ACADEMIC REGULATIONS, COURSE STRUCTURE, AND DETAILED SYLLABUS

ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

For

B.Tech.FOUR YEAR DEGREE COURSE

(Applicable for the batches admitted from 2020-2021)

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

(UGC- AUTONOMOUS)

Sponsored by TKR Educational Society, Approved by AICTE, Affiliated to JNTUH

Accredited by NAAC with 'A' Grade. Accredited by NBA

(Medbowli, Meerpet, Balapur(M), Hyderabad, Telangana- 500097)

College

Vision:

Imparting Knowledge and instilling skills to the aspiring students in the field of Engineering, Technology, Science and Management to face the emerging challenges of the society.

Mission:

- Encouraging scholarly activities that transfer knowledge in the areas of Engineering, Technology, Science and Management.
- Ensuring students of all levels, well trained to meet the needs of education and their future endeavors.
- Inculcating human values and ethics into the education system for the all-round development of the students.

Department

About Department:

AI&ML is wide-ranging branch of computer science concerned with building smart machines capable of performing tasks that typically require human intelligence. The field of artificial intelligence has been an interdisciplinary endeavor, requiring deep knowledge of both computational and human sciences. Machine learning is an application of artificial intelligence (AI) that provides systems the ability to automatically learn and improve from experience without being explicitly programmed. Machine learning focuses on the development of computer programs that can access data and use it learn for themselves.

Advancements in machine learning and deep learning are creating a paradigm shift in virtually every sector of the tech industry. Moreover, the growing impact of AI on society demands that graduates are capable and ethical collaborators, able to ensure the safe and effective adoption of new technologies across domains.

The program begins with introductory courses in programming, computer science, mathematics, and statistics that provide a firm technical foundation. From there, learn core AI concepts and techniques including AI & ML Techniques, Virtual Reality, Web Applications using Machine Learning Techniques, Natural Language and Image Processing, Robotic Process Automation, Business Analytics, Speech Processing, Cognitive systems, Biometrics Systems, computer vision, and language understanding. The program includes a variety of advanced AI electives, enabling technical mastery in specific subfields. Also, specific electives are introduced that will focus on the Application of AI in various industry.

Vision:

- Encourage young minds to lead through experiential learning, develop collaborative solutions and contribute to social responsibility.

Mission:

- To instill in students a taste for research to solve complex engineering problems to meet industry demands.
- To allow graduates to adapt to fast-changing technology with strong fundamentals.
- Assimilate human values and ethics in students to become responsible citizens of society.

ACADEMIC REGULATIONS, COURSE STRUCTURE, AND DETAILED SYLLABUS

ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

For

B.Tech.FOUR YEAR DEGREE COURSE

(Applicable for the batches admitted from 2020-2021)

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

(UGC- AUTONOMOUS)

Sponsored by TKR Educational Society, Approved by AICTE, Affiliated to JNTUH

Accredited by NAAC with 'A' Grade. Accredited by NBA

(Medbowli, Meerpet, Balapur(M), Hyderabad, Telangana- 500097)

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

(Autonomous)

Accredited by NBA & NAAC with 'A' GRADE

1.0 Under-Graduate Degree Program in Engineering & Technology (UGP in E & T)

Teegala Krishna Reddy Engineering College (TKREC) offers a VIII- Semesters (4-years) Bachelor of Technology (B.Tech.) degree Program, under the Choice Based Credit System (CBCS) with effect from the academic year 2020- 21 in the various branches of Engineering.

2.0 Eligibility for Admission

2.1 Seats for each Program in the college are classified into CATEGORY-A (70% of intake), CATEGORY-B (30% of intake) and CATEGORY-C (10% of intake through Lateral Entry in III semester).

2.2 Admission to the CATEGORY-A (70% of Intake) is made either on the basis of the merit rank obtained by the qualified candidate in the entrance test conducted by the Telangana State Government (EAMCET) or on the basis of any other order of merit approved by the Talangana State council for Higher Education, subject to reservations prescribed by the government from time to time.

2.3 The college fills CATEGORY-B (30% of Intake) as per the guidelines of the competent authority.

2.4 CATEGORY-C (10% of intake) are Lateral Entry students who are admitted into the third semester directly based on the rank secured by the candidate in the Engineering Common Entrance Test (ECET) in accordance with the instructions received from the convener, ECET and the competent authority.

2.5 The medium of instruction for the entire under graduate Program in E & T will only be in English.

2.6 It is mandatory that every student follows the undertaking and abides by the rules of Teegala Krishna Reddy Engineering College.

3.0 B. Tech. Program structure

3.1 A student after securing admission is required to pursue the under graduate Program in B.Tech for a minimum period of eight semesters, (four academic years) and a maximum period of eight academic years starting from the date of commencement of the first semester, failing which the student shall forfeit the seat in the B.Tech course.

Each student should secure 160 credits (with CGPA ≥ 5.0) for the completion of Undergraduate Program and award of B.Tech. Degree.

B. Tech. Degree (LES)

The LES students after securing admission shall pursue a course of study for not less than three academic years and not more than six academic years. The student shall register for 123 credits and secure 123 credits with CGPA ≥ 5 from II year to IV year B.Tech program (LES) for the award of B.Tech. degree. The students, who fail to fulfil the requirement for the award of the degree in six academic years from the year of admission, shall forfeit their seat in B.Tech. The attendance requirements of B. Tech. (Regular) shall be applicable to B.Tech (LES).

3.2 Definitions/descriptions specified by UGC/AICTE are adopted appropriately for various terms and abbreviations used in these academic regulations/norms are listed below.

3.2.1 **Semester scheme**

Each under graduate program constitutes eight semesters (four academic years). Each academic year is divided into two semesters, maximum of 22 weeks and minimum of 18 weeks (≥ 90 instructional days) each. In each semester, students are subjected to "Continuous Internal Evaluation (CIE) and a Semester End Examination (SEE)". The Choice Based Semester System (CBSS) is implemented as prescribed by the UGC and the curriculum/course structure is followed as suggested by AICTE on time to time.

3.2.2 **Credit Courses**

All subjects/courses are to be registered by the student in a semester to earn credits which are assigned to each subject/course in an L: T: P: C (Lecture periods: Tutorial periods: Practical periods: Credits) structure which is on the following general pattern.

- One credit for one Period/hour per week per semester for theory/lecture (L) courses.
- Half credit for one Period/hour per week per semester for laboratory/practical (P).

Courses like Environmental Science, Professional Ethics, Gender Sensitization lab, other social context courses, CRT and student activities like NCC/NSO, NSS are identified as mandatory courses. These courses do not carry any credits.

3.2.3 The structure of the Under Graduate Engineering Program:

S.NO.	CATEGORY	Suggested breakup of credits (Total 160)
01	Humanities and Social sciences including Management	9*
02	Basic Sciences	25*
03	Engineering Sciences courses including Workshop, Drawing,basics of Electrical/Mechanical/Computer etc.	18*
04	Professional Core Courses	66*
05	Professional Elective Courses relevant to chosenspecialization/branch	18*
06	Open Electives-Electives from other technical and/oremerging subjects	9*
07	Project work, Seminar and Internship in Industry orelsewhere	15*
08	Mandatory courses [Environmental Sciences, Induction Training, Indian Constitution, Essence of Indian Traditional Knowledge]	(non- credit)
	Total	**160***

***Variation is allowed as per the need of the respective disciplines.**

3.2.4 Subject Code Classification

The subject codes of various branches in TKREC Regulations are formulated using the following Procedure

Regulation, Branch, Semester, Classification, S.No.

Regulation	**20,21, 22, …., and so on**
UG Branch	**Corresponding branch code like CE,EE …..etc**
Semester	**I,II,III,IV,V,VI,VII,VIII**
Classification	**HS-Humanities and Sciences, BS-Basic Sciences,ES-Engineering Sciences, PC- Professional Core,PE-Professional Elective, OE-Open Elective, PW-Project Work**
S.No.	**1 to 9**

4.0 Course registration

4.1 An adviser /counselor or mentor from the faculty shall be assigned to a group of 20 students, who instructs the students regarding the Under Graduate Program, its course structure and curriculum, choice/option for subjects/courses, which is based on their competence, progress, pre-requisites and interest.

4.2 The academic section of the college invites 'registration forms' from students before the commencement of the semester through 'on-line registration' ensuring 'date and time stamping'. The on-line registration requests for any 'current semester' shall be completed before the commencement of the SEEs (Semester End Examinations) of the 'preceding semester', and for 1st semester students the online registration requests shall be completed four weeks from the date of admission.

4.3 A student can apply for on-line registration, only after obtaining the written approval from the faculty adviser/counselor or mentor, which should be submitted to the college academic section through the Head of the Department. A copy of it shall be retained with the Head of the Department, faculty advisor/counselor or mentor and the student.

4.4 A student should register for all the courses offered to him in that particular semester not exceeding nine subjects/courses, excluding the Mandatory Courses.

4.5 If the student submits ambiguous choices or multiple options during on-line registration for the subject /course under a given/specified course group/category as listed in the course structure, then the Head of the Department will allot a subject/course without considering the submission.

4.6 Subject/course options exercised through on-line registration are final and cannot be changed or inter-changed; further, alternate choices also will not be considered. However, if the subject/course that has already been listed for registration by the Head of the Department in a semester cannot be offered due to any unforeseen or unexpected reasons, then the student shall be allowed to select an alternate choice either for a new subject (subject to offering of such subject), or another existing subject (subject to availability of seats). Such alternate arrangements will be made by the Head of the Department, with due notification and within a time-framed schedule, in the first week after commencement of the class-work for that semester.

4.7 Open electives: The students have to choose three/four open electives (OE-I), (OE-II) (OE- III), (OE-IV) depending upon the curriculum. The student cannot opt for open elective subjects offered by their own (parent) department. The student can choose an open elective subject from the list of subjects offered by any other department of the same college. Once, a subject is chosen under the open elective category it cannot be opted again.

4.8 Professional electives: Students have to choose six professional electives (PE-I, PE-II, PE-III, PE-IV, PE-V, PE-VI). However, the students may opt for professional elective subjects offered in the related area.

5.0 Subjects/courses to be offered

5.1 The class strength for each semester shall be 60.

5.2 A subject/ course may be offered to the students, only if a minimum of 20 students (1/3 of the section strength) opt for it. The maximum strength of a section is limited to 80 (60+ 1/3 of the

strength of the section).

5.3 More than one faculty member may offer the same subject (lab/practical may be included with the corresponding theory subject in the same semester) in any semester. However, selection of choice by the students will be based on – 'first come first serve basis and the CGPA criterion' (i.e. the primary shall be on on-line entry from the student for registration in that semester, and the focus that follows, if needed, will be on the CGPA of the student)

5.4 If more entries for registration of a subject comes into picture, then the concerned Head of the Department shall decide, whether or not to offer such a subject/ course for two (or multiple) sections.

5.5 An Elective Course is offered to the students if and only if there is a minimum of 1/3 strength of the sanctioned intake registers for that course.

6.0 Attendance requirements

6.1 A student shall be eligible to appear for the semester end examinations, if the student acquires a minimum of 75% of attendance in aggregate in all the subjects/courses including days of internal examinations (excluding attendance in mandatory courses like Environmental Science, Professional Ethics, Gender Sensitization Lab, NCC and NSS, subjects related to social context and CRT) for that semester.

6.2 For Mandatory Courses a 'Satisfactory Participation' report shall be issued to those students from the authorities concerned only after securing ≥ 65% attendance in such a course.

6.3 Shortage of attendance in aggregate up to 10% (65% and above, and below 75%) in each semester may be condoned by the college academic committee on valid grounds, like natural calamity, medical emergency, any sudden demise of close family members based on the students representation with supporting evidence/certificates.

6.4 A stipulated fee shall be paid to condone the shortage of attendance.

6.5 Shortage of attendance below 65% in aggregate shall, in no case be condoned.

6.6 Students whose shortage of attendance, is not condoned in a semester, are not eligible to take their end examinations of that semester. They get detained and their registration for that semester shall be cancelled. They will not be promoted to the next semester.

6.7 The students who are detained due to lack of attendance should seek re-admission into that semester as and when offered, and re-register all the courses offered in that semester.

6.8 A student fulfilling the attendance requirement in the present semester shall not be eligible for readmission into the same class, until completion of the VIII semester, even on payment of the requisite fees.

7.0 Academic requirements

The following academic requirements have to be satisfied; in addition to the attendance, requirements mentioned in item no 6.

7.1 A student shall be deemed to have satisfied the minimum academic requirements if he/she has earned the credits allotted to each subject/course, and has secured not less than 35% marks (26 out of 75) in the semester end examination, and a minimum of 40% of marks in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together in terms of letter grades. This implies securing 'C' grade or above in that subject/course

7.2 Promotion Rules:

S.No.	Promotion	Conditions to be fulfilled
1.	**I Semester to II Semester**	**Regular course of study of I semester bysatisfying attendance requirements.**

2.	**II Semester to III Semester**	**Regular course of study of II Semester, by satisfying attendance requirements. Must have secured at least 50% credits up to from the offered credits from all the relevant regular and supplementaryexaminations, whether the student takes those examinations or not.**
3.	**III Semester to IV Semester**	**Regular course of study of III semester, bysatisfying attendance requirements.**
4.	**IV Semester to V Semester**	**Regular course of study of IV semester, bysatisfying attendance requirements, andmust have secured at least credits i.e., 60%credits up to IV semester from the offeredcredits (rounding to near low value) from all the relevant regular and supplementary examinations, whether the students takes those examinations or not**
5.	**V Semester to VI Semester**	**Regular course of study of V Semester, bySatisfying attendance requirements.**
6	**VI Semester to VII Semester**	**Regular course study of VI semester, by satisfying attendance requirements. Must have secured at least 60% credits (rounding to near lower value) up to VI Semester from the offeredcredits from all the relevant regular andsupplementary examinations, whether the student takes those examinations or not.**
7	**VII Semester to VIII Semester**	**Regular course of study of VII Semester, bysatisfying attendance requirements.**

Promotion Rules for Lateral Entry Students

S.No.	Promotion	Conditions to be fulfilled
01	**III Semester to IV Semester**	**Regular course of study of Second Year first semester, by satisfying attendance requirements.**
02	**IV Semester to V Semester**	**Regular course of study of IV Semester by satisfying attendance requirements and a minimum of 50 % of credits (rounding to thenear lower value) from the offered credits, from one regular and one supplementary examinations of III semester, irrespective of the candidate takes the examination or not.**
03	**V Semester to VI Semester**	**Regular course of study of V Semester bysatisfying attendance requirements.**
04	**VI semester to VII Semester**	**Regular course of study of VI Semester bysatisfying academic requirements and aminimum of 60% of credits (rounding to thenear low value) from the offered credits,from two regular and two supplementaryexaminations of III Semester; two regularand one supplementary examinations of IV Semester; one regular and one Supplementary examination of V Semester.**
05	**VII Semester to VIII Semester**	**Regular course of study of VII semester bysatisfying the academic requirements.**

7.3 A student shall register for subjects covering 160 credits as specified and listed in the course

structure, fulfill all the attendance and academic requirements for 160 credits, 'earn all 160 credits' by securing SGPA ≥ 5.0 (in each semester) and CGPA (at the end of each successive semester ≥ 5.0) to successfully complete the Under Graduate Program.

7.4 A student eligible to appear in the end semester examination for any subject/course, but absent from it or failed (there by failing to secure 'c' grade or above) may reappear for that subject/course in the supplementary examination as and when conducted. In such cases, the CIE assessed earlier for that subject/course will be carried over, and added to the marks to be obtained in the SEE Supplementary examination for evaluating the performance in that subject.

7.5 A student **detained in a semester due to shortage of attendance, may be re-admitted when the same semester is offered in the next academic year for fulfillment of academic requirements.** The academic regulations under which the student has been readmitted shall be applicable. However, no grade allotments or SGPA/CGPA calculations will be done for the entire semester in which the student has been detained.

7.6 A student detained **due to lack of credits, shall be promoted to the next academic year only after acquiring the required academic credits.** The academic regulations under which the student has been re-admitted shall be applicable to him.

8.0 Evaluation – Distribution and Weightage of marks

8.1 The performance of a student in every subject/course (including Practical) will be evaluated for 100 marks each, with 25 marks allotted for CIE (Continuous Internal Evaluation) and 75 marks for SEE (Semester End Examination).

8.2 For theory subjects, during a semester there shall be two mid-term examinations and average of two internal examinations will be taken as the final marks for CIE. Each mid-term examination consists of only descriptive paper carrying 20 marks with the time duration of 1hour 20 minutes. The remaining 5 marks will be evaluated by the assignment given by the concerned faculty. The syllabus for the first mid examination shall be first 2.5 units. The second mid examination covers remaining 2.5 units of syllabus. **The total marks secured by the student for the whole CIE (Continuous Internal Evaluation) will be the average of two mid-terms.** If any student is absent from / would like to seek improvement in any subject of a mid- term examination, a computer based test will be conducted for him/her by the examination branch of the college, which will be scheduled after completion of both mid-term examinations.

The details of CIE exam question paper are as follows

- ❖ The pattern of Mid-term exam for CIE consists of 4 questions and no choice will be given.
- ❖ Each question carries 5 marks.
- ❖ There will be a CBT (Computer Based Test) for the students who are absent and secured less than 14 marks in the continuous internal evaluation. The CBT will be conducted before the announcement of the results of semester-end exams.
- ❖ The question bank for the CBT should cover entire syllabus of the corresponding course.

The details of the pattern of the end semester question paper are as follows

- ➢ The end semester examinations will be conducted for 75 marks.
- ➢ The question paper consists of two parts namely Part- A and Part-B.
- ➢ Part-A consists of 10 questions. Each question carries 2.5 marks each and no choice will be given. Two questions are from one unit and all the five units should be covered.
- ➢ Part-B consists of five questions (number from 2 to 6) carrying 10 marks each. Each of these questions is from one unit and may contain sub questions. For each question, there will be an "either" "or" choice, which means that there will be two questions from each unit and the student should answer either of the two questions.

The details of evaluation of end semester exam are as follows

- Double evaluation of the answer scripts is followed.
- The average of the two evaluations shall be considered as final marks.
- If the difference of two valuations is more than or equal to15 marks, third evaluation shall be recommended.
- If any difference appeared in the marks after the third valuation also, average of two evaluations will be considered whose difference is minimum, as final marks.

The details of challenging valuation of end semester exam are as follows

- There shall not be any recounting or re-evaluation for all subjects as the double valuation was adopted. But, the students will be given a chance to apply for challenging valuation for all the theory Subjects (no Practical/lab subjects) within one week from the date of declaration of results.
- Whenever the students apply for challenge valuation of answer scripts of semester end examinations, the students should submit their applications (through the HOD) within one week from the date of declaration of the results to the Examination Branch by paying Rs.10,000 (Rupees Ten Thousand only) per subject, in the form of Demand Draft, Drawn in Favor of "TKREC AUTONOMOUS". Any application received after the due date of submission for Challenge valuation, shall not be accepted under any circumstances.

