Academic Regulations
Programme Structure
&
Detailed Syllabus

Bachelor of Technology
(B. Tech)
(Four Year Regular Programme)
(Applicable for Batches admitted from 2018)

Department of Computer Science and 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 COMPUTER SCIENCE AND ENGINEERING (B. Tech)
GR18 REGULATIONS

Gokaraju Rangaraju Institute of Engineering and Technology 2018 Regulations (GR18 Regulations) are given here under. These regulations govern the programmes offered by the Department of Computer Science and Engineering with effect from the students admitted to the programmes in 2018-19 academic year.

1. **Programme Offered:** The programme offered by the Department is B. Tech in Computer Science and 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 Computer Science and 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 is 160.
   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	Course Description
1	BSC	Basic Science Courses	Basic Science Courses
2	ESC	Engineering Science Courses	Includes Engineering subjects
3	HSMC	Humanities and Social sciences	Includes Management courses
4	PCC	Professional Core Courses	Includes core subjects related to the parent discipline/ department/ branch of Engineering.
5	PEC	Professional Elective Courses	Includes elective subjects related to the parent discipline/ department/ branch of Engineering.
6	OEC	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	PROJ	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 be condoned.

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 marks each for a duration of 2 hours. Average of the two mid exams shall be considered **i) Subjective - 15 marks** **ii) Objective - 5 marks** **2) Tutorials - 5 marks** **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-10 marks** **ii) Record - 5 marks** **iii) Continuous Assessment - 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.

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 Phase II.

g) Engineering Graphics:

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

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 credits can appear for a supplementary examination, as per the schedule announced by the College.
11. **Malpractices in Examinations:** Disciplinary action shall be taken in case of malpractices during Mid / End-examinations as per the rules framed by the Academic Council.
12. **Academic Requirements 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.

	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 second semester. (ii) Must have secured at least 50% credits up to first year second semester from all the relevant regular and supplementary examinations, whether the student 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 second semester (ii) Must have secured at least 60% credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student 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 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.
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 grades and 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 the 160 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 withheld 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 GR18
(Applicable for Batches Admitted from 2019-2020)

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 or not.
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**

GokarajuRangaraju Institute of Engineering and Technology (Autonomous)

Bachupally, Kukatpally, Hyderabad – 500 090, India. (040) 6586 4440

COMPUTER SCIENCE AND ENGINEERING

I YEAR I SEMESTER

S.NO.	Course Code	COURSE	Hours			Total Hours	Total Credits	Int	Ext	Marks
			L	T	P					
1	GR18A1001	Linear Algebra and Differential Calculus	3	1	0	4	4	30	70	100
2	GR18A1003	Applied Physics	3	1	0	4	4	30	70	100
3	GR18A1007	Programming for Problem Solving	3	1	0	4	4	30	70	100
6	GR18A1010	Engineering Graphics	1	0	4	5	3	30	70	100
4	GR18A1011	Applied Physics Lab	0	0	3	3	1.5	30	70	100
5	GR18A1015	Programming for Problem Solving Lab	0	0	3		1.5	30	70	100
		Induction Programme					-			
Total			**10**	**3**	**10**	**20**	**18**	**180**	**420**	**600**

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I YEAR II SEMSTER

S.NO.	Course Codes	COURSE	Hours			Total Hours	Total Credits	Int	Ext	Marks
			L	T	P					
1	GR18A1002	Differential Equations and Vector Calculus	3	1	0	4	4	30	70	100
2	GR18A1005	Chemistry	3	1	0	4	4	30	70	100
3	GR18A1008	Basic Electrical Engineering	3	0	0	3	3	30	70	100
4	GR18A1006	English	2	0	0	2	2	30	70	100
5	GR18A1013	Engineering Chemistry Lab	0	0	3	3	1.5	30	70	100
6	GR18A1016	Basic Electrical Engineering Lab	0	0	2	2	1	30	70	100
7	GR18A1014	English Language and Communication Skills Lab	0	0	2	2	1	30	70	100
8	GR18A1017	Engineering Workshop	1	0	3	4	2.5	30	70	100
Total			**12**	**2**	**10**	**24**	**19**	**240**	**560**	**800**

II YEAR I SEMESTER

S.NO.	Course Code	COURSE	Hours			Total Hours	Total Credits	Int	Ext	Marks
			L	T	P					
1		Digital Logic Design	3	0	0	3	3	30	70	100
2		Data Structures	3	0	0	3	3	30	70	100
3		Probability and Statistics	3	0	0	3	3	30	70	100
4		Discrete Mathematics	3	1	0	4	4	30	70	100
5		Database Management Systems	3	0	0	3	3	30	70	100
6		Open Source Lab	0	0	4	4	2	30	70	100
7		Digital Logic Design Lab	0	0	3	3	1.5	30	70	100
8		Data Structures Lab	0	0	3	3	1.5	30	70	100
9		Database Management Systems Lab	0	0	3	3	1.5	30	70	100
Total			**15**	**1**	**13**	**29**	**22.5**	**270**	**630**	**900**
10		Value Ethics and Gender Culture	2	0	0	2	2	30	70	100

II YEAR II SEMESTER

S.NO.	Course Code	COURSE	Hours			Total Hours	Total Credits	Int	Ext	Marks
			L	T	P					
1		Computer Organization	3	0	0	3	3	30	70	100
2		Economics & Accounting for Engineers	3	0	0	3	3	30	70	100
3		Operating Systems	3	0	0	3	3	30	70	100
4		Java Programming	3	0	0	3	3	30	70	100
5		Design and Analysis of Algorithms	3	0	0	3	3	30	70	100
6		Scripting Languages Lab	0	0	3	3	1.5	30	70	100
7		Operating Systems Lab	0	0	3	3	1.5	30	70	100
8		Java Programming Lab	0	0	3	3	1.5	30	70	100
Total			**15**	**0**	**09**	**27**	**19.5**	**240**	**560**	**800**
9		Environmental Science	2	0	0	2	2	30	70	100

III YEAR I SEMESTER

S.NO.	Course Code	COURSE	Hours			Total Hours	Total Credits	Int	Ext	Marks
			L	T	P					
1		Object Oriented Software Engineering	3	0	0	3	3	30	70	100
2		Computer Networks	3	0	0	3	3	30	70	100
3		Formal Languages Automata Theory	3	0	0	3	3	30	70	100
4		Web Technologies	3	0	0	3	3	30	70	100
5		Micro Controller and Internet of Things	3	0	0	3	3	30	70	100
6		Professional Elective I	3	0	0	3	3	30	70	100
7		Object Oriented Software Engineering Lab	0	0	3	3	1.5	30	70	100
8		Computer Networks and Web Technologies Lab	0	0	3	3	1.5	30	70	100
9		Micro Controller and Internet of Things Lab	0	0	2	2	1	30	70	100
Total			**18**	**0**	**08**	**26**	**22**	**270**	**630**	**900**

III YEAR II SEMESTER

S.NO.	Course Code	COURSE	Hours			Total Hours	Total Credits	Int	Ext	Marks
			L	T	P					
1		Data Warehousing and Data Mining	3	0	0	3	3	30	70	100
2		Compiler Design	3	0	0	3	3	30	70	100
3		Fundamentals of Management and Entrepreneurship	3	0	0	3	3	30	70	100
4		Professional Elective II	3	0	0	3	3	30	70	100
5		Open Elective I	3	0	0	3	3	30	70	100
6		Data Warehousing and Data Mining Lab	0	0	2	2	1	30	70	100
7		Compiler Design Lab	0	0	2	2	1	30	70	100
8		Mini Project with Seminar	0	0	6	6	3	30	70	100
		Summer Internship	-	-	-		-			
Total			**18**	**0**	**10**	**25**	**20**	**240**	**560**	**800**
9		Constitution of India	2	0	0	2	2	30	70	100

IV YEAR I SEMESTER

S.NO.	Course Code	COURSE	Hours			Total Hours	Total Credits	Int	Ext	Marks
			L	T	P					
1		Cryptography & Network Security	3	0	0	3	3	30	70	100
2		Machine Learning	3	0	0	3	3	30	70	100
3		Professional Elective III	3	0	0	3	3	30	70	100
4		Professional Elective IV	3	0	0	3	3	30	70	100
5		Open Elective II	3	0	0	3	3	30	70	100
6		Cryptography & Network Security Lab	0	0	3	3	1.5	30	70	100
7		Machine Learning Lab	0	0	3	3	1.5	30	70	100
8		Main Project (Phase I)	0	0	12	12	6	30	70	100
Total			**15**	**0**	**18**	**33**	**24**	**240**	**560**	**800**

IV YEAR II SEMESTER

S.NO.	Course Code	COURSE	Hours			Total Hours	Total Credits	Int	Ext	Marks
			L	T	P					
1		Professional Elective V	3	0	0	3	3	30	70	100
2		Professional Elective VI	3	0	0	3	3	30	70	100
3		Open Elective III	3	0	0	3	3	30	70	100
4		Main Project (Phase II)	0	0	12	12	6	30	70	100
Total			**9**	**0**	**12**	**21**	**15**	**120**	**280**	**400**

PROFESSIONAL ELECTIVES – 4 THREADS

S. No.	Thread 1 Theory and Algorithms	Thread 2 Applications	Thread 3 Data Science and Machine Intelligence	Thread 4 Software and Technology
1	Graph Theory	Principles of Programming Languages	Artificial Intelligence	Software Testing Methodologies
2	Advanced Algorithms	Cloud Computing	Neural Networks and Deep Learning	Software Architecture
3	Parallel and Distributed Algorithms	Image& Video Processing	Natural Language Processing	Agile Software Process
4	Information Retrieval Systems	Multi Media Applications	Data Science	Software Project Management
5	Real Time Operating System	Cyber Security	Soft Computing	Design Patterns
6	Human Computer Interaction	Computer Graphics	Big Data Analytics	Software Measurements and Metrics

OPEN ELECTIVES – 2 THREADS

S. No.	THREAD 1	THREAD 2
1	Soft Skills and Interpersonal Communication	CSE: 1. E-Commerce 2. Database Management Systems 3. Java Programming
2	Human Resource Development and Organizational Behaviour	IT: 1. Multimedia and Application Development 2. Web Programming 3. Operating Systems
3	Cyber Law and Ethics	EEE: 1.Embedded Systems 2. Control Systems 3. Artificial Intelligence Techniques
4	History of Science	ECE: 1. Principles of Satellite Communications 2. Scientific Computing 3. Wavelets
5	Introduction to Art and Aesthetics	ME: 1.Operations Research 2. Automobile Engineering 3. Robotics
6	Economic Policies in India	CE: 1. Green Building Technology 2.Building Materials and Construction Planning 3. Introduction to Fluid Mechanics

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

LINEAR ALGEBRA AND DIFFERENTIAL CALCULUS

Course code: GR18A1001 **L/T/P/C: 3/1/0/4**

Course Objectives: To provide the student with

- The ideas of linearity and linear systems, which lie at the core of many engineering concepts
- The concept of latent values of a matrix which is critical in many engineering applications
- The ideas of function approximation using the tools of mean value theorems
- The skill of using a definite integral for various geometrical applications
- The skill of finding the optimal values of multi-variable functions

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

- Compute the rank of a matrix to determine the existence of solutions of a linear algebraic system
- Determine the eigenvalues and eigenvectors of a square matrix which arise in several engineering applications
- Determine approximate solution of over determined systems using the pseudo inverse
- Apply the definite integral for various computational problems in geometry and Evaluate some improper integrals using special functions
- Develop the skill of determining optimal values of multivariable functions using classical methods

Unit I: VECTOR AND MATRIX ALGEBRA

Vector space (definition and examples), linear independence of vectors, orthogonality of vectors, projection of vectors, Gram-Schmidt orthonormalization of vectors, Symmetric, Hermitian, skew-symmetric, skew-Hermitian, orthogonal and UNIT-ary 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 forms by orthogonal transformation.

