

Course Objectives:

1. Understanding the importance of ecological balance for sustainable development.
2. Understanding the impacts of developmental activities and mitigation measures.
3. Understanding the environmental policies and regulations
4. Integrate human ecology and science of environmental problems.
5. The effect of human activities on atmospheric pollution

Course Outcomes:

Based on this course, the Engineering graduate will

1. Understand the harmonious co-existence in between nature and human being
2. Recognize various problems related to environment degradation.
3. Develop relevant research questions for environmental investigation.
4. Generate ideas and solutions to solve environmental problems due to soil, air and water pollution.
5. Evaluate and develop technologies based on ecological principles and environmental regulations which in turn helps in sustainable development.

UNIT I

Ecosystems: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Bio magnification, ecosystem resources and resilience, ecosystem value, services and carrying capacity.

UNIT II

Natural Resources: Classification of Resources: Living and Non-Living resources, natural capital & Resources water resources: use and over utilization of surface and ground water, conflicts over water, floods and droughts, Dams: benefits and problems. Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources, Land resources: Forest resources, Energy resources: growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.

UNIT III

Biodiversity and Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT IV

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, Air Pollution: Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. Water pollution: Sources and types of pollution, drinking water quality standards. Soil Pollution: Sources and types, Impacts of modern agriculture, degradation of soil. Noise Pollution: Sources and Health hazards, standards, Solid waste: Municipal Solid Waste management, composition and characteristics of e-Waste and its management. Pollution control technologies: Waste water Treatment methods: Primary, secondary and Tertiary.

Global Environmental Issues and Global Efforts: Climate change and impacts on human

environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. Anthropogenic activities, influence on the occurrence of COVID-19 Pandemic? How environment benefitted due to global lockdown arising out of corona outbreak.

UNIT V

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Life cycle analysis (LCA), Towards Sustainable Future: Concept of Sustainable Development Goals, Population and its explosion, Resource exploitation, Crazy Consumerism, Environmental Education, Environmental Ethics, Concept of Green Building.

TEXT BOOKS:

1. Environmental Studies by Anubha Kaushik, 4th Edition, New Age International Publishers.
2. Textbook of Environmental Studies for Undergraduate Courses by ErachBharucha for University Grants Commission.

REFERENCE BOOKS:

1. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
2. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
3. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela.2008 PHI Learning Pvt. Ltd.
4. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
5. Introduction to Environmental Science by Y. Anjaneyulu, BS Publications.
6. Environmental Studies by R. Rajagopalan, Oxford University Press.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
DATA BASE FOR ENGINEERS

Course Code: GR20A2006 **L/T/P/C: 2/0/0/2**
II Year II Semester

Course Objectives:

1. To understand the different issues involved in the design and implementation of a database system.
2. To understand Structured Query Language for manipulating the Data.
3. To study the physical, conceptual and logical database designs
4. To provide concepts of Transaction, Concurrency and Recovery Management Strategies of a DBMS
5. To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modelling, designing, and implementing a DBMS.

Course Outcomes:

1. Identify the role of Database System Applications and the design issues related.
2. Design the logical model for the applications and apply indexing techniques.
3. Construct a Database Schema, Manipulate data using a SQL.
4. Can apply the Schema Refinement techniques for a database design for optimizedaccess.
5. For a given transaction-processing system, determine the transaction atomicity,consistency, isolation, and durability.

UNIT –I

Introduction to DBMS, Data Base System Applications, Data Base System VS File System, Instances And Schemas, Data Models – The ER Model, ER Diagrams –Attributes And Entity Sets – Relationships And Relationship Sets – Concept Design With The ER Model .

To Practice:

1) Practicing DDL commands: Creating tables for various relations (in SQL).

2) Practicing Hostel Management System ER Diagram, Airlines Reservation System ER Diagram.

UNIT –II

Relational Model: Introduction To The Relational Model – Basic Structure, Database Schema, Keys, Form Of Basic SQL Query – Database Langugages , DDL , DML , Examples Of Basic SQL Queries .

To Practice:

Practicing SQL Queries of above mentioned topics

UNIT –III

SQLoperators,SQL functions, JOINS, -Types of Joins,Introduction To Nested Queries, Set Operators,Integrity Constraints over relations,Introduction to Views , Destroying / altering tables and views.Practice on DCL and TCL commands.

To Practice:

Practicing SQL Queries of above mentioned topics

UNIT –IV

Pitfalls in relational databases,Functional Dependencies ,Importance of Normalization–

1NF,2NF,3NF,BCNF,4NF
To Practice:
Concepts of Normalizations and its types, Writing Assertions.

UNIT –V

Transaction Concept- Transaction state,ACID properties, Concurrent executions,Serializability, Lock based protocols,Log based recovery.
To Practice:
Practicing,DCL and TCL commands, (Commit, rollback, Save points, Grant, Revoke and Roles commands on tables)

TEXT BOOK:

1.“Data base Management Systems”, Raghurama Krishnan, Johannes Gehrke, TATAMcGraw Hill 3rd Edition

REFERENCE BOOKS:

1.“Data base System Concepts”, Silberschatz, Korth, McGraw hill, V edition.
2. “Introduction to Database Systems”, C.J.Date Pearson Education.
3. “Database Systems design, Implementation, and Management”, Rob & Coronel 5th Edition.
4. “Database Management Systems”, P. Radha Krishna HI-TECH Publications 2005.
5. “Database Management System”, ElmasriNavate Pearson Education.
6. “Database Management System”, Mathew Leon, Leo.

III YEAR I SEMESTER

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

POWER SYSTEM ANALYSIS

Course Code:GR20A3012 **L/T/P/C:2/1/0/3**

III year I semester

COURSE OBJECTIVES

1. Basic concepts of Power flow analysis.
2. Concepts related to Power flow equations and numerical analysis.
3. Illustrate about the formation of Z buses and short circuit analysis.
4. Solve faults current for different types of faults.
5. Stability constraints in a synchronous grid.

COURSE OUTCOMES

1. Outline the analysis of power system at different concepts, states and conditions.
2. Formulate the Impedance and admittance matrices and necessity of Power Flow Studies.
3. Solve Power Flow equations using different numerical methods.
4. Evaluate fault currents for different types of faults and analyze short circuit studies.
5. Analyze a power system in Transient state, steady state and Stability Constraints in a grid.

UNIT I
POWER FLOW STUDIES-1

Per-Unit System of Representation. Per-Unit equivalent reactance network of a three phase Power System, Numerical Problems. Ybus formation by Direct Inspection Method, Numerical Problems. Necessity of Power Flow Studies – Data for Power Flow Studies – Derivation of Static load flow equations – Load flow solutions using Gauss Seidel Method: Acceleration Factor, Load flow solution with and without P-V buses, Algorithm and Flowchart. Numerical Load Flow Solution for Simple Power Systems (Max. 3-Buses): Determination of Bus Voltages, Injected Active and Reactive Powers (One Iteration only) and finding Line Flows/Losses for the given Bus Voltages.

UNIT II
POWER FLOW STUDIES-2

Newton Raphson Method in Rectangular and Polar Co-Ordinates form, Load Flow Solution with and without PV Busses- Derivation of Jacobian Elements, Algorithm and Flowchart. Decoupled and Fast Decoupled Methods. - Comparison of Different Load flow Methods – DC load Flow.

UNIT III
FORMATION OF ZBUS

Partial network, Algorithm for the Modification of Zbus Matrix for addition of an element for the following cases: Addition of an element from a new bus and reference, Addition of element from a new bus to an old bus, Addition of element between an old bus to reference and Addition of element between two old buses (Derivations and Numerical Problems)-Modification of Zbus for the changes in network (Problems).

SHORT CIRCUIT ANALYSIS

Symmetrical fault Analysis: Short Circuit Current and MVA Calculations, Fault levels, Application of Series Reactors, Numerical Problems. Symmetrical Component Theory: Symmetrical Component Transformation, Positive, Negative and Zero sequence components: Voltages, Currents and Impedances. Sequence Networks: Positive, Negative and Zero Sequence Networks, Numerical Problems.

Unsymmetrical Fault Analysis: LG, LL, LLG faults with and without fault impedance, Numerical Problems.

UNIT IV

STEADY STATE STABILITY ANALYSIS

Elementary concepts of Steady State, Dynamic and Transient Stability. Description of: Steady State Stability Power Limit, Transfer Reactance, Synchronizing

Power Coefficient, Power Angle Curve and Determination of steady state stability and Methods to improve steady state stability.

UNIT V

POWER SYSTEM TRANSIENT STABILITY ANALYSIS

Derivation of Swing Equation. Determination of Transient Stability by Equal Area Criterion, Application of Equal Area Criterion, Critical Clearing Angle Calculation - Solution of Swing Equation: Point-by-Point Method and Modified Euler's method. Multi machine stability. Methods to improve Transient Stability.

TEXT BOOKS

1. Electric Power Systems by C. L. Wadhwa, New Age International.
2. Modern Power System Analysis by I.J.Nagrath & D.P.Kothari, Tata McGraw- Hill.
3. P.Kundur, "Power System Stability and Control" McGraw Hill Education, 1994

REFERENCES

1. Power System Analysis by Grainger and Stevenson, Tata McGraw Hill.
2. Power System Analysis by Hadi Saadat, TMH Edition.
3. A. R. Bergen and V. Vittal, "Power System Analysis", Pearson Education Inc., 1999.
4. B. M. Weedy, B. J. Cory, N. Jenkins, J. Ekanayake and G. Strbac, "Electric Power Systems", Wiley, 2012.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

POWER ELECTRONICS

Course Code:GR20A3013 **L/T/P/C:3/0/0/3**

III year I semester

COURSE OBJECTIVES

1. Provide the students a deep insight into the working of different switching devices with respect to their characteristics.
2. Study advanced converters and switching techniques implemented in recent technology.
3. Analyze different converters and control with their applications.
4. Familiarize the students with the utilization aspects of power engineering, more specifically the techniques of solid-state power conversions and their applications.
5. Evaluate the steady-state and transient state analysis of all the power converters

COURSE OUTCOMES

1. Distinguish between signal level and power level devices and explain the characteristics of power electronic switching devices.
2. Illustrate the performance of controlled rectifiers and AC-DC converters
3. Analyze the operation of DC-DC choppers
4. Discuss the operation of voltage source inverters
5. Illustrate the performance of the AC-AC converters.

UNIT I

POWER SWITCHING DEVICES

Diode, Thyristor, MOSFET, IGBT: I-V Characteristics; R, RC, UJT firing circuits for thyristor; Line and forced commutation circuits of a thyristor; Gate drive circuits for MOSFET and IGBT.

UNIT II

AC-DC CONVERTERS

Single-phase half-wave and full-wave rectifiers, Single-phase full-bridge thyristor rectifier with R-load and highly inductive load; Three-phase full-bridge thyristor rectifier with R-load and highly inductive load; Input current wave shape and power factor.

UNIT III

DC-DC CONVERTERS

Elementary chopper with an active switch and diode, concepts of duty ratio and average voltage, power circuit of a buck converter, analysis and waveforms at steady state, duty ratio control of output voltage. Power circuit of a boost converter, analysis and waveforms at steady state, relation between duty ratio and average output voltage.

UNIT IV

SINGLE-PHASE & THREE-PHASE VOLTAGE SOURCE INVERTER(DC-AC CONVERTERS)

Power circuit of single-phase voltage source inverter, switch states and instantaneous output voltage, square wave operation of the inverter, concept of average voltage over a switching cycle, bipolar sinusoidal modulation and unipolar sinusoidal modulation, modulation index and output voltage.

Power circuit of a three-phase voltage source inverter: (180&120 degree mode), switch states, instantaneous output voltages, average output voltages over a sub-cycle.

UNIT V

AC-AC CONVERTERS

AC Voltage controller with R and RL loads with numerical problems. Cyclo-converters: step up cyclo converters; step down cyclo converters, numerical problems

TEXT BOOKS

1. M. H. Rashid, "Power Electronics: Circuits, Devices, and Applications", Pearson Education India, 2009.

2. P. S. Bimbhra, "Power Electronics", Khanna Publishers.

REFERENCES

1. R. W. Erickson and D. Maksimovic, "Fundamentals of Power Electronics", Springer Science & Business Media, 2007.
2. L. Umanand, "Power Electronics: Essentials and Applications", Wiley India, 2009.
3. B K.Bose "Modern power Electronics and AC Drives" Prentice Hall India Learning Private Limited, 2005.
4. N. Mohan and T. M. Undeland, "Power Electronics: Converters, applications and Design", John Wiley & Sons, 2007.

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

MICROPROCESSORS AND MICROCONTROLLERS

Course Code: GR20A3014 **L/T/P/C:3/0/0/3**

III year I semester

COURSE OBJECTIVES

1. To familiarize the architecture of 8086 Microprocessors.
2. To describe the 8051 Microcontroller architecture.
3. To familiarize in programming the Microprocessors and Microcontrollers.
4. To understand Memory and I/O interfacing of 8086 and 8051.
5. To interface and program various devices with 8051.

COURSE OUTCOMES

1. Understands the internal architecture of 8086 Microprocessor.
2. Understand the internal architecture, organization of 8051.
3. Analyze the assembly language Programming of Microprocessor and Microcontrollers.
4. Do interfacing design of peripherals like Memory, I/O, A/D, D/A, timer etc.
5. Understand the real time applications of timers and serial communication of 8051.

UNIT-I

8086 ARCHITECTURE

8086Architecture-Functional diagram, Register Organization, Memory Segmentation, Programming Model, Memory addresses, Physical Memory Organization, Instruction formats, Addressing modes, Instruction Set, Assembler Directives, Macros.

UNIT-II

ASSEMBLY LANGUAGE PROGRAMMING OF 8086 AND INTERFACING

Simple Programs involving Logical, Branch and Call Instructions, Sorting, Evaluating Arithmetic Expressions, String manipulations, Signal Descriptions of 8086, Common Function Signals, Minimum and Maximum Mode Signals.

Memory and I/O Interfacing: Memory Interfacing of 8086,8255 PPI, Various Modes of Operation, and Interfacing to 8086, Interfacing keyboard, Display, Stepper Motor Interfacing, D/A and A/D Converter.

UNIT-III

THE 8051 ARCHITECTURE

Introduction to Microcontrollers: Overview of 8051 Microcontroller, Architecture, I/O Ports, Memory Organization.

8051 Real Time Control: Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the Serial Communication Interrupts, Programming 8051 Timers and Counters

UNIT-IV

INSTRUCTION SET AND PROGRAMMING

Addressing modes: Introduction, Instruction syntax, Data types, Subroutines Immediate addressing, Register addressing, Direct addressing, Indirect addressing, Relative addressing, indexed addressing, Bit inherent addressing, bit direct addressing.

8051 Instruction set: Data transfer instructions, Arithmetic instructions, Logical instructions, Branch instructions, Subroutine instructions, Bit manipulation instruction. Assembly language programs, C language programs.

UNIT-V

EXTERNAL COMMUNICATION INTERFACE

Serial Communication Standards, Serial Data Transfer Scheme, On board Communication Interfaces-I2C Bus, SPI Bus, UART; External Communication Interfaces-RS232, USB.

Applications:

LED, LCD, and keyboard interfacing. Stepper motor interfacing, DC Motor interfacing, sensor interfacing.

TEXTBOOKS

1. Advanced Microprocessors and Peripherals, A. K. Ray and K. M. Bhurchandani, 2nd Edition, Tata McGraw-Hill, 2006.
2. Microprocessors and Interfacing, D.V. Hall, 2nd Edition, Tata McGraw-Hill, 2006.
3. The 8051 Microcontroller, Kenneth J. Ayala, 3rd Edition, Cengage Learning, 2010.

REFERENCES

1. "The 8051 Microcontroller and Embedded Systems using Assembly and C" – Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D. McKinlay, 2nd Edition, Pearson Education, 2008.
2. Microcontrollers: Theory and Applications, Ajay V. Deshmukh, Tata McGraw-Hill Education, 2005.

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ELECTRICAL AND HYBRID VEHICLES
(Professional Elective –I)

Course Code:GR20A3015 **L/T/P/C:3/0/0/3**

III year I semester

COURSE OBJECTIVES

1. Social importance of modern transportation.
2. Demonstrate Vehicle Brake Performance.
3. Analyze power flow control in hybrid drive-train topologies
4. Discuss electric components used in hybrid and electric vehicles.
5. Select the energy storage technology for Hybrid and Electric Vehicles.

COURSE OUTCOMES

1. Summarize the Economic Aspects of EVs compared to ICEs
2. Explain the braking system in EVs and HEVs.
3. Identify various hybrid drive-train topologies
4. Analyze the configuration and control of different motor drives.
5. Interpret the different possible ways of energy storage requirements in Hybrid and Electric Vehicles.

UNITI
ENVIRONMENTAL IMPACT AND HISTORY OF MODERN TRANSPORTATION
Air Pollution and Global Warming, social and environmental importance and Impact of hybrid and electric vehicles, History of Electric Vehicles, History of Hybrid Electric Vehicles, History of Fuel Cell Vehicles.