On receipt of the DD

The answer script of the applied subject will be shown to the candidate to verify whether it belongs to him or not and the script will be evaluated by the senior faculty of the college appointed by the Controller of examinations. If there is any change in marks (Equal or above 15% of the maximum marks) the new marks will be awarded to the student. Otherwise, there will be no change in old marks. If the change in marks (Equal or above 15% of the maximum marks) occurs, an amount of Rs.9,000/- will be refunded to the student. Otherwise, the student will forfeit the total amount which he/she paid.

8.3 For practical subjects there shall be a continuous internal evaluation during the semester for 25 marks and 75 marks for end semester practical examinations. The duration for both Internal and External Practical Examination is 3 hours. For 25 marks of Internal Evaluation of practical subjects, day-to-day evaluation in laboratory is done for 15 marks and internal practical examination will be assessed for 10 marks. The concerned laboratory subject teacher (Internal Examiner) will conduct the internal practical examination only. The external practical examination will have 2 examiners, one is the external examiner and the other is the internal examiner. The controller of examinations of the college will appoint the external examiner with the consultation of the chief superintendent of examinations from the three names given by the concerned department.

8.4 For the subjects that include design and/or drawing, (such as engineering graphics, engineering drawing, machine drawing and estimation), the distribution shall be 25 marks for continuous internal evaluation (15 marks for day-to-day evaluation and 10 marks for internal examination) and 75 marks for semester end examination. **There shall be two internal examinations in a semester and the average of the two shall be considered for the award of marks for internal examinations**.

8.5 (i) For subjects like **Engineering Graphics/ Engineering Drawing**, the SEE shall consist of five questions. For each question there will be an "either" "or" choice, which means that there will be two questions from each unit and the student should answer either of the two questions.

(ii) For the Subject **Estimation, Costing and Project Management**, the SEE paper should consist of Part- A, Part-B and Part C. (i) Part – A, 1 out of 2 questions from Unit – I for 30 Marks, (ii) Part – B, 1 out of 2 questions from Unit – II for 15 Marks,(iii) Part – C, 3 out of 5 questions from Units – III, IV, V for 30 Marks.

(iii) For subjects **Structural Engineering – I & II (RCC & STEEL),** the SEE will be conducted for 75 marks consisting of 2 parts viz. (i) Part – A for 15 marks and, (i) Part – B for 60 marks. Part

– A is a compulsory question consisting of ten sub- questions. The first five sub-questions are from each unit relating to design theory and codal provisions and carry 2 marks each. The next five sub-questions are from each unit and carry 1 mark each. Part – B consists of 5 questions (numbered 2 to 6).

8.6 The student has to undergo a comprehensive MCQ TEST/ Seminar/Internship/industry oriented mini project/Project Work offered to him by their respective departments and subsequently should satisfy the requirements for completion to acquire the required credits.

8.7 There shall be an Internship in collaboration with an industry of their specialization. Students will register for this immediately after II year II semester examinations and pursue it during summer vacation for 15 days. The Internship shall be submitted in a report form and presented before the committee in III year I semester. It shall be evaluated for 100 internal marks. The committee consists of Head of the Department, supervisor of the Internship and a senior faculty member of the department.

8.8 There shall be an Industrial Oriented Mini Project in collaboration with an industry of their specialization. Students will register for this immediately after III year II semester examinations and pursue it during summer vacation for one month. Industrial Oriented Mini Project shall be submitted in a report form and presented before the committee in IV year I semester. It shall be evaluated for 100 external marks. The committee consists of an external examiner, Head of the Department, supervisor of the Industrial Oriented mini project and a senior faculty member of the department. There shall be no internal marks for Industrial Oriented Mini Project.

8.9 There shall be a seminar presentation in IV year I semester. For the seminar, the student shall collect the information on a specialized topic, prepare a technical report, and submit it to the department. It shall be evaluated by the departmental committee consisting of Head of the Department, seminar supervisor and a senior faculty member. The seminar report shall be evaluated for 100 internal marks. There shall be no semester end examination for the seminar.

8.10 There shall be a comprehensive MCQ exam in IV year I semester. For the comprehensive MCQ exam covers the core subjects which are related to Graduate Aptitude Test in Engineering. It shall be evaluated by the departmental coordinator nominated by Head of the Department. The comprehensive MCQ exam shall be evaluated for 100 internal marks and consists of 50 MCQs. The student has to secure 40% of 100 marks i.e.40 marks. If any student is absent or failed in the comprehensive MCQ exam then he/she can appear for next supplementary exam like other end semester examinations.

8.11 UG project work shall be carried out in two stages: Project Stage – I during IV Year I Semester, Project Stage – II during IV Year II Semester. Each stage will be evaluated for 100 marks. Student has to submit project work report at the end of each semester. First report includes project work carried out in IV Year I semester and second report includes project work carried out in IV Year I & II Semesters. SEE for both project stages shall be completed before the commencement of SEE Theory examinations.

(i) For Project Stage – I, the departmental committee consisting of Head of the Department, project supervisor and a senior faculty member shall evaluate the project work for 75 marks and project supervisor shall evaluate for 25 marks. The student is deemed to have failed, if he (i) does not submit a report on Project Stage - I or does not make a presentation of the same before the evaluation committee as per schedule, or (ii) secures less than 40% marks in the sum total of the CIE and SEE taken together. A student who has failed may reappear once for the above evaluation, when it is scheduled again; if he fails in such 'one re-appearance' evaluation also, he has to reappear for the same in the next subsequent semester, as and when it is scheduled.

(ii) For Project Stage – II, the external examiner shall evaluate the project work for 75 marks and the project supervisor shall evaluate it for 25 marks. The topics for industrial oriented mini project, seminar and Project Stage – I shall be different from one another. The student is deemed to have failed, if he (i) does not submit a report on Project Stage - II, or does not make a presentation of the same before the external examiner as per schedule, or (ii) secures less than 40% marks in the sum '

total of the CIE and SEE taken together. For conducting viva-voce of project stage – II, the controller of examination will nominate an external examiner with the consultation of the chief superintendent from the list of experts in the relevant branch submitted by the concerned department. A student who has failed may re-appear once for the above evaluation in the current semester, when it is scheduled again; if student fails in such 'one re-appearance' evaluation also, he/she has to reappear for the same in the next subsequent semester, as and when it is scheduled.

(iii) Procedure for opting the MOOCs

- If any student got an opportunity to do the final year project as an internship in any reputed company (Approved by the departmental committee), the student can opt for MOOCs which are equivalent to the elective courses offered in VIII semester.
- The MOOCs should be approved by the concerned BOS.
- The selected MOOCs duration should be minimum of 12 weeks.
- A student is eligible to secure up to 12 credits only through MOOCs.

8.12 The laboratory marks, sessional marks, and the end examination marks awarded by the college are subject to scrutiny and scaling, if necessary, by a committee, constituted in this regard, with a university representative/under the guidance of the Director of Evaluation of the affiliating university. The recommendations of the committee are final and binding. The laboratory records, internal examination scripts and external examination scripts, shall be preserved as per the rules for two consecutive academic years if the respective subjects are cleared, and shall be produced before the committee as and when required, till preserved.

8.13 For mandatory courses related to Environmental Science, Constitution of India, Intellectual Property Rights, Gender Sensitization lab and Campus recruitment training a student has to secure 40 marks out of 100 marks (i.e. 40% of the marks allotted) in the continuous internal evaluation for passing the subject/course. **These marks should also be uploaded along with the internal marks of other subjects**

8.14 For all non-credit courses and mandatory courses, no marks or letter grade is allotted.

9.0 Grading Procedure

9.1 Marks will be awarded to the student to indicate the performance in each theory subject, laboratory/ practical's, seminar, project stage I and project stage II. Based on the percentage of marks obtained (Continuous Internal Evaluation plus Semester End Examination, both taken together) as specified in item no. 8 above, a corresponding letter grade shall be given.

9.2 As measure of the performance of a student, a 10-point absolute grading system using the following letter grades (as per UGC/AICTE/JNTUH guidelines) and corresponding percentage of marks shall be followed.

% of marks secured in a subject/course	Letter Grade	GradePoints
90% to 100%	O (Outstanding)	10
80 and less than 90%	A^+ (Excellent)	9
70 and less than 80%	A (Very Good)	8
60 and less than 70%	B^+ (Good)	7
50 and less than 60%	B (Average)	6
40 and less than 50%	C (Pass)	5
Below 40%	F (Fail)	0
Absent	Ab	0

**** Awarding of Letter Grade will be done for the benefit of the student.**

9.3 A student obtaining '**F**' grade in any subject shall be deemed to have **'failed'** and is required to reappear as a 'supplementary student' in the semester end examination, as and when offered. In

such cases, internal marks in those subjects will remain same as those obtained earlier.

9.4 A student who has not appeared for an examination in any subject '**Ab'** grade will be allocated in that subject, and the student shall be considered as **'failed'.** The student will be required to reappear as a 'supplementary student' in the semester end examination, as and when offered.

9.5 A letter grade will not indicate any specific percentage of marks, but states only the range of marks he/she has obtained.

9.6 A student earns Grade Point (GP) in each subject/course, based on the Grade Point the letter grade is awarded for that subject/course. The corresponding 'credit points' (CP) are computed by multiplying the grade point with credits for that particular subject/course.

Credit points (CP) = grade points (GP) x Credits for a course

9.7 The student passes the subject/course only when **GP ≥ 5 ('C' grade or above).**

9.8 The semester grade point average (SGPA) is calculated by dividing the sum of credit points (∑CP) secured from all subjects/course registered in a semester, by the total number of credits registered during the semester. SGPA is rounded off to two decimal places. SGPA is thus calculated as

SGPA = {∑*N*i=1*CiGi*}/ {∑*N* *Ci*} ….. For each semester,

where 'i' is the subject indicator index (takes into account all subjects, in a semester), 'N' is the no. of subjects registered for the semester (as specifically required and listed under the course structure of the parent department), Ci is the no. of credits allotted to the ith subject, and Gi represents the grade points (GP) corresponding to the letter grade awarded for the ith subject.

9.9 The cumulative grade point average (CGPA) is a measure of the overall cumulative performance of a student in **all semesters** considered for registration. The CGPA is the ratio of the total credit points secured by a student in all registered courses in all semesters, and the total number of credits registered in all the semesters. CGPA is rounded to **two** decimal places. CGPA is thus computed from the I year II semester onwards at the end of each semester as per the formula

CGPA = {∑Mj=1*CjGj*}/ {∑Mj=1 C j for all semester registered}

(i.e., up to and inclusive of S semesters, S ≥ 2),

where '**M'** is the **total no. of subjects** (as specifically required and listed under the course structure of the parent department) the student has '**registered**' i.e., from 1st semester onwards up to and inclusive of the 8th semester, 'j' is the subject indicator index (takes into account all subjects from 1 to 8 semesters), cj is the no. of credits allotted to the jth subject, and Gj represents the grade point (GP) corresponding to the letter grade awarded for that jth subject. After registration and completion of first year first semester, the SGPA of that semester itself can be taken as the CGPA, as there are no cumulative effects.

Illustration of calculation of SGPA

Course/subject	Credits	Grade points	Letter Grade	Credit Points
Course1	3	8	A	3 x 8 = 24
Course2	3	10	O	3 x 10 = 30
Course3	3	5	C	3 x 5 = 15
Course4	3	6	B	3 x 6 = 18
Course5	3	9	A+	3 x 9 = 27
Course6	1.5	7	B+	1.5x 7 = 10.5
	16.5			**124.5**

SGPA = 124.5/16.5 = 7.55

Illustration of calculation of CGPA up to 2nd Semester

Course/subject	Credits	LetterGrade	Gradepoints	Credit Points
I year I semester				
Course1	4	A	8	4 x 8 = 32
Course2	4	O	10	4 x 10 = 40
Course3	4	C	5	4 x 5 = 20
Course4	3	B	6	3 x 6 = 18
Course5	3	A+	9	3 x 9 = 27
Course6	3	B+	7	3 x 7 = 21
I year II semester				
Course7	4	B	6	4 x 7 = 28
Course8	4	O	10	4 x 10 = 40
Course9	4	C	5	4 x 5 = 20
Course10	3	B	6	3 x 6 = 18
Course11	3	A+	9	3 x 9 = 27
Course12	1.5	B+	7	1.5 x 7 = 10.5
Total Credits =	**40.5**		**Total Credit=**	**301.5**

CGPA = 301.5/40.5 = 7.44

The above illustrated calculation process of CGPA will be followed for each subsequent semester until 8th semester. The CGPA obtained at the end of 8th semester will become the final CGPA secured for entire B.Tech . Programme.

9.10 For merit ranking or comparison purposes or any other listing, **only** the '**rounded off'** values of CGPAs will be used.

9.11 For calculations listed in regulations 9.6 to 9.9, performance in failed subjects/courses (securing **F grade**) will also be taken into account, and the credits of such subjects/courses will be included in the multiplications and summations. After passing the failed subjects (s), newly secured grade points will be taken into account for calculation of SGPA and CGPA. However, mandatory courses will not be taken into consideration for calculation of CGPA and SGPA.

10.0 Passing standards

10.1 A student shall be declared successful or 'passed' in a semester, if the student secures a GP ≥ 5 ('C' grade or above) in every subject/course in that semester (i.e. when student gets an SGPA ≥ 5.00 at the end of that particular semester); also a student shall be declared successful or 'passed' in the entire under graduate Program, only when he/she gets a CGPA ≥ 5.00 for the award of the degree as required.

10.2 After the completion of each semester, a grade card or grade sheet (or transcript) shall be issued to all the registered students of that semester, indicating the letter grades and credits earned. It will show the details of the courses registered (Course code, title, no. of credits, and grade earned etc.), credits earned, SGPA, and CGPA.

11.0 Declaration of results

11.1 Computation of SGPA and CGPA are done using the procedure listed in 9.6 to 9.9.

11.2 For final percentage of marks equivalent to the computed final CGPA, the following formula may be used.

% of marks = (CGPA-0.5) x 10

12 Award of degree

12.1 A student who registers for all the specified subjects/courses as listed in the course structure and secures the required number of 160 credits (with CGPA ≥ 5.0), within 8 academic years from the date of commencement of the first academic year, shall be declared to have '**qualified'** for the award of the B.Tech degree in the chosen branch of Engineering as selected at the time of admission.

12.2 A student who qualifies for the award of the degree as listed in item 12.1 shall be placed in the following classes.

12.3 Students with the final CGPA (at the end of the under graduate Program) ≥ 8.00, and fulfilling the following condition will be awarded **'first class with distinction'; should have secured a final (at the end of the undergraduate Program) CGPA ≥ 8.00,** for each year of course study.
Students with final CGPA (at the end of the under graduate Program) ≥ **6.50 but <8.00**, shall be placed in '**first class'**.
Students with final CGPA (at the end of the under graduate Program) ≥ **5.50 but<6.50**, shall be placed in '**second class'**.
Students with final CGPA (at the end of the under graduate Program) ≥ **5.00 but <5.50,** and all other students who qualify for the award of degree (as per 12.1) with final CGPA ≥ **5.00 but <5.50**, shall be placed in **'pass class'**.
A student with final CGPA (at the end of the under graduate Program) **<5.00, will not be eligible** for the award of the degree**.**

12.4 Student who secures SGPA ≥ 8.00 consistently in all semesters will be eligible to compete for the awards of 'rank' and 'gold medal'.

13 Withholding of results

13.1 If the student has not paid the fees to the college at any stage, has dues pending due to any reason whatsoever, or if any case of indiscipline is pending, the result of the student may be withheld, and 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.

14.0 Transitory Regulations

14.1 A student, who has discontinued for any reason, is liable to completely pay his balance annual fees, up to discontinued year.

14.2 A student who is detained due to lack of credits or lack of attendance has to follow the existing regulations of the year in which he/she is re-admitted, with additional/substitute subjects if necessary.

15.0 Students Transfers

15.1 There shall be no branch transfers after the completion of the admission process.

15.2 There shall be no transfers from one branch to another branch within the constituent colleges and units of the affiliating university (JNTUH).

15.3 The students seeking transfer under the ceiling admission category to this college from any of the JNTUH affiliated Autonomous colleges or from various other Universities/institutions (National Importance, Autonomous) have to pass the failed subjects which are equivalent to the subjects of Teegala Krishna Reddy Engineering College and also pass the subjects of Teegala Krishna Reddy Engineering College which the students have not studied at the earlier institution/university. Further, though the students have passed some of the subjects at the earlier institution/university, if the same subjects are being offered in different semesters of Teegala Krishna Reddy Engineering College, the students have to study those subjects in Teegala Krishna Reddy Engineering College

in spite of the fact that those subjects are repeated.

15.4 The students transferred from other Universities/institutions to Teegala Krishna Reddy Engineering College, shall be provided a chance of writing online internal examination **for the failed subjects/and or subjects not studied** as per the equivalences recommended in the clearance letter issued by the university/institution, at the end of the semester as per the prescribed schedule by the college examination cell.

16.0 Scope

16.1 The academic regulations should be read as whole, for the purpose of any interpretation.

16.2 In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Chairman, Governing Body of Teegala Krishna Reddy Engineering College is final.

16.3 The college may change or amend the academic regulations, course structure or syllabi, at any time, and the changes or amendments made shall be applicable to all students with effect from the date of notification by the college authorities.

MALPRACTICES RULES
DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices/ Improper conduct	**Punishment**
	If the Student	
1. (a)	Possesses or carries accessible in the examination hall, any paper, note book, programmable calculators, cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (materialshall include any marks on the body of the candidate which can be used as an aid in thesubject of the examination)	Expulsion fromthe examination hall and cancellationof the performance in that subject only.
(b)	Gives assistance or guidance or receives it fromany other candidate orally or byany other bodylanguage methods or communicates through cell phones with any candidate or persons in oroutside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellationof the performance in that subject only of all the candidates involved. In case of an outsider, he will behanded over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellationof the performance in that subject and all other subjects the candidate has already appeared includingpractical examinations and project work and shall notbe permitted to appear for the remaining examinationsof the subjects of that Semester. The hall ticket of the candidate should be cancelled.
3.	Impersonates any other student in connection with the examination.	The student who has impersonated shall be expelled from the examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practical and project work) already appeared and shall not be allowed to appear for

		examinations of the remaining subjects of that semester. The student is also debarred for two consecutive semesters from class work and all end examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of the seat. If the imposteris an outsider, he will be handed over to the police and a case will be registered against him.
4.	Smuggles in the answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellationof performance in that subject and all the other subjects the candidate has already appeared includingpractical examinations and project work and shall notbe permitted for the remaining examinations of the subjects of that semester. The student is also debarred for two consecutive semesters from class work and all end examinations. The continuation of the course by the student is subject to the academicregulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters tothe examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6.	Refuses to obey the orders of the Chief Superintendent/Assistant Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk-out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury tohis person or to any of his relations whether	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shallnot be permitted to appear for the remaining examinations of the subjects of that semester. The candidates also are

		debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case will be registered against them.
	by words, either spoken or written or by signsor by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the college campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has thetendency to disrupt the orderly conduct of the examination	
7.	Leaves the exam hall taking away answerscript or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance inthat subject and all the other subjectsthe candidate has already appeared including practicalexaminations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. The candidate is also debarred for two consecutive semesters from class work and all end examinations. The continuation of thecourse by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possesses any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation ofthe performance inthat subject and all other subjectsthe candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. The candidate is also debarred and forfeits the seat.