Unit III: MATRIX DECOMPOSITION AND PSEUDO INVERSE OF A MATRIX

Spectral decomposition of a symmetric matrix, L-U decomposition, 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: SINGLE VARIABLE CALCULUS

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

volumes of revolutions of curves (only in Cartesian coordinates), Evaluation of improper integral using Beta and Gamma functions.

Unit V: 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

Text/Reference Books:

1. R.K.Jain and S.R.K.Iyengar, Advanced Engineering Mathematics, Narosa publishing house,
2. Fourth edition 2014
3. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
4. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9^{th} edition,Pearson, Reprint,
5. 2002.
6. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006
7. GRIET reference manual.
8. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
9. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11thReprint, 2010.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

APPLIED PHYSICS

Course Code: GR18A1003 **L/T/P/C: 3/1/0/4**

Course Objectives: At the end of the course the student is expected to

- Identify the role of quantum mechanics and its applications on physical system.
- Interpret the properties of semiconducting materials.
- Summarize the use of optoelectronics devices.
- Explain the properties of Laser light and its uses in optical fiber communication.
- Outline the properties of dielectric and magnetic materials.

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

- Outline the development of quantum mechanics and solve Schrodinger equation for simple potentials.
- Demonstrate the operation mechanism of electronic devices such as transistors and diodes.
- Explain the development and applications of optoelectronic devices.
- Analyze the properties of Laser and its propagation in optical fibers.
- Evaluate the properties of dielectric and magnetic materials for various applications.

Unit I: QUANTUM MECHANICS

Introduction to quantum physics, Black body radiation, Planck's law, photoelectric effect Compton effect, 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 box, potential barrier.

Unit II: SEMICONDUCTOR PHYSICS

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

Unit III: OPTOELECTRONICS

Radiative, Non-radiative transitions 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 AND FIBER OPTICS

Lasers: Introduction, Interaction of radiation with matter: Absorption, Spontaneous and Stimulated emission, Einstein coefficients, Characterizes of lasers: Resonating cavity, Active medium, pumping, population inversion, Construction and working of laser: Ruby laser, He-Ne laser, application of lasers. Fiber Optics: Introduction, Principle and Construction of an optical fiber, Acceptance angle, Numerical aperture, Types of Fibers, losses associated with optical fibers, Basic components in optical fiber communication system, Application of optical fibers.

Unit V: DIELECTRIC AND MAGNETIC PROPERTIES OF MATERIALS

Dielectrics: Introduction, Types of polarizations (Electronic, Ionic and Orientation Polarizations) and calculation of Electronic, Ionic polarizability, internal fields in a solid, Clausius-Mossotti relation. Magnetism: Introduction, Bohr magnetron, 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.

Text/ References Books:

1. Engineering Physics, B.K. Pandey, S. Chaturvedi - Cengage Learing.
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.
6. Richard Robinett, Quantum Mechanics
7. Fundamentals of Semiconductor Devices, Second Edition, Anderson and Anderson, McGraw Hill.
8. J. Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw- Hill Inc.(1995)
9. Semiconductor Physics and Devices, 4e, Neamen and Biswas, McGraw Hill.
10. Online Course: “Optoelectronic Materials and Devices” by Monica Katiyar and Deepak Gupthaon NPTEL

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

PROGRAMMING FOR PROBLEM SOLVING

Course Code: GR18A1007 **L/T/P/C: 3/1/0/4**

Prerequisite: Knowledge of Mathematics required.

Course Objectives:

- To learn the fundamentals of computers.
- To understand the various steps in program development.
- To learn the syntax and semantics of C programming language.
- To learn the usage of structured programming approach in solving problems.

Course Outcomes:

The Student will learn:

- To write algorithms and to draw flowcharts for solving problems.
- To convert the algorithms/flowcharts to C programs.
- To code and test a given logic in C programming language.
- To decompose a problem into functions and to develop modular reusable code.
- To use arrays, pointers, strings and structures to write C programs.

Unit I: INTRODUCTION TO PROGRAMMING

Introduction to components of a computer system: disks, primary and secondary memory, processor, operating system, compilers, creating, compiling and executing a program, Number systems

Introduction to Algorithms: steps to solve logical and numerical problems. Representation of Algorithm, Flowchart/Pseudo code with examples, Program design and structured programming

Introduction to C Programming Language: variables (with data types and space requirements), Syntax and Logical Errors in compilation, object and executable code , Operators, expressions and precedence, Expression evaluation, Storage classes (auto, extern, static and register), type conversion, The main method and command line arguments Bitwise operations: Bitwise AND, OR, XOR and NOT operators

Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching with if, if-else, switch-case, ternary operator, goto, Iteration with for, while, do-while loops

I/O: Simple input and output with scanf and printf, formatted I/O.

Unit II: ARRAYS, STRINGS, STRUCTURES AND POINTERS

Arrays: one and two dimensional arrays, creating, accessing and manipulating elements of arrays

Strings: Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen, strcat, strcpy, strstr), arrays of strings

Structures: Defining structures, initializing structures, unions, Array of structures.

Pointers: Idea of pointers, Defining pointers, Pointers to Arrays and Structures, Use of Pointers in self-referential structures, usage of self referential structures in linked list (no implementation)Enumeration data type

Unit III: PREPROCESSOR AND FILE HANDLING IN C

Preprocessor: Commonly used Preprocessor commands like include, define, undef, if, ifdef, ifndef **Files:** Text and Binary files, Creating and Reading and writing text and binary files, Appending data to existing files, Writing and reading structures using binary files, Random access using fseek, ftell and rewind functions. Introduction to stdin,stdout and stderr.

Unit IV: FUNCTION AND DYNAMIC MEMORY ALLOCATION

Functions: Designing structured programs, Declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value, Passing arrays to functions, passing pointers to functions, idea of call by reference, Some C standard functions and libraries

Recursion: Simple programs, such as Finding Factorial, Fibonacci series , Limitations of Recursive functions

Dynamic memory allocation: Allocating and freeing memory, Allocating memory for arrays of different data types

Unit V: INTRODUCTION TO ALGORITHMS

Algorithms for finding roots of a quadratic equations, finding minimum and maximum numbers of a given set, finding if a number is prime number,Basic searching in an array of elements (linear and binary search techniques),Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms), Basic concept of order of complexity through the example programs

Text/ Reference 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)**:**
3. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice
4. Hall of India
5. R.G. Dromey, How to solve it by Computer, Pearson (16^{th} Impression)
6. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
7. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4^{th} Edition

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGINEERING GRAPHICS

Course Code: GR18A1010 **L/T/P/C : 1/0/4/3**

Course Objectives:

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

Course Outcomes:

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

Unit I: INTRODUCTION TO ENGINEERING DRAWING

Principles of Engineering Graphics and their Significance, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid, Scales – Plain and Diagonal.

Unit II: ORTHOGRAPHIC PROJECTIONS

Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures-Auxiliary Planes.

Unit III: PROJECTIONS OF REGULAR SOLIDS

Auxiliary Views - Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views – Sections of Sphere

Unit IV: DEVELOPMENT OF SURFACES OF RIGHT REGULAR SOLIDS

Prism, Cylinder, Pyramid and Cone, Intersection of Solids: Intersection of – Prism vs Prism- Cylinder Vs Cylinder

Unit V: ISOMETRIC PROJECTIONS

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
2. Engineering Drawing/ N.S.Parthasarathy and Vela Murali/Oxford
3. Engineering Graphics. By Basanth Agrawal/CM Agrawal/McGraw Hill Education
4. Engineering Drawing by K.Venu Gopal/New Age Publications.
5. Computer Aided Engineering Drawing / K Balaveerareddy et al-CBS publishers
6. Engineering Graphics and Design by Kaushik Kumar / Apurba kumar Roy / Chikesh Ranjan

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

APPLIED PHYSICS LAB

Course Code: GR18A1011 **L/T/P/C: 0/0/3/1.5**

Course Objectives: At the end of the course the student is expected to

- Compare and tabulate the characteristics of Solar cells, LED and Laser sources.
- Analyze the behavior of semiconductors in various aspects.
- Apply the theoretical concepts of optical fibers in practical applications.
- Recall the basic concepts of LCR and RC circuits through hands on experience.
- Analyze the behavioral aspects of electric and magnetic fields.

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

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

TASK1: Energy gap of P-N junction diode: To determine the energy gap of a semiconductor diode.

TASK 2: Solar Cell: To study the V-I Characteristics of solar cell.

TASK3: Light emitting diode: Plot V-I and P-I characteristics of light emitting diode.

TASK4: Stewart – Gee's experiment: Determination of magnetic field along the axis of a current carrying coil.

TASK5: Hall effect: To determine Hall co-efficient of a given semiconductor.

TASK6: Photoelectric effect: To determine work function of a given material.

TASK7: LASER: To study the characteristics of LASER sources.

TASK 8: Optical fiber: To determine the bending losses of Optical fibers.

TASK 9: LCR Circuit: To determine the Quality factor of LCR Circuit.

TASK10: R-C Circuit: To determine the time constant of R-C circuit.

Note: Any 8 experiments are to be performed

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

PROGRAMMING FOR PROBLEM SOLVING LAB

Course Code: GR18A1015 **L/T/P/C: 0/0/3/1.5**

Prerequisite: Basic operations of computer and knowledge of mathematics

Laboratory Objectives: The students will learn the following:

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

Laboratory Outcomes The candidate is expected to be able to:

- Formulate the algorithms for simple problems and translate given algorithms to a working and correct program.
- Correct syntax errors as reported by the compilers
- Identify and correct logical errors encountered during execution
- Represent and manipulate data with arrays, strings and structures and use pointers of different types
- 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: (Practice sessions)

a. Write a simple program that prints the results of all the operators available in C (including pre/ post increment , bitwise and/or/not , etc.). Read required operand values from standard input.
b. Write a simple program that converts one given data type to another using auto conversion and casting. Take the values form standard input.

Task 2: (Simple numeric problems)

a. Write a program for fiend the max and min from the three numbers.
b. Write the program for the simple, compound interest.
c. Write program that declares Class awarded for a given percentage of marks, where mark <40%= Failed, 40% to <60% = Second class, 60% to <70%=First class, >= 70% = Distinction. Read percentage from standard input.