UNIT II
BRAKING FUNDAMENTALS AND REGENERATIVE BRAKING IN ELECTRIC VEHICLES
General Description of Vehicle Movement, Vehicle Resistance, Dynamic Equation, Tire–Ground Adhesion and Maximum Tractive Effort, Power Train Tractive Effort and Vehicle Speed, Vehicle Power Plant and Transmission Characteristics, Brake Performance.

Braking Energy Consumed in Urban Driving, Importance of Regenerative Braking in Electric and Hybrid Vehicles.

UNIT III
INTRODUCTION TO ELECTRIC AND HYBRID ELECTRIC VEHICLES
Hybrid Electric Drivetrains: Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies; Introduction to pure EV’s (BEV, FCV).

UNIT IV

ELECTRIC PROPULSION SYSTEMS

Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Induction Motor drives, configuration and control of Permanent Magnet Motor drives, Configuration, and control of Switch Reluctance Motor drives, drive system efficiency.

UNIT V

ENERGY STORAGE REQUIREMENTS IN HYBRID AND ELECTRIC VEHICLES

Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery based energy storage and its analysis, Fuel Cell based energy storage and its analysis, Super Capacitor based energy storage and its analysis, Flywheel based energy storage and its analysis, Hybridization of different energy storage devices. Sizing the propulsion motor, sizing the power electronics, selecting the energy storage technology, Communications, supporting subsystems.

TEXT BOOKS

1. Mehrdad Ehsani, Yimin Gao, Ali Emadi, "Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals", CRC Press, 2010.
2. James Larminie, "Electric Vehicle Technology Explained", John Wiley & Sons, 2003
3. Iqbal Hussain, "Electric & Hybrid Vehicles – Design Fundamentals", Second Edition, CRC Press, 2011

REFERENCES

1. Hybrid Vehicles and the future of personal transportation, Allen Fuhs, CRC Press, 2011.
2. Vehicle Power Management: Modeling, Control and Optimization, Xi Zhang, Chris Mi, Springer, 2011.

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

SOLAR AND WIND ENERGY SYSTEMS
(Professional Elective –I)

Course Code: GR20A3016 **L/T/P/C:3/0/0/3**
III year I semester

COURSE OBJECTIVES

1. Introduction of the basic concepts of Solar and Wind Energies
2. Knowledge on the solar power extraction and collection
3. Information and installation of Wind and Photovoltaic systems
4. Knowledge of PV solar panels and wind generators
5. Applications of wind and Solar power technologies for hybrid power generation.

COURSE OUTCOMES

1. Justify the energy scenario and the consequent growth of the power generation from renewable energy sources
2. Describe the basic physics of solar power generation
3. Implement the power electronic interfaces for solar generation
4. Discuss the basic physics of wind power generation
5. Understand the power electronic interfaces for wind generation

UNIT – I
SOLAR RESOURCE
Introduction, solar radiation geometry and measurement, solar day length, Estimation of solar energy availability, Hourly Global, Diffuse and Beam Radiation on Horizontal Surface under Cloudless Skies, Solar Radiation on Inclined Plane Surface.

UNIT – II
SOLAR THERMAL POWER GENERATION
Technologies, Parabolic trough, central receivers, parabolic dish, Fresnel, solar pond, elementary analysis.

UNIT – III
SOLAR PHOTOVOLTAIC GENERATION
Technologies-Amorphous, monocrystalline, polycrystalline; V-I characteristics of a PV cell, PV module, array, Power Electronic Converters for Solar Systems, Maximum Power Point Tracking (MPPT) algorithms, Converter Control.

UNIT – IV
PHYSICS OF WIND POWER
History of wind power, Indian and Global statistics, Wind physics, Betz limit, Tip speed ratio, stall and pitch control, Wind speed statistics-probability distributions, Wind speed and power-cumulative distribution functions.

UNIT – V
WIND GENERATOR TOPOLOGIES
Review of modern wind turbine technologies, Fixed and Variable speed wind turbines, Induction Generators, Doubly-Fed Induction Generators and their characteristics, Permanent Magnet Synchronous Generators, Power electronics converters.

TEXT BOOKS

1. R. Ranjan, D.P.Kothari, "Renewable Energy Sources and Emerging Technologies" 2nd edition PHI

2. B.H.Khan, "Non- Conventional Energy Resources", 2nd edition, Tata McGraw-Hill, New Delhi
3. T. Ackermann, "Wind Power in Power Systems", John Wiley and Sons Ltd., 2005.
4. G.D Rai "Non – Conventional Energy Resources", 3rd Edition Khanna Publishers.
5. G. M. Masters, "Renewable & Efficient Electric Power Systems", John Wiley and Sons, 2004.

REFERENCES

1. S. P. Sukhatme, "Solar Energy: Principles of Thermal Collection and Storage", McGraw Hill, 1984.

2. G. N. Tiwari and M. K. Ghosal, "Renewable Energy Applications", Narosa Publications, 2004.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ELECTRICAL MACHINE DESIGN
(Professional Elective –I)

Course Code:GR20A3017 **L/T/P/C: 3/0/0/3**

III year I semester

COURSE OBJECTIVES
1. Develop knowledge on principles of design of static machines.
2. Principles of design of rotating machines.
3. Understand the design fundamental concepts.
4. Design of machines based on their applications.
5. Solve the problems related to design.

COURSE OUTCOMES
1. Explain the construction and performance characteristics of electrical machines.
2. Distinguish the various factors which influence the design.
3. Analyze Electrical, magnetic and thermal loading of electrical machines.
4. Understand the principles of electrical machine design and carry out a basic design of an ac machine.
5. Summarize use software tools to do design calculations.

UNIT I
INTRODUCTION
Major considerations in electrical machine design, electrical engineering materials, space factor, choice of specific electrical and magnetic loadings, thermal considerations, heat flow, temperature rise, rating of machines, fundamental of DC machine design.

UNIT II
TRANSFORMERS
Sizing of a transformer, main dimensions, KVA output for single and three-phase transformers, window space factor, overall dimensions, operating characteristics, regulation, no load current, temperature rise in transformers, design of cooling tank, methods for cooling of transformers.

UNIT III
INDUCTION MOTORS
Sizing of an induction motor, main dimensions, length of air gap, rules for selecting rotor slots of squirrel cage machines, design of rotor bars & slots, design of end rings, design of wound rotor, magnetic leakage calculations, leakage reactance of polyphase machines, magnetizing current, short circuit current, circle diagram, operating characteristics.

UNIT IV
SYNCHRONOUS MACHINES
Sizing of a synchronous machine, main dimensions, design of salient pole machines, short circuit ratio, shape of pole face, armature design, armature parameters, estimation of air gap length, design of rotor, design of damper winding, determination of full load field mmf, design of field winding, design of turbo alternators, rotor design.

UNIT V

COMPUTER AIDED DESIGN (CAD)

Limitations of traditional designs, need for CAD analysis, synthesis and hybrid methods, design optimization methods, variables, constraints and objective function, problem formulation. Introduction to FEM based machine design. Introduction to complex structures of modern machines-PMSMs, BLDCs, SRM and claw-pole machines.

TEXT BOOKS

1. A. K. Sawhney, "A Course in Electrical Machine Design", Dhanpat Rai and Sons, 1970.
2. M.G. Say, "Theory & Performance & Design of A.C. Machines", ELBS London.

REFERENCES

1. S. K. Sen, "Principles of Electrical Machine Design with computer programmes", Oxford and IBH Publishing, 2006.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
OPTIMIZATION TECHNIQUES
(Professional Elective –I)

Course Code:GR20A3018 **L/T/P/C: 3/0/0/3**
III year I semester

COURSE OBJECTIVES

1. Develop a systematic approach to handle problems to design of electrical circuit etc; with a goal of maximizing the profit and minimizing cost.
2. Understand the various optimization techniques such as classified optimization, linear programming. One dimensional minimization methods, unconstrained optimization techniques, constrained optimization techniques and dynamic programming.
3. Understand the necessary sufficient conditions for finding the solution of the problems in classical optimization.
4. Comprehend the numerical methods for finding approximate solution of complicated problems.
5. Have a thorough understanding on algorithms utilization.

COURSE OUTCOMES

1. Explain the need in optimization techniques and formulating the optimization problems
2. Apply linear and non linear programming for single and multi variable by prior different algorithm
3. Solve geometric programming with and without constraints
4. Apply dynamic programming concepts in multi stage decision process like inventory allocation and etc.,
5. Apply integer and stochastic programming for different simulation.

UNIT I
LINEAR PROGRAMMING

Formulation – Sensivity analysis. Change in the constraints, cost coefficients, coefficients of the constraints, addition and deletion of variable, constraints.

UNIT II
SINGLE VARIABLE NON-LINEAR UNCONSTRAINED OPTIMIZATION

One dimensional Optimization methods:- Uni-modal function, elimination methods, ,, Fibonacci method, golden section method, interpolation methods – quadratic & cubic interpolation methods. Multi variable non-linear unconstrained optimization: Direct search method – Univariant method – pattern search methods – Powell's- Hook -Jeeves, Rosenbrock search methods- gradient methods, gradient of function, steepest decent method, Fletcher Reeves method, variable metric method.

UNIT III

GEOMETRIC PROGRAMMING

Polynomials – arithmetic - geometric inequality – unconstrained G.P- constrained G.P

UNIT IV

DYNAMIC PROGRAMMING

Multistage decision process, principles of optimality, examples, conversion of final problem to an initial value problem, application of dynamic programming, production inventory, allocation, scheduling replacement.

UNIT V

INTEGER PROGRAMMING

Introduction – formulation – Gomory cutting plane algorithm – Zero or one algorithm, branch and bound method STOCHASTIC PROGRAMMING: Basic concepts of probability theory, random variables- distributions-mean, variance, correlation, co variance, joint probability distribution-stochastic linear, dynamic programming. Simulation – Introduction – Types- steps – application – inventory – queuing – thermal system.

TEXT BOOKS

1. Optimization theory & Applications / S.S.Rao / New Age International.
2. Introductory to operation Research / Kasan& Kumar / Springar
3. Optimization Techniques theory and practice / M.C.Joshi, K.M.Moudgalya/ Narosa Publications.
4. Optimization Techniques by N V S Raju/PHI

REFERENCES

1. S.D.Sharma / Operations Research
2. Operation Research / H.A.Taha /TMH
3. Optimization in operations research / R.LRardin
4. Optimization Techniques /Benugundu&Chandraputla / Pearson Asia

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
NON-CONVENTIONAL ENERGY SOURCES
(Open Elective-I)

Course Code: GR20A3019 **L/T/P/C:3/0/0/3**
III year I semester

COURSE OBJECTIVES

1. Introduction of the basic concepts of Solar Energy.
2. Explain the Equivalent and VI characteristics of PV cells.
3. Information and installation of Wind energy systems.
4. Understand energy from Bio mass.
5. Explain the principle of Tidal power plants, basic batteries.

COURSE OUTCOMES

1. Describe the concepts of Solar Energy and Solar collectors.
2. Design the PV Solar system with energy backup.
3. Discuss the basic physics of wind power generation.
4. Explain the energy generation from Bio mass, bio gas and geo thermal energy.
5. Design Tidal power system and fuel cells.

UNIT - I

Solar spectrum-Solar Radiation on Earth's surface- Solar radiation geometry-Solar radiation measurements-Solar radiation data-Solar radiation on horizontal and tilted surfaces. Solar Thermal conversion-Flat plate collectors concentrated collectors- construction and thermal analysis- Solar applications-Solar ponds-Heliostat systems-water heater-air heater- solar still.

UNIT - II

Photo voltaic cells-Equivalent circuit- V-I Characteristics- Photovoltaic modules – constructional details- design considerations-Tracking-Maximum power point tracking– algorithms-PV solar system design with energy backup-Solar Thermo electric conversion.

UNIT - III

Fundamentals of wind energy-power available in wind-BetzLimit- Aerodynamics of wind turbine-Wind turbines-Horizontal and vertical axis turbines – their configurations-Wind Energy conversion systems.

UNIT - IV

Various fuels-Sources-Conversion technologies-WetProcesses–Dry Processes-Bio Gas generation–Aerobic and an aerobic digestion- Factorsaffecting generation of bio gas – Classification of bio gas plants-Different Indian digesters-Digester design considerations-Gasification process-Gasifiers – Applications. Geo thermalEnergy-sources-Hydro thermal convective-Geo-pressure resources-Petro-thermal systems(HDR)-Magma Resources-Prime Movers.

UNIT - V

Principle of operation-Open and closed cycles, Energy from Tides-Principle of Tidal Power- -Components of tidal Power plants-Operation Methods-Estimation of Energy in Single and double basin systems-Energy and Power from Waves-Wave energy conversion devices-Fuel Cells-Design and Principle of operation-Types of Fuel Cells-Advantages and disadvantages-Types of Electrodes- Applications-Basics of Batteries –Constructional details of Lead acid batteries- Ni-Cd Batteries.

TEXT BOOKS

1. John Twidell&Wier, Renewable Energy Resources, CRC Press,2009.
2. D.P. Kothari, Singal, Rakesh, Ranjan, Renewable Energy sources and Emerging Technologies, PHI, 2009.

REFERENCES

1. G.D. Rai–Non Conventional Energy sources, Khanna publishers.
2. B.H.Khan, Non Conventional Energy Sources, PHI

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

POWER SYSTEMS LAB

Course Code: GR20A3020 **L/T/P/C:0/0/3/1.5**

III year I semester

COURSE OBJECTIVES

1. Knowledge in the area of Various power systems hardware components
2. Demonstration of characteristics of various relays
3. Analyze various types of faults and its protection
4. Determine transmission line model parameters
5. Develop power management system in Real-time applications

COURSE OUTCOMES

1. Illustrate different components related to power system hardware
2. Distinguish the characteristics of different relays.
3. Perform various types of faults and its protection
4. Design and analyse the transmission line.
5. Integrate various applications that provides intelligent power monitoring, energy management, system optimization, advanced automation, and real-time prediction.

LIST OF EXPERIMENTS

1. Characteristics of Over Current relay for Phase fault
2. Characteristics of Over Current relay for Earth fault
3. Characteristics of Induction Disc type relay
4. Testing of differential relay
5. Characteristics of Over Voltage Relay
6. Characteristics of Under Voltage Relay
7. Testing of Negative sequence Relay

8. To determine Efficiency and Regulation of 3 Phase Transmission model

9. Determination of ABCD parameters for short, medium and long lines

10. Ferranti effect of Transmission line

11. Zones Protection using Distance relay

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

POWER ELECTRONICS LAB

Course Code: GR20A3021 **L/T/P/C:0/0/4/2**

III year I semester

COURSE OBJECTIVES

1. Develop hands-on experience in analyzing, designing and carrying out experiments on various power converters.
2. Familiarize with switching devices and their applications in power control.
3. Familiarize with power converters in various systems for power control.
4. Analyze and simulate different Converters using Simulation.
5. Conduct experiments with converters and compare the results with theoretical concepts and simulations.

COURSE OUTCOMES

1. Choose appropriate switching devices & firing circuits based on their characteristics and application.
2. Design and analyze the operation of power switching converters.
3. Develop practical control circuits for various real time applications.
4. Analyze and evaluate the operation of Inverters & Cyclo converters.
5. Judge power electronic converter performance for various applications in virtual platforms and AC Voltage controllers.

1. Characteristics of SCR, IGBT, MOSFET.

2. R, RC and UJT firing circuits.

3. Single-phase Half Controlled Converter with R-load.

4. Single-phase Fully Controlled Converter with R-load.

5. Open loop analysis of Buck Converter.

6. Open loop analysis of Boost Converter.

7. Performance analysis of Single-phase Full Bridge Inverter with R & RL load.

8. Performance analysis of Single-phase Cyclo-converter with R & RL load.

9. Practical validation of Three Phase Fully Controlled Converter.

10. Operation of Single Phase AC Voltage Controller.

11. Operation of Three Phase Half Controlled Converter using Simulation.

12. Operation of Buck-Boost Converter using Simulation.

13. Performance and analysis of speed control of single-phase Induction Motor using simulation.

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
MICROPROCESSORS AND MICROCONTROLLERS LAB

Course Code:GR20A3022 **L/T/P/C:0/0/3/1.5**
III year I semester

COURSE OBJECTIVES

1. To introduce the basics of microprocessors and its applications.
2. To provide in depth knowledge of 8051 Microcontrollers.
3. To expertise working with programming.
4. To impart the I/O interfacing concepts for developing real time systems.
5. To encourage the students in building real time applications.

COURSE OUTCOMES

1. Familiarize with the assembly level programming using 8086.
2. Judge the difference between Assembly language and Embedded C Programming
3. Design circuits for interfacing different modules to microcontrollers.
4. Experiment 8051 with different types of communicating devices.
5. Execute various programs which can resemble to the real time applications.

List of Experiments

Task-1: Using 8086 Processor Kits and/or Assembler

Assembly Language Programs to 8086 to Perform

- Arithmetic, Logical, String Operations on 16 Bit and 32-Bit Data.
- Bit level Logical Operations, Rotate, Shift, Swap and Branch Operations.