9.	Indulges in any malpractice or improperconduct mentioned in clause 6 to 8 and is not a student for the particular examination or not a person connected with the college.	Student of the college expulsion from the examinationhall and cancellation ofthe Performance inthat subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the college will be handed over to the police and, a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation ofthe performance inthat subject and all other subjectsthe candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester.
11.	Is detected copying on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and allother subjects the candidate has appeared including practical examinations and project work of that semester examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall bereported to the PRINCIPAL / DIRECTOR forfurther action to award suitable punishment.	

I Year B.Tech. AIML - I Sem

S. No	Subject Code	Category	Subject Name	Hours per			Credits
				L	T	P	
01	20MA1BS01	BS	Mathematics – I	3	1	0	4
02	20CH1BS02	BS	Chemistry	3	1	0	4
03	20EE1ES01	ES	Basic Electrical Engineering	3	0	0	3
04	20ME1ES05	ES	Engineering Workshop	1	0	3	2.5
05	20EN1HS01	HS	English	2	0	0	2
06	20CH1BS03	BS	Engineering Chemistry Lab	0	0	3	1.5
07	20EN1HS02	HS	English Language and Communication Skills Lab	0	0	2	1
08	20EE1ES03	ES	Basic Electrical	0	0	2	1
09		MC	Induction Programme				
	Total			**12**	**2**	**10**	**19**

I Year B.Tech. AIML - II Sem

S. No	Subject Code	Category	Subject Name	Hours per			Credits
				L	T	P	
01	20MA2BS04	BS	Mathematics - II	3	1	0	4
02	20AP2BS05	BS	Applied Physics	3	1	0	4
03	20CS2ES04	ES	Programming for Problem Solving	3	1	0	4
04	20ME2ES02	ES	Engineering Graphics	1	0	4	3
05	20AP2BS06	BS	Applied Physics Lab	0	0	3	1.5
06	20CS2ES06	ES	Programming for Problem Solving Lab	0	0	3	1.5
07	20MC2ES07	MC	Environmental Science	3	0	0	0
	Total			**13**	**3**	**10**	**18**

II Year B.Tech. AIML - I Sem

S. No	Subject Code	Category	Subject Name	Hours per			Credits
				L	T	P	
01	20MA3PC07	BS	Discrete Mathematics	3	0	0	3
02	20CS3PC01	PC	Computer Organization	3	1	0	4
03	20AI3PC01	PC	Basic Python Programming	3	0	0	3
04	20CS3PC03	PC	Data Structures	3	1	0	4
05	20CS3ES08	ES	Analog and Digital Electronics	3	0	0	3
06	20CS3PC04	PC	IT WORKSHOP Lab	0	0	3	1
07	20CS3PC05	PC	Data Structures Lab	0	0	3	1.5
08	20AI3PC02	PC	Basic Python Programming Lab	0	0	3	1.5
09	20MC3HS01	MC	Professional and Engineering Ethics	3	0	0	0
10	20MC3BS02	MC	Quantitative Aptitude	3	0	0	0
	Total			**21**	**2**	**9**	**21**

II Year B.Tech. AIML - II Sem

S. No	Subject Code	Category	Subject Name	Hours per			Credits
				L	T	P	
01	20AI4BS07	PC	Foundations of Machine Learning	3	0	0	3
02	20MS4HS03	MS	Business Economics and Financial Analysis	3	0	0	3
03	20AI4PC03	PC	Design and Analysis of Algorithm	3	0	0	3
04	20CS4PC09	PC	Operating Systems	3	0	0	3
05	20CS4PC10	PC	Database Management Systems	3	1	0	4
06	20CS4PC11	PC	Operating Systems Lab	0	0	3	1.5
07	20AI4PC04	PC	Design and Analysis of Algorithm Lab	0	0	3	1
08	20CS4PC13	PC	Database Management Systems Lab	0	0	3	1.5
09	20MC4HS03	MC	Gender Sensitization	3	0	0	0
10	20MC4BS03	MC	Quantitative Logical and Reasoning	3	0	0	0
	Total			**21**	**2**	**9**	**20**

III Year B.Tech. AIML - I Sem

S. No	Subject Code	Category	Subject Name	Hours per			Credits
				L	T	P	
01	20AI5PC05	PC	Computer Networks	3	1	0	4
02	20AI5PC06	PC	OOP's Through Java	3	0	0	3
03	20AI5PC07	PC	Formal Language Automata Theory/CD	3	0	0	3
04	20AI5PC08	PC	Machine Learning	3	0	0	3
05		PE-1	Professional Elective 1	3	0	0	3
06	20AI5PC09	PC-LAB	Computer NetworkLAB	0	0	3	1.5
07	20AI5PC10	PC-LAB	OOPs through Java Lab	0	0	3	1.5
08	20AI5PC11	PC-LAB	Machine Learning LAB	0	0	3	1.5
09	20AI5PW01	PW	Summer Internship	0	0	0	1
10	20MC5HS05	MC	Intellectual Property Rights	3	0	0	0
11	20MC5HS06	MC	Personality Development & Soft Skills	3	0	0	0
	Total			**21**	**1**	**9**	**21.5**

Professional Elective – I

S. No	Subject Code	Subject Name
1	20AI5PE11	Expert Systems
2	20AI5PE12	Fuzzy Logic
3	20AI5PE13	Computer Vision
4	20A15PE14	Design Pattens

III Year B.Tech. AIML- II Sem

S. No	Subject Code	Category	Subject Name	Hours per			Credits
				L	T	P	
1	20AI6PC12	PC	Artificial Intelligence	3	0	0	3
2	20AI6PC13	PC	Robotics	3	0	0	3
3	20AI6PC14	PC	Data Science	3	0	0	3
4	20AI6PC15	PC	Neural Networks	3	0	0	3
5		PE-II	Professional Elective II	3	0	0	3
6		OE-1	Open Elective 1	3	0	0	3
7	20EN6HS04	HSMC	AECS Lab	0	0	3	1
8	20AI6PC16	PC	Tensor Flow Lab	0	0	3	1.5
9		PE-II	PE-II Lab	0	0	3	1
10	20MC6HS07	MC	Constitution of India	3	0	0	0
11	20MC6CS01	MC	Basic Technical Training	3	0	0	0
	Total			**24**	**0**	**9**	**21.5**

Professional Elective – II

S. No	Subject Code	Subject Name
1	20AI5PE21	R Programming
2	20AI5PE22	Deep Learning with Keras
3	20AI5PE23	Software Testing & Project Management
4	20AI5PE24	Advanced Algorithms

Professional Elective – II LAB

S. No	Subject Code	Subject Name
1	20AI5PE26	R Programming Lab
2	20AI5PE27	Deep Learning with Keras Lab
3	20AI5PE28	Software Testing & Project Management Lab
4	20AI5PE29	Advanced Algorithms Lab

Open Elective–I

S. No	Subject Code	Subject Name
01	20CS6OE11	JAVA
02	20CS6OE12	COMPUTER ORGANISATION & ARCHITECTURE

*** Open Elective subjects' syllabus is provided at the end of the document.**
*** Open Elective – Students should take Open Electives from the List of Open Electives Offered by Other Departments/Branches Only.**

Ex: - A Student of Mechanical Engineering can take Open Electives from all other departments/branches except Open Electives offered by Mechanical Engineering Dept.

IV Year B.Tech. AIML - I Sem

S. No	Subject Code	Category	Subject Name	Hours per			Credits
				L	T	P	
1	20AI7PC17	PC	Deep Learning	3	0	0	3
2		OE	Open elective -II	3	0	0	3
3		PE-III	Professional Elective III	3	0	0	3
4		PE-IV	Professional Elective IV	3	0	0	3
5		PE-V	Professional Elective V	3	0	0	3
6		PE-III	Professional Elective III Lab	3	0	0	1
7	20AI7PW02	PW	Comprehensive Test	0	0	0	1
8	20AI7PW03	PW	Seminar	0	0	2	1
9	20AI7PW04	PW	Industrial oriented Mini Project	0	0	0	2
10	20AI7PW05	PW	Major Project Stage-1	0	0	6	3
11	20MC7CS02	MC	Advance Technical Training	3	0	0	0
	Total			**21**	**0**	**8**	**23**

Open Elective–II

S. No	Subject Code	Subject Name
01	20CS7OE21	OPERATIGSYSTEM
02	20CS7OE22	ARTIFICIALINTELLIGENCE

Professional Elective – III

S. No	Subject Code	Subject Name
1	20AI7PE31	Advance Python Programming
2	20AI7PE32	Web Technologies
3	20AI7PE33	Natural Language Processing
4	20AI7PE34	Internet Of Things

Professional Elective – III LAB

S. No	Subject Code	Subject Name
1	20AI7PE36	Advance Python Programming Lab
2	20AI7PE37	Web Technologies Lab
3	20AI7PE38	Natural Language Processing Lab
4	20AI7PE39	Internet Of Things Lab

Professional Elective – IV

S. No	Subject Code	Subject Name
1	20AI7PE41	Document Analysis and Speech Recognition
2	20AI7PE42	Application of ML
3	20AI7PE43	Robotics and Intelligent Systems
4	20AI7PE44	Virtual Reality

Professional Elective – V

S. No	Subject Code	Subject Name
1	20AI7PE51	Text Recognition
2	20AI7PE52	Block Chain Technology
3	20AI7PE53	Grid Computing
4	20AI7PE54	Augmented Reality

*** Open Elective subjects' syllabus is provided at the end of the document.**
*** Open Elective – Students should take Open Electives from the List of Open Electives Offered by Other Departments/Branches Only.**

Ex: - A Student of Mechanical Engineering can take Open Electives from all other departments/branches except Open Electives offered by Mechanical Engineering Dept.

IV Year B.Tech. AIML- II Sem

S. No	Subject Code	Category	Subject Name	Hours per			Credits
				L	T	P	
1	20HS8MS02	HSMC	Organization Behavior	3	0	0	3
2		OE-III	Open Elective-III	3	0	0	3
3		PE-VI	Professional Elective VI	3	0	0	3
4	20AI8PW06	PW	Major Project Stage-2	0	0	15	7
	Total			**9**	**0**	**15**	**16**

Professional Elective – VI

S. No	Subject Code	Subject Name
1	20AI7PE61	Image Processing
2	20AI7PE62	Big Data Computing
3	20AI7PE63	Pattern Warehouse
4	20AI7PE64	Agent Systems

Open Elective–III

S. No	Subject Code	Subject Name
01	20CS7OE31	CYBERSECURITY
02	20CS7OE32	SCRIPTINGLANGUAGES

*** Open Elective subjects' syllabus is provided at the end of the document.**
*** Open Elective – Students should take Open Electives from the List of Open Electives Offered byOther Departments/Branches Only.**

Ex: - A Student of Mechanical Engineering can take Open Electives from all other departments/branches except Open Electives offered by Mechanical Engineering Dept.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

I Year B.Tech. AIML -I Sem	**L**	**T**	**P**	**C**
	3	**1**	**0**	**4**

(20MA1BS01) MATHEMATICS – I

Course Objectives: To learn.

1. Types of matrices and their properties. Concept of a rank of the matrix and applying this Conceptto know the consistency and solving the System of linear equations.
2. Concept of Eigen values and eigenvectors and to reduce the quadratic form to canonical form.
3. Concept of Sequence.
4. Concept of nature of the series.
5. Geometrical approach to the mean value theorems and their application to the mathematical Problems.
6. Evaluation of surface areas and volumes of revolutions of curves.
7. Evaluation of improper integrals using Beta and Gamma functions.
8. Partial differentiation, concept of total derivative.
9. Finding maxima and minima of function of two and three variables.

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

1. Represent the matrix form of a set of linear equations and to analyze the solution of the System ofequations.
2. Reduce the quadratic form to canonical form.
3. Analyze the nature of sequence and series.
4. Apply the mean value theorems.
5. Find the extreme values of functions of two variables with / without constraints.

UNIT - I

Matrices: Types of Matrices, Symmetric, Hermitian, Skew-symmetric, Skew-Hermitian, orthogonal matrices, Unitary Matrices, rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method. **System of linear equations**: solving system of Homogeneous and Non- Homogeneous equations. Gauss elimination method, Gauss Seidel Iteration Method.

UNIT - II

Eigen values and Eigen vectors: Linear Transformation and Orthogonal Transformation. Eigen values andEigenvectors and their properties. Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem. Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

UNIT - III

Sequences &Series: Sequence: Definition of a Sequence, limit, and Convergent, **Divergent and Oscillatory sequences. Series:** Convergent, Divergent and Oscillatory Series, Series of positive terms. Comparison test, p-test, D-Alembert's ratio test, Raabe's test, Cauchy's Integral test, Cauchy's root test, logarithmic test. **Alternating series**: Leibnitz test; **Alternating Convergent series**: Absolute and Conditional Convergence.

UNIT – IV

Single Variable Calculus: Mean value theorems: Rolle's Theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem. Taylor's Series. **Applications of definite integrals:** To evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates). Improper Integral: Definitions of Beta and Gamma functions and their applications.

UNIT - V

Multivariable calculus: Definitions of Limit and continuity. Partial Differentiation, Euler's Theorem, Total derivative. **Jacobian:** Functional dependence & independence, Maxima, and minima of functions of two variables and three variables using method of Lagrange multipliers.

TEXTBOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. G.B.Thomas and R.L.Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.

REFERENCE BOOKS:

1. N.P. Bali and Manish Goyal, A textbook of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11thReprint, 2010.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

I Year B.Tech. AIML -I Sem	**L**	**T**	**P**	**C**
	3	**1**	**0**	**4**

(20CH1BS02) CHEMISTRY

Course Objectives: To learn.

1. To bring adaptability to the concepts of chemistry and to acquire the required skills to become a perfect engineer.
2. To impart the basic knowledge of atomic, molecular and electronic modifications whichmakes the student to understand the technology based on them.
3. To acquire the knowledge of electrochemistry, corrosion and water treatment which are essential for the Engineers and in industry?
4. To acquire the skills pertaining to spectroscopy and to apply them for medical field etc.
5. To impart then knowledge of stereochemistry and synthetic aspects useful for understanding reaction path ways

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

1. Understand the atomic and molecular orbitals and conductivity of the materials using band theory.
2. Apply the principle of potable water for industrial and domestic purposes.
3. Make use of essential aspects of Electro chemistry and Corrosion in industry.
4. Analyze the knowledge of stereochemistry and synthetic aspects useful for understanding reaction pathways.
5. Interpret the spectroscopic principles in medical field.

UNIT - I

Matrices: Types of Matrices, Symmetric, Hermitian, Skew-symmetric, Skew-Hermitian, orthogonal matrices, Unitary Matrices, rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method. **System of linear equations:** solving system of Homogeneous and Non-Homogeneous equations. Gauss elimination method, Gauss Seidel Iteration Method.

UNIT - II

Eigen values and Eigen vectors: Linear Transformation and Orthogonal Transformation. Eigen values and Eigenvectors and their properties. Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem. Quadratic forms andNature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation

UNIT - III

Sequences &Series: Sequence: Definition of a Sequence, limit, and Convergent, Divergent and Oscillatory sequences. **Series:** Convergent, Divergent and Oscillatory Series, Series of positive terms.

Comparison test, p-test, D-Alembert's ratio test, Raabe's test, Cauchy's Integral test, Cauchy's root test, logarithmic test. **Alternating series:** Leibnitz test; Alternating Convergent series: Absolute and Conditional Convergence.

UNIT – IV

Single Variable Calculus: Mean value theorems: Rolle's Theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem. Taylor's Series. **Applications of definite integrals:** To evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates). **Improper Integral:** Definitions of Beta and Gamma functions and their applications

UNIT - V

Multivariable calculus: Definitions of Limit and continuity. Partial Differentiation, Euler's Theorem,

Total derivative. **Jacobian:** Functional dependence & independence, Maxima, and minima of functions of two variables and three variables using method of Lagrange multipliers.

TEXTBOOKS:

1. Text book of Engineering Chemistry by Jain & Jain, Dhanpat Rai Publishing company (P)Ltd. New Delhi.

REFERENCE BOOKS:

1. Physical Chemistry, by P.W.Atkins
2. Engineering Chemistry (NPTEL Web-book), by B.L. Tembe, Kamaluddin and .S.Krishnan
3. University Chemistry, by B.H.Mahan
4. Fundamentals of Molecular Spectroscopy, by C.N.Banwell
5. Organic Chemistry: Structure and Function by K.P.C. VolhardtandN.E.Schore, 5thEdition.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

I Year B.Tech. AIML -I Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20EE1ES01) BASIC ELECTRICAL ENGINEERING

Course Objectives: To learn.

1. To introduce the basics of electrical circuits and its components
2. To understand DC circuits and AC single phase & three phase circuits.
3. To introduce the concept of power, power factor.
4. To study and understand the different types of magnetic circuits i.e., DC/AC machines and Transformers.
5. To import the knowledge of various electrical installations and power factor improvement methods.

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

1. Solve electrical circuits using basic network laws and theorems.
2. Understand basic AC Circuits and effect of resonance.
3. Extract the working and operation of Transformers and its applications.
4. Articulate working principles of Electrical Machines of both AC and DC.
5. Describe about components of Components of LT Switchgear and 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, The venin and Norton Theorems. Time-domain analysisof 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 R-L-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, Earthling. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

TEXTBOOKS:

1. Basic Electrical Engineering - D.P. Kothari and I.J. Nagrath, 3rd edition 2010, Tata Mc GrawHill.
2. D.C. Kulshreshtha, “Basic Electrical Engineering”, Mc Graw Hill, 2009.

REFERENCE BOOKS:

1. L.S. Bobrow, Fundamentals of Electrical Engineering”, Oxford University Press, 2011.
2. Electrical and Electronics Technology, E. Hughes, 10th Edition, Pearson, 2010.