Task 3: (Simple numeric problems)

a. Write a program that prints a multiplication table for a given number and the number of rows in the table. For example, for a number 5 and rows = 3, the output should be:

i. 5 x 1 = 5
ii. 5 x 2 = 10
iii. 5 x 3 = 15

b. Write a program that shows the binary equivalent of a given positive number between 0 to 255.

Task 4: (Expression Evaluation)

a. A building has 10 floors with a floor height of 3 meters each. A ball is dropped from the top of the building. Find the time taken by the ball to reach each floor. (Use the formula s = ut+(1/2)at^2 where u and a are the initial velocity in m/sec (= 0) and acceleration in m/sec^2 (= 9.8 m/s^2)).
b. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)
c. Write a program that finds if a given number is a prime number

Task 5: (Expression Evaluation)

a. Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome.
b. A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
c. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

Task 6: (Expression Evaluation)

a. Write a C program to find the roots of a Quadratic equation.
b. Write a C program to calculate the following, where x is a fractional value.
   1-x/2 +x^2/4-x^3/6
c. Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression: 1+x+x^2+x^3+……+x^n. For example: if n is 3 and x is 5, then the program computes 1+5+25+125.

Task 7: (Arrays and Pointers and Functions)

a. Write a C program to find the minimum, maximum and average in an array of integers.
b. Write a functions to compute mean, variance, Standard Deviation, sorting of n elements in single dimension array.
c. Write a C program that uses functions to perform the following:
   i. Addition of Two Matrices
   ii. Multiplication of Two Matrices
   iii. Transpose of a matrix

   with memory dynamically allocated for the new matrix as row and column counts may not be same.

Task 8: (Arrays and Pointers and Functions)

a. Write C programs that use both recursive and non-recursive functions
   i. To find the factorial of a given integer.
   ii. To find the GCD (greatest common divisor) of two given integers.
   iii. To find x^n

b. Write a program for reading elements using pointer into array and display the values using array.
c. Write a program for display values reverse order from array using pointer.
d. Write a program through pointer variable to sum of n elements from array.

Task 9: (Files)

a. Write a C program to display the contents of a file to standard output device.
b. Write a C program which copies one file to another, replacing all lowercase characters with their uppercase equivalents.
c. Write a C program to count the number of times a character occurs in a text file. The file name and the character are supplied as command line arguments.

Task 10: (Files)

a. Write a C program that does the following:It should first create a binary file and store 10 integers, where the file name and 10 values are given in the command line. (hint: convert the strings using atoi function) Now the program asks for an index and a value from the user and the value at that index should be changed to the new value in the file. (hint: use fseek function).The program should then read all 10 values and print them back.
b. Write a C program to merge two files into a third file (i.e., the contents of the firs t file followed by those of the second are put in the third file).

Task 11: (Strings)

a. Write a C program to convert a Roman numeral ranging from I to L to its decimal equivalent.
b. Write a C program that converts a number ranging from 1 to 50 to Roman equivalent
c. Write a C program that uses functions to perform the following operations:
   i. To insert a sub-string in to a given main string from a given position.
   ii. To delete n Characters from a given position in a given string.

Task 12: (Strings)

a. Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba, etc.)
b. Write a C program that displays the position of a character ch in the string S or – 1 if S doesn‘t contain ch.
c. Write a C program to count the lines, words and characters in a given text.

Task 13: (Miscellaneous)

a. Write a menu driven C program that allows a user to enter n numbers and then choose between finding the smallest, largest, sum, or average. The menu and all the choices are to be functions. Use a switch statement to determine what action to take. Display an error message if an invalid choice is entered.
b. Write a C program to construct a pyramid of numbers as follows:

```
1          *          1          1          *
1 2        * *        2 3        2 2        * *
1 2 3      * * *      4 5 6      3 3 3      * * *
                                 4 4 4 4    * *
                                            *
```

Task 14: (Sorting and Searching)

a. Write a C program that uses non recursive function to search for a Key value in a given list of integers using linear search method.
b. Write a C program that uses non recursive function to search for a Key value in a given sorted list of integers using binary search method.
c. Write a C program that implements the Bubble sort method to sort a given list of integers in ascending order.

Task 15: (Sorting and Searching)

a. Write a C program that sorts the given array of integers using selection sort in descending order.
b. Write a C program that sorts the given array of integers using insertion sort in ascending order .
c. Write a C program that sorts a given array of names.

Text/ Reference Books:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)
3. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
4. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
5. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
6. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

Course Code : GR18A1002 **L/T/P/C : 3/1/0/4**

Course Objectives: To provide the student with

- The knowledge to visualize solutions to engineering problems governed by differential equations
- The skill of evaluating multiple integrals needed for applications in mechanics and electro-magnetic field theory
- The knowledge to visualize the functions arising in vector field theory and use mathematical tools for some computations
- The skill of calculating work done by a field and flux across a surface
- The skill of using specialized theorems for fast computation of work and flux

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

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

Unit I: FIRST ORDER ODE

LDE of the first order: Solution of Exact, linear and Bernoulli equations, modeling of Newton's law of cooling, growth and decay models, modeling an R-L circuit.Non - linear differential equations of the first order: Equations solvable for *p*, equations solvable for *x*, equations solvable for *y*.

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: Areas (by double integrals) and volumes (by double integrals and triple integrals), Centre of mass and Gravity (constant and variable densities) by double and triple integrals (applications involving cubes, sphere and rectangular parallelepipeds

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 fields, irrotational fields, potentials

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 proofs) and their applications

Text/Reference Books:

1. R.K.Jain and S.R.K.Iyengar, Advanced Engineering Mathematics, Narosa publishing house,
2. Fourth edition 2014
3. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
4. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006
5. 4.. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition, Pearson, Reprint, 2002.
6. GRIET reference manual
7. Paras Ram, Engineering Mathematics, 2nd Edition, CBS Publishes
8. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

CHEMISTRY

Course Code: GR18A1005 **L/T/P/C: 3/1/0/4**

Course Objectives:

- To relate how the basic concepts and principles of chemistry can be applied to practical utility in a broader perspective of the society.
- 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.
- To identify and apply various principles of electrochemistry, corrosion and water treatment which are essential for an engineer in industry
- To acquire knowledge of existence of different organic molecules in different stereo chemical orientations useful for understanding reaction path ways.
- To bring adaptability to the concepts of chemistry and to acquire the required skills to become a perfect engineer.

Course Outcomes:

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

Unit I: ATOMIC AND MOLECULAR STRUCTURE

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

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 anharmonic oscillators of a diatomic molecule, selection rules, applications of IR spectroscopy.

Nuclear Magnetic Resonance: Basic concepts of NMR, Chemical shift. Magnetic resonance Imaging.

Unit III: ELECTROCHEMISTRY AND CORROSION

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. Fuel cells: hydrogen-oxygen fuel cell - applications and advantages.

Corrosion: Definition, causes and effects of corrosion, Theories 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

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, melting and boiling points, glass transition temperature, viscoelasticity. Compounding and fabrication by compression moulding and injection moulding, conducting polymers – definition, classification, application.

Water: impurities, hardness- causes of hardness, types, Units. Boiler troubles- scales and sludges, caustic embrittlement, water purification by reverse osmosis (RO) method.

Unit V: STEREOCHEMISTRY AND ENERGY RESOURCES

Stereo chemistry: Structural isomers and stereoisomers, representations of 3D structures, configurations and symmetry, chirality, enantiomers, diastereomers, optical activity, conformational analysis of n-butane. Structure, synthesis and pharmaceutical applications of paracetamol and aspirin.

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 engines, Octane rating and cetane number. Composition and Uses of Natural gas, LPG and CNG.

Text/Reference Books:

1. Engineering Chemistry by P.C. Jain and M. Jain; Dhanpat Rai Publishing Company (P) Ltd., New Delhi.
2. Engineering Chemistry by Prasanta Rath, B. Rama Devi, Ch. Venkata Ramana reddy, S. Chakroborty. Cengage Publications, 2018.
3. University Chemistry, by B.H. Mahan.
4. Engineering Chemistry by B. Siva Sankar, Mc Graw Hill Publication.
5. Fundamentals of Molecular Spectroscopy, by C.N. Banwell. Mc Graw Hill Publication.

6. A Text book 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: GR18A1008 **L/ T/ P/ C: 3/0/0/3**

Course Objectives:

- To introduce the fundamentals of Electrical Engineering.
- To solve problems in AC circuits.
- To provide foundation in theory and applications of Transformers and DC machines
- Understand the basic principles of AC Electrical machinery and their applications.
- To import the knowledge of Electrical Installations.

Course Outcomes:

- To understand and analyze basic electric circuits with suitable theorems.
- To solve 1-phase and 3-phase balanced sinusoidal systems.
- To interpret the working principle of Electrical machines.
- To appraise the applications of Induction motors and synchronous generators used in Industries.
- To 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. Superposition, Thevenin and Norton Theorems.
Time-domain analysis of first-order RL and RC circuits.

Unit II: A.C. CIRCUITS

Representation of sinusoidal waveforms, peak 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 RL-C circuit.
Three-phase balanced circuits, voltage and current relations in star and delta connections.

Unit III: TRANSFORMERS

Ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

Unit IV: ELECTRICAL MACHINES

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

Unit V: ELECTRICAL INSTALLATIONS

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/Reference 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

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGLISH

Course Code: GR18A1006 **L/T/P/C: 2/0/0/2**

INTRODUCTION

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire language skills, the syllabus of English has been designed to develop linguistic, communicative and critical thinking competencies of Engineering students.

In English classes, the focus should be on the skills development in the areas of vocabulary, grammar, reading and writing. For this, the teachers should use the prescribed text for detailed study. The students should be encouraged to read the texts leading to reading comprehension and different passages may be given for practice in the class. The time should be utilized for working out the exercises given after each excerpt, and also for supplementing the exercises with authentic materials of a similar kind, for example, newspaper articles, advertisements, promotional material etc. *The focus in this syllabus is on skill development, fostering ideas and practice of language skills in various contexts and cultures.*

Course Objectives: The course will help to

- Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
- Equip students to study academic subjects more effectively and critically using the theoretical and practical components of English syllabus.
- Develop study skills and communication skills in formal and informal situations.
- Understand the importance of defining, classifying and practice the unique qualities of professional writing style.
- 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 should be able to

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

Unit I

'The Raman Effect' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

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

Letter Writing

Vocabulary: Synonyms and Antonyms. Use of phrases for formal and informal letter writing. Eg.., I would like to apply, I regret to inform, This is to bring to your kind notice... etc.

Grammar: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.

Reading: Improving Comprehension Skills – Techniques for Good Comprehension, Read a letter

Writing: Format of a Formal Letter-**Writing Formal Letters** E.g.., Letter of Complaint, Letter of Requisition, Job Application with Resume. Reorganising of sentences /paragraphs in a letter.

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 and Tenses.

Reading: Sub-skills of Reading- Skimming and Scanning

Writing: Nature and Style of Sensible Writing- **Defining- Describing** Objects, Places and Events – **Classifying**- Providing Examples or Evidence.

Unit IV

'What Should You Be Eating' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary: Standard Abbreviations in English

Grammar: Redundancies and Clichés in Oral and Written Communication.