Task-2: Using 8051 Microcontroller Kit

- LED's to 8051.
- Interfacing LCD to 8051.
- Interfacing Matrix Keypad to 8051.
- Interfacing DC Motor to 8051.

Task-3: Arduino Programming

- LEDs interfacing
- Switches and LED's interfacing
- 2*16 LCD
- Serial Communication
- Device control
- Reading sensors using ADC
- DC Motor control

III YEAR II SEMESTER

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

PROGRAMMABLE LOGIC CONTROLLERS

Course Code:GR20A3091 **L/T/P/C:3/0/0/3**

III year II semester

COURSE OBJECTIVES

1. Familiarize with the PLC Architecture, I/O Modules and Programming structure of PLC.
2. Discuss input instructions and output instructions of PLC.
3. Understand the working of Registers and conversion examples.
4. Apply Timer and Counter for different industrial applications.
5. Implement analog operations and PID Control of PLC and Robot Application with PLC.

COURSE OUTCOMES

1. Understand the Architecture, I/O Modules and programming structure of PLC.
2. Develop the ladder logic using input and output instructions of PLC.
3. Describe characteristics of Registers and Conversion Examples
4. Apply PLC functions to Timing and Counting Applications.
5. Analyze the analog operations and PID Control of PLC, demonstrate Robot Application with PLC.

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

Input Instructions, Outputs, Operational Procedures, Programming examples using contacts and coils. Drill press operation.

UNIT III

DIGITAL LOGIC GATES

Programming in the Boolean Algebra System, Conversion examples Ladder diagrams for process control: Ladder Diagrams & Sequence Listings, Ladder Diagram Construction and Flow chart for Spray Process System.

PLC REGISTERS

Characteristics of Registers, Module addressing, Holding registers, Input registers, Output registers.

UNIT IV

PLC FUNCTIONS

Timer functions & Industrial Applications, Counters, Counter function Industrial Applications. Arithmetic functions, Number Comparison Functions, Number Conversion Functions.

DATA HANDLING FUNCTIONS

SKIP, Master Control Relay, Jump, Move, FIFO, FAL, ONS, CLR and Sweep functions and their applications.

UNIT V

BIT PATTERN AND CHANGING A BIT SHIFT REGISTER

Sequence Functions and Applications, Controlling of Two-Axis and Three Axis Robots with PLC, Matrix Functions.

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

TEXT BOOKS

1. "Programmable Logic Controllers - Principle and Applications" by John W Webb and Ronald A Reiss, Fifth edition, PHI, 2009.

REFERENCES

1. "Programmable Logic Controllers - Programming Method and Applications" by Jr. Hackworth and F.D Hackworth Jr., Pearson, 2003.
2. "Introduction to Programmable Logic Controllers", Gary Dunning, Delmar Thomas Learning, 3rd Edition, 2005.

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
SENSORS MEASUREMENTS AND INSTRUMENTATION

Course Code: GR20A3092 **L/T/P/C: 2/1/0/3**
III year II semester

COURSE OBJECTIVES

1. To Memorize, monitor, analyze and control any physical system.
2. Demonstration on construction and working of different types of meters.
3. Interpret the use of modern tools necessary for electrical projects.
4. Compose different techniques for precise measurement of electrical and non-electrical quantities.
5. Design and create novel products and solutions for real life problems.

COURSE OUTCOMES

1. Outline the fundamentals and measurement of different electrical quantities.
2. Calculate unknown values in AC & DC Bridges.
3. Summarize Oscilloscopes and evaluate the usage of Digital voltmeters.
4. Identify working principles of various Sensors
5. Know how to design the various applications related to sensors and its applications

UNIT-I:
FUNDAMENTALS OF ELECTRICAL MEASUREMENTS

Ammeters & Voltmeters PMMC & Moving Iron Instruments C.T.s and PTs Ratio and Phase angle errors. Measurement of Power and power factor. Measurement of Active and Reactive power.

UNIT-II:
MEASUREMENT OF ENERGY AND OTHER ELECTRICAL QUANTITIES

Single phase & Three phase energy meters, Crompton's Potentiometer AC potentiometers. Measurement of resistance, Inductance and Capacitance by bridges: Wheatstone bridge, Meggar Kelvin Double Bridge, Maxwell's Bridge, Anderson’s bridge, Schering Bridge.

UNIT-III:
OSCILLOSCOPE AND DIGITAL VOLTMETERS

Cathode Ray Oscilloscope, Time base Horizontal & Vertical Amplifier, Measurement of phase and frequency. Sampling Oscilloscope, Digital storage Oscilloscope. Digital Voltmeters-Successive Approximation, Ramp, Dual slope Integration.

UNIT-IV:
SENSOR FUNDAMENTAL PRINCIPLES

Sensors / Transducers, principles, classification, parameters, characterizations, Introduction to mechanical &Electro Mechanical Sensors: Resistive type, Inductive sensors, Capacitive Sensors, Force and displacement/ position sensor, LVDT.

UNIT V:
SENSOR APPLICATIONS

Working Principles: Flow - rate sensors, Pressure Sensors, Temperature Sensors, Ultrasonic sensor, Acceleration Sensors.

TEXT BOOKS

1. Electrical & Electronic Measurement & Instruments by A.K.ShawneyDhanpat Rai & Sons Publications.
2. Sensors & Transducers By D. Patranabis , PHI Publications

REFERENCES

1. Sensors and Their Applications XII by S. J. Prosser, E. Lewis CRC Press
2. Handbook of modern sensors by JACOB FRADEN Springer AIP Press
3. Electrical Measurements and Measuring Instruments, by Er. R K Rajput by S. Chand Publishing**.**
4. Measurement Systems by Ernest O Doebelin by Mc Graw Hill.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ECONOMICS AND ACCOUNTING FOR ENGINEERS

Course Code:GR20A2004 **L/T/P/C:3/0/0/3**

III year II semester

COURSE OBJECTIVES

1. To provide the student with a clear understanding of demand analysis, elasticity of demand and demand forecasting;
2. To provide the insight on theory of production and cost analysis.
3. To describe different types of markets and competition and to elaborate the different forms of organisation and different methods of pricing.
4. To make the students understand various capital budgeting techniques
5. To Provide an insight of fundamental of accounting and emphasis on describe final accounts preparation

COURSE OUTCOMES

1. The student will be able to understand the concepts of economics and Demand concepts, elasticity and techniques for forecast demand of products
2. The student will be able to plan the production levels in tune with maximum utilization of organizational resources and with maximum profitability.
3. To understand the types of markets, types of competition and to estimate the cost of products and decide the price of the products and services produced
4. The student will be able to analyze the profitability of various projects using capital budgeting techniques and
5. The student is able will be able prepare the financial statements and more emphasis on preparation of final accounts.

UNIT I

INTRODUCTION & DEMAND ANALYSIS

Definition and Scope: Introduction to Economics, Nature and Scope of Managerial Economics. ***Demand Analysis***: Demand Determinants, Law of Demand and its exceptions. ***Elasticity of Demand***: Definition, Types, Measurement and Significance of Elasticity of

Demand. ***Demand Forecasting***, Factors governing demand forecasting, methods of demand forecasting.

UNIT II

PRODUCTION & COST ANALYSIS

Production Function – Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Laws of Returns, Internal and External Economies of Scale. ***Cost Analysis*:** Cost concepts. Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems) - Managerial Significance.

UNIT III

MARKETS AND FORMS OF BUSINESS ORGANIZATIONS

Types of competition and Markets, Features of Perfect competition, Monopoly and Monopolistic Competition. ***Pricing*:** Objectives and Policies of Pricing. Methods of Pricing. ***Business:*** Features and evaluation of different forms of Business Organisation: Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types.

UNIT IV

CAPITAL BUDGETING

Capital and its significance, Types of Capital, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value (NPV) Method and Internal Rate of Return (IRR) (simple problems) and Profitability Index (PI)

UNIT V

INTRODUCTION TO FINANCIAL ACCOUNTING

Accounting Concepts and Conventions - Double-Entry Bookkeeping. ***Accounting Cycle:*** Journal, Ledger, Trial Balance, Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).

TEXT BOOKS

1. Aryasri: Managerial Economics and Financial Analysis, TMH, 2009.
2. Managerial Economics: Analysis, Problems and Cases - P. L. Mehta, Edition, 13. Publisher, Sultan Chand, 2007.
3. Financial Accounting -1: S P Jain and K. L. Narang, Kalyani Publishers,2005.

REFERENCES

1. Peterson, Lewis and Jain: Managerial Economics, Pearson, 2009
2. Mithani : Managerial Economics , HPH, 2009
3. Lipsey&Chrystel, Economics, Oxford University Press, 2009
4. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.2009
5. Horngren : Financial Accounting, Pearson, 2009.
6. Dr. S. N. Maheswari and Dr. S.K. Maheshwari: Financial Accounting, Vikas, 2009.

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

MODERN POWER ELECTRONICS
(Professional Elective –II)

Course Code:GR20A3093 **L/T/P/C:3/0/0/3**
III year II semester

COURSE OBJECTIVES

1. A deep insight in to the working of different switching devices with respect to their characteristics.
2. Analysis of different resonant converters and control with their applications.
3. Knowledge on Multilevel Inverters and switching techniques implemented in recent technology.
4. Analysis of DC power supplies.
5. Knowledge on AC power supplies.

COURSE OUTCOMES

1. Define the advances in power electronic devices.
2. Articulate power electronic resonant converters in power control applications.
3. Evaluate the design and control of multi-level inverters.
4. Articulate DC power supplies in Power electronic applications
5. Evaluate the design and control of AC power supplies and uninterruptable power supplies.

UNIT I
MODERN POWER SEMICONDUCTOR DEVICES

Modern power semiconductor devices- MOS turn Off Thyristor (MTO) - Emitter Turn Off Thyristor (ETO) Integrated Gate- Commutated Thyristor (IGCTs)-MOS-controlled Thyristors (MCTs)-Static Induction circuit comparison of their features.

UNIT II
RESONANT PULSE INVERTERS

Resonant pulse inverters-series resonant inverters- with unidirectional & Bidirectional switches. Analysis of half bridge resonant inverter - evaluation of currents and Voltages of a simple resonant inverter-Analysis full bridge resonant inverter with bidirectional switches.

UNIT III
MULTILEVEL INVERTERS

Multi level concept-Classification of multilevel inverters- Diode clamped multilevel inverter-principle of operation, main features. Improved Diode Clamped inverter-principle of operation-Flying capacitors multilevel inverter principle of operation-main features.

UNIT IV
DC POWER SUPPLIES

DC power supplies-classification-switched mode dc power supplies-fly back Converter - forward converter- push pull converter-half bridge converter-Full bridge converter-Resonant dc power supplies-bidirectional dc power supplies-Applications.

UNIT V

AC POWER SUPPLIES

AC power supplies classification-switched mode ac power supplies. Resonant AC power supplies-bi directional ac power supplies-multi stage conversions-control circuits-applications. Introduction-power line disturbances-power conditioners-uninterruptible Power supplies applications.

TEXT BOOKS

1. Power Electronics—Mohammed H.Rashid Pearson Education—Third Edition

REFERENCES

1. Power Electronics—Ned Mohan, Tore M.Undeland and William P. Robbins —John Wiley and Sons Second Edition.

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

HVDC TRANSMISSION SYSTEMS
(Professional Elective –II)

Course Code:GR20A3094 **L/T/P/C:3/0/0/3**

III year II semester

COURSE OBJECTIVES
1. Evaluation of technical and economical aspects of HVDC transmission.
2. Development of HVDC converter analysis
3. Focusing on HVDC control
4. Analysis of harmonics and their rectification.
5. Impact of AC system performance on DC system

COURSE OUTCOMES
1. Compare the differences between HVDC and HVAC transmission.
2. Analyze the rectifier and inverter commutating circuits.
3. Discuss the different control strategies.
4. Estimate the requirement of HVDC filters.
5. Explain 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 VSC-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, AC-DC system interaction short circuit rates and its effects

GROUNDING AND GROUND ELECTRODES

Advantages and Problems with ground return, hvdc systems-grounding, the current field in the earth near an electrode, resistance of electrodes.

TEXT BOOK

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

REFERENCES

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

ADVANCED CONTROL SYSTEMS
(Professional Elective –II)

Course Code:GR20A3095 **L/T/P/C:3/0/0/3**
III year II semester

COURSE OBJECTIVES

1. Understand the basics of advanced control systems.
2. Analyze different types of linear and nonlinear systems.
3. Summarize phase-plane analysis of nonlinear control systems.
4. Understand the describing function analysis of nonlinear control systems.
5. Understand the optimal control theory.

COURSE OUTCOMES

1. Design controllers using the concept of state feedback and pole placement tech.
2. Find the stability of Linear and Nonlinear continuous time systems..
3. Relate the concepts of phase-plane analysis to nonlinear control systems.
4. Demonstrate non-linear system behavior by phase plane and describing function methods.
5. Perform the stability analysis of nonlinear systems by lyapunov method develop design skills in optimal control problems.

UNIT – I
STATE FEEDBACK CONTROLLER AND STATE OBSERVERS

Design of state feedback controller using pole placement technique, Ackerman's formula, Stability Improvements by State Feedback, Necessary and Sufficient Conditions for Arbitrary Pole Placement, Design of State Observer, Compensator Design by the Separation Principle.

UNIT –II
NON-LINEAR SYSTEMS ANALYSIS

Introduction, Common Nonlinear System Behaviours, Common Nonlinearities in Control Systems, Fundamentals, Describing Functions of Common Nonlinearities, Stability Analysis by Describing Function Method, Concept of Phase Plane Analysis, Construction of Phase Portraits, System Analysis on the Phase Plane.

UNIT –III
LIAPUNOV STABILITY ANALYSIS

Stability of Equilibrium State in the Sense of Liapunov, Graphical Representation of Stability, Asymptotic Stability and Instability, Sign-Definiteness of Scalar Function, Second Method of Liapunov, Stability Analysis of Linear Systems, Krasovski's Theorem, Liapunov Function Based on Variable Gradient Method

UNIT – IV
DESCRIBING FUNCTION ANALYSIS

Describing Functions for Common Types of Nonlinearities, Describing Function Analysis, Stability and Limit Cycles.

Phase Plane Analysis :

Analytical Methods for constructing Trajectories, Graphical Methods for constructing Trajectories, Isocline Method, Delta Method, Pell's Method, Lienard's Method, Classification of Singular Points, Phase-Plane Analysis of Linear control system, Phase-plane Analysis of Non-linear control system, Minimum Time Trajectory, Optimum Switching Curve.

UNIT – V

OPTIMAL CONTROL THEORY

Introduction, Optimal control problems, Mathematical procedures for optimal control design: Calculus of variations, Pontryagin's optimum policy, Bang-Bang Control, Hamilton-Jacobi Principle.

TEXT BOOKS

1. Advanced Control Systems, B. N. Sarkar, PHI Learning Private Limited.
2. M. Gopal, Control System Principles and Design Tata – McGraw Hill, 1997
3. Nonlinear Systems by Hassan K Khalil , Prentice Hall Publications.

REFERENCES

1. Control Systems theory and applications, S.K Bhattacharya, Pearson.
2. Control Systems, N.C.Jagan, BS Publications.
3. Advanced Control Theory, Somanath Majhi, Cengage Learning.
4. Richard C. Dorf and Robert H. Bishop, "Modern Control Systems", Eleventh Edition, Prentice Hall, Pearson Education, 2008

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

OPERATING SYSTEMS
(Professional Elective –II)

Course Code:GR20A2075 **L/T/P/C:3/0/0/3**
III year II semester

COURSE OBJECTIVES
1. Understand main concepts of OS and to analyze the different CPU scheduling policies.
2. Understand process synchronization and deadlock management.
3. Understand memory management and virtual memory techniques.
4. Appreciate the concepts of storage and file management.
5. Study OS protection and security concepts.

COURSE OUTCOMES
1. Explain different functions and types of operating system and implement various process management concepts for maximization of CPU throughput
2. Analyse synchronization problems and design a deadlock management scheme.
3. Optimize memory management for improved system performance.
4. Demonstrate disk management, implement disk scheduling and file system interface
5. Describe and frame protection and security policy for OS.

UNIT I
OPERATING SYSTEM OVERVIEW: Objectives and functions, Computer System Architecture, Evolution of Operating Systems, System Services, System Calls, System Programs, OS Structure, Virtual machines.
PROCESS MANAGEMENT: Process concepts, CPU scheduling-criteria, algorithms with evaluation, Preemptive / Non-Preemptive Scheduling, Threads, Multithreading Models.

UNIT II
CONCURRENCY: Process synchronization, the critical- section problem, Peterson's Solution, synchronization Hardware, semaphores, classic problems of synchronization, monitors.
DEADLOCKS: Principles of deadlock–system model, deadlock characterization, deadlock prevention, detection and avoidance, recovery from deadlock.

UNIT III
MEMORY MANAGEMENT: Swapping, contiguous memory allocation, paging, structure of the page table, segmentation.
VIRTUAL MEMORY: Demand paging, page replacement algorithms, Allocation of Frames, Thrashing.