3. Electrical Engineering Fundamentals, Vincent Deltoro, Second Edition, Prentice Hall, India, 1989.
4. Circuit Theory Analysis and Synthesis, Abhijit Chakrabarti, Dhanpat Rai& Co, 2016.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

I Year B.Tech. AIML -I Sem	**L**	**T**	**P**	**C**
	1	**0**	**3**	**2.5**

(20ME1ES05) ENGINEERING WORKSHOP

Course Objectives:

1 To study of different hand operated power tools, uses and their demonstration.
2 To gain a good basic working knowledge required for the production of various engineering products.
3 To provide hands on experience about use of different engineering materials, tools, equipment's and processes those are common in the engineering field.
4 To develop a right attitude, team working, precision and safety at workplace.
5 To explain the construction, function, use and application of different working tools, equipmentand machines.
6 To study commonly used carpentry joints.
7 To have practical exposure to various welding and joining processes.
8 To identify and use marking out tools, hand tools, measuring equipment and to work to prescribed to clearances.

Course outcomes:

1. Demonstrate various machine tools and their operations.
2. Apply different workshop trades like fitting, carpentry, foundry and welding.
3. Practice various workshop trades including Tin smithy and Black smithy.
4. Identify suitable tools for different trades of engineering processes including drilling, material removing, measuring and chiseling.
5. Apply basic electrical engineering knowledge for house wiring practice

1.TRADES FOR EXERCISES:

At least two exercises from each trade:

i. Carpentry – (T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint)
ii. Fitting – (V-Fit, Dovetail Fit & Semi-circular fit)
iii. Tin-Smithy – (Square Tin, Rectangular Tray & Conical Funnel)
iv. Foundry – (Preparation of Green Sand Mould using Single Piece and Split Pattern)
v Welding Practice – (Arc Welding & Gas Welding)
vi. House-wiring – (Parallel & Series, Two-way Switch and Tube Light)
vii. Black Smithy – (Round to Square, Fan Hook and S-Hook)

2. TRADES FOR DEMONSTRATION & EXPOSURE:
Plumbing, Machine Shop, Metal Cutting (Water Plasma), Power tools in construction and WoodWorking

TEXT BOOK

1. Workshop Practice /B. L. Juneja / Cengage
2. Workshop Manual / K. Venugopal / Anuradha.

REFERENCE BOOKS:

1. Workshop Manual - P. Kannaiah/ K. L. Narayana/ SciTech
2. Workshop Manual / Venkat Reddy/ BSP

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

I Year B.Tech. AIML -I Sem	**L**	**T**	**P**	**C**
	2	**0**	**0**	**2**

(20EN1HS01) ENGLISH

Course Objectives: To learn.

1. Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
2. Equip students to study academic subjects more effectively and critically using the theoretical and practical components of English syllabus.
3. Develop study skills and communication skills in formal and informal situations.

Course outcomes: Students should be able to

1. Use English Language effectively in spoken and written communication.
2. Understand the given texts and respond appropriately.
3. Articulate confidently in various contexts and different cultures.
4. Demonstrate basic proficiency in English including reading and listening comprehension, writing and speaking skills.
5. Choose appropriate vocabulary in oral and written communication.

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

'Ancient Architecture in India' from the prescribed textbook 'English for Engineers' published by Cambridge University Press. Vocabulary: Synonyms and Antonyms. Grammar: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject- verb Agreement. Reading: Improving Comprehension Skills – Techniques for Good ComprehensionWriting: Format of a Formal Letter-Writing Formal Letters E.g.., Letter of Complaint, Letter of Requisition, Job Application with Resume.

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 BOOK

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

REFERENCE BOOKS:

1. Swan, M. (2016). Practical English Usage. Oxford University Press.
2. Kumar, S and Lata, P. (2018). Communication Skills. Oxford University Press.
3. Wood, F.T. (2007). Remedial English Grammar. Macmillan.
4. Zinsser, William. (2001). On Writing Well. Harper Resource Book.
5. Hamp-Lyons, L. (2006). Study Writing. Cambridge University Press.
6. Exercises in Spoken English. Parts I –III. CIEFL, Hyderabad. Oxford University Press.
7. Raju, Yadava B, B T Sujatha & C, Murali Krishna. English for Better Performance, Orient Black swan, Pvt., Ltd, 2014.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

I Year B.Tech. AIML -I Sem	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

(20CH1BS03) ENGINEERING CHEMISTRY LAB

Course Objectives: The chemistry laboratory course consists of experiments related to the principles ofchemistry required to the engineering student. The course will make the student to learn

1 Estimation of hardness and chloride content in water to check its suitability for drinking purpose.
2 To determine the rate constant of reactions from concentrations as a function of time.
3 The measurement of physical properties like adsorption and viscosity.
4. To synthesize the drug molecules and check the purity of organic molecules by thin layer chromatographic (TLC) technique.

Course outcomes: The experiments will make the student gain skills on

1. An ability to gain knowledge about different types of qualitative and quantitative estimation.
2. An ability to analyze the quality of water by determining its chemical parameters.
3. To acquire the skill for the preparation of common drugs like Paracetamol and Aspirin.
4. Estimation of rate constant of a reaction from concentration –time relationships.
5. Determination of physical properties like adsorption and viscosity of lubricants.

List of Experiments:

1. Determination of total hardness of water by complexometric method using EDTA.
2. Estimation of Fe+2 by Dichrometry.
3. Estimation of an HCl by Conductometric titrations.
4. Estimation of Acetic acid by Conductometric titrations.
5. Estimation of HCl by Potentiometric titrations.
6. Estimation of Fe2+ by Potentiometry using KMnO4.
7. Determination of rate constant of acid catalysed hydrolysis of methylacetate
8. Synthesis of Aspirin and Paracetamol.
9. Thin layer chromatography calculation of Rfvalues. Eg- ortho and para nitrophenols
10. Determination of acid value of coconut oil.
11. Verification of freundlich adsorption isotherm-adsorption of acetic acid oncharcoal
12. Determination of viscosity of Coconut oil and ground nut oil by using Ostwald' sviscometer.
13. Determination of surface tension of a give liquid using stalagmometer.
14. Determination of partition coefficient of acetic acid between n-butanol and water.

REFERENCE BOOKS:

1. Senior practical physical chemistry, B.D. Khosla, A. Gulati and V. Garg (R. Chand &Co., Delhi).
2. An introduction to practical chemistry, K.K. Sharma and D. S. Sharma (Vikas publishing, N. Delhi).
3. Vogel's text book of practical organic chemistry 5thedition.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

I Year B.Tech. AIML -I Sem	**L**	**T**	**P**	**C**
	0	**0**	**2**	**1**

(20EN1HS02) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

Course Objectives: To learn.

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

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

1. Better understanding of nuances of English language through audio- visual experience and group activities.
2. Neutralization of accent for intelligibility by overcoming mother tongue influence.
3. Develop the skill of using appropriate language in various speaking contexts.
4. Understand how to use language to make formal presentations.
5. Speaking skills with clarity and confidence which in turn enhances their inter personal skills

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 next. 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 andSeeking 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.

TEXT BOOK

1. ELCS Lab Manual
   (The course content is prescribed for the English Language and Communication Skills Labbased on Unit-6 of AICTE Model Curriculum 2018 for B.Tech. First English)

REFERENCE BOOKS:

1. Suresh Kumar, E. &Sreehari, P. 2009. A Handbook for English Language Laboratories. New Delhi: Foundation
2. Speaking English Effectively 2nd Edition by Krishna Mohan and N. P. Singh, 2011. Macmillan Publishers India Ltd. Delhi.
3. Sasi Kumar, V & Dhamija, P.V. How to Prepare for Group Discussion and Interviews. Tata McGrawHill
4. Hancock, M. 2009. English Pronunciation in Use. Intermediate. Cambridge: CUP
5. Spoken English: A Manual of Speech and Phonetics by R. K. Bansal &J. B. Harrison. 2013. Orient Blackswan. Hyderabad.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

I Year B.Tech. AIML -I Sem	**L**	**T**	**P**	**C**
	0	**0**	**2**	**1**

(20EE1ES03) BASIC ELECTRICAL ENGINEERING LAB

Course Objectives: To learn.

1 To analyze and understand behavior given network by applying various electrical laws and network theorems.
2 To know the response of electrical circuits for different excitations.
3 To determine, measure and know the relation between basic electrical quantities.
4. To analyze the performance characteristics of DC and AC electrical machines.

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

1. Understand the basic electrical laws.
2. Sketch the response of different types of electrical circuits to different excitations.
3. Solve the response of electrical circuits under resonance condition.
4. Understand the measurement, calculation and relation between the basic electrical parameters.
5. Categorize the basic characteristics of transformers and electrical machines.

List of experiments/demonstrations:

1 Verification of Ohms Law.
2 Verification of KVL and KCL.
3 Transient Response of Series RL and RC circuits using DC excitation.
4. Transient Response of RLC Series circuit using DC excitation.
5. Resonance in series RLC circuit.
6. Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits.
7. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-Phase Transformer.
8. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation).
9. Three Phase Transformer: Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta-star, Star-Star).
10. Measurement of Active and Reactive Power in a balanced Three-phase circuit.
11. Performance Characteristics of a Separately/Self Excited DC Shunt/Compound Motor.
12. Torque-Speed Characteristics of a Separately/Self Excited DC Shunt/Compound Motor.
13. Performance Characteristics of a Three-phase Induction Motor.
14. Torque-Speed Characteristics of a Three-phase Induction Motor.
15 No-Load Characteristics of a Three-phase Alternator.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

I Year B.Tech. AIML -II Sem	**L**	**T**	**P**	**C**
	3	**1**	**0**	**4**

(20MA2BS04) MATHEMATICS – II

Course Objectives: To learn.

1 Methods of solving the differential equations of first and higher order.
2 Evaluation of multiple integrals and their applications.
3 The physical quantities involved in engineering field related to vector valued functions.
4. The basic properties of vector valued functions and their applications to line, Surface and volume integrals.

Course outcomes: After learning the contents of this paper the student will be able to

1. Determine different types of ordinary differential equations of first order.
2. Apply the concepts of higher differential equation to solve real world problems.
3. Apply the concept of multiple integrals to find areas and volumes
4. Evaluate the Centre of mass and gravity for cubes, sphere and rectangular parallelepiped.
5. Calculate the line, surface and volume integrals and converting them from one to another

UNIT - I

First Order Ordinary Differential Equations: Exact, linear and Bernoulli's equations. **Applications:** Newton's law of cooling, Law of natural growth and decay. **Equations not of first degree:** equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type

UNIT - II

Ordinary Differential Equations of Higher Order: Second order linear differential equations with constant coefficients. Non-Homogeneous terms of the type eax , sinax, cosax, polynomials in x, eaxV(x) and $xV(x)$.Method of variation of parameters. Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation.

UNIT - III

Multiple Integrals: Evaluation of Double Integrals (Cartesian and polar coordinates), change of order of integration (only Cartesian form). **Evaluation of Triple Integrals:** Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals.
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 parallelepiped).

UNIT – IV

Vector Differentiation: Vector point functions and scalar point functions. Gradient, Divergence and Curl. Directional derivatives, Tangent plane and normal line. Vector Identities. Scalar potential functions. Solenoidal and Irrotational vectors.

UNIT - V

Vector Integration: Line, Surface and Volume Integrals. Theorems of Green, Gauss and Stokes (without proofs) and their applications.

TEXT BOOK

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.

REFERENCE BOOKS:

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

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

I Year B.Tech. AIML -II Sem	**L**	**T**	**P**	**C**
	3	**1**	**0**	**4**

(20AP2BS05) APPLIED PHYSICS

Course Objectives: To learn.

1 Students will demonstrate skills in scientific inquiry, problem solving and laboratory techniques.
2 Students will be able to demonstrate competency and understanding of the concepts foundin Quantum Mechanics, Fiber optics and lasers, Semiconductor physics and Electromagnetic theory and a broad base of knowledge in physics.
3 The graduates will be able to solve non-traditional problems that potentially draw on knowledge in multiple areas of physics.
4. To study applications in engineering like memory devices, transformer core and electromagnetic machinery.

Course outcomes: After learning the contents of the syllabus the student will be

1. Demonstrate the fundamentals concepts of modern physics and quantum mechanics.
2. Design various electronic circuits using fundamentals of Semiconductor physics.
3. Apply the concepts of optoelectronic in various optoelectronic devices.
4. Apply the learned knowledge of laser and fibre optics in communication system.
5. Analyze various magnetic and Electromagnetic properties applicable in magneticmaterials

UNIT - I

Quantum Mechanics: Introduction to quantum physics, Black body radiation, Planck's law, Photoelectric effect, Compton effect, de-Broglie's hypothesis, Wave-particle duality, 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

UNIT - II

Semiconductor Physics: Intrinsic and Extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature, Carrier generation and recombination. **Carrier transport**: diffusion and drift, Hall effect, p-n junction diode, Zener diode and their V-I Characteristics. **Bipolar Junction Transistor (BJT)**: Construction, Principle of operation.

UNIT - III

Optoelectronics: Radiative and non-radiative recombination mechanisms in semiconductors. **LED and semiconductor lasers**: Device structure, Materials, Characteristics and figures of merit, Semiconductor. **Photodetectors**: Solar cell, PIN and Avalanche and their structure, Materials, working principle and Characteristics.

UNIT – IV

Lasers and Fibre Optics Lasers: Introduction to interaction of radiation with matter, Coherence, Principle and working of Laser, Population inversion, pumping. Types of Lasers: Ruby laser, Carbon dioxide (CO2) laser, He-Ne laser, Applications of laser. Fibre Optics: Introduction, Optical fibre as a dielectric wave guide, Total internal reflection, Acceptance angle, Acceptance cone and Numerical aperture, Step and Graded index fibres, Losses associated with optical fibres, Applications of optical fibres

UNIT - V

Electromagnetism and Magnetic Properties of Materials: Laws of electrostatics, Electric current and the continuity equation, Ampere's and Faraday's laws, Maxwell's equations, Polarisation, Permittivity and Dielectric constant, Internal fields in a solid, Clausius- Mossotti equation, **Ferroelectrics and** piezo electrics. Magnetisation, permeability and susceptibility, Classification of magnetic materials, Ferromagnetism and ferromagnetic domains, Hysteresis, Applications of magnetic materials.

TEXT BOOK

1. Engineering Physics, B.K. Pandey, S. Chaturvedi - Cengage Learing.
2. Halliday and Resnick, Physics - Wiley.
3. A textbook of Engineering Physics, Dr. M. N. Avadhanulu, Dr. P.G. Kshirsagar - S. Chand

REFERENCE BOOKS:

1. Richard Robinett, Quantum Mechanics
2. J. Singh, Semiconductor Optoelectronics: Physics and Technology, Mc Graw-Hill inc.(1995).
3. Online Course: “Optoelectronic Materials and Devices” by Monica Katiyar and Deepak Guptha on NPTEL

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

I Year B.Tech. AIML -II Sem	**L**	**T**	**P**	**C**
	3	**1**	**0**	**4**

(20CS2ES04) PROGRAMMING FOR PROBLEM SOLVING

Course Objectives: To learn.

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

Course outcomes: The student able to

1. Build the algorithm for the given unsolved problems.
2. Apply the concepts of arrays, strings, structures and pointers to find the solution for thegiven problem.
3. Apply the various preprocessor commands in a given different real time situations.
4. Dissect a problem into sub functions to develop modular reusable code.
5. Demonstrate various searching, sorting techniques along with the complex city analysis.

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 etc., 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, Introduction to stdin, stdout and stderr, Command line arguments.

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 etc.), 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.

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 etc., 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 quadratic equations, finding minimum and maximum numbers of a given set, finding if a number is prime number, etc. 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 BOOK

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

REFERENCE BOOKS:

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

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

I Year B.Tech. AIML -II Sem	**L**	**T**	**P**	**C**
	1	**0**	**4**	**3**

(20ME2ES02) ENGINEERING GRAPHICS

Course Objectives: To learn.

1 To provide basic concepts in engineering drawing.
2 To impart knowledge about standard principles of orthographic projection of objects.
3 To draw sectional views and pictorial views of solids.

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

1. Apply the principles of engineering graphics to create engineering drawings of various geometric construction, conic section, curves and scales as per BIS standards.
2. Construct orthographic projections for points, lines and planes in different quadrants and auxiliary views.
3. Draw the sectional views and true shape of sections of solids, by applying the principles of projections.
4. Draw the development of surfaces and intersections of solids in real time situations.
5. Develop isometric and orthographic views of the objects.

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 & 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 Weight age only**): Introduction to CAD Software Package Commands. - Free Hand Sketches of 2D- Creation of 2D Sketches by CAD Package.

TEXT BOOK

1. Engineering Drawing N.D. Bhatt / Charotar.
2. Engineering Drawing / N. S. Parthasarathy and Vela Murali/ Oxford

REFERENCE BOOKS:

1. Engineering Drawing / Basant Agrawal and McAgrawal/ McGraw Hill
2. Engineering Drawing/ M. B. Shah, B.C. Rane / Pearson.
3. Computer Aided Engineering Drawing – K Balaveera Reddy et al – CBS Publishers.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

I Year B.Tech. AIML -II Sem	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

(20AP2BS06) APPLIED PHYSICS LAB

Course outcomes: The student will be

1. Compute the (V-I/P-I) characteristics of LED, LASER, and Solar cell.
2. Calculate the energy gap of semiconductor diode.
3. Interpret the theory of Hall Effect with experiment by determining the Hall coefficient.
4. Examine the bending losses for different Optical fiber Cables.
5. Construct various circuits –Resonance, Time constant and Magnetic field using LCR, RC, Stewart and Gees circuits.

List of experiments:

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

Note: Any 8 experiments are to be performed**.**

REFERENCE BOOKS:

1. Laboratory Manual of Engineering Physics by Dr.Y.Aparna & Dr.K.Venkateswara Rao(V.G.S Publishers)
2. Engineering physics practicals by Dr. B. SrinivasaRao, V.K.V. Krishna. K.S. Rudramamba.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

I Year B.Tech. AIML -II Sem	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

(20CS2ES06) PROGRAMMING FOR PROBLEM SOLVING LAB

Course Objectives: The students will learn the following

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

Course outcomes: The student will be able to:

1. Formulate The Algorithms for Simple Problems.
2. Translate the given algorithms to C program.
3. Correct the logical errors found during program execution.
4. Make use of pointers in different types to modularize the code with functions.
5. Apply the appropriate sorting techniques for the given list of elements.

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 autoconversion and casting. Take the values form standard input.

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.
d. 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:
   5 x 1 = 5
   5 x 2 = 10
   5 x 3 = 15Synthesis of Aspirin and Paracetamol.
e Write a program that shows the binary equivalent of a given positive number between 0 to 255.