Reading: Comprehension- Intensive Reading and Extensive Reading

Writing: Writing Practices--Writing Introduction and Conclusion - Essay Writing- Précis Writing.

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

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/Reference Books:

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

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGINEERING CHEMISTRY LAB

Course code: GR18A1013 **L/T/P/C: 0/0/3/1.5**

Course Objectives:

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

Course Outcomes:

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

TASK 1: Determination total hardness of water by complexometric method using EDTA.

TASK 2: Determination of chloride content of water by Argentometry.

TASK 3: Redox titration: Estimation of ferrous iron using standard $KMnO_4$

TASK 4: Estimation of HCl by Conductometric titrations

TASK 5: Estimation of Acetic acid by Conductometric titrations

TASK 6: Estimation of Ferrous iron by Potentiometry using dichromate

TASK 7: Determination of rate constant of acid catalyzed reaction of methyl acetate

TASK 8: Determination of acid value of coconut oil.

TASK 9: Adsorption of acetic acid by charcoal

TASK 10: Determination of surface tension of liquid by using stalagmometer

TASK 11: Determination of viscosity of liquid by using Ostwald's viscometer.

TASK 12: Determination of partition coefficient of acetic acid between n-butanol and water.

TASK 13: Synthesis of Aspirin

TASK 14: Synthesis of Paracetamol.

Text/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, New Delhi)

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

BASIC ELECTRICAL ENGINEERING LAB

Course Code: GR18A1016 **L /T/ P/ C: 0/ 0/ 2/1**

Course Objectives:

- To introduce the use of measuring instruments.
- To analyze a given network by applying various electrical laws
- To calculate, measure and know the relation between basic electrical parameters.
- To know the response of electrical circuits for different excitations
- To summarize the performance characteristics of electrical machines.

Course Outcomes:

- Get an exposure to common electrical components and their ratings.
- Get an exposure to basic electrical laws.
- Understand the measurement, calculation and relation between the basic electrical parameters
- Understand the response of different types of electrical circuits to different excitations.
- Compare the basic characteristics of Electrical machines

TASK 1: Verification of Ohms Law

TASK 2: Verification of KVL and KCL

TASK 3: Transient Response of Series RL and RC circuits using DC excitation

TASK 4: Transient Response of RLC Series circuit 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: Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single Phase Transformer

TASK 8: Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)

TASK 9: Three Phase Transformer: Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta-star, Star-Star)

TASK 10: Measurement of Active and Reactive Power in a balanced Three-phase circuit

TASK 11: Performance Characteristics of a Separately/Self Excited DC Shunt/Compound Motor

TASK 1**2:** Torque-Speed Characteristics of a Separately/Self Excited DC Shunt/Compound Motor

TASK 13: Performance Characteristics of a Three-phase Induction Motor

TASK 14: Torque-Speed Characteristics of a Three-phase Induction Motor

TASK 15: No-Load Characteristics of a Three-phase Alternator

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB

Course code: GR18A1014 **L/T/P/C: 0/0/2/1**

The **Language Lab** focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

Course Objectives:

- To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning.
- To sensitize students to the nuances of English speech sounds, word accent, intonation rhythm and Neutralization of accent for intelligibility
- To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking
- To improve the fluency of students in spoken English and neutralize their mother tongue influence
- To train students to use language appropriately for public speaking and interviews

Course Outcomes:

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

Listening Skills Objectives:

1. To enable students develop their listening skills so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation

2. To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions

Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.

- Listening for general content
- Listening to fill up information
- Intensive listening
- Listening for specific information

Speaking Skills Objectives:

- To involve students in speaking activities in various contexts
- To enable students express themselves fluently and appropriately in social and professional contexts
- Oral practice: Just A Minute (JAM) Sessions
- Describing objects/situations/people
- Role play – Individual/Group activities

 The following course content is prescribed for the English Language and Communication Skills Lab based on Unit-6 of AICTE Model Curriculum 2018 for B.Tech First English. As the syllabus is very limited, it is required to prepare teaching/learning materials by the teachers collectively in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning and timesaving in the Lab)

Exercise – I

CALL Lab:

Understand: Listening Skill- Its importance – Purpose- Process- Types- Barriers of Listening.

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

ICS Lab:

Understand: Communication at Work Place- Spoken vs. Written language.

Practice: Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – 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:

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: How to make Formal Presentations.

Practice: Formal Presentations.

Exercise – IV:

CALL Lab:

Understand: Listening for General Details.

Practice: Listening Comprehension Tests.

ICS Lab:

Understand: Public Speaking – Exposure to Structured Talks.

Practice: Making a Short Speech – Extempore.

Exercise – V:

CALL Lab:

Understand: Listening for Specific Details.

Practice: Listening Comprehension Tests.

ICS Lab:

Understand: Interview Skills.

Practice: Mock Interviews.

Minimum Requirement of infrastructural facilities for ELCS Lab:

1. Computer Assisted Language Learning (CALL) Lab:

The Computer Assisted Language Learning Lab has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software for self- study by students.

System Requirement (Hardware component):

Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:

i) Computers with Suitable Configuration

ii) High Fidelity Headphones

2. Interactive Communication Skills (ICS) Lab:

The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio-visual aids with a Public-Address System, a LCD and a projector etc.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGINEERING WORKSHOP

Course Code: GR18A1017 **L/T/P/C: 1/0/4/3**

Course Objectives :

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

Course Outcomes:

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

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

i. Carpentry
ii. Fitting Shop
iii. Tin-Smithy
iv. Casting
v. Welding Practice
vi. House-wiring
vii. Black Smithy

2. 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

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

DIGITAL LOGIC DESIGN

Course Code: GR18A1017 **L/T/P/C: 3/0/0/3**

II Year I Semester

Prerequisites

- Fundamentals of Mathematics.
- Knowledge of Problem Solving with Algorithms and Flowcharts.

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

- Comprehend different number systems including the binary system and Boolean algebraic principles.
- Create minimal realizations of single and multiple output Boolean functions;
- Design and analyze combinational circuits using medium scale integrated (MSI) components, including arithmetic logic units;
- Apply strategies for state minimization, state assignment, for the implementation of synchronous Finite State Machines
- Design of Combinational Programmable Logic Devices (CPLDs) like PROM, PAL, and PLA and develop HDL Models for Logic Circuits.

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

- Apply knowledge of fundamental Boolean principles and manipulation to design Logic Circuits.
- Apply various techniques of Boolean function simplification to create minimal expressions.
- Create combinational circuits for a specified behavior with minimal specification.
- Synthesise Sequential circuits with minimal states.
- Realize combinational circuitry using Combinational PLDs and develop & test HDL models of Logic Circuits.

Unit I: Binary Systems

Digital Systems, Binary Numbers, Number Base Conversions, Octal and Hexadecimal Numbers, Complements, Signed Binary Numbers, Binary Codes, Binary Storage and Registers, Binary Logic.

Boolean Algebra And Logic Gates: Basic Definitions, Axiomatic definition of Boolean Algebra, Basic theorems and properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Other Logic Operations, Digital Logic Gates, Integrated Circuits.

Unit II: Gate-Level Minimization

The Map method, Four-variable map, Five-Variable map, Product of Sum’s simplifications, Don’t care conditions, NAND and NOR implementation, other two level implementations, Exclusive-OR Function.

Unit III: Combinational Logic

Combinational Circuits, Analysis Procedure, Design Procedure, Binary Adder - Subtractor, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers.

Unit IV: Synchronous Sequential Logic

Sequential Circuits, Latches, Flip-Flops, Analysis of clocked sequential circuits, State Reduction and Assignment, Design Procedure.

Registers and Counters: Registers, shift registers, Ripple Counters, Synchronous Counters, other counters.

Unit V: Memory and Programmable Logic

Introduction, Random Access Memory, Memory Decoding, Error Detection and Correction, Read Only Memory, Programmable Logic Array, Programmable Array Logic, Sequential Programmable Devices.

Hardware Description Language: Hardware Description Language, Definition, Structural Definition of HDL, HDL Models for Combinational circuits, HDL for Models for Sequential circuits.

Text/Reference Books:

1. Digital Design – Fourth Edition, M. Morris Mano, Pearson Education.
2. Fundamentals of Logic Design – Roth, 5th Edition, Thomson.
3. Switching and Finite Automata Theory by ZviKohavi, Tata McGraw Hill.
4. Fundamentals of Digital Logic with VHDL Design, Stephen Brown, Zvonko Vranesic, Tata McGraw Hill, Indian edition.
5. Switching and Logic Design – CVS Rao, Pearson Education
6. Digital Principles and Design – Donald D.Givone, Tata McGraw Hill.
7. Fundamentals of Digital Logic and Micro Computer Design, 5th Edition, M.Rafiquzzaman (John Willey)

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

DATA STRUCTURES

Course Code: GR18A1017 **L/T/P/C: 3/0/0/3**

II Year I Semester

Course Objectives: The students will learn

- The basic concepts of Data structures.
- The techniques used to analyze the performance of various Searching and Sorting techniques.
- The various types of Linked lists over arrays.
- Basic concepts about stacks, queues, lists, trees and graphs.
- To write algorithms for solving problems with the help of fundamental data structures

Course outcomes: Upon the successful completion of the course the students will be able to

- Implement searching techniques for a given problem.
- Write pseudo code for various sorting techniques.
- Implement various linear data structures and determine the time complexity.
- Understand the non-linear data structures like trees, graphs.
- Choose appropriate data structures to represent data items in real world problems

Unit I

Introduction: Basic Terminologies: Elementary Data Organizations, Data Structures, Operations: Insertion, Deletion, Traversal.

Searching: Linear Search and Binary Search Techniques and their complexity analysis.

Sorting: Quick Sort, Merge Sort.

Unit II

Stacks and Queues: Stack ADT, operations, Applications of Stacks: Expression Conversion and Evaluation– corresponding algorithms and complexity analysis.

Queue ADT, Types of Queues: Simple Queue, Circular Queue, Priority Queue; Operations on each type of Queues: Algorithms and their analysis.

Unit III

Linked Lists: Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion, Deletion; Linked representation of Stack and Queue.

Doubly linked list: operations and algorithmic analysis;

Circular Linked Lists: operations and algorithmic analysis.

Unit IV

Trees: Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their algorithms with complexity analysis. Applications of Binary Trees.

Unit V

B Tree: Definition, Operations: Insertion, Searching and Deletion.

Graph: Basic Terminologies and Representations, Graph traversal algorithms: BFS and DFS

Text/Reference Books:

1. Data Structures and Algorithm Analysis , 2nd edition, Mark Allen Weiss, Pearson
2. Data Structures using C, 1st Edition, Aaron M. Tenenbaum, Pearson
3. Data Structures using C, 2nd Edition, Reema Thareja, Oxford.
4. Data Structures and Algorithms Using C, 5th Edition, R. S. Salaria, Khanna Book Publishing Edition.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

PROBABILITY AND STATISTICS

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

Course Objectives:

- State the fundamentals of Probability and Statistics.
- Describe the properties of random variables and distributions.
- Interpret the measures of central tendency, dispersion, and association
- Distinguish between explanatory and response variables and analyze multi variable data using correlation and regression.
- Apply the tests of hypothesis.