UNIT IV
MASS-STORAGE STRUCTURE: Overview of Mass-storage structure, Disk structure, disk attachment, disk scheduling, swap-space management.
FILE SYSTEM IMPLEMENTATION: Access Methods, File system structure, file system implementation, directory implementation, allocation methods, free-space management.

UNIT V

PROTECTION: Goals and Principles of Protection, Implementation of Access Matrix, Access control, Revocation of Access Rights.

SECURITY: The Security problem, program threats, system and network threats, implementing security defenses.

TEXT BOOKS

1. Operating System Concepts Essentials, 9th Edition by AviSilberschatz, Peter Galvin, Greg Gagne, Wiley Asia Student Edition.
2. Operating Systems: Internals and Design Principles, 5th Edition, William Stallings, Prentice Hall of India.
3. Operating System: A Design-oriented Approach, 1st Edition by Charles Crowley, Irwin Publishing
4. Operating Systems: A Modern Perspective, 2nd Edition by Gary J. Nutt, Addison-Wesley.

REFERENCES

1. Modern Operating Systems, Andrew S Tanenbaum 3rd Edition PHI.
2. Operating Systems, R. Elmasri, A. G. Carrick and D. Levine, Mc Graw Hill.
3. Operating Systems in depth, T. W. Doeppner, Wiley.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
MACHINE LEARNING
(Open Elective –II)

Course Code:GR20A3123 **L/T/P/C:3/0/0/3**
III year II semester

COURSE OBJECTIVES

1. Recognize the basic terminology and fundamental concepts of machine learning.
2. Understand the concepts of Supervised Learning models with a focus on recent advancements.
3. Relate the Concepts of Neural Networks Models of supervised Learning
4. Discover Unsupervised learning paradigms of machine learning
5. Understand the concepts of Reinforcement learning and Ensemble methods

COURSE OUTCOMES

1. Explain the concepts and able to prepare the dataset for different Machine learning models..
2. Identify and Apply appropriate Supervised Learning models.
3. Design Neural Network models for the given data.
4. Perform Evaluation of Machine Learning algorithms and ModelSelection.
5. Devise un-supervised Reinforcement learning model .

UNIT-I
INTRODUCTION
Introduction to Machine learning, Supervised learning, Unsupervised learning, Reinforcement learning. Deep learning.
Feature Selection: Filter, Wrapper, Embedded methods.
Feature Normalization:- min-max normalization, z-score normalization, and constant factor normalization
Dimensionality Reduction : Principal Component Analysis(PCA), Linear Discriminant Analysis(LDA)

UNIT-II
SUPERVISED LEARNING – I (REGRESSION/CLASSIFICATION)
Regression models: Simple Linear Regression, multiple linear Regression. Cost Function, Gradient Descent, Performance Metrics: Mean Absolute Error(MAE),Mean Squared Error(MSE)
R-Squared error, Adjusted R Square.
Classification models: Decision Trees-ID3,CART, Naive Bayes, K-Nearest-Neighbours (KNN), Logistic Regression, Multinomial Logistic Regression
Support Vector Machines (SVM) - Nonlinearity and Kernel Methods

UNIT-III
SUPERVISED LEARNING – II (NEURAL NETWORKS)
Neural Network Representation – Problems – Perceptrons , Activation Functions, Artificial Neural Networks (ANN) , Back Propagation Algorithm.
Convolutional Neural Networks - Convolution and Pooling layers, , Recurrent Neural Networks (RNN).

Classification Metrics: Confusion matrix, Precision, Recall, Accuracy, F-Score

UNIT-IV

MODEL VALIDATION IN CLASSIFICATION

Cross Validation - Holdout Method, K-Fold, Stratified K-Fold, Leave-One-Out Cross Validation.

Bias-Variance tradeoff, Regularization , Overfitting, Underfitting.

Ensemble Methods: Boosting, Bagging, Random Forest.

UNIT-V

UNSUPERVISED LEARNING

Clustering-K-means, K-Modes, K-Prototypes, Gaussian Mixture Models, Expectation-Maximization.

Reinforcement Learning: Exploration and exploitation trade-offs, non-associative learning, Markov decision processes, Q-learning.

TEXT BOOKS

1. Machine Learning – Tom M. Mitchell, -MGH
2. Kevin Murphy, Machine Learning: A Probabilistic Perspective, MIT Press,2012
3. R. S. Sutton and A. G. Barto. Reinforcement Learning - An Introduction. MIT Press.1998.

REFERENCES

1. Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning, Springer2009
2. Christopher Bishop, Pattern Recognition and Machine Learning, Springer,2007.
3. Machine Learning Yearning, AndrewNg.
4. Data Mining–Concepts and Techniques -Jiawei Han and Micheline Kamber,Morgan Kaufmann

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
POWER SYSTEM ANALYSIS LAB

Course Code:GR20A3096 **L/T/P/C:0/0/3/1.5**
III year II semester

COURSE OBJECTIVES

1. Compute different power system parameters
2. Analyse various load flow solutions
3. Outline distinct types of faults and its protection
4. Perform load flow, short circuit and transient stability analysis
5. Generalise power system problems and its solutions

COURSE OUTCOMES

1. Mathematically model various parameters in power system
2.To solve different load flow problems
3. Summarise different protection scheme for the faults
4. Formulate the different algorithms for load flows and stability problems
5. To develop and design solutions for power system problems

LIST OF EXPERIMENTS

1.Computation of line parameters
2.Formation of bus Admittance matrix
3. a) Load Flow solution using Newton Raphson method in polar coordinates
b)Load Flow solution using Newton Raphson method in Rectangular coordinates
4. Unsymmetrical fault Analysis: LG, LL, LLG Fault
5. Z–Bus Building Algorithm
6. a)Obtain Symmetrical Components of a set of Unbalanced currents.
b)Obtain the original Unbalanced phase voltages from Symmetrical Components
7. Zones Protection
8. Short circuit analysis
9. Tripping sequence of protective devices
10. Transient Stability analysis
11. Power flow solution of power system model

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
SENSORS MEASUREMENTS AND INSTRUMENTATION LAB

Course Code: GR20A3097 **L/T/P/C:0/0/3/1.5**
III year II semester

COURSE OBJECTIVES

1. To introduce the concepts and phenomenon of various types of sensors and Instrumentation
2. To demonstrate the designing and conducting experiments on sensors, to analyze and interpret data using basic programs.
3. To demonstrate various types of bridges for measurement of resistance, inductance capacitance etc. and their hardware set ups.
4. To provide students with the scientific necessary skills to create an instrumentation line with various actuators
5. To gain knowledge about the measuring instruments, the methods of measurement and the use of different transducers

COURSE OUTCOMES

1. Measure common physical and electrical quantities using common sensors available
2. Construct basic programs for computer-controlled data acquisition, measurement and transfer of data across the sensor network for different types of sensors.
3. Establish competence in laboratory reporting in addition to the proper instrumentation of test systems and appropriate capture and interpretation of experimental test data.
4. Apply the statistics and uncertainty analysis and analyze the dynamic response using measuring instruments like DSO and Function Generator and record measuring data
5. Define various types of bridges in measurements, analyze and process the obtained measures

List of Experiments

Task-1: Voltage and Current Detection Circuitry

Task-2: Temperature and Pressure and Humidity Detection Circuitry

Task-3: Measure one-cycle data of a periodic waveform from a DSO and use values to compute the RMS value

Task-4: Position by LVDT/ Pot

Task-5: Distance(Ultrasonic) sensor

Task-6: Light sensor

Task-7: Rainfall sensor& Soil moisture sensor

Task-8: Measurement of Power and Energy

Task-9: Accelerometer sensor

Task-10: Measurement of Resistance by bridges

Task-11: Measurement of Inductance by bridges

Task-12: Measurement of Capacitance by bridges

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
MINI PROJECT WITH SEMINAR

Course Code:GR20A3141 **L/T/P/C: 0/0/4/2**

III Year II Semester

Course Objectives:

1. Demonstrate a wide range of skills learned to deliver a project.
2. Encourage multidisciplinary research through the integration learned.
3. Develop problem solving, analysis, synthesis and evaluation skills.
4. Encourage teamwork.
5. Improve communication and presentation skills during project work.

Course Outcomes:

1. Formulate hypothesis for the problem statement with sound technical knowledge from selected project domain.
2. Design Engineering Solution to the problem statement with systematic approach.
3. Analyse and develop an efficient solution for implementation of the project.
4. Apply the theoretical concepts while providing solution to the problem statement with teamwork and multidisciplinary approach.
5. Demonstrate professionalism with ethics while preparing and presenting the project work.

IV YEAR I SEMESTER

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

POWER SEMICONDUCTOR DRIVES

Course Code:GR20A4014 **L/T/P/C:2/1/0/3**

IV year I semester

COURSE OBJECTIVES

1. To know the characteristics of various motors and loads.
2. Analyze most of the widely used converters for DC motors
3. Understand performance of converter fed DC motors, its speed torque characteristics and various control methods.
4. Gain the knowledge about operation of DC motor speed control using converters and choppers
5. To acquire the knowledge of different speed control methods in AC motors using thyristors-based control schemes.

COURSE OUTCOMES

1. Analyse 1Φ & 3Φ converters fed DC motors and categorize the electric drive system based On the applications.
2. Understand the various mode of operations of electrical drives
3. Evaluate the performance characteristics of converter fed and chopper fed DC motor drives
4. Propose a speed control scheme of an induction motor drive for real life applications
5. Compare Separate control and self-control of synchronous motors drive.

UNIT I
PHASE CONTROLLED CONVERTER FED DC MOTOR

Introduction to Thyristor controlled Drives, single phase semi and full controlled converters connected to d.c. separately excited and d.c. series motors – continuous current operation – output voltage and current waveforms – speed and torque expressions – speed-torque – characteristics – problems on converter fed d.c. motors . Three phase semi and fully controlled connected to d.c. separately excited and d.c series motors - output voltage and current waveforms – speed and torque expressions – speed –torque characteristics – problems.

UNIT II
FOUR QUADRANT OPERATION OF DC DRIVES

Introduction to four quadrant operation – motoring operations, electric braking – plugging, dynamic and regenerative braking operations. Four quadrant operation of D.C. motors by dual converters – Closed loop control of DC motor (block diagram only)

UNIT III
CONTROL OF DC MOTORS BY CHOPPERS

Single quadrant, two quadrant and four quadrant chopper fed dc separately excited and series motors – continuous current operation – voltage and current waveforms – speed torque expressions and characteristics – problems – closed loop operation (block diagram only)

UNIT IV
CONTROL OF INDUCTION MOTOR

Variable voltage characteristics – control of induction motor by Ac voltage controllers – waveforms – speed torque characteristics. Variable frequency characteristics – variable frequency control of induction motor by voltage source and current source inverter and cyclo converters – PWM control of VSI and CSI – comparison of VSI and CSI operations - speed

torque characteristics – problems on induction motor drives - closed loop operation of induction motor drives (block diagram only). Static rotor resistance control – slip power recovery – static scherbius drive – static Kramer drive – their performance and speed torque characteristics – advantages -applications – problems.

UNIT V

CONTROL OF SYNCHRONOUS MOTOR

Separate control &self control of synchronous motors – operations of self controlled synchronous motors by VSI and CSI, Cycloconverters. Load commutated CSI fed synchronous motor – operation – waveforms – speed torque characteristics – applications- advantages and problems- Closed loop control operation of synchronous motor drives (block diagram only)

TEXT BOOKS

1. B. K. Bose, "Modern Power Electronics and AC Drives", Pearson Education, Asia, 2003.
2. Dubey G. K. "Power semiconductor control drives" Prentice Hall, Englewood Cliffs, New Jersey, 1989.
3. R. Krishnan, "Electric Motor Drives: Modeling, Analysis and Control", Prentice Hall, 2001.

REFERENCES

1. G. K. Dubey, "Fundamentals of Electrical Drives", CRC Press, 2002.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
WIDE BAND GAP POWER DEVICES
(Professional Elective –III)

Course Code:GR20A4015 **L/T/P/C:3/0/0/3**
IV year I semester

COURSE OBJECTIVES
1. Learn the characteristics of Power electronic devices
2. Study the GAN device fundamentals
3. Lean the SIC devices fundamentals
4. To understand the GAN device applications in Power Electronics
5. To understand the SIC device applications in Power Electronics

COURSE OUTCOMES
1. Comparison of SI based devices with wideband gap power devices
2. Demonstration of GAN characteristics
3. Illustrate the SIC Characteristics
4. Design of GAN based power electronics circuits.
5. Design of SIC based power electronics circuits

UNIT – I
INTRODUCTION OF DEVICES
MOSFET - structure and characteristics, MOSFET drain current, MOSFET transconductance and output conductance, MOSFET on-state resistance. The insulated gate bipolar transistor (IGBT) IGBT structure and characteristics - IGBT at turn-off and turn on, IGBT latch-up. Introduction of Wind band gap devices SiC, GaN, C(Diamond), necessity of wind band Gap, advantage of wide band gap semiconductors.

UNIT – II
GAN DEVICES
Fabrication of GaN Devices, Characterization and modelling GaN devices, Switching Characteristics, Advantages of GaN over si power semiconductors.

UNIT – III
SIC DEVICES
Fabrication of SiC Devices, Characterization and modelling SiC devices, Switching Characteristics, Advantages of SiC over silicon power semiconductors.

UNIT–IV
GAN APPLICATIONS
Consumer applications, Industrial applications, energy converters, e-mobility devices.

UNIT –V
SIC APPLICATIONS
High efficiency inverters for solar and wind power, power converters for electric and hybrid vehicles, power inverters for Industrial equipment’s, high voltage switches for X-ray generators.

TEXT BOOKS

1. Mohan, Undeland and Robbins, "Power Electronics: Converters, Applications and Design", John's Wiley and Sons.
2. B. W. Williams, Power Electronics: Devices, Drivers, Applications, and Passive Components, TMH
3. B Jayant Balija, Fundamentals Power Electronic Devices, Springer

REFERENCES

1. B Jayant Balija, SIC Devices, world Scientific Publishing, 2005.
2. Fei (Fred) Wang, Zheyu Zhang, and Edward A. Jones, Characterization of Wide Bandgap Power Semiconductor Devices, IET ENERGY ENGINEERING

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
HIGH VOLTAGE ENGINEERING
(Professional Elective –III)

Course Code:GR20A4016 **L/T/P/C:3/0/0/3**
IV year I semester

COURSE OBJECTIVES

1. Know the importance of high voltage engineering.
2. State the different dielectric materials and their break down mechanisms.
3. Acquire the knowledge of generation & measurement of high voltages and currents.
4. Impart the knowledge of insulation co-ordination.
5. Acquire the information on testing of electrical apparatus.

COURSE OUTCOMES

1. Recall the basic physics related to various breakdown processes in solid, liquid and gaseous insulating materials.
2. Classify the different methods of breakdown mechanisms that occur on application of high voltages.
3. Explain the methods of generation of high voltages.
4. State the procedures for the measurement of D. C., A.C., & Impulse voltages.
5. Describe the various tests on H. V. equipment and on insulating materials.

UNIT -I
BREAKDOWN IN GASES
Ionization processes and de-ionization processes, Types of Discharge, Gases as insulating materials, Breakdown in Uniform gap, non-uniform gaps, Townsend's theory, Streamer mechanism, Corona discharge.

UNIT – II
BREAKDOWN IN LIQUID AND SOLID INSULATING MATERIALS
Breakdown in pure and commercial liquids, Solid dielectrics and composite dielectrics, intrinsic breakdown, electromechanical breakdown and thermal breakdown, Partial discharge, applications of insulating materials.

UNIT – III
GENERATION OF HIGH VOLTAGES
Generation of high voltages, generation of high D. C. and A.C. voltages, generation of impulse voltages, generation of impulse currents, tripping and control of impulse generators.

UNIT-IV
MEASUREMENTS OF HIGH VOLTAGES AND CURRENTS
Peak voltage, impulse voltage and high direct current measurement method, cathode ray oscillographs for impulse voltage and current measurement, measurement of dielectric constant and loss factor, partial discharge measurements.

UNIT-V

HIGH VOLTAGE TESTING OF ELECTRICAL APPARATUS AND HIGH VOLTAGE LABORATORIES

Various standards for HV Testing of electrical apparatus, IS, IEC standards, Testing of insulators and bushings, testing of isolators and circuit breakers, testing of cables, power transformers and some high voltage equipment, High voltage laboratory layout, indoor and outdoor laboratories, testing facility requirements, safety precautions in H. V. Labs.