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
d. Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome.
e. 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 in terms of the sequence.

f. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
g. Write a C program to find the roots of a Quadratic equation.
h. Write a C program to calculate the following, where x is a fractional value. 1-x/2 +x^2/4-x^3/6
i. 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 compute 1+5+25+125.

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 function to compute mean, variance, Standard Deviation, sorting of n elements in single dimension array.
c.
   i. Write a C program that uses functions to perform the following:
   ii. Addition of Two Matrices
   iii. Multiplication of Two Matrices
   iv. Transpose of a matrix with memory dynamically allocated for the new matrix as row and column counts may not be same.
d. 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
e. Write a program for reading elements using pointer into array and display the values using array.
f. Write a program for display values reverse order from array using pointer.
g. Write a program through pointer variable to sum of n elements from array.

Files:

a. Write a C program to display the contents of a file to standard output device. 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)
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.
d. 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. Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome.
e. Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file).

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.
d. 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.)
e. Write a C program that displays the position of a character ch in the string S or – 1 if S doesn‘t contain ch.
f. Write a C program to count the lines, words and characters in a given text.

Miscellaneous:

1. 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.
2. 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    * *
                                            *
```

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

Suggested Reference Books for solving the problems:

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

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

I Year B.Tech. AIML -II Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**0**

(20MC2ES07) ENVIRONMENTAL SCIENCE

Course Objectives:

1. Understanding the importance of ecological balance for sustainable development.
2. Understanding the impacts of developmental activities and mitigation measures
3. Understanding the environmental policies and regulations

Course outcomes: Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn help in sustainable development.

The students should be able to:

1. Develop an understanding of ecological perspective and the value of the environment.
2. Understand the significance of various natural resources and its management.
3. Demonstrate a comprehensive understanding of the world's biodiversity and the importance of its conservation.
4. Identify different types of pollution and their control measures, discover effective methods of waste management and come out with best possible solutions.
5. Raise awareness about environmental laws and 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, Biomagnifications, ecosystem value, services and carrying capacity, Field visits.

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. Overview of air pollution control technologies, Concepts of bioremediation. **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. NAPCC- GoI Initiatives.

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. Overview on Impacts of air, water, biological and Socio- economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). Towards Sustainable Future: Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

TEXTBOOKS

1. Text book of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2. Environmental Studies by R.Rajagopalan, Oxford University Press.

REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T.Wright. 2008 PHLLearning 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, 4thEdition, new age international publishers.
5. Text book of Environmental Science and Technology- Dr. M.Anji Reddy 2007, BS Publications
6. Introduction to Environmental Science by Y. Anjaneyulu, BS. Publications

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

II Year B.Tech. AIML -I Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20MA3PC07) DISCRETE MATHEMATICS

Course Objectives:

1. Introduces the elementary discrete mathematics for computer science and engineering.
2. Topics include formal logic notation, methods of proof, induction, sets, relations, graph theory, permutations and Combinations, counting principles; recurrence relations and generating functions

Course outcomes: learning the contents of this paper the students must able to.

1. Construct precise mathematical proofs.
2. Predict logic and set theory to formulate precise statements.
3. Apply the concept of group theory in given Algebraic System.
4. Calculate linear recurrence relations using advanced counting techniques.
5. Explain graph theory in solving computing problems.

UNIT - I

The Foundations: Logic and Proofs: Propositional Logic, Applications of Propositional Logic, Propositional Equivalence, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference, Introduction to Proofs, Proof Methods and Strategy.

UNIT - II

Basic Structures: Sets, Functions, Sequences, Sums, Matrices and Relations Sets, Functions, Sequences & Summations, Cardinality of Sets and Matrices Relations, Relations and Their Properties, n-ary Relations and Their Applications, Representing Relations, Closures of Relations, Equivalence Relations, Partial Orderings.

UNIT - III

Algebraic Structures: Algebraic Systems-Semi groups And Monoids –Groups-Sub Groups-Homomorphism's-Normal Subgroups-Cosets-Lagrange's Theorem-Definition's And Examples of Rings and Fields.

UNIT – IV

Discrete Probability and Advanced Counting Techniques: An Introduction to Discrete Probability, Probability Theory, Baye's Theorem, Expected Value and Variance Advanced Counting Techniques: Recurrence Relations, Solving Linear Recurrence Relations, Divide-and-Conquer Algorithms and Recurrence Relations, Generating Functions, Inclusion Exclusion, Applications of Inclusion-Exclusion

UNIT - V

Graphs: Graphs and Graph Models, Graph Terminology and Special Types of Graphs, Representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamilton Paths, Shortest-Path Problems, Planar Graphs, Graph Coloring. Trees: Introduction to Trees, Applications of Trees, Tree Traversal, Spanning Trees, Minimum Spanning Tree.

TEXTBOOKS

1. Discrete Mathematics and its Applications with Combinatorics and Graph Theory – Kenneth H Rosen, 7th Edition, TMH

REFERENCE BOOKS:

1. Discrete Mathematical Structures with Applications to Computer Science -J.P. Tremblay and R.Manohar, TMH,
2. Discrete Mathematics for Computer Scientists & Mathematicians: Joe L. Mott, Abraham Kandel, Teodore P. Baker, 2nd ed, Pearson Education.

3. Discrete Mathematics- Richard Johnsonbaugh, 7Th Edn., Pearson Education.
4. Discrete Mathematics with Graph Theory- Edgar G. Goodaire, Michael M. Parmenter.
5. Discrete and Combinatorial Mathematics - an applied introduction: Ralph.P.Grimald, 5th edition, Pearson Education.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

II Year B.Tech. AIML -I Sem	**L**	**T**	**P**	**C**
	3	**1**	**0**	**4**

(20CS3PC01) COMPUTER ORGANIZATION

Course Objectives:

1. Construction of computers out of a set of functional units and how the functional unitsoperate, Interact, and communicate.
2. Representation of data at the machine level and how computations are performed at the machine level.
3. Working procedure of various input/output devices and transfer of data from differentmodes.
4. Advanced concepts like parallelism and pipelining.

Course outcomes: The Student will be able to

1. Demonstrate the functional organization of digital computer system.
2. Classify different addressing modes for fetching machine instructions.
3. Apply different data representation formats and perform arithmetic operations.
4. Tell the design of input/output organization and memory organization of computer.
5. Demonstrate the concepts of parallel processing, pipelining and inter processcommunication

UNIT - I

Digital Computers: Introduction, Block diagram of Digital Computer, Definition of Computer Organization, Computer Design and Computer Architecture.

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.

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

UNIT - II

Micro programmed Control: Control memory, Address sequencing, micro program example, design of control unit.

Central Processing Unit: General Register Organization, Instruction Formats, Addressing modes, Data Transfer and Manipulation, Program Control.

UNIT - III

Data Representation: Data types, Complements, Fixed Point Representation, Floating Point Representation.

Computer Arithmetic: Addition and subtraction, multiplication Algorithms, Division Algorithms, Floating – point Arithmetic operations. Decimal Arithmetic unit, Decimal Arithmetic operations.

UNIT – IV

Input-Output Organization: Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupt Direct memory Access.

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary memory, Associate Memory, Cache Memory.

UNIT - V

Reduced Instruction Set Computer: CISC Characteristics, RISC Characteristics. **Pipeline and Vector Processing**: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processor.

Multi Processors: Characteristics of Multiprocessors, Interconnection Structures, inter processor arbitration, Inter processor communication and synchronization, Cache Coherence.

TEXTBOOKS

1. Computer System Architecture – M. Moris Mano, Third Edition, Pearson/PHI.

REFERENCE BOOKS:

1. Computer Organization – Car Hamacher, Zvonks Vranesic, Safea Zaky, Vth Edition, McGrawHill.
2. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI.
3. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition, PHI/Pearson.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

II Year B.Tech. AIML -I Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20AI3PC01) BASIC PYTHON PROGRAMMING

Prerequisites: A course on "Programming for Problem Solving using C"

Course Objectives:

1. Learn Syntax and Semantics and create Functions in Python.
2. Handle Strings and Files in Python.
3. Understand Lists, Dictionaries and Regular expressions in Python.
4. Implement Object Oriented Programming concepts in Python.
5. Build Web Services and introduction to Network and Database Programming in Python

Course outcomes: The Student will be able to

1. Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.
2. Demonstrate proficiency in handling Strings and File Systems.
3. Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.
4. Interpret the concepts of Object-Oriented Programming as used in Python.
5. Implement exemplary applications related to Network Programming, Web Services and Databases in Python.

UNIT - I

Python Basics, Objects- Python Objects, Standard Types, Other Built-in Types, Internal Types, Standard Type Operators, Standard Type Built-in Functions, Categorizing the Standard Types, Unsupported Types

Numbers - Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers, Operators, Built-in Functions, Related Modules Sequences - Strings, Lists, and Tuples, Mapping and Set Types

UNIT - II

FILES: File Objects, File Built-in Function [open ()], File Built-in Methods, File Built-in Attributes, Standard Files, Command-line Arguments, File System, File Execution, Persistent Storage Modules, Related Modules

Exceptions: Exceptions in Python, Detecting and Handling Exceptions, Context Management, *Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions, *Creating Exceptions, Why Exceptions (Now)? Why Exceptions at All? Exceptions and the sys Module, Related Modules: Modules and Files, Namespaces, Importing Modules, Importing Module Attributes, Module Built-in Functions, Packages, Other Features of Modules

UNIT - III

Regular Expressions: Introduction, Special Symbols and Characters, Res and Python Multithreaded Programming: Introduction, Threads and Processes, Python, Threads, and the Global Interpreter Lock, Thread Module, Threading Module, Related Modules

UNIT – IV

GUI Programming: Introduction, Tkinter and Python Programming, Brief Tour of Other GUIs, Related Modules and Other GUIs.

WEB Programming: Introduction, Wed Surfing with Python, Creating Simple Web Clients, Advanced Web Clients, CGI-Helping Servers Process Client Data, Building CGI Application Advanced CGI, Web (HTTP) Servers

UNIT - V

Database Programming: Introduction, Python Database Application Programmer's Interface (DB-API), Object Relational Managers (ORMs), Related Modules

TEXTBOOKS

1. Core Python Programming, Wesley J. Chun, Second Edition, Pearson.

REFERENCE BOOKS:

1. Think Python, Allen Downey, Green Tea Press
2. Introduction to Python, Kenneth A. Lambert, Cengage
3. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
4. Learning Python, Mark Lutz, O'Really.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

II Year B.Tech. AIML -I Sem	**L**	**T**	**P**	**C**
	3	**1**	**0**	**4**

(20CS3PC03) DATA STRUCTURES

Prerequisites: A course on "Programming for Problem Solving using C"

Course Objectives:

1. Introduce Analysis of Algorithm in terms of space and time complexity, exploring basic data structures such as stacks and queues.
2. Introduces a variety of data structures such as hash tables, search trees, tries, heaps, graphs.
3. Introduces sorting and Pattern matching algorithms.

Course outcomes: The Student will be able to

1. Choose appropriate data structures to represent data items in real world problems with linear data structures.
2. Apply dictionaries and hash tables to overcome problems of sequential data structures.
3. Develop the programs using trees for nonlinear data structures.
4. Measure the computational efficiency of the principal algorithms for sorting and searching.
5. Implement the graph traversal methods in nonlinear data structures

UNIT - I

Introduction to Data Structures, Abstract Data types, Analysis of Algorithms-Big Oh and Theta Notations, Stacks using arrays, Queues using arrays, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, linked representations of stacks, stack applications, linked representations of Queues.

UNIT - II

Dictionaries: linear list representation, skip list representation, operations - insertion, deletion and searching.

Hash Table Representation: hash functions, collision resolution-separate chaining, open addressing-linear probing, quadratic probing, double hashing, and rehashing, extendible hashing.

UNIT - III

Search Trees: Binary Search Trees, Definition, Implementation, Operations- Searching, Insertion and Deletion, AVL Trees, Definition, Height of an AVL Tree, Operations – Insertion, Deletion and Searching.

UNIT – IV

Sorting: Heap Sort, Internal Sorting- Bubble sort, Selection Sort and Insertion Sort, External Sorting-Model for external sorting, Merge Sort. Searching: Linear Search and Binary Search.

UNIT - V

Graphs – Introduction, Definition, Terminology, Graph ADT, Graph Representations- Adjacency matrix, Adjacency lists, Graph traversals- Depth First Search and Breadth First Search.

TEXTBOOKS

1. Fundamentals of Data Structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson Freed, Universities Press.
2. Data Structures using C – A. S. Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/Pearson Education.

REFERENCE BOOKS:

1. Data Structures: A Pseudocode Approach with C, 2nd Edition, R. F. Gilberg and B.A. Forouzan, Cengage Learning.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

II Year B.Tech. AIML -I Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20CS3ES08) ANALOG AND DIGITAL ELECTRONICS

Course Objectives:

1. To introduce components such as diodes, BJTs and FETs.
2. To know the applications of components.
3. To give understanding of various types of amplifier circuits
4. To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
5. To understand the concepts of combinational logic circuits and sequential circuits

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

1. Identify the characteristics of various components and its utilization.
2. Compile the Construction, Operation and Characteristics of BJT, FET.
3. Make use of Boolean algebra Postulates to minimize combinational functions
4. Design and analyze combinational and sequential circuits
5. Categorize the logic families and realization of logic gates

UNIT - I

Diodes and Applications: Junction diode characteristics: Open circuited p-n junction, p-n junction as a rectifier, V-I characteristics, effect of temperature, diode resistance, diffusion capacitance, diode switching times, breakdown diodes, Tunnel diodes, photo diode, LED. Diode Applications - clipping circuits, comparators, Half wave rectifier, Full wave rectifier, rectifier with capacitor filter.

UNIT - II

BJTs: Transistor characteristics: The junction transistor, transistor as an amplifier, CB, CE, CC configurations, comparison of transistor configurations. FETs: JFET, V-I characteristics, MOSFET, low frequency CS and CD amplifiers, CS and CD amplifiers.

UNIT - III

Digital Circuits: Digital (binary) operations of a system, OR gate, AND gate, NOT, EXCLUSIVE OR gate, De Morgan Laws, NAND and NOR DTL gates, modified DTL gates, HTL and TTL gates,output stages, RTL and DCTL, CMOS, Comparison of logic families.

UNIT – IV

Combinational Logic Circuits: Basic Theorems and Properties of Boolean Algebra, Canonical and Standard Forms, Digital Logic Gates, The Map Method, Product-of-Sums Simplification, Don't- Care Conditions, NAND and NOR Implementation, Exclusive-OR Function, Binary Adder- Subtractor, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers.

UNIT - V

Sequential Logic Circuits: Sequential Circuits, Storage Elements: Latches and flip flops, Analysis of Clocked Sequential Circuits, State Reduction and Assignment, Shift Registers, Ripple Counters, synchronous Counters, Random-Access Memory, Read-Only Memory.

TEXTBOOKS

1. Electronic Devices and Circuits- Jacob Millman, McGraw Hill Education
2. Integrated Electronics: Analog and Digital Circuits and Systems, 2/e, Jaccob Millman, Christos Halkias and Chethan D. Parikh, Tata McGraw-Hill Education, India, 2010.
3. Switching and Finite Automata Theory - Zvi Kohavi & Niraj K. Jha, 3 rd Edition, Cambridge, 2010

REFERENCE BOOKS:

1. Electronic Devices and Circuits theory– Robert L. Boylestead, Louis Nashelsky, 11th Edition, 2009, Pearson.
2. Digital Design- Morris Mano, PHI, 4th Edition,2006

3. Introduction to Switching Theory and Logic Design – Fredriac J. Hill, Gerald R.Peterson,3rd Ed, John Wiley & Sons Inc.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

II Year B.Tech. AIML -I Sem	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1**

(20CS3PC04) IT WORKSHOP LAB

Course Objectives:
The IT Workshop for engineers is a training lab course spread over 60 hours. The modules include training on PC Hardware, Internet & World Wide Web and Productivity tools including Word, Excel, Power Point and Publisher.

Course outcomes:
1. Gain the knowledge of computer hardware.
2. Install the system software in the specified hardware.
3. Build the computer by assemble different parts and make sure of troubleshoots.
4. Make use of the Web browsers, email and news groups.
5. Craft professional word documents; excel spread sheet and power point presentations.

PC Hardware introduces the students to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like MS Windows, Linux and the required device drivers. In addition, hardware and software level troubleshooting process, tips and tricks would be covered. **The students should work on working PC to disassemble and assemble to working condition and install Windows and Linux on the same PC. Students are suggested to work similar tasks in the laptop scenario wherever possible. Internet & World Wide Web** module introduces the different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet. Usage of web browsers, email, newsgroups and discussion forums would be covered. In addition, awareness of cyber hygiene, i.e., protecting the personal computer from getting infected with the viruses, worms and other cyber-attacks would be introduced. Productivity tools module would enable the students in crafting professional word documents, excel spread sheets, power point presentations and personal web sites using the Microsoft suite of office tools and LaTeX.

PC Hardware

Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Task 2: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also, students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

Task 3: Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both windows and Linux. Lab instructors should verify the installation and follow it up with a Viva.

Task 5: Hardware Troubleshooting: Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva.

Task 6: Software Troubleshooting: Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva.

Internet & World Wide Web

Task1: Orientation & Connectivity Boot Camp: Students should get connected to their Local Area

Network and access the Internet. In the process they configure the TCP/IP setting. Finally, students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

Task 2: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop-up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

Task 3: Search Engines & Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

Task 4: Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to first install an antivirus software, configure their personal firewall and windows update on their computer. Then they need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

LaTeX and WORD
Task 1 – Word Orientation: The mentor needs to give an overview of LaTeX and Microsoft (MS) office 2007/ equivalent (FOSS) tool word: Importance of LaTeX and MS office 2007/ equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

Task 2: Using LaTeX and Word to create project certificate. Features to be covered: - Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

Task 3: Creating project abstract Features to be covered: -Formatting Styles, inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Task 4: Creating a Newsletter: Features to be covered: - Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

Excel
Excel Orientation: The mentor needs to tell the importance of MS office 2007/ equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

Task 1: Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text

Task 2: Calculating GPA -. Features to be covered: - Cell Referencing, Formulae in excel – average, St. Deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP/VLOOKUP

Task 3: Performance Analysis - Features to be covered: - Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting LaTeX and MS/equivalent (FOSS)

Tool Power Point
Task 1: Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this week includes: - PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in both LaTeX and PowerPoint. Students will be given model power point presentation which needs to be

replicated (exactly how it's asked).

Task 2: Second week helps students in making their presentations interactive. Topic covered during this week includes: Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.

Task 3: Concentrating on the in and out of Microsoft power point and presentations in LaTeX. Helps them learn best practices in designing and preparing power point presentation. Topic covered during this week includes: - Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc.), and Inserting – Background, textures, Design Templates, Hidden slides.

REFERENCE BOOKS:

1. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dreamtech
2. The Complete Computer upgrade and repair book, 3rd edition Cheryl A Schmidt, WILEY Dreamtech
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
4. PC Hardware - A Handbook – Kate J. Chase PHI (Microsoft)
5. 5.LaTeX Companion – Leslie Lamport, PHI/Pearson.
6. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. – CISCO Press, Pearson Education.
7. IT Essentials PC Hardware and Software Labs and Study Guide Third Edition by Patrick Regan – CISCO Press, Pearson Education

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

II Year B.Tech. AIML -I Sem	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

(20CS3PC05) DATA STRUCTURES LAB

Prerequisites: A course on "Programming for Problem Solving".

Course Objectives:

1. Introduce Analysis of Algorithm in terms of space and time complexity, exploring basic data It covers various concepts of Java programming language
2. It introduces searching and sorting algorithms
3. It provides an understanding of data structures such as stacks and queues, Hashing Techniques.
4. It provides and understanding of Tree, Graph Data Structures and also pattern matching algorithms.

Course Outcomes:

1. Design an algorithm along with the complexity for a given problem.
2. Able to implement the stack, queues using static and dynamic data structures.
3. Develop the programs to perform different operations on linked list.
4. Make use of different tree traversal techniques for nonlinear data structures.
5. Develop programs for searching and sorting techniques by different methods.

List of Experiments:

1. Write a program that implement Stack (its operations) using Arrays.
2. Write a program that implement Queues (its operations) using Arrays.
3. Write a program that uses functions to perform the following operations on singly linked list:
   i). Creation ii). Insertion iii). Deletion iv). Traversal
5. Write a program that implements Stack (its operations) using Linked List.
6. Write a program that implement Queues (its operations) using Linked List.
   i). Creation ii). Insertion iii). Deletion iv). Traversal
7. Write a program that uses functions to perform the following operations on doubly linked list.
   i). Creation ii). Insertion iii). Deletion iv). Traversal
8. Write a program that uses functions to perform the following:
   Create a binary search tree of integers.
   Traverse the above Binary search tree non recursively in
   i) in order ii) preorder iii) post order.
9. Write a program that uses functions to perform the following operations on AVL trees:
   i). Rotation ii) Insertion iii) Deletion.
10. Write a program that implements the following sorting methods to sort a given list of integers in ascending order
    i). Bubble sort ii) Selection sort iii) Insertion sort.
11. Write a program that implements the following sorting methods to sort a given list of integers in ascending order
    i) Merge Sort ii) Heap sort.
12. Write a program that use both recursive and non- recursive functions to perform the following searching operations for a key value in a given list of integers:
    i). Linear search ii) Binary search
13. Write a program to implement the graph traversal methods

TEXT BOOKS: `

1. Fundamentals of Data Structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson Freed, Universities Press.
2. Data Structures using C – A. S. Tanenbaum, Y. Langsam, and M. J. Augenstein, PHI/ Pearson Education.

REFERENCE BOOKS:

1. Data Structures: A Pseudo code Approach with C, 2nd Edition, R. F. Gilberg and B. A. Forouzan, Cengage Learning.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

II Year B.Tech. AIML -I Sem	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

(20A13PC02) BASIC PYTHON PROGRAMMING LAB

Prerequisites: A course on "Programming for Problem Solving".

Course Objectives:

- To be able to introduce core programming basics and program design with functions using Python programming language.
- To understand a range of Object-Oriented Programming, as well as in-depthdata and information processing techniques.
- To understand the high-performance programs designed to strengthen the practical expertise

Course Outcomes: Student should be able to

1. Implement the basic concepts scripting and the contributions of scripting language
2. Explore object-oriented concepts thru built in objects of Python.
3. Implement Dictionaries of python for a given problem.
4. Implement mathematical & statistical concepts thru python.
5. Create practical and contemporary applications.

List of Experiments:

1. Write a program to demonstrate different number data types in Python.
2. Write a program to perform different Arithmetic Operations on numbers in Python.
3. Write a program to create, concatenate and print a string and accessing sub-string from a given string.
5. Write a python script to print the current date in the following format "Sun May 29 02:26:23 IST 2017"
6. Write a program to create, append, and remove lists in python.
7. Write a program to demonstrate working with tuples in python.
8. Write a program to demonstrate working with dictionaries in python.
9. Write a python program to find largest of three numbers.
10. Write a Python program to convert temperatures to and from Celsius, Fahrenheit. [Formula: c/5 = f-32/9]