Course Outcomes:

- Estimate the chance of occurrence of various uncertain events in different random experiments with strong basics of probability.
- Compute and interpret descriptive statistics.
- Evaluate random processes which occur in engineering applications governed by the Binomial, Poisson, Multinomial, Exponential, Normal and Gamma distributions.
- Forecast the models using Regression Analysis.
- Apply Inferential Statistics to make predictions or judgments about the population from which the sample data is drawn.

Unit I: BASIC PROBABILITY AND RANDOM VARIABLES

Probability spaces, conditional probability, independence, Bayes' rule;Discrete random variables, Continuous random variables and their properties, Distribution functions and densities
Independent random variables, Sums of independent random variables; Expectation of Discrete and Continuos Random Variables, Moments, Variance of a sum, Chebyshev's Inequality.

Unit II: BASIC STATISTICS AND DISCRETE PROBABILITY DISTRIBUTIONS

Measures of Central tendency: Moments, Skewness and Kurtosis.
Probability distributions: Infinite sequences of Bernoulli trials, Binomial, Poisson, Poisson approximation to the binomial distribution, multinomial distribution and evaluation of statistical parameters for Binomial and Poisson distributions.

Unit III: CONTINUOUS PROBABILITY DISTRIBUTIONS AND BIVARIATE DISTRIBUTIONS

Bivariate distributions and their properties, Distribution of sums and quotients, Conditional densities.
Normal, Exponential and Gamma density functions, Evaluation of statistical parameters for Normal distribution.

Unit IV: CURVE FITTING AND CORRELATION

Curve fitting by the method of least squares- fitting of straight line, Second degree parabola, Exponential and Power curves.
Correlation (Karl Pearson's Correlation coefficient and Spearman's Rank correlation (Statements of their properties and problems)) , Regression (including Multiple regression with two independent random variables), (Statements of their properties and problems only).

Unit V: APPLIED STATISTICS

Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.
Test for single mean, difference of means and correlation coefficient, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.

Text / References Books:

1. E. Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons, 2006.
2. P. G. Hoel, S. C. Port and C. J. Stone, "Introduction to Probability Theory", Universal Book Stall, 2003.
3. S. Ross, "A First Course in Probability", Pearson Education India, 2002.
4. W. Feller, "An Introduction to Probability Theory and its Applications", Vol. 1, Wiley, 1968.
5. N.P. Bali and M. Goyal, "A text book of Engineering Mathematics", Laxmi Publications, 2010.
6. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 2000.
7. T. Veerarajan, "Engineering Mathematics", Tata McGraw-Hill, New Delhi, 2010.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

DISCRETE MATHEMATICS

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

II Year I Semester

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

- Use mathematically correct terminology and notation.
- Construct correct direct and indirect proofs.
- Use division into cases in a proof.
- Use counterexamples.
- Apply logical reasoning to solve a variety of problems.

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

- For a given logic sentence express it in terms of predicates, quantifiers, and logical connectives.
- For a given a problem, derive the solution using deductive logic and prove the solution based on logical inference.
- For a given a mathematical problem, classify its algebraic structure..
- Evaluate Boolean functions and simplify expressions using the properties of Boolean algebra.
- Develop the given problem as graph networks and solve with techniques of graph theory.

Unit I: MATHEMATICAL LOGIC

Statements and notations, Connectives, Well formed formulas, Truth Tables, tautology, equivalence implication, Normal forms.

Predicates: Predicative logic, Free & Bound variables, Rules of inference, Consistency, proof of contradiction.

Unit II: SET THEORY

Properties of binary Relations, equivalence, compatibility and partial ordering relations, Hasse diagram.

Functions: Inverse Function Composite of functions, recursive Functions, Lattice and its Properties, Pigeon hole principles and its application.

Algebraic structures: Algebraic systems Examples and general properties, Semi groups and monads, groups sub groups' homomorphism, Isomorphism.

Unit III: ELEMENTARY COMBINATORICS

Basis of counting, Combinations & Permutations, with repetitions, Constrained repetitions, Binomial Coefficients, Binomial Multinomial theorems, the principles of Inclusion – Exclusion.

Unit IV: RECURRENCE RELATION: Generating Functions, Function of Sequences Calculating Coefficient of generating function, Recurrence relations, Solving recurrence relation by substitution and Generating funds. Characteristics roots solution of In homogeneous Recurrence Relation.

Unit V: GRAPH THEORY

Representation of Graph, DFS, BFS, Spanning Trees, planar Graphs

Graph Theory and Applications, Basic Concepts Isomorphism and Sub graphs, Multi graphs and Euler circuits, Hamiltonian graphs, Chromatic Numbers.

Text /Reference Books:

1. Discrete and Combinational Mathematics- An Applied Introduction-5th Edition – Ralph. P.Grimaldi.Pearson Education
2. Discrete Mathematical Structures with applications to computer science Trembly J.P. &Manohar .P, TMH
3. Mathematical Foundations for Computer Science Engineers, JayantGanguly,Pearson Education
4. Discrete Mathematics and its Applications, Kenneth H. Rosen, Fifth Edition.TMH.
5. Discrete Mathematics with Applications, Thomas Koshy, Elsevier
6. Discrete Mathematical Structures, BernandKolman, Roberty C. Busby, Sharn Cutter Ross, Pearson

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

DATABASE MANAGEMENT SYSTEMS

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

II Year I Semester

Course Objectives:

- To understand the different issues involved in the design and implementation of a database system.
- To understand Structured Query Language for manipulating the Data.
- To study the physical, conceptual and logical database designs
- To provide concepts of Transaction, Concurrency and Recovery Management Strategies of a DBMS
-
- 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:

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

Unit I

Introduction to Database and System Architecture: Database Systems and their Applications, Database Vs File System, View of Data, Data Models, Database Languages-DDL and DML, Transaction Management, Database users and Administrators, Database System Structure.

Introduction to Database Design: ER Diagrams, Entities, Attributes and Entity sets, Relationships and Relationship set, Extended ER Features, Conceptual Design with the ER Model, Logical database Design.

Unit I:

SQL: Queries and Constraints: Form of Basic SQL Query, SQL Operators, Set Operators, Nested Queries, Aggregate Operators, NULL values, Integrity Constraints Over Relations, Joins, Introduction to View, Destroying / Altering Tables and Views, Cursors, Triggers and Active Databases.

Unit III

Relational Model: Introduction to Relational Model, Basic Structure, Database Schema, Keys, Relational Algebra and Relational Calculus.

Storage and Indexing: File Organizations and Indexing-Overview of Indexes, Types of Indexes, Index Data Structures, Tree structured Indexing, Hash based Indexing.

Unit IV

Schema Refinement and Normal Forms: Introduction to Schema Refinement, Functional Dependencies, Reasoning about FD, Normal Forms, Properties of Decomposition.

Unit V:

Transaction Management: Transactions: Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for Serializability.

Concurrency Control: Lock based Protocols, Timestamp based protocols

Recovery System: Recovery and Atomicity, Log based recovery, Shadow Paging, Recovery with concurrent Transactions, Buffer Management.

Text/Reference Books

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

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

OPEN SOURCE LAB

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

II Year I Semester

Course Objectives:

- To expose students to FOSS environment and introduce them to use open source Packages
- To expose the students installation of open source software's
- To explore features of open CV
- To explore the features of LIST processing languages
- To explore the features Scilab

Course Outcomes:

- Students are able to install open source packages
- Students understand Kernel Configuration of Linux
- Students are able to use GUI programs with Open CV
- Students are able to develop the programs for PERL, LISP
- Students are able to use LATEX

1. **Kernel configuration, compilation and installation :** Download / access the latest kernel source code from kernel.org,compile the kernel and install it in the local system.Try to view the source code of the kernel

2. **Virtualisation environment** (e.g., xen, kqemu or lguest) to test an applications, new kernels and isolate applications. It could also be used to expose students to other alternate OSs like *BSD

3. **Compiling from source** : learn about the various build systems used like the auto* family, cmake, ant etc. instead of just running the commands. This could involve the full process like fetching from a cvs and also include autoconf, automake etc.,

4. **Introduction to scilab: Installation of scilab, basic programs using scilab**

5. **Installing various software packages :** Either the package is yet to be installed or an older version is existing. The student can practice installing the latest version. Of course, this might need internet access.
   - Install samba and share files to windows
   - Install Common Unix Printing System(CUPS)

6. **Write userspace drivers using fuse** -- easier to debug and less dangerous to the system (Writing full-fledged drivers is difficult at student level)

7. **Installation of Open CV and GUI programming : a sample programme** – using Gambas since the students have VB knowledge. However, one should try using GTK or QT

8. **Version Control System setup and usage** using RCS, CVS, SVN

9. **Text processing with Perl:** simple programs, connecting with database e.g., MYSQL

10. **Running PHP** : simple applications like login forms after setting up a LAMP stack

11. **Running Python** : some simple exercise – e.g. Connecting with MySql database

12. **Set up the complete network interface** usinf ifconfig command liek setting gateway, DNS, IP tables, etc.,

Resources:

An environment like **FOSS Lab Server** (developed by NRCFOSS containing the various packages)

OR

Equivalent system with Linux distro supplemented with relevant packages

Note:
Once the list of experiments are finalised, NRCFOSS can generate full lab manuals complete with exercises, necessary downloads, etc. These could be made available on NRCFOSS web portal.

LIST OF EQUIPMENTS:

Hardware:

Minimum Requirements:

- 700 Mhz X86 Processor
- 384 MB of system memory (RAM)
- 40 GB of disk space
- Graphics card capable of 1024*768 resolution
- Sound Card
- Network or Internet Connection

Software:

Latest distribution of Linux

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

DIGITAL LOGIC DESIGN LAB

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

II Year I Semester

Prerequisites

- Exposure to basic electronics, knowledge about transistor operation and skills of logical thinking.

Course Objectives: The objective of this course is to provide

- Exposure to the hardware interaction for the Computer Science Engineering students.
- Strengthens the logical thinking skills
- Explaining the different combinational circuits
- Explaining the different sequential circuits
- Introducing simulating environment.

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

- Identify the logic gates to solve the real world problems.
- Validate and check the various combinational circuits like adders, comparators, multiplexers and checkers.
- Verify various sequential circuits like flip flops, registers, counters. Translate the Boolean expressions using hardware description language.
- Implement the sequential and combinational circuits over hardware description language.
- Analyze and synthesize logic circuits. Design any Boolean function using universal gates such as NAND and NOR.

A. COMBINATIONAL CIRCUITS

1. Realization of Gates (AND, OR, NOT, NAND, NOR)
   Exercise: Realize an XOR and XNOR gates
2. Design half adder and full adder using Gates
   Exercise: Design half subtractor circuit
3. Verification of four bit magnitude comparator
   Exercise: Verify an 8bit magnitude comparator
4. Design a 2 to 1 Multiplexer
   Exercise: Implement a 4 to 1 Multiplexer.
5. Design a 2 to 4 Decoder and 1 to 4 Demultiplexer
   Exercise: Implement a 3 to 8 decoder and design a 1 to 4 demultiplexer using 1 to 2 demultiplexer.
6. Design a 4 bit Parity Checker
   Exercise: Design a 4 bit Parity Generator.