TEXT BOOKS

1. M. S. Naidu and V. Kamaraju, "High Voltage Engineering", McGraw Hill Education, 2015.

REFERENCES

1. C. L. Wadhwa, "High Voltage Engineering", New Age International Publishers, 2007.
2. E. Kuffel, W. S. Zaengl and J. Kuffel, "High Voltage Engineering Fundamentals", Newnes Publication, 2000.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

DIGITAL CONTROL SYSTEMS
(Professional Elective –III)

Course Code: GR20A4017 **L/T/P/C:3/0/0/3**

IV year I semester

COURSE OBJECTIVES

1. Understand the fundamentals of digital control systems, z-transforms
2. Explain Discrete System Analysis and Stability of Discrete Time System
3. Study the State Space Approach for discrete time systems
4. Design the Discrete compensator
5. Summarize discrete output feedback control

COURSE OUTCOMES

1. Demonstrate discrete representation of LTI systems.
2. Interpret the stability of open loop and closed loop discrete-time systems.
3. Analyze the State Space Approach for discrete time systems
4. Design of different digital controllers.
5. Model state feedback and output feedback controllers.

UNIT I
DISCRETE REPRESENTATION OF CONTINUOUS SYSTEMS

Basics of Digital Control Systems. Discrete representation of continuous systems. Sample and hold circuit. Mathematical Modelling of sample and hold circuit. Effects of Sampling and Quantization. Choice of sampling frequency. ZOH equivalent. Z-Transform and Inverse Z Transforms.

UNIT II
DISCRETE SYSTEM ANALYSIS AND STABILITY OF DISCRETE TIME SYSTEM

Pulse Transfer function. Pulse transfer function of closed loop systems. Mapping from s-plane to z plane. Solution of Discrete time systems. Time response of discrete time system. Stability analysis by Jury test. Stability analysis using bilinear transformation. Design of digital control system with dead beat response. Practical issues with dead beat response design.

UNIT III
STATE SPACE APPROACH FOR DISCRETE TIME SYSTEMS

State space models of discrete systems, State space analysis. Lyapunov Stability. Controllability, reach-ability, Reconstructibility and observability analysis. Effect of pole zero cancellation on the controllability & observability.

UNITIV
DESIGN OF DIGITAL CONTROL SYSTEM

Design of Discrete PID Controller, Design of discrete state feedback controller. Design of set point tracker. Design of Discrete Observer for LTI System. Design of Discrete compensator.

UNIT V

DISCRETE OUTPUT FEEDBACK CONTROL

Design of discrete output feedback control. Fast output sampling (FOS) and periodic output feedback controller design for discrete time systems

TEXT BOOKS

1. K. Ogata, “Digital Control Engineering”, Prentice Hall, Englewood Cliffs, 1995.
2. M. Gopal, “Digital Control Engineering”, Wiley Eastern, 1988.

REFERENCES

1. G. F. Franklin, J. D. Powell and M. L. Workman, “Digital Control of Dynamic Systems”, Addison-Wesley, 1998.
2. B.C. Kuo, “Digital Control System”, Holt, Rinehart and Winston, 1980.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
FUNDAMENTALS OF DIGITAL SIGNAL PROCESSING
(Professional Elective –III)

Course Code:GR20A4018 **L/T/P/C:3/0/0/3**
IV year I semester

COURSE OBJECTIVES

1. Distinguish the basic concepts and techniques for processing signals.
2. Analyze discrete time signal processing and characterization of random signals
3. Demonstrate the important methods in DSP, including digital filter design.
4. Evaluate the transform-domain processing and importance of Signal Processors.
5. Apply engineering problem solving strategies for DSP applications.

COURSE OUTCOMES

1. Represent signals mathematically in continuous and discrete-time, and in the frequency domain.
2. Analyse discrete-time systems using z-transform.
3. Explain the Discrete-Fourier Transform (DFT) and the FFT algorithms.
4. Design digital filters for various applications.
5. Solve problems in digital signal processing for the analysis of real-life signals.

UNIT I
DISCRETE-TIME SIGNALS AND SYSTEMS

Discrete time signals and systems: Sequences; representation of signals on orthogonal basis; Representation of discrete systems using difference equations, Sampling and reconstruction of signals- aliasing; Sampling theorem and Nyquist rate.

UNIT II
Z-TRANSFORM

z-Transform, Analysis of Linear Shift Invariant systems using z-transform, Properties of z-transform for causal signals, Interpretation of stability in z-domain, Inverse z-transforms.

UNIT III
DISCRETE FOURIER TRANSFORM

Frequency Domain Analysis, Discrete Fourier Transform (DFT), Properties of DFT, Convolution of signals, Fast Fourier Transform Algorithm, Parseval's Identity, Implementation of Discrete Time Systems.

UNIT IV
DESIGN OF DIGITAL FILTERS

Design of FIR Digital filters: Window method, Park-McClellan's method. Design of IIR Digital Filters: Butterworth, Chebyshev and Elliptic Approximations; Low-pass, Band-Pass, Band-Stop and High Pass Filters.

UNIT V

APPLICATIONS OF DIGITAL SIGNAL PROCESSING

Correlation Functions and Power Spectra, Stationary Processes, Optimal filtering using ARMA Model, Linear Mean-Square Estimation, Wiener Filter.

TEXT BOOKS

1. S. K. Mitra, "Digital Signal Processing: A computer based approach", McGraw Hill, 2011.
2. A.V. Oppenheim and R. W. Schafer, "Discrete Time Signal Processing", Prentice Hall, 1989.
3. J. G. Proakis and D.G. Manolakis, "Digital Signal Processing: Principles, Algorithms And Applications",Prentice Hall, 1997.
4. L. R. Rabiner and B. Gold, "Theory and Application of Digital Signal Processing", Prentice Hall, 1992.

REFERENCES

1. J. R. Johnson, "Introduction to Digital Signal Processing", Prentice Hall, 1992.
2.D. J. DeFatta, J. G. Lucas andW. S. Hodgkiss, "Digital Signal Processing", John Wiley & Sons, 1988.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

POWER QUALITY and FACTS
(Professional Elective –IV)

Course Code:GR20A4019 **L/T/P/C:3/0/0/3**

IV year I semester

COURSE OBJECTIVES

1. Analyse the transmission interconnections and relative importance of FACTS controllers.
2. Determine the operating characteristics of Shunt compensators.
3. Understand the working principles of Series compensators.
4. Analyse the basic concepts of Power Quality.
5. Understand the working principle of DVR, DSTATCOM.

COURSE OUTCOMES

1. Analyse the characteristics of ac transmission and know basic types of FACTS controllers.
2. Adapt FACTS devices for power-flow control, and Discuss the working principles of Shunt compensators and their operating characteristics.
3. Discuss the working principles of Series compensators.
4. Interpret the basic concepts of power quality.
5. Determine the working principles of devices DVR and DSTATCOM, to improve power quality.

UNIT I
FACTS CONCEPTS
Transmission Interconnections, Power Flow and Dynamic Stability Considerations of a Transmission Interconnection, Basic Types of FACTS Controllers-Shunt Connected Controllers, Series Connected Controllers, Combined Shunt and Series Connected controllers.

UNIT II
SHUNT COMPENSATORS
Objectives of shunt compensation, Midpoint voltage regulation, Improvement of Transient stability, power oscillation damping, Principle of operation of FC-TCR(SVC) compensator, characteristic of FC-TCR and control diagram, Basic concept of voltage source converter, principle of operation of STATCOM, characteristic of STATCOM, control diagram.

UNIT III
SERIES COMPENSATORS
Objectives of series compensation, Improvement of Transient stability, power oscillation damping, Principle of operation of Thyristor controlled series compensator (TCSC), operating characteristics, TCSC control diagram, Principle of operation voltage source converter type series compensator (SSSC). Basic principle of operation of UPFC, transmission control capabilities of UPFC.

UNIT IV
POWER QUALITY MEASUREMENTS
Power Quality problems in distribution systems: Transient and Steady state variations in

voltage and frequency. Unbalance, Sags, Swells, Interruptions, Wave-form Distortions: harmonics, noise. Tolerance of Equipment: CBEMA curve.

UNIT V

WORKING PRINCIPLE OF DVR, DSTATCOM

Principle of operation of DSTATCOM, Control in UPF mode of operation and zero voltage regulation mode, Full bridge single phase DVR and Three phase three wire DVR topology description, Principle of operation of active series compensator (DVR).

TEXT BOOKS

1. N. G. Hingorani and L. Gyugyi, "Understanding FACTS: Concepts and Technology of FACTS Systems" , Wiley-IEEE Press, 1999.
2. K. R. Padiyar, "FACTS Controllers in Power Transmission and Distribution", New Age International (P) Ltd. 2007.

REFERENCES

1. Bhim singh, Ambrish chandra and Kamal AL-Haddad, "Power Quality Problems and Mitigation Techniques" John wiley and sons Ltd 2015.

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ELECTRICAL ENERGY AUDIT
(Professional Elective –IV)

Course Code:GR20A4020 **L/T/P/C:3/0/0/3**

IV year I semester

COURSE OBJECTIVES
1. Know about current scenario and importance of energy conservation.
2. Evaluate the concepts of Energy and its various forms
3. Outline Energy Management & Audit-Definition
4. Observe improving of energy efficiency in different electrical systems.
5. Know how assessment of cooling towers can be done

COURSE OUTCOMES
1. Interpret the current energy scenario and energy need of growing economy.
2. Identify the Energy and its various forms and Electricity tariffs.
3. Analyze types of energy audit, energy costs, bench marking, energy performance.
4. Estimate Electricity billing, electrical load management and maximum demand control.
5. Discuss various types of air compressors, compressor efficiency and Compressed air system components.

Syllabus

UNIT – I
ENERGY SCENARIO
Commercial and Non-commercial energy, primary energy resources, commercial energy production, final energy consumption, energy needs of growing economy, long term energy scenario, energy pricing, energy sector reforms, energy and environment, energy security, energy conservation and its importance, restructuring of the energy supply sector, energy strategy for the future, air pollution, climate change.

UNIT – II
BASICS OF ENERGY AND ITS VARIOUS FORMS
Electricity tariff, load management and maximum demand control, power factor improvement, selection & location of capacitors, Thermal Basics-fuels, thermal energy contents of fuel, temperature & pressure, heat capacity, sensible and latent heat, evaporation, condensation, steam, moist air and humidity & heat transfer, units and conversion.

UNIT – III
ENERGY MANAGEMENT & AUDIT
Definition: energy audit, need, types of energy audit. Energy management (audit) approach understanding energy costs, bench marking, energy performance, matching energy use to requirement, maximizing system efficiencies, optimizing the input energy requirements, fuel & energy substitution, energy audit instruments.

UNIT–IV

ENERGY EFFICIENCY IN ELECTRICAL SYSTEMS

Electricity billing, electrical load management and maximum demand control, power factor improvement and its benefit, selection and location of capacitors, performance assessment of PF capacitors, distribution and transformer losses.

UNIT –V

ENERGY EFFICIENCY IN INDUSTRIAL SYSTEMS

Compressed Air System: Types of air compressors, compressor efficiency, efficient compressor operation, Compressed air system components, capacity assessment, leakage test. Fans and blowers: Types, performance evaluation, efficient system operation, flow control strategies and energy conservation opportunities. Pumps and Pumping System: Types, performance evaluation, efficient system operation, flow control strategies and energy conservation opportunities, Cooling Tower: Types and performance evaluation, efficient system operation, flow control strategies and energy saving opportunities, assessment of cooling towers..

TEXT BOOKS

1. S. C. Tripathy, "Utilization of Electrical Energy and Conservation", McGraw Hill, 1991.

REFERENCES

1. Guide books for National Certification Examination for Energy Manager / Energy Auditors Book-1, General Aspects (available online)

2. Guide books for National Certification Examination for Energy Manager / Energy Auditors Book-3, Electrical Utilities (available online).

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

SPECIAL ELECTRICAL MACHINES
(Professional Elective –IV)

Course Code: GR20A4021 **L/T/P/C:3/0/0/3**

IV year I semester

COURSE OBJECTIVES

1. Develop knowledge on Construction, principle of operation and performance of synchronous reluctance motors.
2. Understand the concepts of sine wave motor.
3. Develop Construction, principle of operation, control and performance of switched reluctance motors.
4.Explain principle of operation, control and performance of permanent magnet brushless D.C motors.
5.Principle of operation and performance of permanent magnet synchronous motors.

COURSE OUTCOMES

1. Summarize Various Special Electrical Machines
2. Explain Permanent magnet brushless D.C Motors .
3. Identify Various Power Controllers.
4.Analyze the Variable Reluctanceandhybridmotors.
5. Interpret the Different Switched Reluctancemotors

UNIT-I
INTRODUCTION OF SPECIAL MACHINES.

Construction and principle of operation - Emf equation of BLPM sine wave motor- Flux density distribution.

UNIT-II
PERMANENTMAGNETBRUSHLESS D.C.MOTORS

Permanent Magnet materials– Magnetic Characteristics –Permeance coefficient-Principle of operation–Types–Magnetic circuit analysis–EMF and torque equations –CommutationPower controllers–Motor characteristics and control.

UNIT-III
PERMANENTMAGNET SYNCHRONOUSMOTORS

Principle of operation–Ideal PMSM –EMF and Torque equations–Armature reaction MMF– Synchronous Reactance – Sine wave motor with practical windings - Phasor diagram – Torque/speed characteristics- Power controllers- Converter Volt-ampere requirements.

UNIT-IV
SYNCHRONOUS RELUCTANCEMOTORS

Constructionalfeatures–Types–AxialandRadialfluxmotors–Operatingprinciples–Variable ReluctanceandHybridMotors–SYNRELMotors–VoltageandTorqueEquations- Phasor diagram - Characteristics.

UNIT-V

SWITCHED RELUCTANCEMOTORS

Constructional features–Rotary and Linear SRMs-Principle of operation–Torque production–Steady state performance prediction-Analytical method-Power Converters and their controllers – Methods of Rotor position sensing – Sensor less operation – Closed loop control of SRM - Characteristics.

TEXT BOOKS

1. T.J.E.Miller,_Brushless Permanent Magnet and Reluctance Motor Drives‘, Clarendon Press, Oxford, 1989.

2. T.Kenjo,_Stepping Motors andTheir Microprocessor Controls‘, Clarendon Press London, 1984.

REFERENCES

1.R.Krishnan,_SwitchedReluctanceMotor Drives–Modeling,Simulation,Analysis,Designand Application‘,CRCPress,NewYork,2001.

2.P.P.Aearnley,_SteppingMotors–AGuidetoMotorTheoryandPractice‘,PeterPerengrinus London, 1982.

3.T.KenjoandS.Nagamori,_PermanentMagnetandBrushlessDCMotors‘,ClarendonPress, London, 1988

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

VLSI DESIGN
(Professional Elective –IV)

Course Code:GR20A3108 **L/T/P/C:3/0/0/3**
IV year I semester

COURSEOBJECTIVES

1. To learn the fundamentals of MOS transistors and IC fabricationtechnologies
2. To analyze and design CMOS subsystems
3. To understand the flow of VLSI design and to draw stick diagrams and layouts for CMOS circuits
4. To implement the VLSI designs using programmable logic devices
5. To understand the need of testing and the methods oftesting ICs

COURSE OUTCOMES

1. The student able to visualize the fabrication process of ICtechnology.
2. The student able to analyze and design CMOS subsystems
3. The student able to draw stick diagrams and layouts for CMOS circuits using design rules
4. The student able to implement the VLSI design using programmable logic devices
5. The student able to understand various testingschemes

UNIT I

Introduction: Introduction to IC Technology–MOS transistors, NMOS, CMOS & BiCMOS fabrication processes, Integrated Resistors and Capacitors

UNIT II

Basic Electrical Properties: Basic Electrical Properties of MOS and BiCMOS Circuits: Ids-Vds relationships, MOS transistor threshold Voltage Vt, gm, gds, Figure of merit ωo; Pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter-analysis and design, BiCMOS Inverters, Power Dissipation

UNIT III

VLSI Circuit Design Processes, Gate Level Design: VLSI Design Flow, Stick Diagrams, Layout, Lambda based Design rules for wires, contacts and Transistors, Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits, Design using Pass transistors and transmission gates, Dynamic CMOS Logic and Domino CMOS Logic

UNIT IV

Data path Subsystems, Array Subsystems: Subsystem Design, Shifters, Adders- Ripple Carry,

CLA CSA, ALUs, Multipliers –Array Type, Booth,Wallace tree, Parity generators, Comparators, Zero/One Detectors, SRAM, DRAM, ROM

UNIT V

Semicustom Integrated Circuit Design, IC Testing: PLAs, Programmable Array Logic, FPGAs, CPLDs, Standard cells design approach, Need for Testing, Test Principles, Design Strategies for Test, Chip Level Test Techniques, System-Level Test Techniques.

TEXTBOOKS

1. Essentials of VLSI circuits and systems – Kamran Eshraghian, Douglas A.Pucknell, Sholeh Eshraghian,PHI,2011.
2. CMOS VLSI Design–A circuits and systems perspective, Neil H.E Weste, David Harris, Fourth Edition, Addison Wesley,2011.
3. VLSI Design, K. Lal Kishore and V. S. V. Prabhakar, 1st Edition, I.K. International,2009.