```
*
* *
* * *
* * * *
* * *
* *
*
```

11. Write a Python script that prints prime numbers less than 20.
12. Write a python program to find factorial of a number using Recursion.
13. Write a program that accepts the lengths of three sides of a triangle as inputs. The program output should indicate whether or not the triangle is a right triangle (Recall from the Pythagorean Theorem that in a right triangle, the square of one side equals the sum of the squares of the other two sides).
14. Write a python program to define a module to find Fibonacci Numbers and import themodule to another program.
15. Write a python program to define a module and import a specific function in that module to another program.
16. Write a script named copyfile.py. This script should prompt the user for the names of twotext files. The contents of the first file should be input and written to the second file.
17. Write a program that inputs a text file. The program should print all of the unique words inthe file in alphabetical order.
18. Write a Python class to convert an integer to a roman numeral.
19. Write a Python class to implement pow (x, n)

20. Write a Python class to reverse a string word by word

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

II Year B.Tech. AIML -I Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**0**

(20MC3HS01) PROFESSIONAL ENGINEERING AND ETHICS

Course Objectives:

1. To enable the students to imbibe and internalize the Values and Ethical Behavior in the personal and Professional lives.

Course Outcomes:

1. To gain the knowledge on different codes of ethics, such as personal & professional, accountability, controllability, governability, life skills and consequentialism.
2. To perceive moral values in different fields in different ways.
3. To follow value-based education system by learning different techniques.
4. To asses workplace responsibilities by following different case studies.
5. To realize the work place responsibilities, honesty, integrity, and promise-keeping & trustworthiness, loyalty, fairness.

UNIT – I

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 – II

Basic Theories: Basic Ethical Principles, Moral Developments, Deontology, Utilitarianism, Virtue Theory, Rights Theory, Casuist Theory, Moral Absolution, Moral Rationalism, Moral Pluralism, Ethical Egoism, Feminist Consequentialism, Moral Issues, Moral Dilemmas, Moral Autonomy.

UNIT – III

Professional Practices in Engineering: Professions and Norms of Professional Conduct, Norms of Professional Conduct vs. Profession; Responsibilities, Obligations and Moral Values in Professional Ethics, Professional codes of ethics, the limits of predictability and responsibilities of the engineering profession. Central Responsibilities of Engineers - The Centrality of Responsibilities of Professional Ethics; lessons from 1979 American Airlines DC- 10 Crash and Kansas City Hyatt Regency Walk away Collapse.

UNIT – IV

Work Place Rights & Responsibilities: Ethics in changing domains of Research, Engineers and Managers; Organizational Complaint Procedure, difference of Professional Judgment within the Nuclear Regulatory Commission (NRC), the Hanford Nuclear Reservation. Ethics in changing domains of research - The US government wide definition of research misconduct, research misconduct distinguished from mistakes and errors, recent history of attention to research misconduct, the emerging emphasis on understanding and fostering responsible conduct, responsible authorship, reviewing & editing.

UNIT – V

Global issues in Professional Ethics: Introduction – Current Scenario, Technology Globalization of MNCs, International Trade, World Summits, Issues, Business Ethics and Corporate Governance, Sustainable Development Ecosystem, Energy Concerns, Ozone Deflection, Pollution, Ethics in Manufacturing and Marketing, Media Ethics; War Ethics; Bio Ethics, Intellectual Property Rights.

TEXT BOOKS: `

1. Professional Ethics: R. Subramanian, Oxford University Press, 2015.
2. Ethics in Engineering Practice & Research, Caroline Whitbeck, 2e, Cambridge University Press 2015.

REFERENCE BOOKS:

1. Engineering Ethics, Concepts Cases: Charles E Harris Jr., Michael S Pritchard, Michael J Rabins, 4e, Cengage learning, 2015.
2. Business Ethics concepts & Cases: Manuel G Velasquez, 6e, PHI, 2008.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

II Year B.Tech. AIML -I Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**0**

(20MC3BS02) QUANTITATIVE APTITUDE

Course Objectives: The students learn

1. To improve the problem-solving skills.
2. To enhance the employability skills among students to meet out the corporate expectations.
3. To enhance the student's interest towards industry expectations.
4. To prepare students for the campus recruitment program.
5. To produce the most competitive man power to fit in all scenario of the job market.

Course Outcomes:

1. To Understand and Practice Simplifications.
2. To Understand and Practice the Problems on Ages.
3. To Understand and Practice the Quadratic Equations.
4. To Understand and Practice arrangement and selection in their daily life.
5. To Understand and Practice commercial mathematics.

UNIT-I

Numbers, H.C.F & L.C.M. of Numbers, Decimal Fractions & Simplifications.

UNIT-II

Square Roots & Cube Roots, Problems on Ages, Pipes & Cistern.

UNIT-III

Average, Time & Distance, Time & Work, Logarithm, Set Theory, Progressions, Quadratic Equations and Surds.

UNIT-IV

Permutation & Combination, Probability, Co-ordinate Geometry, Inequalities, Functions, Alligation & Mixtures, Number System

UNIT-V

Partnership, Profit & Loss, Simple & Compound Interest, Percentage, Ratio & Proportion, Mensuration 2D & 3D.

TEXT BOOKS: `

1. R.S. Aggarwal, Quantitative Aptitude for Competitive Examinations.
2. R.S. Aggarwal, A Modern Approach to Logical Reasoning.

REFERENCE BOOKS:

1. Arun Sharma, Teach Yourself Quantitative Aptitude.
2. Rajesh Verma, Fast Track Objective Arithmetic.
3. Dinesh Khattar, The Pearson Guide to Quantitative Aptitude for Competitive Examination.
4. Abhijit Gupta, Quantitative Aptitude for all Competitive Exam

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

II Year B.Tech. AIML -II Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20A14BS07) FOUNDATIONS OF MACHINE LEARNING

Course Objectives: To learn

1. The theory of Probability, and probability distributions of single and multiple random variables.
2. The sampling theory and testing of hypothesis and making inferences.
3. Stochastic process and Markov chains.

Course Outcomes: After the end of the course students will be able to

1. Apply the concepts of probability and distributions to some case studies.
2. To define the mean, Variance and covariance of a discrete random variable.
3. Know about Uniform Distributions.
4. Apply the concept of test of hypothesis to take decision for profit or loss.
5. Apply stochastic processes to greatly simplify processes that satisfy Markov Property.

UNIT-I

Random Variables and Probability Distributions: Introduction, Concept of a Random Variable, Discrete Probability Distributions, Continuous Probability Distributions, Statistical Independence.

UNIT-II

Mathematical Expectation: Mean of a Random Variable, Variance and Covariance of Random Variables, Means and Variances of Linear Combinations of Random Variables. **Discrete Probability Distributions:** Binomial, Distribution, Geometric Distributions and Poisson distribution.

UNIT-III

Continuous Probability Distributions: Continuous Uniform Distribution, Normal Distribution, Areas under the Normal Curve, Applications of the Normal Distribution, Normal Approximation to the Binomial, Gamma and Exponential Distributions. **Fundamental Sampling Distributions:** Random Sampling, Some Important Statistics, Sampling Distributions, Sampling Distribution of Means and the Central Limit Theorem, Sampling Distribution of S2, t–Distribution, F-Distribution.

UNIT-IV

Estimation & Tests of Hypotheses: Introduction, Statistical Inference, Classical Methods of Estimation: Estimating the Mean, Standard Error of a Point Estimate, Prediction Intervals, Tolerance Limits, Estimating the Variance, Estimating a Proportion for single mean, Difference between Two Means, between Two Proportions for Two Samples and Maximum Likelihood Estimation.
Statistical Hypotheses: General Concepts, testing a Statistical Hypothesis, Tests Concerning a Single Mean, Tests on Two Means, Test on a Single Proportion.

UNIT-V

Stochastic Processes and Markov Chains: Introduction to Stochastic processes-Markov process. Transition Probability, Transition Probability Matrix, First order and Higher order Markov process, n-step transition probabilities, Markov chain, Steady state condition, Markov analysis.

TEXT BOOKS: `

1. R K Jain & S R K Iyengar - Advanced Engineering Mathematics - fifth Edition, Narosa Publications.
2. S C Gupta and V K Kapoor, Fundamentals of Mathematical statistics, Khanna publications.
3. S. D. Sharma, Operations Research, Kedarnath and Ramnath Publishers, Meerut, Delhi.

REFERENCE BOOKS:

1. T.T. Soong, Fundamentals of Probability and Statistics for Engineers, John Wiley & Sons Ltd, 2004.
2. Sheldon M Ross, Probability and statistics for Engineers and scientists, Academic Press.

3. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, Probability & Statistics for Engineers & Scientists, 9th Ed. Pearson Publishers.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

II Year B.Tech. AIML -II Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20MS4HS03) BUSINESS ECONOMICS AND FINANCIAL ANALYSIS

Course Objectives: To learn the basic Business types, impact of the Economy on Business and Firms specifically. To analyze the Business from the Financial Perspective.

Course Outcomes:

1. Identify the various forms of business and its impact on economic variables.
2. To realize the demand fluctuations and factors influencing the demand.
3. To analyze different market structures, pricing strategies and forms of business organization.
4. To study the firms, financial position and the financial statements of a company.
5. To evaluate different types of financial ratios for knowing liquidity and profitabilitypositions of business concern.

UNIT-I

Introduction to Business and Economics: Business: Structure of Business Firm, Theory of Firm, Types of Business Entities, Limited Liability Companies, Sources of Capital for a Company, Non-Conventional Sources of Finance. Economics: Significance of Economics, Micro and Macro Economic Concepts, Concepts and Importance of National Income, Inflation, Money Supply in Inflation, Business Cycle, Features and Phases of Business Cycle. Nature and Scope of Business Economics, Role of Business Economist, Multidisciplinary nature of Business Economics.

UNIT-II

Demand and Supply Analysis: Elasticity of Demand: Elasticity, Types of Elasticity, Law of Demand, Measurement and Significance of Elasticity of Demand, Factors affecting Elasticity of Demand, Elasticity of Demand in decision making, Demand Forecasting: Characteristics of Good Demand Forecasting, Steps in Demand Forecasting, Methods of Demand Forecasting. Supply Analysis: Determinants of Supply, Supply Function & Law of Supply.

UNIT-III

Production, Cost, Market Structures & Pricing: Production Analysis: Factors of Production, Production Function, Production Function with one variable input, two variable inputs, Returns to Scale, Different Types of Production Functions. Cost analysis: Types of Costs, Short run and long run Cost Functions. Market Structures: Nature of Competition, Features of Perfect competition, Monopoly, Oligopoly, and Monopolistic Competition. Pricing: Types of Pricing, Product Life Cycle based Pricing, Break Even Analysis, Cost Volume Profit Analysis.

UNIT-IV

Financial Accounting: Accounting concepts and Conventions, Accounting Equation, Double-Entry system of Accounting, Rules for maintaining Books of Accounts, Journal, Posting to Ledger, Preparation of Trial Balance, Elements of Financial Statements, and Preparation of Final Accounts.

UNIT-V

Financial Analysis through Ratios: Concept of Ratio Analysis, Liquidity Ratios, Turnover Ratios, Profitability Ratios, Proprietary Ratios, Solvency, Leverage Ratios (simple problems). Introduction to Fund Flow and Cash Flow Analysis (simple problems).

TEXT BOOKS: `

1. D.D. Chaturvedi, S.L. Gupta, Business Economics - Theory and Applications, International Book House Pvt. Ltd. 2013.
2. Dhanesh K Khatri, Financial Accounting, Tata McGraw Hill, 2011.
3. Geethika Ghosh, Piyali Gosh, Purba Roy Choudhury, Managerial Economics, 2e, Tata McGraw Hill Education Pvt. Ltd. 2012

REFERENCE BOOKS:

1. Paresh Shah, Financial Accounting for Management 2e, Oxford Press, 2015.
2. S.N. Maheshwari, Sunil K Maheshwari, Sharad K Maheshwari, Financial Accounting, 5e, Vikas Publications, 2013.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

II Year B.Tech. AIML -II Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20AI4PC03) DESIGN AND ANALYSIS OF ALGORITHMS

Prerequisites:

1. A course on "Computer Programming and Data Structures"
2. A course on "Advanced Data Structures"

Course Objectives:

1. Introduces the notations for analysis of the performance of algorithms.
2. Introduces the data structure disjoint sets.
3. Describes major algorithmic techniques (divide-and-conquer, backtracking, dynamic programming, greedy, branch and bound methods) and mention problems for which each technique is appropriate;
4. Describes how to evaluate and compare different algorithms using worst-, average-, and best-case analysis.
5. Explains the difference between tractable and intractable problems, and introduces the problems that are P, NP and NP complete.

Course Outcomes:

1. Make use of divide and conquer methods for developing algorithms.
2. Apply the concept of backtracking to solve the optimization problems.
3. Solve the optimization problems using dynamic programming methodology.
4. Solve the optimization problem by using Greedy method.
5. Solve the optimization problem by using branch and bound method and NP-Hard and NP-Complete for the given example problems.

UNIT-I

Introduction: Algorithm, Performance Analysis-Space complexity, Time complexity, Asymptotic Notations- Big oh notation, Omega notation, Theta notation and Little oh notation. Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort, Strassen's matrix multiplication

UNIT-II

Disjoint Sets: Disjoint set operations, union and find algorithms

Backtracking: General method, applications, n-queen's problem, sum of subsets problem, graph coloring

UNIT-III

Dynamic Programming: General method, applications- Optimal binary search trees, 0/1 knapsack problem, all pairs shortest path problem, Traveling sales person problem, Reliability design

UNIT-IV

Greedy method: General method, applications-Job sequencing with deadlines, knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

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, NP - Hard and NP-Complete classes, Cook's theorem.

TEXT BOOKS: `

1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharan, University Press.

REFERENCE BOOKS:

1. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson education.

2. Introduction to Algorithms, second edition, T. H. Cormen, C.E. Leiserson, R. L.Rivest, and C. Stein, PHI Pvt. Ltd./ Pearson Education.
3. Algorithm Design: Foundations, Analysis and Internet Examples, M.T. Goodrich and R. Tamassia, John Wiley and sons

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

II Year B.Tech. AIML -II Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20CS4PC09) OPERATING SYSTEMS

Prerequisites: A course on "Computer Programming and Data Structures". A course on "Computer Organization and Architecture".

Course Objectives:

1. Provide an introduction to operating system concepts (i.e., processes, threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystems and protection).
2. Introduce the issues to be considered in the design and development of operating system.
3. Introduce basic Unix commands, system call interface for process management, inter process communication and I/O in Unix.

Course Outcomes: The student will be able to

1. Demonstrate the fundamental components of a computer operating system.
2. Identify appropriate scheduling algorithm for process management.
3. Solve the situations occurred by deadlock to maintain appropriate process synchronization.
4. Make use of page replacement algorithm for effective memory management.
5. Apply the various system calls to enable the operating system services.

UNIT-I

Operating System - Introduction, Structures - Simple Batch, Multi programmed, Time-shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating System services, System Calls.

UNIT-II

Process and CPU Scheduling - Process concepts and scheduling, Operations on processes, Cooperating Processes, Threads, and Interposes Communication, Scheduling Criteria, Scheduling Algorithms, Multiple - Processor Scheduling.

System call interface for process management-fork, exit, wait, waitpid, and exec.

UNIT-III

Deadlocks - System Model, Deadlocks Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock **Process Management and Synchronization** - The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors.

Inter process Communication Mechanisms: IPC between processes on a single computer system, IPC between processes on different systems, using pipes, FIFOs, message queues, shared memory.

UNIT-IV

Memory Management and Virtual Memory - Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging, Demand Paging, Page Fault, Page Replacement, Page Replacement Algorithms.

UNIT-V

File System Interface and Operations -Access methods, Directory Structure, Protection, File System Structure, Allocation methods, Free-space Management. Usage of open, create, read, write, close, lseek, stat, ioctl system calls, System Protection-Goals.

TEXT BOOKS: `

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley
2. Advanced programming in the UNIX environment, W.R. Stevens, Pearson education.

REFERENCE BOOKS:

1. Operating Systems – Internals and Design Principles Stallings, Fifth Edition–2005, Pearson

Education / PHI.
2. Operating System A Design Approach- Crowley, TMH.
3. Modern Operating Systems, Andrew S. Tanenbaum 2nd edition, Pearson/PHI.
4. UNIX programming environment, Kernighan and Pike, PHI/ Pearson Education.
5. UNIX Internals -The New Frontiers, U. Vahalia, Pearson Education.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

II Year B.Tech. AIML -II Sem	**L**	**T**	**P**	**C**
	3	**1**	**0**	**4**

(20CS4PC10) DATABASE MANAGEMENT SYSTEMS

Course Objectives:

1. To learn the basic database concepts, applications and data models
2. To understand ER model and Relational models
3. To learn Relational algebra and calculus operations
4. To master the basics of SQL and write queries using SQL.
5. To learn transaction control, concurrency control, storage structures and access techniques

Course Outcomes: The Student will be able to

1. Build the appropriate ER Model for the given problem.
2. Illustrate the concepts of Relational Model, Algebra and Calculus.
3. Apply the concepts of Normalization for the consistent database.
4. Write the proper SQL queries to access the database.
