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 of the 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 UGC and course structure as suggested by AICTE are followed.
   i) **Subject / Course Classification:** All subjects/ courses offered for the under graduate programme 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 gets re-registered.

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

a) Paper setting and evaluation of the answer scripts shall be done as per the procedures laid down by the Academic Council 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 durationof 2 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 total of 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 is final.

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

    d) The college may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the college.

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 123 credits and secure all credits. The marks obtained in all 123 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.Tech programme.

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 total of 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 123 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

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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	Total	L	T	P	Total			
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	Total	L	T	P	Total			
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 Electronics Lab	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 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		Power system Analysis	2	1	0	3	2	1	0	3	30	70	100
2	EEE	PC		Power Electronics	3	0	0	3	3	0	0	3	30	70	100
3	EEE	PC		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		Power System Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
7	EEE	PC		Power Electronics Lab	0	0	2	2	0	0	4	4	30	70	100
8	EEE	PC		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**

III 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	EEE	PC		Programmable Logic Controllers	3	0	0	3	3	0	0	3	30	70	100
2	EEE	PC		Sensors, Measurements and Actuators	2	1	0	3	2	1	0	3	30	70	100
3	Mgmt	HS		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		Programmable Logic Controllers Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
7	EEE	PC		Sensors, Measurements and Actuators Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
8	EEE	PW		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**

IV 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		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	Mgmt	HS		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		Internet of Things lab	0	0	2	2	0	0	4	4	30	70	100
7	EEE	PC		Power Electronics and Drives Lab	0	0	2	2	0	0	4	4	30	70	100
8	EEE	PW		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**

IV 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	EEE	PC		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		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 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	Wind and Solar Energy Systems	Electrical Machine Design	Optimisation Technics
2	Wide band gap Power Devices	HVDC Transmission Systems	Advanced Control Systems	Operating Systems and computer networks
3	Modern Power Electronics	High Voltage Engineering	Special Electrical Machines	Embedded Systems
4	Power Quality and FACTS	Electrical Energy Audit	Digital Control Systems	VLSI Design
5	Advanced Electric Drives	Big Data applications in Power systems	Control Systems Design	Industrial IoT
6	Applications of AI, ML and BIGDATA in Power electronic	Electric Smart Grid	Modern Control Systems	Data Analytics

OPEN ELECTIVES FOR GR20 REGULATIONS:

THREAD 1	THREAD 2	OFFERED BY
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. Business Analytics 3. Augmented Reality and Virtual Reality	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. Artificial Intelligence 2. Human Computer Interaction 3. Data Science	IT
	1. Non-Conventional Energy Sources 2. Machine Learning 3. Artificial Intelligence Techniques	EEE
	1. Artificial Neural Networks 2. Software Defined Radio and Cognitive Radio 3. Fundamentals of Mimo Wireless Communications	ECE
	1. Operations Research 2. Robotics 3. Mechatronic Systems	ME
	1. Engineering Materials for Sustainability 2. Geographic Information Systems and Science 3. Environmental Impact Assessment 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, (3^{rd} 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 (16^{th} Impression)
3. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
4. Herbert Schildt, C: The Complete Reference, McGraw Hill, 4^{th} 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.

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TASK 5

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

i) 1
2 3
4 5 6
7 8 9 10

ii. 1
2 3
4 5 6
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 Binary Search Tree.
   i. Create
   ii. Insert
   iii. Search

TASK 10

a. Implement Preorder, Inorder and Postorder traversals 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 Bias circuits.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(Astable Muitivibrator) 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:

Analyze linear and non-linear magnetic circuits

1. Summarize concepts of generators and motors
2. Select the appropriate DC generator or DC motor for the given application
3. Explain the different types of materials used in transformers.
4. 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 on a moving charge-Force on a differential current element- Force between differential current elements-Nature of magnetic materials- Magnetization and Permeability- magnetic boundary conditions-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. Explain the 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.Dietel PearsonEducation
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

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

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

- Recall types of active components.
- Draw characteristics of Diode, BJT and MOSFET
- Design Operational Amplifiers as inverting and non-inverting amplifier
- Apply mathematical operation on signals using Operational Amplifier
- 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

COMPOSITION OF JUDICIARY AND ELECTION COMMISSION

Composition of Indian Judiciary, 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 Avasthi and Avasthi-by lakshminarainagarwal publication

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).**Programmable LogicDevices**: 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. Explain the 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 Erach Bharucha 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 optimized access.
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.