REFERENCES

1. CMOS logic circuit Design- John. P. Uyemura, Springer,2013.
2. Modern VLSI Design - Wayne Wolf, Pearson Education, 3rdEdition,1997.
3. VLSI Design–A. Albert Raj, Latha, PHI,2008
4. Introduction to VLSI–Mead & Convey, BS Publications, 2010

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
FUNDAMENTALS OF MANAGEMENT AND ENTREPRENEURSHIP

Course Code:GR20A3140 **L/T/P/C:3/0/0/3**

IV year I semester

COURSE OBJECTIVES

1. To provide engineering and science students with an accelerated introduction to the basics of management.
2. The course provides a framework that will enhance a person's effectiveness in the business world and make familiarize management language.
3. To understand the management concepts and applications of concepts in practical aspects of business and development of managerial skills.
4. To provide the student with a clear understanding of Entrepreneurship.
5. To give hands on experience on how to generate ideas, evaluate business model.

COURSE OUTCOMES

1. The students understand the significance of Management in their Profession.
2. The various Management Functions like Planning, Organizing, Staffing, Leading, Motivation and Control aspects are learnt in this course.
3. The students can explore the Management Practices in their domain area and understand, adopt motivational theories and leadership styles and apply controlling techniques at right time for better decision making.
4. The student will be exposed to the basic concepts of entrepreneurship and its development process.
5. The student will be able to evaluate business ideas and attain hands on experience in designing value proposition and he will acquire the ability of developing a business plan / model.

UNIT–I

INTRODUCTION TO MANAGEMENT

Definition, Nature and Scope, Functions, Managerial Roles, Levels of Management, Managerial Skills; **Evolution of Management Thought**- Classical Approach- Scientific and

Administrative Management; The Behavioural approach; The Systems Approach; Contingency Approach.

UNIT– II

PLANNING AND ORGANIZING

Planning – Planning Process, Types of Plans, Decision making and Steps in Decision Making; Principles of Organization: Span of control, organizational Design & Organizational Structures; Departmentalization, Delegation; Centralization, Decentralization.

UNIT–III

LEADING, MOTIVATION AND CONTROLLING

Leadership, Power and Authority, Leadership Styles; Behavioral Leadership, Situational Leadership, Leadership Skills. Motivation – Types; Motivational Theories – Needs Hierarchy Theory, Two Factor Theory, Theory X and Theory Y. **- controlling** – basic control process – control techniques.

UNIT–IV

NATURE OF ENTREPRENEURSHIP

Characteristics and skills of an entrepreneur, Entrepreneur scenario in India and abroad. Types of entrepreneur, types of ownership, Small business in Indian economy. Risk Reduction strategies. Strategies for growth. Financial aspects: sources of rising capital, schemes of Department of Industries (DIC), KVIC, SIDBI, NABARD, NSIC, IFCI and IDBI.

UNIT–V

CREATING AND STARTING THE VENTURE

Creativity and the business idea (Self-discovery, Opportunity discovery); Developing the business plan (Business model – Lean canvas by Alexander Osterwalder); Marketing plan (Customer & Solution- Value proposition, Marketing & Sales); Financial plan (Validation, money), Human Resource Plan (Team).

TEXT BOOKS

1. Management Fundamentals, Robert N Lussier, 5e, Cengage Learning, 2013.
2. Fundamentals of Management, Stephen P. Robbins, Pearson Education, 2009.
3. Principles and Practice of Management, L. M. Prasad, Sultan Chand & Sons, 2012
4. Entrepreneurship- Robert D Hisrich, Michael P Peters, Dean A Shepherd, TMH.2009

REFERENCES

1. Essentials of Management, Koontz Kleihrich, Tata Mc – Graw Hill.
2. Management Essentials, Andrew DuBrin, 9e, Cengage Learning, 2012.
3. Entrepreneurship- Rajeev Roy, Oxford, 2011
4. Intellectual Property- Deborah E.Bouchoux, Cengage, 2012

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ARTIFICAL INTELLIGENCE TECHNIQUES
(Open Elective –III)

Course Code:GR20A4022 **L/T/P/C:3/0/0/3**
IV year I semester

COURSE OBJECTIVES

1. Classify the difference between Biological Neuron and Artificial Neuron.

2. Articulate about Back propagation networks

3. Illustrate the concepts of Fuzzy logic systems

4. Identify the Systems which are designed using Fuzzy Membership Rules

5. Describe the importance of the Genetic Algorithm and its applications.

COURSE OUTCOMES

1. Outline importance of BNN, ANN and its learning techniques and architectures.

2. Summarize the concept of Back propagation networks

3. Interpret the concept of Fuzzy logic System

4. Design of Fuzzy membership Function and rules for Applications

5. Analyze the parameters of Genetic Algorithm.

UNIT I

NEURAL NETWORKS –I (Introduction & Architecture)

Neuron, Nerve structure and synapse, Biological Neural network , Artificial Neuron and its model, activation functions, Neural network architecture: single layer and multilayer feed forward networks, recurrent networks. Various learning techniques.

UNIT II

NEURAL NETWORKS –II (Back Propagation Networks)

Architecture: perceptron model, solution, single layer artificial neural network, multilayer perception model; back propagation learning methods, effect of learning rule co-efficient; back propagation algorithm, factors affecting back propagation training, applications.

UNIT III

FUZZY LOGIC –I (Introduction)

Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory and operations,

Properties of fuzzy sets, Fuzzy and Crisp relations, Fuzzy to Crisp conversion.

UNIT IV

FUZZY LOGIC –II (Fuzzy Membership, Rules)

Membership functions, interference in fuzzy logic, fuzzy if-then rules, Fuzzy implications and Fuzzy algorithms, Fuzzyfications & Defuzzificataions, Fuzzy Controller, Industrial applications.

UNIT V

GENETIC ALGORITHMS (GA)

Basic concepts, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection, Genetic operators, Mutation, Generational Cycle, applications.

TEXTBOOKS

1. J M Zurada , "An Introduction to ANN",Jaico Publishing House

2. Neural Networks, Fuzzy Logic, And Genetic Algorithms : Synthesis And Applications - by S. RAJASEKARAN, G. A. VIJAYALAKSHMI PAI, PHI publishers.

3. Timothy J Ross, "Fuzzy Logic with Engg.Applications", McGraw. Hill

REFERENCES

1. Hung T. Nguyen, Nadipuram R. Prasad, Carol L. Walker and Elbert A. Walker, "A First Course in Fuzzy and Neural Control" Chapman & Hall, CRC.

2. Driankov, Dimitra, "An Introduction to Fuzzy Control", Narosa Publication

3. Golding, "Genetic Algorithms", Addison-Wesley Publishing Com

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

PROGRAMMABLE LOGIC CONTROLLERS LAB

Course Code:GR20A4023 **L/T/P/C:0/0/4/2**
IV year I semester

COURSE OBJECTIVES

1. Know the different Programming Languages of PLC.
2. Execute Logic Gates in Ladder Logic of PLC.
3. Examine various experiments of PLC in FBD.
4. Apply Timer and Counter for different industrial applications.
5. Design various application of PLC like Traffic Light Control, Water Level Control, etc.

COURSE OUTCOMES

1. Ability to learn different programming languages of PLC.
2. Implement all the Logic Gates in Ladder Logic.
3. Perform different FBD programming experiments of PLC.
4. Ability to use PLC timers and counters for the various applications.
5. Design and implementation of different applications of PLC like Traffic Light Control, Water Level Control, etc

List of Experiments

Task-1: Experiments on Ladder Programming

- Logic Gates.
- Latching and Unlatching
- Interlocking
- Forward and Reverse direction control of Motors.

Task-2: Experiments on FBD Programming

- Different applications of Push buttons.
- Working of different types of Timers.
- Working of different types of Counters.
- Sequential operation of ON/OFF a set of lights.
- Latching and Unlatching of a Motor.

Task-3: Applications of PLC

- Water Level Controller.
- Traffic Light Control
- Lift Control System

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
POWER SEMICONDUCTOR DRIVES LAB

Course Code:GR20A4024 **L/T/P/C:0/0/4/2**
IV year I semester

COURSE OBJECTIVES

1. To match a foundation in the theory and applications of electrical machinery and their different types with respect to their control.
2. To recall control theory concepts in electric drive control systems.
3. To Knowledge on different power converters for AC and DC drives.
4. To Information on modeling and different control strategies for synchronous motor drives, PMSM and BLDC.
5. To Evaluation of Closed loop speed and torque control of switched reluctance motor drives.

COURSE OUTCOMES

1. Explain the operation of power electronic converters and their control strategies.
2. Construct control DC Motor by Three Phase Converters.
3. Develop Three Phase Inverter for Induction motor drives..
4. Solve four quadrant Operation of DC drives.
5. Classify speed and torque control in BLDC, PMSM & SRM.

List of Experiments

1. Firing angle control of thyristor based DC drive connected to DC motor.

2. Closed loop speed control of DC motor using PI,PID, PD controllers.

3. Step, ramp, parabolic response of second order DC motor system.

4. Indirect speed control of DC motor using armature voltage control with PI,PID controllers.

5. V/F control of AC drive connected to AC motor.

6. Closed loop speed control of AC motor with step, ramp, parabolic inputs and PI,PID controllers.

7. Closed loop speed control of AC motor- DC generator set with load using PI,PID controllers.

8. Speed Control of SRM (Switched Reluctance Motor) in Forward Motoring and Reverse Motoring Mode.

9. Speed Control of PMBLDC Motor in Forward Motoring, Reverse Motoring and Forward Breaking Mode.

10. Speed Control of PMSM in Forward Motoring Mode.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
PROJECT WORK - PHASE I

Course Code: GR20A4129 **L/T/P/C: 0/0/12/6**
IV Year I Semester

Course Objectives:

1. Demonstrate a wide range of skills learned to deliver a project.
2. Encourage multidisciplinary research through the integration learned.
3. Develop problem solving, analysis, synthesis and evaluation skills.
4. Encourage teamwork.
5. Improve communication and presentation skills during project work.

Course Outcomes:

1. Formulate hypothesis for the problem statement with sound technical knowledge from selected project domain.
2. Design Engineering Solution to the problem statementwith systematic approach.
3. Analyse and develop an efficient solution for implementation of the project.
4. Apply the theoretical concepts while providing solution to the problem statement with teamwork and multidisciplinary approach.
5. Demonstrate professionalism with ethics while preparing and presenting the project work.

IV YEAR II SEMESTER

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

POWER SYSTEM MONITORING AND CONTROL

Course Code:GR20A4092 **L/T/P/C:2/1/0/3**

IV year II semester

COURSE OBJECTIVES

1. Outline the concept of Economic operation of power system and Unit commitment
2. Explain about the operation and control the voltage, frequency
3. Monitoring and control of a power system.
4. Basics of power system economics
5. Basics of Demand Side-management

COURSE OUTCOMES

1. Analyze the concept of Economic operation of power system and Unit commitment
2. List methods to control the voltage, frequency and power flow
3. Compose monitoring and control of a power system.
4. Recall the basics of power system economics.
5. Write about Demand Side-management

UNIT I
ECONOMIC OPERATION OF POWER SYSTEMS AND UNIT COMMITMENT

Optimal operation of Generators in Thermal Power Stations, - heat rate Curve – Cost Curve – Incremental fuel and Production costs, input-output characteristics, Optimum generation allocation with line losses neglected.Optimum generation allocation including the effect of transmission line losses – Loss Coefficients, General transmission line loss formula. Numerical problems.

Constraints in Unit Commitment, UC solution methods: Priority- list methods, forward dynamic programming approach.

UNIT II
CONTROL OF FREQUENCY AND VOLTAGE

Turbines and Speed-Governors, Load frequency control of single area and Two area system: Steady state analysis, Dynamic Response, Droop Control and Power Sharing, Automatic Generation Control, Excitation Systems

UNIT III
MONITORING AND CONTROL

Overview of Energy Control Centre Functions: SCADA systems. Phasor Measurement Units and Wide-Area Measurement Systems, State-estimation: Maximum likelihood weighted least squares estimation. Factors effecting power System Security, Introduction of Contingency analysis, Preventive Control and Emergency Control.

UNIT IV
POWER SYSTEM ECONOMICS

Basic Pricing Principles: Generator Cost Curves, Utility Functions, Power Exchanges, Spot

Pricing. Electricity Market Models (Vertically Integrated, Purchasing Agency, Whole-sale competition, Retail Competition),

UNIT V
POWER MANAGEMENT
Demand Side-management, Transmission and Distributions charges, Ancillary Services. Regulatory framework.

TEXT BOOKS
1. J. Grainger and W. D. Stevenson, "Power System Analysis", McGraw Hill Education,1994.
2. P.Kundur, "Power System Stability and Control" McGraw Hill Education, 1994
3. O. I. Elgerd, "Electric Energy Systems Theory", McGraw Hill Education, 1995.
4. A. R. Bergen and V. Vittal, "Power System Analysis", Pearson Education Inc., 1999.
5. D. P. Kothari and I. J. Nagrath, "Modern Power System Analysis", McGraw Hill Education,2003.

REFERENCES
1. B. M. Weedy, B. J. Cory, N. Jenkins, J. Ekanayake and G. Strbac, "Electric Power Systems",Wiley, 2012.

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ADVANCED ELECTRIC DRIVES
(Professional Elective –V)

Course Code:GR20A4093 **L/T/P/C:3/0/0/3**

IV year II semester

COURSE OBJECTIVES

1. To Knowledge on different power converters for AC drives
2. To Focus on modeling and different control strategies for Induction motor drives
3. To Information on modeling and different control strategies for synchronous motor drives, PMSM and BLDC.
4. To Evaluation of Closed loop speed and torque control of switched reluctance motor drives.
5. To Analysis of DSP based motion control.

COURSE OUTCOMES

1. Explain the operation of power electronic converters and their control strategies.
2. Apply vector control strategies for Induction motor drives
3. Design different control strategies for Synchronous motor drives and PM AC Machines
4. Demonstrate the operation of switched reluctance motor drives.
5. Interpret the implementation of DSP based motion control.

UNIT I
POWER CONVERTERS FOR AC DRIVES
PWM control of inverter, selected harmonic elimination, space vector modulation, current control of VSI, three level inverter, Different topologies, SVM for 3 level inverter, Diode rectifier with boost chopper, PWM converter as line side rectifier, current fed inverters with self-commutated devices. Control of CSI, H bridge as a 4-Q drive.

UNIT II
INDUCTION MOTOR DRIVES
Different transformations and reference frame theory, modeling of induction machines, voltage fed inverter control-v/f control, vector control, direct torque and flux control(DTC).

UNIT III
SYNCHRONOUS MOTOR DRIVES
Modeling of synchronous machines, open loop v/f control, vector control, direct torque control, CSI fed synchronous motor drives.
PERMANENT MAGNET MOTOR DRIVES
Introduction to various PM motors, BLDC and PMSM drive configuration, comparison, block diagrams, Speed and torque control in BLDC and PMSM.

UNIT IV

SWITCHED RELUCTANCE MOTOR DRIVES

Evolution of switched reluctance motors, various topologies for SRM drives, comparison, Closed loop speed and torque control of SRM.

UNIT V

DSP BASED MOTION CONTROL

Use of DSPs in motion control, various DSPs available, realization of some basic blocks in DSP for implementation of DSP based motion control.

TEXT BOOKS

1. B. K. Bose, "Modern Power Electronics and AC Drives", Pearson Education, Asia, 2003.
2. P. C. Krause, O. Wasynczuk and S. D. Sudhoff, "Analysis of Electric Machinery and Drive Systems", John Wiley & Sons, 2013.
3. H. A. Taliyat and S. G. Campbell, "DSP based Electromechanical Motion Control", CRC press, 2003.

REFERENCES

1. R. Krishnan, "Permanent Magnet Synchronous and Brushless DC motor Drives", CRC Press, 2009.

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

BIG DATA APPLICATIONS IN POWER SYSTEMS
(Professional Elective –V)

Course Code:GR20A4094 **L/T/P/C:3/0/0/3**

IV year II semester

COURSE OBJECTIVES

1. Basic concepts of data analytics that are used to realize the benefits of smart grid
2. Introduce goals of data modeling as well as the benefits and challenges of creating useful models
3. Available and desired data sources for big data analytics
4. The difficulties in the existing approaches for database integration and storage efforts, and adapting to distributed approaches that are more cost-effective
5. Techniques and algorithms used to extract and visualize the value from utility data

COURSE OUTCOMES

1. Debate on the challenges of creating a highly scalable, easily managed, secure foundation for data management
2. Create useful analytical models specific to the utility enterprise.
3. Understand the available and desired data sources as well as the business value of that data
4. Identify the difficulties in adapting to the needs of high-volume and varied data types
5. Extract value from utility data and visualize the utility.

UNIT I
BUILDING THE FOUNDATION FOR DATA ANALYTICS

What Are Data Analytics? Building the Analytical Architecture, The Art of Data Management, Managing Big Data Is a Big Problem, The Truth Won't Set You Free, One Size Doesn't Fit All, Solving the "Situation-Specific" Dilemma, The Build-Versus-Buy War Rages On, When the Cloud Makes Sense, Change Is Danger and Opportunity.