5. Apply the concurrency control protocol to maintain the ACID properties while designing the database.
6. Apply the proper indexing techniques for accessing the data.

UNIT-I

INTRODUCTION: A Historical Perspective, File Systems versus a DBMS, the Data Model, Levels of Abstraction in a DBMS, Data Independence, Structure of a DBMS.

DATABASE DESIGN: Database Design and ER Diagrams, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design with the ER Model.

UNIT-II

THE RELATIONAL MODEL: Introduction to the relational model, Integrity constraint over relations, enforcing integrity constraints, querying relational data, logical data base design, introduction to views, destroying/altering tables and views.

RELATIONAL ALGEBRA AND CALCULUS: Relational Algebra, Tuple relational Calculus, Domain relational calculus.

UNIT-III

SQL: QUERIES, CONSTRAINTS, TRIGGERS: form of basic SQL query, UNION, INTERSECT, and
EXCEPT, Nested Queries, aggregation operators, NULL values, complex integrity constraints in SQL, triggers and active data bases.

SCHEMA REFINEMENT AND NORMAL FORMS: Introduction to schema refinement, functional dependencies, reasoning about functional dependencies, FIRST, SECOND, THIRD normal forms, BCNF, lossless join decomposition, multi-valued dependencies, FOURTH normal form, FIFTH normal form.

UNIT-IV

TRANSACTION MANAGEMENT: Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for serializability.

CONCURRENCY CONTROL AND RECOVERY SYSTEM: Lock Based Protocols, Timestamp Based Protocols, Validation- Based Protocols, Multiple Granularity, Recovery and Atomicity, Log–Based Recovery, Recovery with Concurrent Transactions.

UNIT-V

OVERVIEW OF STORAGE AND INDEXING: Data on External Storage, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes, Index data Structures, Hash Based Indexing, Tree base Indexing, Comparison of File Organizations, Indexes and Performance Tuning.

TREE STRUCTURED INDEXING: Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic Index Structure.

TEXT BOOKS: `

1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill 3rd Edition.
2. Database System Concepts, Silberschatz, Korth, Mc Graw hill, V edition.

REFERENCE BOOKS:

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate, Pearson Education
3. Introduction to Database Systems, C. J. Date, Pearson Education
4. Oracle for Professionals, The X Team, S.Shah and V. Shah, SPD.
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL,Shah, PHI.
6. Fundamentals of Database Management Systems, M. L. Gillenson, Wiley Student.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

II Year B.Tech. AIML -II Sem	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

(20CS4PC11) OPERATING SYSTEMS LAB

Prerequisites:

1. A course on "Programming for Problem Solving".
2. A course on "Computer Organization and Architecture".

Co-requisite:

A course on "Operating Systems".

Course Objectives:

1. To provide an understanding of the design aspects of operating system concepts through simulation
2. Introduce basic Unix commands, system call interface for process management, inter process communication and I/O in Unix

Course Outcomes: The Student will be able to

1. Implement programs based on operating system concept of scheduling.
2. Develop a program based on operating system concept of deadlock management.
3. Simulate the concept to implement programs based on operating system concept of file management.
4. Apply the concept of memory management for implementing a program.
5. Implement C programs using UNIX system calls.

List of Experiments:

1. Write C programs to simulate the following CPU Scheduling algorithms
   a) FCFS b) SJF c) Round Robin d) priority
2. Write programs using the I/O system calls of UNIX/LINUX operating system (open, read, write, close, fcntl, seek, stat, opendir, readdir)
3. Write a C program to simulate Bankers Algorithm for Deadlock Avoidance and Prevention.
4. Write a C program to implement the Producer – Consumer problem using semaphores using UNIX/LINUX system calls.
5. Write C programs to illustrate the following IPC mechanisms
   a) Pipes b) FIFOs c) Message Queues d) Shared Memory
6. Write C programs to simulate the following memory management techniques
7. a) Paging b) Segmentation

TEXT BOOKS: `

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley
2. Advanced programming in the Unix environment, W.R.Stevens, Pearson education.

REFERENCE BOOKS:

1. Operating Systems – Internals and Design Principles, William Stallings, Fifth Edition– 2005, Pearson Education/PHI
2. Operating System - A Design Approach-Crowley, TMH.
3. Modern Operating Systems, Andrew S Tanenbaum, 2nd edition, Pearson/PHI
4. UNIX Programming Environment, Kernighan and Pike, PHI/Pearson Education
5. UNIX Internals: The New Frontiers, U. Vahalia, Pearson Education.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

II Year B.Tech. AIML -II Sem	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1**

(20AI4PC04) DESIGN AND ANALYSIS OFALGORITHM LAB

Course Objectives:

1. To write programs in java to solve problems using divide and conquer strategy.
2. To write programs in java to solve problems using backtracking strategy.
3. To write programs in java to solve problems using greedy and dynamic programming techniques.

Course Outcomes:

1. Write programs for given real world problems using java collection frame work.
2. Build the programs using abstract classes to solve the specified problems.
3. Make use the concept of multithreading to allow parallel processing in the given program.
4. Create GUI programs using Java swing controls for the given example program.
5. Create web pages using Applets for given example problem.

List of Experiments:

1. Write a java program to implement Quick sort algorithm for sorting a list of integers in ascending order
2. Write a java program to implement Merge sort algorithm for sorting a list of integers in ascending order.
   i) Write a java program to implement the dfs algorithm for a graph.
   ii) Write a. java program to implement the bfs algorithm for a graph.
3. Write a java program to implement backtracking algorithm for the N-queens problem.
4. Write a java program to implement the backtracking algorithm for the sum of subsets problem.
5. Write a java program to implement the backtracking algorithm for the Hamiltonian Circuits problem.
6. Write a java program to implement greedy algorithm for job sequencing with deadlines.
7. Write a java program to implement Dijkstra's algorithm for the Single source shortest path problem.
8. Write a java program that implements Prim's algorithm to generate minimum cost spanning tree.
9. Write a java program that implements Kruskal's algorithm to generate minimum cost spanning tree
10. Write a java program to implement Floyd's algorithm for the all-pairs shortest path problem.
11. Write a java program to implement Dynamic Programming algorithm for the 0/1 Knapsack problem.
12. Write a java program to implement Dynamic Programming algorithm for the Optimal All Binary Search Tree Problem.

REFERENCE BOOKS:

1. Data structures, Algorithms and Applications in java, 2nd Edition, S. Sahani, Universities Press.
2. Data structures and Algorithms in java, 3rd edition, A. Drozdek, Cengage Learning.
3. Data structures with Java, J. R. Hubbard, 2nd edition, Schaum's Outlines, TMH.
4. Data structures and algorithms in Java, 2nd Edition, R. Lafore, Pearson Education.
5. Data Structures using Java, D. S. Malik and P.S. Nair, Cengage Learning

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

II Year B.Tech. AIML -II Sem	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

(20CS4PC13) DATABASE MANAGEMENT SYSTEMS LAB

Course Objectives:

1. Introduce ER data model, database design and normalization
2. Learn SQL basics for data definition and data manipulation
3. Learn triggers, concurrency control mechanisms

Course Outcomes:

1. Design a database schema for given problem data.
2. Build a GUI application.
3. Apply the normalization techniques for development of application software to realistic problems.
4. Formulate queries using SQL DML/DDL/DCL commands.
5. Implement triggers to raise as per real time data and also Implement concurrency control mechanisms

List of Experiments:

1. Concept design with E-R Model (Draw ER diagrams which includes key constraints and participation constraints also)
2. Relational Model (Convert ER model to Relational model)
3. Normalization
4. Practicing DDL commands: Creating tables along with primary key and foreign key. Altering tables, Dropping tables.
5. Practicing DML commands: Practicing insert, select, update and delete commands.
6. Practicing queries using ANY, ALL, IN, EXISTS, NOT EXISTS, UNION, INTERSECT, Constraints etc.
7. Practicing queries using Aggregate functions (COUNT, SUM, AVG, MIN, MAX), GROUP BY, HAVING and Creation and dropping of Views.
8. Triggers: Creation of trigger, insert trigger, delete trigger, update trigger.
9. Procedures: Creation procedures, executing procedures and modification of procedures.
10. Usage of Cursors.

TEXT BOOKS: `

1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill, 3rd Edition
2. Database System Concepts, Silberschatz, Korth, McGraw Hill, V edition.

REFERENCE BOOKS:

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Corone 7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate, Pearson Education
3. Introduction to Database Systems, C.J. Date, Pearson Education
4. Oracle for Professionals, The X Team, S. Shah and V. Shah, SPD.
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, Shah, PHI.
6. Fundamentals of Database Management Systems, M. L. Gillenson, Wiley Student Edition.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

II Year B.Tech. AIML -II Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**0**

(20MC4HS03) GENDER SENSITIZATION

Course Description

This course offers an introduction to Gender Studies, an interdisciplinary field that asks critical questions about the meanings of sex and gender in society. The primary goal of this course is to familiarize students with key issues, questions and debates in Gender Studies, both historical and contemporary. It draws on multiple disciplines – such as literature, history, economics, psychology, sociology, philosophy, political science, anthropology and media studies – to examine cultural assumptions about sex, gender, and sexuality.

This course integrates analysis of current events through student presentations, aiming to increase awareness of contemporary and historical experiences of women, and of the multiple ways that sex and gender interact with race, class, caste, nationality and other social identities. This course also seeks to build an understanding and initiate and strengthen programmes combating gender- based violence and discrimination. The course also features several exercises and reflective activities designed to examine the concepts of gender, gender-based violence, sexuality, and rights. It will further explore the impact of gender-based violence on education, health and development.

Course Objectives:

1. To develop students' sensibility with regard to issues of gender in contemporary India.
2. To provide a critical perspective on the socialization of men and women.
3. To introduce students to information about some key biological aspects of genders.
4. To expose the students to debates on the politics and economics of work.
5. To help students reflect critically on gender violence.
6. To expose students to more egalitarian interactions between men and women.

Course Outcomes:

1. Students will have developed a better understanding of important issues related to gender in contemporary India.
2. Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
3. Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
4. Students will acquire insight into the gendered division of labour and its relation to politics and economics.
5. Men and women students and professionals will be better equipped to work and live together as equals.
6. Students will develop a sense of appreciation of women in all walks of life.
7. Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

UNIT-I

Understanding Gender: Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring Attitudes towards Gender-Construction of Gender-Socialization: Making Women, Making Men, Preparing for Womanhood. Growing up Male. First lessons in Caste.

UNIT-II

Gender Roles and Relations: Two or Many? -Struggles with Discrimination-Gender Roles and Relations- Types of Gender Roles- Gender Roles and Relationships Matrix-Missing Women-Sex Selection and Its Consequences Declining Sex Ratio. Demographic Consequences-Gender Spectrum: Beyond the Binary.

UNIT-III

Gender and Labour
Division and Valuation of Labour-Housework: The Invisible Labor- "My Mother doesn't Work.""Share the Load."-Work: Its Politics and Economics -Fact and Fiction. Unrecognized and Unaccounted work.
Gender Development Issues-Gender, Governance and Sustainable Development-Gender and Human Rights-Gender and Mainstreaming.

UNIT-IV

Gender - Based Violence

The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective-Sexual Harassment: Say No! -Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "Chupulu". Domestic Violence: Speaking OutIs Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Thinking about Sexual Violence Blaming the Victim- "I Fought for my Life…."

UNIT-V

Gender and Culture: Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature- Gender Development Issues-Gender Sensitive Language-Gender and Popular. Literature - Just Relationships: Being Together as Equals. Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Rosa Parks- TheBrave Heart.

TEXT BOOKS:

1. "Towards a World of Equals: A Bilingual Textbook on Gender" written by A.Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu published by Telugu Akademi, Telangana Government in 2015.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

II Year B.Tech. AIML -II Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**0**

(20MC4BS03) QUANTITATIVE LOGICAL AND REASONING

Course Objectives: To learn

1. To improve the Logical Ability and Reasoning skills among the students to meet the expectations of Industry.
2. To counsel the students to improve their career exposure across the industry
3. To improve the Data Sequences & Calendars problems.
4. To enhance Non-Verbal Reasoning among the students as per the industry requirements
5. To improve the graphical representation skills among the students.

Course Outcomes: The Students able

1. To understand and practice logical reasoning
2. To understand and practice the different classifications
3. To understand and practice different Sitting Arrangements, Data Sequences.
4. To understand and practice the Non-Verbal Reasoning.
5. To understand and practice the graphs.

UNIT-I

Coding Decoding, Directions, Blood Relations & Alphabet Test

UNIT-II

Statements & Arguments, Analogy Classification & Clocks.

UNIT-III

Sitting Arrangements, Data Sequences & Calendars and Syllogism.

UNIT-IV

Puzzle Test, Non-Verbal Reasoning, Cubs & Dice.

UNIT-V

Tabulation, Bar Graphs, Pie Charts and Line Graphs.

TEXT BOOKS:

1. R.S. Aggarwal, A Modern Approach to Logical Reasoning.
2. R.S. Aggarwal, A Modern Approach to Verbal & Non-Verbal Reasoning

REFERENCE BOOKS:

1. R.V. Praveen, Quantitative Aptitude and Reasoning.
2. Praxis groups, Campus Recruitment Complete Reference.
3. BS Sijwalii & Indu Sijwali, A New Approach to Reasoning Verbal, Non-Verbal &Analytical.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. AIML -I Sem

L	T	P	C
3	1	0	4

(20AI5PC05) COMPUTER NETWORKS

Course Objectives:

1. The objective of the course is to equip the students with a general overview of the concepts andfundamentals of computer networks.
2. Familiarize the students with the standard models for the layered approach to communication between machines in a network and the protocols of the various layers.

Course Outcomes: The students able

1. Demonstrate the concepts of Data communication procedures and various models of Networking.
2. Summarize the features of various protocols used in Data Link Layer.
3. Identify appropriate routing algorithm for broadcasting in Network Layer.
4. Demonstrate the services and features of TCP/UDP protocols in Transport Layer.
5. Summarize the services and features of Application Layer with respect to World Wide

UNIT-I

Network hardware, Network software, OSI, TCP/IP Reference models, Example Networks: ARPANET, Internet. Physical Layer: Guided Transmission media: twisted pairs, Coaxial cable, fiber optics, Wireless transmission.

UNIT-II

Data link layer: Design issues, framing, Error detection and correction. Elementary data link protocols: simplex protocol, A simplex stop and wait protocol foran Error-free channel, A simplex stop and wait protocol for noisy channel.

Sliding Window protocols: A one-bit sliding window protocol, A protocol using Go-Back- N, Protocol using Selective Repeat, Example data link protocols.

Medium Access sub layer: The channel allocation problem, Multiple access protocols: ALOHA, Carrier sense multiple access protocols, collision free protocols. Wireless LANs, Data link layer switching.

UNIT-III

Network Layer: Design issues, Routing algorithms: shortest path routing, Flooding, Hierarchical routing, Broadcast, Multicast, distance vector routing, Congestion Control Algorithms, Quality of Service, Internetworking, The Network layer in the internet.

UNIT-IV

Transport Layer: Transport Services, Elements of Transport protocols, Connection Management, TCP and UDP protocol.

UNIT-V

Application Layer –Domain name system, SNMP, Electronic Mail; the World WEB, HTTP, Streaming audio and video.

TEXT BOOKS:

1. Computer Networks -- Andrew S Tanenbaum, David. j. Wetherall, 5th Edition. Pearson Education/PHI

REFERENCE BOOKS:

1. An Engineering Approach to Computer Networks-S. Keshav, 2nd Edition, Pearson Education
2. Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. AIML -I Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20AI5PC06) OOP'S THROUGH JAVA

Course Objectives:

1. To introduce the object-oriented programming concepts.
2. To understand object-oriented programming concepts, and apply them in solving problems.
3. To introduce the principles of inheritance and polymorphism; and demonstrate howthey relate to the design of abstract classes.
4. To introduce the implementation of packages and interfaces.
5. To introduce the concepts of exception handling and multithreading.
6. To introduce the design of Graphical User Interface using applets and swing controls.

Course Outcomes: The student will be able to

1. Demonstrate the concepts of OOPS using java.
2. Implement complex programs using java standard API library.
3. Build java programs using multithreading and exception handling techniques.
4. Solve the problems using java collection framework.
5. Develop interactive programs using applets and swings for the given problem.

UNIT-I