B. SEQUENTIAL CIRCUITS

1. Verification of truth tables of D and T Flip-Flops
   Exercise: Verify JK Flip-Flop
2. Conversion of JK Flip-Flop to D Flip-Flop
   Exercise: Convert JK Flip-Flop to T Flip-Flop
3. Design of 8 bit left Shift Register
   Exercise: Design a 4 bit right shift Register
4. Design a Binary Counter
   Exercise: Design of Decade Counter
5. Design of Asynchronous Up Counter
   Exercise: Design an Asynchronous mod Counter
6. Design of Synchronous Down Counter
   Exercise: Design an Synchronous Up/Down Counter

C. HARDWARE DESCRIPTION LANGUAGE

1. Simulation of Logic Gates
2. Simulation of any given Boolean Expression.
   Example: Y = A'B + AB'C'
3. Simulation of Multiplexers, Comparators and Decoders.
4. Simulation of Sequential Counter.

Note: A minimum of 12 experiments are to be performed and recorded by the candidate to attain eligibility for practical examination.

Text/Reference Books:

1. Digital Design-Fourth Edition,M.Morris Mano,Pearson Education.
2. Fundamentals of Logic Design-Roth, 5th Edition, Thomson.
3. Switching and Finite Automata Theory by ZviKohavi, Tata McGraw Hill.
4. Fundamentals of Digital Logic with VHDL Design, Stephen Brown, Zvonko Vranesic, Tata McGraw Hill, Indian edition.
5. Switching and Logic Design – CVS Rao, Pearson Education
6. Digital Principles and Design – Donald D.Givone, Tata McGraw Hill.
7. Fundamentals of Digital Logic and Micro Computer Design, 5th Edition, M.Rafiquzzaman (John Willey)

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

DATA STRUCTURES LAB

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

II Year I Semester

Course Objectives: The students will learn

- Efficient Searching and sorting techniques.
- To assess how the choice of data structures and algorithm design methods impacts the performance of programs.
- To choose the appropriate data structure like Single, Double and Circular Linked list for a specific application.
- To introduce various techniques for representation of the data in the real world and to develop application using data structures.
- To solve problems using data structures such as linear lists, stacks, queues, binary trees, binary search trees, and graphs and writing programs for these solutions.

Course Outcomes:

After completion of course student will be able to:

- Analyze run-time execution of various sorting , searchingmethods.
- Apply the knowledge of various Linked lists in real time problems.
- To choose appropriate data structure as applied to specified problem definition
- Understand the applications of Stacks and Queues.
- To handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.

Task- 1: Write a C Program for implementing the following searching methods

a. Linear Search b. Binary Search

Task- 2: Write a C Program for implementing the following Sorting Algorithms

a. Selection sort b. Bubble sort c. Insertion sort

Task- 3: Write a C Program for implementing the following Sorting Algorithms

a. Quick sort b. Merge sort

Task- 4: Write a C Program for implementing the following using an array

a. Stack ADT b. Queue ADT

Task- 5: Write a C Program that reads an Infix expression and converts the expression to Postfix form (use Stack ADT).

Task- 6: Write a C Program to implement Circular Queue ADT using an array

Task-7: Write a C Program for implementing the following using a SinglyLinked List.

a. Stack ADT b. Queue ADT

Task- 8: Write a C Program to implement the DoublyLinked List.

Task- 9: Write a C Program to implement the Circular Linked List.

Task- 10: Write a C Program to perform the following operations.

a. Construct a Binary search tree of elements
b. Search for a key element in the above Binary search tree
c. Delete an element from the above Binary search tree

Task- 11: Write a C Program to perform the following operations.

a. Construct a AVL tree
b. Search for a key element in the above AVL tree
c. Delete an element from the above AVL tree

Task- 12: Write a C Program for implementing BFS and DFS for a given graph

Text /Reference Books:

1. Data Structures and AlgorithmAnalysis, 2nd edition, Mark Allen Weiss, Pearson
2. Data Structures using C, 1st Edition, Aaron M. Tenenbau,m, Pearson
3. Data Structures using C, 2nd Edition, Reema Thareja, Oxford.
4. Data Structures and Algorithms Using C, 5th Edition, R. S. Salaria, Khanna Book Publishing Edition.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

DATABASE MANAGEMENT SYSTEMS LAB

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

II Year I Semester

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

- Develop the logical design of the database using data modeling concepts such as Relational model
- Infer the data models and use of queries in retrieving the data.
- Create a relational database using a relational database package.
- Manipulate a database using SQL.
- Render the concepts of database system structure.

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

- Construct the schema of the database and modify it.
- Compile a query to obtain the aggregated result from the database.
- Speculate the concepts of various database objects.
- Compare the use of procedure and function in database.
- Use triggers and packages to create applications in the database.

Task- 1:

DDL commands (Create, Alter, Drop, Truncate)

1. Create a table EMP with the following structure.

Name	Type
EMPNO	NUMBER(6)
ENAME	VARCHAR2(20)
JOB	VARCHAR2(10)
MGR	NUMBER(4)
DEPTNO	NUMBER(3)
SAL	NUMBER(7,2)

2. Add a column commission to the emp table. Commission should be numeric with null values allowed.
3. Modify the column width of the job field of emp table.
4. Create dept table with the following structure.

Name	Type
DEPTNO	NUMBER(2)
DNAME	VARCHAR2(10)
LOC	VARCHAR2(10)

DEPTNO as the primary key

5. Add constraints to the emp table that is empno as the primary key and deptno as the foreign key.
6. Add constraints to the emp table to check the empno value while entering (i.e) empno> 100. Salary value by default is 5000, otherwise it should accept the values from the user.
7. Add columns DOB to the emp table. Add and drop a column DOJ to the emp table.

Task- 2: DML COMMANDS (Insert, Update, Delete)

1. Insert 5 records into dept Insert few rows and truncate those from the emp1 table and also drop it.
2. Insert 11 records into emp table.
3. Update the emp table to set the value of commission of all employees to Rs1000/- who are working as managers.
4. Delete only those who are working as supervisors.
5. Delete the rows whose empno is 7599.

Task- 3: DQL COMMAND (Select)- SQL Operators and Order by Clause

1. List the records in the emp table order by salary in descending order.
2. Display only those employees whose deptno is 30.
3. Display deptno from the table employee avoiding the duplicated values.
4. List all employee names, salary and 15% rise in salary. Label the column as pay hike.
5. Display the rows whose salary ranges from 15000 to 30000.
6. Display all the employees in dept 10 and 20 in alphabetical order of names.
7. List the employee names who do not earn commission.
8. Display all the details of the records with 5 character names with 'S' as starting character.
9. Display joining date of all employees in the year of 1998.
10. List out the employee names whose salary is greater than 5000 and less than 6000

Task- 4: SQL Aggregate Functions, Group By clause, Having clause

1. Count the total records in the emp table.
2. Calculate the total and average salary of the employee.
3. Determine the max and min salary and rename the column as max-salary and min_salary.
4. Find number of departments in employee table.
5. Display job wise sum, average, max, min salaries.
6. Display maximum salaries of all the departments having maximum salary > 2000
7. Display job wise sum, avg, max, min salaries in department 10 having average salary is greater than 1000 and the result is ordered by sum of salary in descending order.

Task- 5: SQL Functions

1. Display the employee name concatenate with employee number.
2. Display half of employee name in upper case and half in lower case.
3. Display the month name of date "14-jul-09" in full.
4. Display the Date of joining of all employees in the format "dd-mm-yy".
5. Display the date two months after the Date of joining of employees.
6. Display the last date of that month in "05-Oct-09".
7. Display the rounded date in the year format, month format, day format in the employee
8. Display the commissions earned by employees. If they do not earn commission, display it as "No Commission".

Task- 6: Nested Queries

1. Find the third highest salary of an employee.
2. Display all employee names and salary whose salary is greater than minimum salary of the company and job title starts with 'M'.
4. Write a query to display information about employees who earn more than any employee in dept 30.
5. Display the employees who have the same job as Jones and whose salary is greater than or equal to the salary of Ford.

6. List out the employee names who get the salary greater than the maximum salaries of dept with dept no 20, 30.
7. Display the maximum salaries of the departments whose maximum salary is greater than 9000.
8. Create a table employee with the same structure as the table emp and insert rows into the table using select clauses.
9. Create a manager table from the emp table which should hold details only about the managers.

Task- 7:

Joins, Set Operators.

1. Display all the employees and the departments implementing a left outer join.
2. Display the employee name and department name in which they are working implementing a full outer join.
3. Write a query to display their employee names and their managers' name and salary for every employee.
4. Write a query to output the name, job, empno, deptname and location for each dept, even if there are no employees.
5. Display the details of those who draw the same salary.

Task- 8: Views

1. Create a view that displays the employee id, name and salary of employees who belong to 10^{th} department.
2. Create a view with read only option that displays the employee name and their department name.
3. Display all the views generated.
4. Execute the DML commands on views created and drop them.

Task- 9: Practices on DCL commands, Sequence and indexes.

Task- 10:

1. Write a PL/SQL code to retrieve the employee name, join date and designation of an employee whose number is given as input by the user.
2. Write a PL/SQL code to calculate tax of employee.
3. Write a PL/SQL program to display top ten employee details based on salary using cursors.
4. Write a PL/SQL program to update the commission values for all the employees' with salary less than 2000, by adding 1000 to the existing values.

Task- 11:

1. Write a trigger on employee table that shows the old and new values of employee name after updating on employee name.
2. Write a PL/SQL procedure for inserting, deleting and updating the employee table.
3. Write a PL/SQL function that accepts the department number and returns the total salary of that department.

Task- 12:

1. Write PL/SQL program to handle predefined exceptions.
2. Write PL/SQL program to handle user defined exception.
3. Write a PL/SQL code to create

a. Package specification

b. Package body to insert ,update, delete and retrieve data on emp table.

Text/Reference Books

1. The Complete Reference,3rd edition by James R.Groff, Paul N.Weinberg, Andrew J. Oppel
2. SQL & PL/SQL for Oracle10g, Black Book, Dr.P.S.Deshpande.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

VALUE ETHICS AND GENDER CULTURE

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

Course objectives

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

Course Outcomes

- To enable the student to understand the core values that shapes the ethical behaviour.
- Student will be able to realize the significance of ethical human conduct and self-development
- Students will be able to inculcate positive thinking, dignity of labour and religious tolerance.
- Students will attain a finger grasp of how gender discrimination works in our society and how to counter it.
- 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.

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.

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.

Unit–IV Introduction to Gender - Definition of Gender, Basic Gender Concepts and Terminology, Attitudes towards Gender, Social Construction of 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.

Text Books

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, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, 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

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

COMPUTER ORGANIZATION

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

II Year II Semester

Prerequisites: Knowledge of Digital Logic Design.