UNIT II
APPLYING ANALYTICAL MODELS IN THE UTILITY

Understanding Analytical, What Exactly Are Models? Using Descriptive Models for Analytics, Using Diagnostic Models for Analytics, How Diagnostic Tools Help Utilities, Predictive, Prescriptive Analytics, An Optimization Model for the Utility, Toward Situational Intelligence Moving Beyond Business Intelligence, Energy Forecasting, Asset Management, Demand Response and Energy Analytics, Dynamic-Pricing Analytics, Revenue-Protection Analytics

UNIT III
SOURCING DATA

Smart Meters, Sensors, Control Devices, Intelligent Electronic Devices, Distributed Energy Resources, Consumer Devices, Historical Data, Third-Party Data, Working with a Variety of Data Sources, Data Fusion.

UNIT IV

BIG DATA INTEGRATION, FRAMEWORKS AND DATABASES

This Is Going to Cost, Storage Modalities, Hyperscale, Network-Attached Storage, Object Storage, Data Integration, The Costs of Low-Risk Approaches, Let the Data Flow, Hadoop, MapReduce, Hadoop Distributed File System, How Does This Help Utilities? Other Big Data Databases, NoSQL 166, In-Memory or Main Memory Databases, Object-Oriented Database, Management Systems, Time Series Database Servers, Spatial and GIS Databases, The Curse of Abundance.

UNIT V

EXTRACTING VALUE & ENVISIONING THE UTILITY

Mining Data for Information and Knowledge, The Process of Data Extraction, Hadoop: A Single-Purpose, Batch-Data Platform? Stream Processing, Complex Event Processing, Process Historians

Big Data Comprehension, Why Humans Need Visualization? The Role of Human Perception: Preattentive Processing, The Utility Visualized, Advancing Business Intelligence, High-Impact Operations, Improving Customer Value, Making Sense of It All

TEXT BOOKS

1. “Big Data Analytics Strategies for the Smart Grid” Carol L. Stimmel, CRC Press, Taylor & Francis Group.
2. “Big Data Application in PowerSystems”Reza Arghandeh &Yuxun Zhou, Elsevier publications.
3. “Big Data Analytics in Future Power Systems”Ahmed F. Zobaa and Trevor J. BihlCRC Press, Taylor & Francis Group.

REFERENCES

1. “Advanced Data Analytics for Power Systems”, Ali Tajer, Samir M. Perlaza, H. Vincent Poor, Cambridge University Press.
2. “Data Fusion and Data Mining for Power System Monitoring”, Arturo Román Messina,CRC Press, Taylor & Francis Group.

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

MODERN CONTROL THEORY
(Professional Elective –V)

Course Code:GR20A4095 **L/T/P/C:3/0/0/3**
IV year II semester

COURSE OBJECTIVES

1. Outline of fundamental state feedback.
2. Analyze the full and reduced order observer.
3. Understand the robust control system
4. Apply the concepts state regulator and Riccati equation.
5. Understand the concept of variable - structure controller

COURSE OUTCOMES

1. Determine state feedback gain and its effect.
2. Design of full order and reduced order state observers.
3. Design robust controller for tracking and disturbance rejection
4. Analyze continuous and discrete time linear state regulator
5. Design of sliding mode controller and reduce chattering problem..

UNIT I
STATE FEEDBACK

Non uniqueness of state model, Similarity transformation, Invariance of system properties. Controllability – necessary and sufficient condition - Pole assignment using State feedback – Ackerman's formula for feedback gain determination, Observability. Duality. Effect of state feedback on controllability and observability. Controllable subspace – decomposition of state into controllable and uncontrollable components

UNIT II
DESIGN OF FULL AND REDUCED ORDER OBSERVERS

Design of full order observer – Bass Gura algorithm. The separation principle - Combined observer – controller compensator. Design of reduced order observer. Unobservable subspace – decomposition of state into observable and unobservable components – Canonical decomposition theorem.

UNIT III
DESIGN OF ROBUST CONTROL SYSTEM

Reducibility – realization of transfer function matrices. Model decomposition and decoupling by state feedback. Design of robust control system for asymptotic tracking and disturbance rejection using State variable equations. Transfer function interpretations – transfer function form of observer and state estimate feedback. State space interpretation of internal model principle.

UNIT IV
STATE REGULATOR

Discrete time linear state regulator – Algorithm for the solution, Use of observer in

implementing the control law. Continuous time linear state regulator – Matrix Riccati equation. Time invariant linear state regulator – the reduced matrix Riccati equation - An iterative method to solve the reduced matrix Riccati equation. Suboptimal linear regulator.

UNIT V

VARIABLE - STRUCTURE CONTROLLER

Concept of variable - structure controller and sliding control, reaching condition, and reaching mode, implementation of switching control laws. Reduction of chattering in sliding and steady state mode.

TEXT BOOKS

1. Modern Control Engineering, Katsuhiko Ogata, 5th Edition, Prentice Hall India, 1997
2. Modern Control System Theory, M. Gopal, Revised 2nd Edition, New Age International Publishers, 2005.

REFERENCES

1. Linear Systems, Thomas Kailath, Perntice Hall, 1980.
2. Control System Design, Graham C. Goodwin, StefanF. Graebe and Mario E. Salgado, Pearson Education, 2000.
3. Linear System Theory and Design, Chi-Tsong Chen, OXFORD University Press.
4. Richard C. Dorf and Robert H. Bishop, Modern Control Systems, 11th Edition, Pearson Edu India, 2009.
5. M. Vidyasagar, Nonlinear Systems Analysis, Prentice - Hall International editions,1993.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

INDUSTRIAL IoT
(Professional Elective –V)

Course Code:GR20A4096 **L/T/P/C:3/0/0/3**
IV year II semester

COURSE OBJECTIVES

1. Summarize the Story of IoT
2. List the processes involved in Industrial I-IoT
3. Illustrate about the data flow in I-IoT
4. Acquire Knowledge on strategy and Architecture development in I-IoT
5. Explore the latents of cloud-based Industrial IoT platforms, analytics, and protocols

COURSE OUTCOMES

1. Summarize about I-IoT Stories with its key technologies and terminologies
2. Demonstrate the concept of Industrial process and devices used in IoT
3. Illustrate how to generate data and flow in industry and its protocols.
4. Analyze the strategy, implementation and the developing architecture in I-IoT
5. Implement the Solutions for Cloud I-IoT applications

UNIT I
THE IOT STORY AND ITS INTRODUCTION

What is IoT, IoT key technologies, IoT Potentials, IoT Architecture and core IoT modules; Sensors, End points and Power Systems: Sensor devices, SMART IoT End points; Sensor Fusion; Communication and information theory.

Some Definitions: Industry 4.0, M2M.IoT versus I-IoT, bigdata, blockchain, Cloud computing.

UNIT II
UNDERSTANDING THE INDUSTRIAL PROCESS AND DEVICES

Technical requirements, The industrial process, Automation in the industrial process; Control and measurement systems; Types of industrial processes; Continuous processes, Batch processes, Semi-continuous processes, Discrete processes

UNIT III
THE I-IOT DATA FLOW

The Industrial IoT data flow in a factory; The edge device; The Industrial IoT data flow in the cloud; Measurements and the actuator chain; Controllers;
Designing Industrial Internet Systems.

Industrial Protocols:I-IoT WAN Technologies and Protocols

UNIT IV
IIOT STRATEGY AND IMPLEMENTATION

IIoT Strategy Planning IIoT Implementation Methodology Challenges in Adopting IIoT Managing Data Factors Need To Be Invested Primarily to Implement IIoT

Developing Industrial IoT and Architecture: Introduction to the I-IoT platform and architectures; Understanding the time-series technologies; Data-processing and the analytics platform; Advanced analytics; Big data analytics

UNIT V

IMPLEMENTING A CLOUD INDUSTRIAL IOT SOLUTION

A brief overview on-I-IoT analytics;Implementing a Custom Industrial IoT Platform-Mosquitto as MQTT connector-Working with an MQTT client

TEXT BOOKS

1. Hands-On Industrial Internet of Things: Create a powerful Industrial IoT By Giacomo Veneri, Antonio Capasso Packt Publishing Ltd.
2. Internet of Things for Architects: by Perry LeaPackt Publishing Ltd.
3. Smart Automation to Smart Manufacturing Industrial Internet of Things-UthayanElangovan

REFERENES

1. Industry 4.0 The Industrial Internet of Things by Alasdair Gilchrist Apress

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
APPLICATIONS OF AI AND ML IN POWER ELECTRONICS
(Professional Elective –VI)

Course Code:GR20A4097 **L/T/P/C:3/0/0/3**
IV year II semester

COURSE OBJECTIVES

1. Understand basis in designing with Intelligent Systems
2. Concept of learning Support Vector Machines
3. Understand Neural Networks & their learning rules
4. Comprehend Fuzzy Inference Systems.
5. Analyse power electronic systems which are designed using Fuzzy and Neural Networks.

COURSE OUTCOMES

1. Describe the importance of designing the System with AI and Machine Learning.
2. Learn Support Vector Machines and its Regression.
3. Distinguish the various Neural Networks Architectures.
4. Categorize Fuzzy rule base and neuro-fuzzy systems.
5. Analyze various power electronic systems using neural & fuzzy systems.

UNIT-1
INTRODUCTION
Towards Intelligent Machines, Well-Posed Machine Learning Problems, Examples of Applications-Machine Vision, Biometric Recognition & Handwriting recognition, load forecasting and Control & Automation. Time Series Forecasting, Datasets for Unreastically Simple and Realistic Problems, Domain Knowledge for Productive use of Machine Learning, Diversity of Data: Structured/Unstructured. Forms of Learning, Machine Learning and Data Mining, Basic Linear Algebra in Machine Learning Techniques.

UNIT-II
SUPPORT VECTOR MACHINES
Learning with Support Vector Machines, Perceptron Algorithm, Linear Soft Margin Classifier for Overlapping Classes, Nonlinear Classifier, Regression by Support Vector Machines, Variants of Basic SVM Techniques.

UNIT-III
NEURAL NETWORKS
Towards Cognitive Machine, Neuron Models, Network Architectures, Perceptrons, Linear Neuron and the Widrow-Hoff Learning Rule, Error-Correction Delta Rule, Multi-Layer Perceptron Networks, Radial Basis Functions Networks.

UNIT-IV
FUZZY INFERENCE SYSTEMS
Cognitive Uncertainty and Fuzzy Rule-Base, Fuzzy Quantification of Knowledge, Fuzzy Rule-Base and Approximate Reasoning, Takagi-Sugeno Fuzzy Mode, Neuro-Fuzzy Inference Systems.

UNIT-V

APPLICATIONS

Neural Network Topologies for space vector pulse width modulation of three level inverter, Neural Network based feedback signal estimator performance – Torque & Rotor Flux, Neural Network topology for stator flux estimator, Neuro-fuzzy based efficiency optimization control, Neuro-Fuzzy Controller based Direct Torque Control

TEXTBOOKS

1. Applied Machine Learning – M. Gopal, Mc Graw Hill
2. Power Electronics & Motor Drives – Advances & Trends, Bimal K Bose, 2nd Edition, Academic Press

REFERENCES

1.J M Zurada , "An Introduction to ANN",Jaico Publishing House.

2. Simon Haykins, "Neural Networks", Prentice Hall.

3. Timothy Ross, "Fuzzy Logic with Engg.Applications", McGraw. Hill.

4. Driankov, Dimitra, "An Introduction to Fuzzy Control", Narosa Publication.

5. Golding, "Genetic Algorithms", Addison-Wesley Publishing Com.

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ELECTRIC SMART GRID
(Professional Elective –VI)

Course Code:GR20A4098 **L/T/P/C:3/0/0/3**
IV year II semester

COURSE OBJECTIVES

1. Understand the concepts and design of Smart grid
2. Acquire knowledge about various communication and measurement technologies in smart grid
3. Analyze smart grid under steady state.
4. Evaluate the stability of smart grid.
5. Utilize renewable energy resources and storage facilities for the sustenance of smart grid

COURSE OUTCOMES

1. Understand the concepts and design of smart grid
2. Illustrate suitable communications and measurement technology for smart grid
3. Make use of various performance analysis tools for smart grid design
4. Perform stability analysis for smart grid
5. Identify sustainable energy options for the smart grid

UNIT I
SMART GRID ARCHITECTURAL DESIGNS

Introduction – Comparison of Power grid with Smart grid – power system enhancement – communication and standards - General View of the Smart Grid Market Drivers - Stakeholder Roles and Function - Measures -Representative Architecture - Functions of Smart Grid Components Wholesale energy market in smart grid-smart vehicles in smart grid.

UNIT II
SMART GRID COMMUNICATIONS AND MEASUREMENT TECHNOLOGY

Communication and Measurement - Monitoring, Phasor Measurement Unit(PMU), Smart Meters, Wide area monitoring systems (WAMS) – Advanced metering infrastructure- GIS and Google Mapping Tools.

UNIT III
PERFORMANCE ANALYSIS TOOLS FOR SMART GRID DESIGN

Introduction to Load Flow Studies - Challenges to Load Flow in Smart Grid and Weaknesses of the Present Load Flow Methods - Load Flow State of the Art: Classical, Extended Formulations, and Algorithms –Load flow for smartgrid design-Contingencies studies for smart grid.

UNIT IV

STABILITY ANALYSIS TOOLS FOR SMART GRID

Voltage Stability Analysis Tools-Voltage Stability Assessment Techniques Voltage Stability Indexing-Application and Implementation Plan of Voltage Stability in smart grid-Angle stability assessment in smart grid-Approach of smart grid to State Estimation-Energy management in smart grid.

UNIT V

RENEWABLE ENERGY AND STORAGE

Renewable Energy Resources-Sustainable Energy Options for the Smart Grid-Penetration and Variability Issues Associated with Sustainable Energy Technology-Demand Response Issues-Electric Vehicles and Plug-in Hybrids PHEV Technology-Environmental Implications-Storage Technologies-Grid integration issues of renewable energy sources.

TEXT BOOKS

1. James Momoh, "Smart Grid: Fundamentals of design and analysis",John Wiley & sons Inc, IEEE press 2012.
2. JanakaEkanayake, Nick Jenkins, KithsiriLiyanage, JianzhongWu,Akihiko Yokoyama, "Smart Grid: Technology and Applications", JohnWiley& sons inc, 2012.
3. Fereidoon P. Sioshansi, "Smart Grid: Integrating Renewable,Distributed& Efficient Energy", Academic Press, 2012.

REFERENCES

1. Clark W.Gellings, "The smart grid: Enabling energy efficiency anddemand response", Fairmont Press Inc, 2009.
2. Krzysztof Iniewski, "Smart Grid Infrastructure & Networking". McGraw Hill Education Pvt. Ltd., 2014.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
EMBEDDED SYSTEMS
(Professional Elective –VI)

Course Code:GR20A4099 **L/T/P/C:3/0/0/3**
IV year II semester

COURSE OBJECTIVES

1. To comprehend the different issues related to embedded systems and their design.
2. To train the students with a foundation in architecture of embedded processor.
3. To impart the knowledge of I/O devices used for embedded systems.
4. To provide the knowledge about various concepts related to real time operating systems.
5. To impart the basic knowledge of system design techniques.

COURSE OUTCOMES

1. Understand various I/O devices and their communication.
2. Define the unique design problems and challenges of real-time systems Program an embedded system
3. Identify the unique characteristics of real-time operating systems and evaluate the need for real-time operating system
4. Explain the general structure of a real-time system and how to use RTOS to build an embedded real-time system.
5. Gain knowledge and skills necessary to design and develop embedded applications based on real-time operating systems.

UNIT I

INTRODUCTION TO EMBEDDED SYSTEMS

Embedded Systems, Processor Embedded to a system, Embedded hardware units and devices in a system, Embedded software in a system, Examples of Embedded systems, Soc(System on chip) and use of VLSI circuit design technology, complex system design and processors, Design process in Embedded system, formalization of system design, design process and design examples, classification of embedded systems, skills required for embed system design.

UNIT II

DEVICES AND BUSES FOR DEVICES NETWORK

I/O Devices:- Types and Examples of I/O devices, Synchronous, Iso-synchronous and Asynchronous Communications from Serial Devices - Examples of Internal Serial-Communication Devices:- SPI, UART, Parallel Port Devices - Timer and Counting Devices – Serial Communication using: ‘I2C’, ‘USB’, ‘CAN’- Advanced I/O Serial high speed buses: ISA, PCI, PCI- X, cPCI and advanced buses

UNIT III

REAL TIME OPERATING SYSTEMS

Definitions of process, tasks and threads–Inter Process Communication, Shared data problem, Use of Semaphore(s), Priority Inversion Problem and Deadlock Situations, Message Queues, Mail boxes, Pipes, Virtual (Logical) Sockets, Remote Procedure Calls (RPCs).

UNIT IV

OPERATING SYSTEM SERVICES

Goals, Structures, Kernel, Process Management, Memory Management, Device Management- Real Time Operating System-RTOS Task scheduling models- Co-operative Round Robin Scheduling, Cyclic Scheduling with Time Slicing.

UNIT V

SYSTEM DESIGN TECHNIQUES

Design Methodologies, Requirement Analysis, Specification, System Analysis and Architecture Design. Design Examples: Telephone PBX-System Architecture, Inkjet printer-Hardware Design and Software Design, Personal Digital Assistants, Set-top Boxes.

TEXT BOOKS

1. Rajkamal, Embedded Systems Architecture, Programming and Design, TATA McGraw-Hill, First reprint Oct.2003

REFERENCES

1.Steve Heath, Embedded Systems Design, Second Edition-2003,Newnes,

2.David E. Simon, An Embedded Software Primer, Pearson Education Asia, First Indian Reprint 2000.

3. FrankVahidandTonyGivargis, Embedded Systems Design–Aunified Hardware/Software Introduction, John Wiley,2002.

4. Wayne Wolf, Computers as Components: Principles of Embedded Computing System Design – Harcourt India, Morgan Kaufman Publishers, First Indian Reprint 2001.

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

BIG DATA ANALYTICS
(Professional Elective –VI)

Course Code:GR20A3131 **L/T/P/C:3/0/0/3**

IV year II semester

COURSE OBJECTIVES

1. Describe Big Data and its use cases from selected business domains.
2. Provide an overview of HDFS Architecture and its daemon services.
3. Perform Map Reduce analytics with YARN using Hadoop.
4. Understand the working of data ingestion tools and PIG Latin.
5. Use Hadoop related tools such as Hive and HBase for big data analytics.

COURSE OUTCOMES

1. Understand the concepts of Big Data and navigation of the Hadoop Ecosystem.
2. Illustrate the HDFS Architecture and the coordination service of Hadoop.
3. Implement distributed processing Map Reduce Paradigm with YARN.
4. Analyze importing and exporting data from Hadoop using Sqoop, Flume and working with PIG.
5. Examine the data stores - Hive and HBase on Hadoop.

UNIT I
INTRODUCTION TO BIG DATA AND HADOOP

Challenges of Traditional Decision Making, Solution with Big Data Analytics, Classification of Digital Data, Definition of Big Data, Characteristics of Big Data, Definition of Big Data Analytics, Features of Hadoop, History of Hadoop, RDBMS Vs. Hadoop, Hadoop Distributors, Ecosystems of Hadoop.

UNIT II
HDFS AND ZOO KEEPER

HDFS: Concepts – Blocks, HDFS Components, Block Caching, Characteristics of HDFS, HDFS High Availability Architecture and its types, HDFS Command Line, Data Flow – Anatomy of File read and File write operations.
Zoo Keeper: Characteristics of Zoo Keeper, Zoo keeper Services, Zoo keeper Data Model.

UNIT III
MAP REDUCE AND YARN

YARN: Elements of YARN Architecture, Map Reduce: Characteristics of Map Reduce, Phases of Map Reduce with an Example, Anatomy of MR Job Run with YARN, Handling Failures, Task Execution, Map Reduce Input and Output Formats, Shuffle and Sort, Built - in Counters of MR, Joins in MR,

UNIT IV

DATA INGESTION TOOLS AND PIG

Data Ingestion Tools: Data Ingestion, Big Data Ingestion Tools, SQOOP - Benefits of SQOOP, SQOOP Connectors, Importing and Exporting to and from Hadoop using SQOOP, Limitations of SQOOP, FLUME – Apache Flume, Data Sources for FLUME, Components of FLUME Architecture.

PIG: Introduction to PIG, Components of PIG, Data Types in PIG – Simple and Complex, PIG Execution Modes, PIG Interactive Modes, Comparison of PIG with databases, Data Processing Operators.

UNIT V

HIVE AND HBASE

HIVE: Features of HIVE, HIVE Architecture, HIVE Meta store, Data types in HIVE, HIVEQL, Tables, File Format Types – Text, Sequence, AVRO, Parquet, Querying Data.

HBASE: NOSQL Database, Types of NOSQL Database, Characteristics of HBASE, Architecture, HBase Vs. RDBMS, HBASE Shell Commands.

TEXT BOOKS

1. Tom White “Hadoop: The Definitive Guide” 4thedition, O’reily Media,2012.
2. SeemaAcharya, SubhasiniChellappan, "Big Data Analytics" Wiley2015.

REFERENCES

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis”, Springer,2007.
2. Jay Liebowitz, “Big Data and Business Analytics” Auerbach Publications, CRC press(2013)
3. Tom Plunkett, Mark Hornick, “Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop”, McGraw-Hill/Osborne Media (2013), Oracle press.
4. AnandRajaraman and Jefrey David Ulman, “Mining of Massive Datasets”,Cambridge University Press, 2012.
5. Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, John Wiley & sons,2012.
6. Glen J. Myat, “Making Sense of Data”, John Wiley & Sons,2007
7. Pete Warden, “Big Data Glossary”, O’Reily,2011.
8. Michael Mineli, Michele Chambers, AmbigaDhiraj, "Big Data, Big Analytics:Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley Publications, 2013.
9. ArvindSathi, “BigDataAnalytics: Disruptive Technologies for Changing the Game”,MC Press,2012
10. Paul Zikopoulos ,Dirk DeRoos , Krishnan Parasuraman , Thomas Deutsch , James Giles, David Corigan , "Harness the Power of Big Data The IBM Big Data Platform ", Tata McGraw Hill Publications,2012.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

PROJECT WORK - PHASE II

Course Code:GR20A4130 **L/T/P/C: 0/0/12/6**

IV Year II Semester

Course Objectives:

1. Demonstrate a wide range of skills learned to deliver a project.
2. Encourage multidisciplinary research through the integration learned.
3. Develop problem solving, analysis, synthesis and evaluation skills.
4. Encourage teamwork.
5. Improve communication and presentation skills during project work.

Course Outcomes:

1. Formulate hypothesis for the problem statement with sound technical knowledge from selected project domain.
2. Design Engineering Solution to the problem statementwith systematic approach.
3. Analyse and develop an efficient solution for implementation of the project.
4. Apply the theoretical concepts while providing solution to the problem statement with teamwork and multidisciplinary approach.
5. Demonstrate professionalism with ethics while preparing and presenting the project work.

GOKARAJURANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

SOFT SKILLS AND INTERPERSONAL SKILLS
(Open Elective)

Course code:GR20A3136 **L/T/P/C:3/0/0/3**

COURSE OBJECTIVES:

1. To know the importance of soft skills.
2. To identify good leadership skills /qualities.
3. To recognize the importance of interpersonal skills.
4. To demonstrate the significance of confidence building.
5. To define and differentiate between a report and a proposal.

COURSE OUTCOMES:

1. Develop soft skills communication skills, leadership skills etc.
2. Implement goal setting techniques to build a promising career.
3. Design formal report and proposals with appropriate formal expressions.
4. Create healthy workplace environment by treating others with respect and dignity.
5. Evaluate the power of confidence building and self-esteem with examples.

UNIT I
SOFT SKILLS

- Introduction to soft skills, Definition of Soft skills, Importance of soft skills
- Communication skills, Usage of English in Business/Corporate scenario
- Nonverbal communication - Proxemics
- Presentation skills

UNIT II
TEAM BUILDING & LEADERSHIP QUALITIES

- Qualities of a good leader
- Problem solving and Decision Making
- Strategic management
- Crisis management

UNIT III
PERSONALITY DEVELOPMENT

- Motivation

- Goal setting
- Self-esteem
- Team skills

UNIT IV
DEVELOPING REPORTS AND PROPOSALS

- Understanding reports and proposals
- Planning reports and proposals
- Writing beginning, body and ending
- Formats of reports and proposals

UNITV
INTERPERSONAL SKILLS

- Understanding professional relationships
- Networking professionally
- Showing basic office courtesies
- Interview skills

TEXT BOOKS

1. Soft Skills-Key to success in workplace and life
   Meenakshi Raman, Raman Upadhyay, CENAGE

REFERENCE BOOKS

1. Soft skills for Everyone - Jeff Butterfield, CENAGE Learning

2.Soft skills for Interpersonal Communication - S.Balasubramaniam
(ORIENT BLACKSWAN)

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

HUMAN RESOURCE DEVELOPMENT AND ORGANIZATIONAL BEHAVIOR
(Open Elective)

Code: GR20A3137 **L/T/P/C:3/0/0/3**

COURSE OBJECTIVES

1. OB provides perspectives and skills that enhance understanding of our own behaviour and our ability to influence the behaviour of others in organizational settings
2. OB and HRM together can instill sustainability deep within an organizations' culture.
3. To equip them with behavioural skills in managing people at work.
4. To make student aware of the concepts, techniques and practices of human resource development.
5. This course is intended to make students capable of applying the principles and techniques as professionals for developing human resources in an organization.

COURSE OUTCOMES

1. To acquaint the student with the determinants of intra -individual, inter-personnel and inter-group behaviour in organisational setting.
2. To Understand individual behavior in organizations, including diversity, attitudes, job satisfaction, emotions, moods, personality, values, perception, decision making, and motivational theories and apply in the organizational context.
3. To assess the group behavior in organizations, including communication, leadership, power and politics, conflict, and negotiations in the framework of organization and to familiarize the concepts, techniques and practices of human resource development in the current organizational view.
4. To impart and apprise the capable of applying the principles and techniques as professionals for developing human resources in an organization.
5. To report the current trends and applications in HRD and Balanced Scorecard to measures the performance and to develop, implement, and evaluate organizational human resource

development strategies aimed at promoting organizational effectiveness in different organizational environments.

UNIT I

INTRODUCTION TO OB

Organisational Behaviour- Concept and Emergence of OB Concept; Nature and Theoretical frameworks; Models of Organisational Behaviour, Challenges and Opportunities for Organisational Behavior;

UNIT II

INDIVIDUAL BEHAVIOUR

Individual Behaviour: Personality, Learning, Values and Attitudes, Perception, Stress at work. Management's assumptions about people- McGregor's Theory X and Theory Y. Motivation - Maslow's Need Hierarchy, Herzberg's Two Factors Theory, Vroom's Expectancy Theory.

UNIT III

INTER-PERSONAL AND GROUP BEHAVIOUR

Interpersonal communication and Feedback; Transactional Analysis (TA); Johari Window. Group Behaviour: Group Dynamics, Cohesiveness and Productivity; Management of Dysfunctional groups; Group Decision Making. Leadership- Concept and Styles.

UNIT IV

INTRODUCTION TO HUMAN RESOURCE DEVELOPMENT

Concept; Relationship between human resource management and human resource development; HRD mechanisms, processes and outcomes; HRD matrix; Roles and competencies of HRD professionals; Challenges in HRD, steps in HRD Process.

UNIT V

HRD APPLICATIONS AND TRENDS

Coaching and mentoring; Career management and development; Competency mapping; Balanced Score Card. HRD in Organisations: Selected cases covering HRD practices in government

organisations, manufacturing and service industries and MNCs.

TEXT BOOKS

1. Robbins, Stephen P. and Timothy A. Judge, Organisational Behaviour, Prentice -Hall, New Delhi.
2. Werner J. M., DeSimone, R.L., Human resource development, South Western.

REFERENCES

1. Luthans, Fred, Organizational Behaviour, McGraw-Hill, New York.
2. Gregory, Moorhead and Ricky W. Griffin, Managing Organizational Behaviour, Thomson South Western Publication.
3. Pareek, Udai and V. Sisodia, "HRD in the New Millennium, Tata McGraw - Hill Publishing Co. Ltd., New Delhi, 1999.
4. Haldar, U. K., Human resource development, Oxford University Press India.
5. Rao, T.V., Future of HRD, Macmillan Publishers India.
6. Rao, T.V., HRD Score Card 2500: Based on HRD audit, Response Books, SAGE Publications.
7. Mankin, D., Human resource development, Oxford University Press India.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

CYBER LAW AND ETHICS
(Open Elective)

Code: GR20A3138 **L/T/P/C:3/0/0/3**

COURSE OBJECTIVES

1. The course objective is to provide the fundamental skill to understand cyber laws.
2. It enable to understand the legal frameworks
3. It helps the student understand different cyber crimes
4. It provides overview on Intellectual Property, copy rights, patents rights etc.
5. Given rapid changes in technology and the corresponding changes in crime and the law

COURSE OUTCOMES.

1. Students identify and analyze statutory, regulatory, constitutional, and organizational laws that affect the information technology professional.
2. Students locate and apply case law and common law to current legal dilemmas in the technology field.
3. Students apply diverse viewpoints to ethical dilemmas in the information technology field and recommend appropriate actions.
4. Students will be able understand cybercrime and ethical practices and the student will be able to know and learn web technologies and related issues.
5. The student will be in position to interface with various issues pertaining to Intellectual Property, copy rights, patents rights etc. and provide an overview of cybercrime and framework.

UNIT I

THE LEGAL SYSTEM: SOURCES OF LAW AND THE COURT STRUCTURE

Enacted law -Acts of Parliament are of primary legislation, Common Law or Case law- Principles taken from decisions of judges constitute binding legal rules. The Court System in India and Foreign Courtiers. (District Court, District Consumer Forum, Tribunals, High Courts, Supreme Court), Arbitration: As an alternative to resolving disputes in the normal courts, parties who are in dispute can agree that this will instead be referred to arbitration.

UNIT II

INTRODUCTION CYBER LAW

Computers and its Impact in Society, Overview of Computer and Web Technology, Need for Cyber Law, Cyber Jurisprudence at International and Indian Level.

UNIT –III

CONSTITUTIONAL & HUMAN RIGHTS ISSUES IN CYBER SPACE

Freedom of Speech and Expression in Cyberspace, Right to Access Cyberspace, Access to Internet, Right to Privacy, Right to Data Protection.

UNIT –IV

CYBER CRIMES & LEGAL FRAMEWORK

Cyber Crimes against Individuals, Institution and State, Hacking, Digital Forgery, Cyber Stalking/Harassment, Cyber Pornography, Identity Theft & Fraud, Cyber terrorism, Cyber Defamation, Different offences under IT Act

UNIT –V

INTELLECTUAL PROPERTY ISSUES IN CYBER SPACE

Interface with Copyright Law, Interface with Patent Law, Trademarks & Domain Names Related issues.

TEXT BOOKS:

1. Chris Reed & John Angel, Computer Law, OUP, New York, (2007).
2. Justice Yatindra Singh, Cyber Laws, Universal Law Publishing Co, New Delhi, (2012)
3. Verma S, K, Mittal Raman, Legal Dimensions of Cyber Space, Indian Law Institute, New Delhi, (2004)
4. JonthanRosenoer, Cyber Law, Springer, New York, (1997).
5. Sudhir Naib, The Information Technology Act, 2005: A Handbook.
6. S. R. Bhansali, Information Technology Act, 2000
7. University Book House Pvt. Ltd. Jaipur (2003).
8. Vasu Deva, Cyber Crimes and Law Enforcement, Commonwealth Publishers, New Delhi

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ECONOMIC POLICIES IN INDIA
(Open Elective)

Code:GR20A3139 **L/T/P/C:3/0/0/3**

COURSE OBJECTIVE

1. To analyse the overall business environment and evaluate its various components in business decision making.
2. To Provide an analysis and examination of significant contemporary ethical issues and challenges.
3. To Emphases the manager's social and environmental responsibilities to a wide variety of stakeholders.
4. To know the various Government policies governing industry.
5. To know economic terms and its scope.

COURSE OUTCOMES

1. Familiarize with the nature of business environment and its components.
2. The students will be able to demonstrate and develop conceptual framework of business environment.
3. Understand the definition of ethics and the importance and role of ethical behaviour in the business world today.
4. Explain the effects of government policy on the economic environment.
5. Outline how an entity operates in a business environment.

UNIT I

BUSINESS ENVIRONMENT

factors effecting Business Environment-need for industrial policies, Overview of Indian Economy, Trends towards market economy, problems of underdevelopment –meaning, Main problems, reasons, of underdevelopment.

UNIT-II

FACTORS AND MEASURE

Meaning of Economic development, National income, Percapital income,Quality of life, Capital Formation – Savings, Investment.

UNIT III

NITI AAYOG AND PLANNING IN INDIA

Niti Aayog and its function, how is Niti Aayog different from planning commission, Meaning, Importance, Main reasons of adopting, planning in India,Objectives of planning, Economic development, moderation, stability, self-sufficiency, employmentetc, foreign aid, Employment. Allocation of Resources,

UNIT IV

PRIVATE AND PUBLIC SECTOR

Public Sector – role and growth, Achievements of the public sector,Private Sector – Importance Problems, New foreign Trade Policy.

UNIT V

PRESENT ECONOMIC POLICY

Main feature, Globalization, Expansion of Private sector, moremarket orient approach. Public distribution system, Industrial policies before and after 1991, Industrial Licensing, Monetary and Fiscal Policy, elements of Indian current GDP and review of current budget.

TEXT BOOKS

1. Francis Cherunilam: Business Environment: Text and Cases. 18/e. Himalaya. 2009.
2. Misra and Puri: Indian Economy, Himalaya, 2009.

REFERENCES:

1. Indian Economy- A. N. Agarwal
2. Indian Economy – Mishra &Puri
3. Indian Development and planning – M. L. Jhingan
4. Indian Economy – R. S. Rastogi Yozna and Kurukshetra Magazines