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

- Comprehend operational concepts and understand register organization within a basic computer system
- Analyze the basic computer organization and understand the concepts of Micro programmed control
- Understand the design aspects of Central processing unit organization
- Understand various algorithms for arithmetic operations within a computer system and communication with I/O devices and standard I/O interfaces..
- Study the hierarchical memory system including cache memory and virtual memory along with the design of Multiprocessor systems using various interconnection structures.

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

- Demonstrate knowledge of register organization of a basic computer system
- Incorporate In-depth understanding of control unit organization and micro programmed control.
- Understand the performance of central processing unit of a basic computer system.
- Apply various algorithms to perform arithmetic operations and propose suitable hardware for them.
- Analyze and emphasize various communication media in the basic computer system using design of various memory structures and Multiprocessor systems.

UNIT-I:

Basic Structure of Computers: Computer Types, Functional unit, Data Representation, Fixed Point Representation, Floating – Point Representation, Error Detection codes.

Register Transfer Language and Micro operations: Register Transfer language, Register Transfer, Bus and memory transfers, Arithmetic Micro operations, Logic micro operations, Shift micro operations, Arithmetic logic shift unit.

UNIT-II:

Basic Computer Organization and Design: Instruction codes, Computer Registers, Computer instructions, Timing and Control, Instruction cycle, Memory Reference Instructions, Input – Output and Interrupt, Complete Computer Description.

Micro Programmed Control: Control memory, Address sequencing, micro program example, design of control unit, Micro program Sequencer, Hard wired control Vs Micro programmed control.

UNIT-III:

Central Processing Unit Organization: General Register Organization, STACK organization, Instruction formats, Addressing modes, DATA Transfer and manipulation, Program control, Reduced Instruction Set Computer.

Computer Arithmetic: Addition and subtraction, multiplication Algorithms, Floating – point Arithmetic operations, BCD Adder.

UNIT-IV:

Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous data transfer Modes of Transfer, Priority Interrupt, Direct memory Access, Input –Output Processor (IOP).

Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, Dependencies, Vector Processing.

UNIT-V:

Memory Organization: Memory Hierarchy, Main memory- RAM and ROM chips, Memory Address map, Auxiliary memory – Magnetic Disks, Magnetic Tapes, Associative Memory – Hardware Organization, Match Logic, Cache Memory – Associative mapping, Direct mapping, Set associative mapping, Writing into cache and cache initialization, Cache Coherence, Virtual memory – Address Space and Memory Space, Address mapping using pages, Associative Memory page table, Page Replacement.Multi Processors: Characteristics or Multiprocessors, Interconnection Structures, Cache Coherence, Shared Memory Multiprocessors.

Text/Reference Books:

1. Computer Systems Architecture – M.Moris Mano, IIIrd Edition, Pearson/PHI
2. Computer Organization – Carl Hamacher, Zvonks Vranesic, SafeaZaky, Vth Edition, McGraw Hill.
3. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI
4. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition PHI/Pearson
5. Fundamentals or Computer Organization and Design, - Sivaraama Dandamudi Springer Int. Edition.
6. Computer Architecture a quantitative approach, John L. Hennessy and David A. Patterson, Fourth Edition Elsevier
7. Computer Architecture: Fundamentals and principles of Computer Design, Joseph D. Dumas II, BS Publications.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ECONOMICS AND ACCOUNTING FOR ENGINEERS

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

Course Objectives:

- To provide the student with a clear understanding of demand analysis, elasticity of demand and demand forecasting;
- To provide the insight on theory of production and cost analysis.
- To describe different types of markets and competition, forms of organization and methods of pricing.
- To make the students understand various capital budgeting techniques.
- To describe fundamentals of accounting.

Course Outcomes:

After studying this course, students will be in a position to:

- The student will be able to scan the economic environment and forecast demand of products through demand forecasting techniques.
- The student will be able to plan the production levels in tune with maximum utilization of organizational resources and with maximum profitability and list out various costs associated with production and able to compute breakeven point.
- To outline the different types markets and competition, forms of business organization and methods of pricing.
- To analyze the profitability of various projects using capital budgeting techniques
- The students will be able prepare the financial statements.

Unit-1: Introduction & Demand Analysis: ***Definition and Scope:*** Introduction to Economics, Nature and Scope of Managerial Economics. ***Demand Analysis***: Demand Determinants, Law of Demand and its exceptions. ***Elasticity of Demand***: Definition, Types, Measurement and Significance of Elasticity of Demand. ***Demand Forecasting***, Factors governing demand forecasting, methods of demand forecasting.

Unit-2: Production & Cost Analysis: ***Production Function*** – Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Laws of Returns, Internal and External Economies of Scale. ***Cost Analysis*****:** Cost concepts. Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems) - Managerial Significance.

Unit-3: Markets and Forms of Business organizations: ***Types of competition and Markets***, Features of Perfect competition, Monopoly and Monopolistic Competition. ***Pricing*****:** Objectives and Policies of Pricing. Methods of Pricing. ***Business:*** Features and evaluation of different forms of Business Organisation: Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types.

Unit-4: Capital Budgeting: Capital and its significance, Types of Capital, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value (NPV) Method and Internal Rate of Return (IRR) (simple problems) and Profitability Index (PI)

Unit-5: Introduction to Financial Accounting: ***Accounting Concepts and Conventions*** - Double-Entry Book Keeping. ***Accounting Cycle:*** Journal, Ledger, Trial Balance, Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).

Text Books

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

Reference Books

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

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

OPERATING SYSTEMS

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

II Year II Semester

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

- To learn the mechanisms of OS to handle processes and threads and their communication
- To learn the mechanisms involved in memory management in contemporary OS
- To gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols
- To know the components and management aspects of concurrency management
- To understand the concepts of Input/Output, storage and file management.

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

- Explain functions, structures of operating system
- Determine various process management concepts including scheduling and synchronization.
- Demonstrate the concepts of memory management and I/O systems.
- Solve issues related to file system interface and implementation of disk management.
- Classify protection and security mechanisms.

UNIT-I:

Computer System and Operating System Overview: Overview of computer operating systems, operating systems functions, protection and security, distributed systems, special purpose systems, operating systems structures and system calls, operating systems generation

UNIT-II:

Process Management: Process concepts, threads, scheduling-criteria, algorithms with evaluation, Thread scheduling, case studies: Linux, Windows .

Concurrency: Process synchronization, the critical- section problem, Peterson‘s Solution, synchronization Hardware, semaphores, classic problems of synchronization, monitors, Synchronization examples, atomic transactions. Case studies: Linux, Windows

UNIT-III:

Memory Management: Swapping, contiguous memory allocation, paging, structure of the page table, segmentation, virtual memory, demand paging, page replacement algorithms, Case studies: Linux, Windows.

Deadlocks: Principles of deadlock – system model, deadlock characterization, deadlock prevention, detection and avoidance, recovery from deadlock.

I/O systems: Hardware, application interface, kernel I/O subsystem, Transforming I/O requests, Hardware operation, performance.

UNIT-IV:

File system Interface: The concept of a file, Access Methods, Directory structure, file sharing, protection. File System implementation- File system structure, file system implementation, directory implementation, allocation methods, free-space management, efficiency and performance.
Mass-storage structure: Overview of Mass-storage structure, Disk structure, disk attachment, disk scheduling, swap-space management, RAID structure, stable-storage implementation, Tertiary storage structure.

UNIT-V:
Protection: Protection, Goals of Protection, Principles of Protection, Domain of protection, Access Matrix, Implementation of Access Matrix, Access control, Revocation of Access Rights, Capability-Based systems, Language – Based Protection.
Security: The Security problem, program threats, system and network threats, cryptography as a security tool, user authentication, implementing security defenses, firewalling to protect systems and networks, computer – security classifications.

Text/Reference Books:

1. Operating System Concepts Essentials, 9th Edition by AviSilberschatz, Peter Galvin, Greg Gagne, Wiley Asia Student Edition.
2. Operating Systems: Internals and Design Principles, 5th Edition, William Stallings, Prentice Hall of India.
3. Operating System: A Design-oriented Approach, 1st Edition by Charles Crowley, Irwin Publishing
4. Operating Systems: A Modern Perspective, 2nd Edition by Gary J. Nutt, Addison-Wesley
5. Design of the Unix Operating Systems, 8th Edition by Maurice Bach, Prentice-Hall of India
6. Understanding the Linux Kernel, 3rd Edition, Daniel P. Bovet, Marco Cesati, O'Reilly and Associates

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

JAVA PROGRAMMING

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

II Year II Semester

Pre-requisites: Computer Programming through C

Course Objectives: The students will learn the following:

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

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

- Write java programs and differentiate between object-oriented programming and procedure-oriented programming.
- Apply object-oriented programming features for solving a given problem.
- Incorporate exception handling mechanism.
- Implement Use java standard API library to write complex programs.
- Develop interactive programs using applet and swing.

Unit I

Introduction to OOP: Introduction, Need of object-oriented programming, principles of object-oriented languages, C++ vs JAVA, 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.

Packages- Creating Packages, using Packages, Access protection, java I/O package.

Exceptions - Introduction, Exception handling techniques - try, catch, throw, throws, finally block, user defined Exception.

Unit IV

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. **Exploring java.io, Exploring java.util**

Unit V

Applets- Applet class, Applet structure, an example Applet program, Applet life cycle.

Event Handling- Introduction, Event Delegation Model, Java.awt.event Description, Adapter classes, Inner classes.

Abstract Window Toolkit: Why AWT?,java.awt package, components and containers, Button, Label, Checkbox, Radio buttons, List boxes, choice boxes, Text field and Text area, container classes.

Swing: Introduction, JFrame, JApplet, JPanel, Components in swings, Layout Managers, JList and JScrollPane, JTabbedPane.

Text/Reference Books:

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

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

DESIGN AND ANALYSIS OF ALGORITHMS

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

II Year II Semester

Course Objectives:

The objective of this course is to provide the student:

- To train the students in exploring the knowledge of estimating the efficiency of an algorithm.
- To provide mathematical foundations and methods for dynamic programming that is an essential part in the research and development in almost all areas of modern technology.
- To provide the ability to analyze and simplify a given algorithm using different methods of simplification.
- To provide knowledge about various techniques in solving problems.
- Provides knowledge about performances of various techniques.

Course Outcomes:

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

- Express algorithms in a language independent manner (as pseudo codes).
- Applying various searching and sorting algorithms for different applications.
- Illustrating various techniques like greedy and dynamic approach in solving problems.
- Explain different backtracking applications and can also solve problems using fundamental graph algorithms.
- Differentiate between deterministic and non-deterministic problems.

Unit I

Introduction: Definition of algorithm, properties of an Algorithm, performance analysis - space complexity & time complexity, asymptotic notations: big oh notation, omega notation, theta notation, little oh notation & little omega notation.

Disjoint sets: Disjoint set Representation, Operations, union and find algorithms.

Unit II

Divide and conquer: General method, applications, binary search, quick sort, merge sort, strassen's matrix multiplication. Time complexities of divide and conquer algorithms.

Dynamic programming - I: General method, applications, matrix chain multiplication, optimal binary search trees, 0/1 knapsack problem

Unit III

Dynamic programming - II: All pairs shortest path problem, travelling sales person problem, reliability design.

Greedy method: General method, applications-- job sequencing with deadlines, knapsack problem, minimum cost spanning trees, single source shortest path problem.

Unit IV

Backtracking: General method, applications, n-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles.

Unit V

Branch and Bound: General method, applications, travelling sales person problem, 0/1 knapsack problem: LC branch and bound solution, FIFO branch and bound solution.

NP-hard and NP-complete problems: Basic concepts, non-deterministic algorithms, deterministic algorithms, Introduction to P class problems, NP class problems.

TEXT BOOKS

1. Ellis Horowitz, SatrajSahni and S Rajasekharam, Fundamentals of Computer Algorithms, Galgotia publishers
2. T H Cormen, C E Leiserson, and R L Rivest, Introduction to Algorithms, 3rd Edn, Pearson

Education

REFERENCES

1. R C T Lee, Hang and TT Sai, Introduction to Design and Analysis of Algorithms, A strategic approach, TMH

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

SCRIPTING LANGUAGES LAB

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

II Year I Semester

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

- Understand how server-side programming works on the web.
- Ability to use scripting languages like PHP, Python to develop applications
- Understanding POST and GET in form submission and know how to receive and process form submission data..
- Read and process data in a MySQL database.
- To learn how to use lists, tuples dictionaries and modules for reusability in Python programs.

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

- Evaluate the process of executing a PHP-based script on a web server
- Design, debug and run complete web applications using PHP and MYSQL
- Adequately use Python programming in selection, functions, modules, aggregated data (arrays, lists, etc.)
- Develop substantial Python scripts by appropriate reusing previously created scripts.
- Ability to develop Python scripts for using databases.

Task -1: Write a PHP script for the following.

1. Find the factorial of a number (while loop)
2. To reverse the digit (Use do while)
3. Find the sum of the digits (Use for loop)
4. Write a PHP script for the following: Design a form to accept the details of 5 different items, such as item code, item name, units sold, rate. Display the bill in the tabular format. Use only 4 text boxes. (Hint: Use of explode function.)
5. Assume an array with different values. Print only unique values from the array.
6. Create a form to accept customer information (name, address, ph-no).Once the customer information is accepted, accept product information in the next form (Product name, qty, rate). Display the bill for the customer in the next form. Bill should contain the customer information and the information of the products entered.

Task -2:

1. Create a login form with a username and password. Once the user logs in, the second form should be displayed to accept user details (name, city, phoneno). If the user doesn't enter information within a specified time limit, expire his session and give a warning
2. Write a PHP script to store, retrieve and delete data cookies values.

3. Write a PHP script to accept user name and password . If in the first three chances, username and password entered is correct, then display second form, otherwise display error message.

Task-3:

a. Write a PHP program to display the contents of a file using fgets, fgetc, fread functions.
b. Write a PHP program to upload a file and display the contents in server.

Task-4:

a. Design a php application where we connect with the database in one page but access the database in all the pages instead of establishing connection in every page.
b. Write a PHP script to store, retrieve and delete data using session variables.

Task-5: Design a PHP application for

a. Create a database table with user information like username, password and other required information.
b. Write PHP script for designing a page to allow both registration and login facility.

Task-6:

a. Write a PHP script for updating required user information in the database.
b. Write a PHP script for deleting a specified user from the database

Task-7:

a. Design a PHP application to displaying user name across all the pages from the time user login till user logout from the application.(using sessions)
b. Design a PHP application to create home page with different menu list based upon the type of user login.(Admin user and normal user)

Task-8:

Write a PHP script that will demonstrate POSIX regular expressions for validating

i) Name ii) Pin Code iii) Date iv) Email-id

Task-9: Write a Python script using basic data types.

a. Find the biggest of 3 numbers.
b. To check whether a number is positive or negative.
c. Find the factorial of a number
d. To reverse the digit
e. Find the sum of the digits
f. Fibonacci series for a particular limit.

Task-10:

a. Write a python script to test the using of modules.
b. Write a Python script to test various functions of Dictionary.
c. Write a Python script to define a function and calling the function by passing arguments. (using pass by value & pass by reference).

Task-11:

1. Write a Python script to test built in methods of Strings.
2. Write a Python script to test various functions of List and Tuple.

Task-12:

Write a python script to perform MYSQL database operations like select, update and delete.

Text/Reference Books:

1. Beginning.PHP.and.MySQL.3rd.Edition W. Jason Gilmoren - Third Edition Apress publications
2. Python- Standard Library by Frederik Luth- O'Relly
3. Practical Programming in Python by Jeffery Elkener.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

OPERATING SYSTEMS LAB

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

II Year II Semester

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

- Learn different types of CPU scheduling algorithms
- Demonstrate the usage of semaphores for solving synchronization problem
- Understand memory management techniques and different types of fragmentation that occur in them and various page replacement policies
- Understand Banker's algorithm used for deadlock avoidance
- Learn different file organization methods various disk scheduling algorithms.

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

- Evaluate the performance of different types of CPU scheduling algorithms
- Implement producer-consumer problem, reader-writers problem, Dining philosophers problem using semaphore
- Implement MVT, MFT, paging techniques and page replacement policies, memory allocation techniques in memory management and types of fragmentation that encounter in such techniques.
- Simulate Banker's algorithm for deadlock avoidance
- Implement file allocation strategies, file organization techniques and disk scheduling techniques.

Task 1:

Simulate the following CPU scheduling algorithms

a) Round Robin b) SJF c) FCFS d) Priority

Task 2:

Simulate the Producer-Consumer Problem

Task 3:

Simulate the Readers-Writers Problem using Semaphore.

Task 4:

Simulate the Dinning Philosophers Problem.

Task 5:

Simulate MVT and MFT.

Task 6:

Simulate First Fit and Best Fit algorithms for memory management.

Task 7:
Simulate Paging Technique of memory management.

Task 8:
Simulate all page replacement algorithms
a) FIFO b) LRU c) LFU

Task 9:
Simulate Bankers Algorithm for Dead Lock Avoidance.

Task 10:
Simulate all file allocation strategies
a) Sequential b) Indexed c) Linked

Task 11:
Simulate all File Organization Techniques
a) Single level directory b) Two level directory

Task 12:
Simulate the following Disk Scheduling Algorithms
(a) First Come-First Serve (FCFS)
(b)Shortest Seek Time First (SSTF)
(c)Elevator (SCAN)
(d)Circular SCAN (C-SCAN)
(e)LOOK
(f)C-LOOK

Text /Reference Books:
1. Operating System Concepts- Abraham Silberchatz , Peter B. Galvin, Greg Gagne 7th Edition, John Wiley.
2. Operating Systems– Internal and Design Principles Stallings, Fifth Edition–2005, Pearson education/PHI

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

JAVA PROGRAMMING LAB

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

II Year II Semester

Course Objectives: The students will learn the following

- Working with java compiler and eclipse platform.
- Writing of java programs using object oriented concepts.
- Developing java applications and handle the exceptions.
- Building java GUI based applications using swing.
- To handle the events.

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

- Implement object-oriented programming concepts.
- Analyze a problem, identify and define the computing requirements appropriate to its solution.
- Explore the java standard API library to write complex programs.
- Implement and manage multithreading.
- Develop graphical user interface in Java programs.

Recommended Systems/Software Requirements:

1. Dual core CPU, 4 GB of Ram.
2. Windows/linux OS, JDK 1.8.

Task-1: Write java programs that implement the following

a) Constructor
b) Parameterized constructor
c) Method overloading
d) Constructor overloading.

Task-2:

a) Write a Java program that checks whether a given string is a palindrome or not. Ex: MADAM is a palindrome.
b) Write a Java program for sorting a given list of names in ascending order.
c) Write a Java Program that reads a line of integers, and then displays each integer and the sum of all the integers (Use StringTokenizer class of java.util)

Task-3: Write java programs that uses the following keywords

a) this b) super c) static d) final

Task-4:

a) Write a java program to implement method overriding
b) Write a java program to implement dynamic method dispatch.
c) Write a Java program to implement multiple inheritance.
d) Write a java program that uses access specifiers.

Task-5:

a) Write a Java program that reads a file name from the user, then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes.
b) Write a Java program that reads a file and displays the file on the screen, with a line number before each line.
c) Write a Java program that displays the number of characters, lines and words in a text file

Task-6:

a) Write a Java program for handling Checked Exceptions.
b) Write a Java program for handling Unchecked Exceptions.

Task- 7:

a) Write a Java program that creates three threads. First thread displays "Good Morning" every one second, the second thread displays "Hello" every two seconds and the third thread displays "Welcome" every three seconds.
b) Write a Java program that correctly implements producer consumer problem using the concept of inter thread communication.

Task-8:

a) Develop an applet that displays a simple message.
b) Develop an applet that receives an integer in one text field and compute its factorial value and return it in another text field, when the button named "Compute" is clicked.

Task-9:

Write a Java program that works as a simple calculator. Use a grid layout to arrange button for the digits and for the +, -,*, % operations. Add a text field to display the result.

Task-10:

a) Write a Java program for handling mouse events.
b) Write a Java program for handling key events.

Task-11:

a) Write a program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields Num1 and Num 2.
b) The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1or Num2 were not an integer, the program would throw

Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception and display the exeption in a message dialog box.

Task -12:

a) Write a java program that simulates traffic light. The program lets the user select one of three lights: red, yellow or green. When a radio button is selected, the light is turned on, and only one light can be on at a time. No light is on when the program starts.
b) Write a Java program that allows the user to draw lines, rectangles and ovals.

Task -13:

Create a table in Table.txt file such that the first line in the file is the header, and the remaining lines correspond to rows in the table. The elements are separated by commas. Write a java program to display the table using JTable component.

Text/ Reference books:

1. Java: The Complete Reference, 10th edition, Herbert Schildt, Mcgraw Hill.
2. Java Fundamentals- A Comprehensive introduction, Herbert schildtand Dale skrien, TMH.
3. Java for programming, P.J.Dietel Pearson education (OR) Java: How to Program P.J.Dietel and H.M.Dietel, PHI
4. Object Oriented Programming through java, P.Radha Krishna, Universities Press.
5. Thinking in Java, Bruce Eckel, Pearson Education
6. Programming in Java, S.Malhotra and S.Choudhary, Oxford University Press.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENVIRONMENTAL SCIENCE

Course Code : L-3, T -0, P-0, C-3

Course Objectives:

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

Course Outcomes:

Based on this course, the Engineering graduate will

- Understand the harmonious co-existence in between nature and human being
- Recognize various problems related to environment degradation.
- Develop relevant research questions for environmental investigation.
- Generate ideas and solutions to solve environmental problems due to soil, air and water pollution.
- 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 value, services and carrying capacity.

Unit II

Natural Resources: Classification of Resources: Living and Non-Living resources, water resources: use and over utilization of surface and ground 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.

Unit V

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

TEXT BOOKS:

1. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS. Publications.
2. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.

REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela.2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha, Kaushik, 4th Edition, New age international publishers.
5. Introduction to Environmental Science by Y. Anjaneyulu, BS Publications.
6. Environmental Studies by R. Rajagopalan, Oxford University Press.