Object-Oriented Thinking- A way of viewing world – Agents and Communities, messages and methods, Responsibilities, Classes and Instances, Class Hierarchies- Inheritance, Method binding, Overriding and Exceptions, Summary of Object-Oriented concepts. Java buzzwords, An Overview of Java, Data types, Variables and Arrays, operators, expressions, control statements, Introducing classes, Methods and Classes, String handling. **Inheritance**– Inheritance concept, Inheritance basics, Member access, Constructors, Creating Multilevel hierarchy, super uses, using final with inheritance, Polymorphism-ad hoc polymorphism, pure polymorphism, method overriding, abstract classes, Object class, and forms of inheritance: specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance

UNIT-II

Packages- Defining a Package, CLASSPATH, Access protection, importing packages. Interfaces- defining an interface, implementing interfaces, Nested interfaces, applying interfaces, variables in interfaces and extending interfaces. Stream based I/O (java.io) – The Stream Classes-Byte streams and Character streams, reading console Input and Writing Console Output, File class, Reading and writing Files, Random access file operations, The Console class, Serialization, Enumerations, auto boxing, generics.

UNIT-III

Exception handling - Fundamentals of exception handling, Exception types, Termination or presumptive models, Uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws and finally, built- in exceptions, creating own exception sub classes. **Multithreading**- Differences between thread-based multitasking and process-based multitasking, Java thread model, creating threads, thread priorities, synchronizing threads, interthread communication.

UNIT-IV

The Collections Framework (java. util)- Collections overview, Collection Interfaces, The Collection classes- Array List, Linked List, Hash Set, Tree Set, Priority Queue, Array Deque. Accessing a Collection via an Iterator, Using an Iterator, The For-Each alternative, Map Interfaces and Classes, Comparators, Collection algorithms, Arrays, The Legacy Classes and Interfaces- Dictionary, Hash table, Properties, Stack, Vector More Utility classes, String Tokenizer, Bit Set, Date, Calendar, Random, Formatter, Scanner

UNIT-V

GUI Programming with Swing – Introduction, limitations of AWT, MVC architecture, components, containers. Understanding Layout Managers, Flow Layout, Border Layout, Grid Layout, Card Layout, Grid Bag Layout.

Event Handling- The Delegation event model- Events, Event sources, Event Listeners, Event classes, Handling mouse and keyboard events, Adapter classes, Inner classes, Anonymous Inner classes.

A Simple Swing Application, Applets – Applets and HTML, Security Issues, Applets and Applications, passing parameters to applets. Creating a Swing Applet, Painting in Swing, A Paint example, Exploring Swing Controls- JLabel and Image Icon, JText Field, The Swing Buttons JButton, JToggle Button, JCheck Box, JRadio Button, JTabbed Pane, JScroll Pane, JList, JCombo Box, Swing Menus, Dialogs

TEXT BOOKS:

1. Java The complete reference, 9th edition, Herbert Schildt, McGraw Hill Education (India) Pvt. Ltd.
2. Understanding Object-Oriented Programming with Java, updated edition, T. Budd, Pearson Education.

REFERENCE BOOKS:

1. An Introduction to programming and OO design using Java, J. Nino and F.A. Hosch, John Wiley &sons.
2. Introduction to Java programming, Y. Daniel Liang, Pearson Education.
3. Object Oriented Programming through Java, P. Radha Krishna, and University Press.
4. Programming in Java, S. Malhotra, S. Chudhary, 2nd edition, Oxford Univ. Press.
5. Java Programming and Object-oriented Application Development, R. A. Johnson, Cengage learning

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. AIML -I Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20AI5PC07) FORMAL LANGUAGE AUTOMATA THEORY/CD

Course Objectives:

1. To provide introduction to some of the central ideas of theoretical computer science from the perspective of formal languages.
2. To introduce the fundamental concepts of formal languages, grammars and automata theory.
3. Classify machines by their power to recognize languages.
4. Employ finite state machines to solve problems in computing.
5. To understand deterministic and non-deterministic machines.

Course Outcomes:

1. Able to employ finite state machines for modeling and solving computing problems.
2. Able to design context free grammars for formal languages.
3. Able to distinguish between decidability and undecidability.
4. Demonstrate the knowledge of patterns, tokens & regular expressions for lexical analysis.
5. Acquire skills in using lex tool and design LR parsers

UNIT-I

Introduction to Finite Automata: Structural Representations, Automata and Complexity, the Central Concepts of Automata Theory – Alphabets, Strings, Languages, Problems.

Nondeterministic Finite Automata: Formal Definition, an application, Text Search, Finite Automata with Epsilon-Transitions.

Deterministic Finite Automata: Definition of DFA, How A DFA Process Strings, The language of DFA, Conversion of NFA with €-transitions to NFA without €-transitions. Conversion of NFA to DFA

UNIT-II

Regular Expressions: Finite Automata and Regular Expressions, Applications of Regular Expressions, Algebraic Laws for Regular Expressions, Conversion of Finite Automata to Regular Expressions.

Pumping Lemma for Regular Languages: Statement of the pumping lemma, Applications of the Pumping Lemma.

Context-Free Grammars: Definition of Context-Free Grammars, Derivations Using a Grammar, Leftmost and Rightmost Derivations, the Language of a Grammar, Parse Trees, Ambiguity in Grammars and Languages.

UNIT-III

Push Down Automata: Definition of the Pushdown Automaton, the Languages of a PDA, Equivalence of PDA and CFG's, Acceptance by final state

Turing Machines: Introduction to Turing Machine, Formal Description, Instantaneous description, The language of a Turing machine

Undecidability: Undecidability, A Language that is Not Recursively Enumerable, An Undecidable Problem That is RE, Undecidable Problems about Turing Machines

UNIT-IV

Introduction: The structure of a compiler,

Lexical Analysis: The Role of the Lexical Analyzer, Input Buffering, Recognition of Tokens, The Lexical- Analyzer Generator Lex,

Syntax Analysis: Introduction, Context-Free Grammars, writing a Grammar, Top-Down Parsing, Bottom- Up Parsing, Introduction to LR Parsing: Simple LR, More Powerful LR Parsers

UNIT-V

Syntax-Directed Translation: Syntax-Directed Definitions, Evaluation Orders for SDD's, Syntax-Directed Translation Schemes, Implementing L-Attributed SDD's.

Intermediate-Code Generation: Variants of Syntax Trees, Three-Address Code
Run-Time Environments: Stack Allocation of Space, Access to Nonlocal Data on the Stack,Heap Management

TEXT BOOKS:

1. Introduction to Automata Theory, Languages, and Computation, 3nd Edition, John
2. E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Pearson Education.

REFERENCE BOOKS:

1. Compilers: Principles, Techniques and Tools, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffry
2. D. Ullman, 2nd Edition, Pearson.
3. Introduction to Formal languages Automata Theory and Computation, Kamala Krithivasan, Rama R, Pearson.
4. Introduction to Languages and The Theory of Computation, John C Martin, TMH.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. AIML -I Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20AI5PC08) MACHINE LEARNING

Course Objectives: The course will help to

1. Introduce basic concepts of Probability and Machine Learning.
2. Introduce Descriptive Statistics and data analysis along with visualization
3. Gain knowledge on Regression analysis.
4. Learn about Classification and Clustering Techniques.
5. Develop knowledge of non-Parametric machine learning algorithms and SVMs

Course Outcomes: After learning the concepts of this course, the student is able to

1. Outline the basic concepts or Probability and Machine Learning
2. Develop the Statistics and data analysis along with visualization
3. Implement the different types of regression models.
4. Implement the classification model for categorical data.
5. Analyze and develop the non-Parametric models.

UNIT-I

Introduction: What is Machine Learning, Use of Machine Learning, and Types of Machine Learning systems: supervised, unsupervised, semi-supervised Reinforcement Learning, Batch and Online learning, Main Challenges of Machine Learning.

UNIT-II

Decision Tree Learning – Introduction, decision tree representation, appropriate problems for decision tree learning, the basic decision tree l earning algorithm, hypothesis space search in decision tree learning, inductive bias in decision tree learning, issues in decision tree learning.

UNIT-III

Regression: Introduction to Regression analysis, measure of linear relationship. Regression with stats models, determining coefficient, meaning and significance of coefficients, coefficient calculation with least square method, Types or regression, Simple Linear Regression, Using Multiple features, Polynomial Regression, Metrics for Regression: MSE, RMSE, MAE

UNIT-IV

Bayesian learning – Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum Likelihood and least squared error hypotheses, Bayes optimal classifier, Gibs algorithm, Naïve Bayes classifier, an example: learning to classify text, Bayesian belief networks, the EM algorithm. Instance-Based Learning- Introduction, k-nearest neighbor algorithm, K-means

UNIT-V

SVM classification & Ensemble Method: Introduction to Random Forest, Accuracy measure & performance, SVM classification

TEXT BOOKS:

1. Hands-On Machine Learning with Scikit-Learn and Tensor Flow-Aurelien Geron, O'Reilly Media, 2017.
2. Practical Python Data Visualization: A Fast Track Approach to Learning Data Visualization with Python, Ashwin Pajankar, A Press.
3. Python: End-to-end Data Analysis-Phuong Vo.T.H, Martin Czygan, Ivan Idris, Magnus Vilhelm Persson, Luiz Felipe Martins, Packet Pub.

REFERENCE BOOKS:

1. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Francis
2. Machine Learning – Tom M. Mitchell, - MGH

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. AIML -I Sem

L	T	P	C
3	0	0	3

(20AI5PE11) EXPERT SYSTEMS
(PROFESSIONAL ELECTIVE – I)

Course Objectives:

1. Understand the basic techniques of artificial intelligence.
2. Understand the Non-monotonic reasoning and statistical reasoning.

Course Outcomes:

1. Apply the basic techniques of artificial intelligence.
2. Discuss the architecture of an expert system and its tools.
3. Understand the importance of building an expert system.
4. Understand various problems with an expert system.
5. Design application of expert system

UNIT-I

Introduction to AI programming languages, Blind search strategies, Breadth-first – Depth- first – Heuristic search techniques Hill Climbing – Best first – A Algorithms AO* algorithm – game tress, Min- max algorithms, game playing – Alpha-beta pruning.

UNIT-II

Knowledge representation issues predicate logic – logic programming Semantic nets- framesand inheritance, constraint propagation; Representing Knowledge using rules, Rules-based deduction systems.

UNIT-III

Introduction to Expert Systems, Architecture of expert systems, Representation and organization of knowledge, Basics characteristics, and types of problems handled by expert systems.

UNIT-IV

Expert System Tools: Techniques of knowledge representations in expert systems, knowledge engineering, system-building aids, support facilities, stages in the development ofexpert systems.

UNIT-V

Building an Expert System: Expert system development, Selection of the tool,Acquiring Knowledge, Building process.

Problems with Expert Systems: Difficulties, common pitfalls in planning, dealing withdomain experts, difficulties during development

TEXT BOOKS:

1. Elain Rich and Kevin Knight, “Artificial Intelligence”, Tata McGraw-Hill, NewDelhi.
2. Waterman D.A., “A Guide to Expert Systems”, Addison Wesley Longman.

REFERENCE BOOKS:

1. Stuart Russel and other Peter Norvig, “Artificial Intelligence – A Modern Approach”, Prentice- Hall.
2. Patrick Henry Winston, “Artificial Intelligence”, Addison Wesley.
3. Patterson, Artificial Intelligence & Expert System, Prentice Hall India, 1999.
4. Hayes-Roth, Lenat, and Waterman: Building Expert Systems, Addison Wesley.
5. Weiss S.M. and Kulikowski C.A., “A Practical Guide to Designing Expert Systems”, Rowman & Allan held, New Jersey.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. AIML -I Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20AI5PE12) FUZZY LOGIC
(PROFESSIONAL ELECTIVE – I)

Course Objectives:

1. To develop the fundamental concepts such as fuzzy sets, operations and fuzzy rrelations.
2. To lean about the fuzzification of scalar variables and the defuzzification of membership functions.
3. To learn three different inference methods to design fuzzy rule-based system.
4. To develop fuzzy decision making by introducing some concepts and also Bayesian decision methods
5. To learn different fuzzy classification methods.

Course Outcomes: After successful completion of the course, the students are able to

1. Understand the basic ideas of fuzzy sets, operations and properties of fuzzy sets and alsoabout fuzzy relations.
2. Understand the basic features of membership functions, fuzzification process and defuzzification process.
3. Design fuzzy rule-based system.
4. Know about combining fuzzy set theory with probability to handle random and non-random uncertainty, and the decision-making process.
5. Gain the knowledge about fuzzy C-Means clustering.

UNIT-I

Classical sets: Operations and properties of classical sets, Mapping of classical sets to the functions. Fuzzy sets - Membership functions, Fuzzy set operations, Properties of fuzzy sets. Classical and Fuzzy relations: Cartesian product, crisp relations-cardinality, operations and properties of crisp relations. Fuzzy relations-cardinality, operations, properties of fuzzy relations, fuzzy Cartesian product and composition, Fuzzy tolerance and equivalence relations, value assignments and other format of the composition operation.

UNIT-II

Fuzzification and Defuzzification: Features of the membership functions, various forms, fuzzification, defuzzification to crisp sets, λ - cuts for fuzzy relations, Defuzzification to scalars. Fuzzy logic and approximate reasoning, other forms of the implication operation.

UNIT-III

Fuzzy Systems: Natural language, Linguistic hedges, Fuzzy (Rule based) System, Aggregation of fuzzy rules, Graphical techniques of inference, Membership value assignments: Intuition, Inference, rank ordering, Fuzzy Associative memories.

UNIT-IV

Fuzzy decision making: Fuzzy synthetic evaluation, Fuzzy ordering, Preference and consensus, Multi objective decision making, Fuzzy Bayesian, Decision method, Decision making under Fuzzy states and fuzzy actions.

UNIT-V

Fuzzy Classification: Classification by equivalence relations-crisp relations, Fuzzy relations, Cluster analysis, Cluster validity, C-Means clustering, Hard C-Means clustering, Fuzzy C-Meansalgorithm, Classification metric, Hardening the Fuzzy C-Partition.

TEXT BOOKS:

1. Timothy J.Ross - Fuzzy logic with engineering applications, 3rd edition, Wiley,2010.

2. George J.KlirBo Yuan - Fuzzy sets and Fuzzy logic theory and Applications, PHI, New Delhi,1995.

REFERENCE BOOKS:

1. S.Rajasekaran, G.A.Vijayalakshmi - Neural Networks and Synthesis and Applications, PHI, New Delhi,2003.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. AIML -I Sem

L	T	P	C
3	0	0	3

(20AI5PE13) COMPUTER VISION
(PROFESSIONAL ELECTIVE – I)

Pre-Requisites: UG level Course in Linear Algebra and Probability.

Course Objectives:

1. To understand the Fundamental Concepts Related To sources, shadows and shading.
2. To understand the Geometry of Multiple Views.

Course Outcomes:

1. Implement fundamental image processing techniques required for computer vision.
2. Implement boundary tracking techniques.
3. Apply chain codes and other region descriptors, Hough Transform for line, circle,and ellipse detections.
4. Apply 3D vision techniques and Implement motion related techniques.
5. Develop applications using computer vision techniques.

UNIT-I

CAMERAS: Pinhole Cameras.

Radiometry – Measuring Light: Light in Space, Light Surfaces, Important Special Cases. **Sources, Shadows, And Shading:** Qualitative Radiometry, Sources and Their Effects, Local Shading Models, Application: Photometric Stereo, Interreflections: Global Shading Models. **Color:** The Physics of Color, Human Color Perception, Representing Color, A Model for Image Color, Surface Color from Image Color.

UNIT-II

Linear Filters: Linear Filters and Convolution, Shift Invariant Linear Systems, Spatial Frequency and Fourier Transforms, Sampling and Aliasing, Filters as Templates.

Edge Detection: Noise, Estimating Derivatives, Detecting Edges.

Texture: Representing Texture, Analysis (and Synthesis) Using Oriented Pyramids, Application: Synthesis by Sampling Local Models, Shape from Texture.

UNIT-III

The Geometry of Multiple Views: Two Views

Stereopsis: Reconstruction, Human Stereopsis, Binocular Fusion, Using More Cameras Segmentation by Clustering: What Is Segmentation? Human Vision: Grouping and Getstalt, Applications: Shot Boundary Detection and Background Subtraction, Image Segmentation by Clustering Pixels, Segmentation by Graph-Theoretic Clustering,

UNIT-IV

Segmentation by Fitting a Model: The Hough Transform, Fitting Lines, Fitting Curves, Fitting as a Probabilistic Inference Problem, Robustness

Segmentation and Fitting Using Probabilistic Methods: Missing Data Problems, Fitting, and Segmentation, The EM Algorithm in Practice.

Tracking With Linear Dynamic Models: Tracking as an Abstract Inference Problem, Linear Dynamic Models, Kalman Filtering, Data Association, Applications and Examples

UNIT-V

Geometric Camera Models: Elements of Analytical Euclidean Geometry, Camera Parameters and the Perspective Projection, Affine Cameras and Affine Projection Equations. **Geometric Camera Calibration:** Least-Squares Parameter Estimation, A Linear Approach to Camera Calibration, Taking Radial Distortion into Account, Analytical Photogrammetry, An Application: Mobile
Robot Localization.

Model-Based Vision: Initial Assumptions, Obtaining Hypotheses by Pose Consistency, Obtaining Hypotheses by pose Clustering, Obtaining Hypotheses Using Invariants, Verification, Application:

Registration in Medical Imaging Systems, Curved Surfaces and Alignment.

TEXT BOOKS:

1. David A. Forsyth and Jean Ponce: Computer Vision – A Modern Approach, PHI Learning (Indian Edition), 2009.

REFERENCE BOOKS:

1. E. R. Davies: Computer and Machine Vision – Theory, Algorithms and Practicalities,Elsevier (Academic Press), 4th edition, 2013.
2. R. C. Gonzalez and R. E. Woods "Digital Image Processing" Addison Wesley 2008.
3. Richard Szeliski "Computer Vision: Algorithms and Applications" Springer-VerlagLondon Limited 2011

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. AIML -I Sem

L	T	P	C
3	0	0	3

(20AI5PE14) DESIGN PATTENS
(PROFESSIONAL ELECTIVE – I)

Course Objectives:

1. The aim of the course is to appreciate the idea behind Design Patterns in handling common problems faced during building application.
2. This course covers all pattern types from creational to structural, behavioral to concurrency and highlights the scenarios when one pattern must be chosen over others.

Course Outcomes:

1. Analyze a software development problem and express its essence succinctly andprecisely.
2. Design a module structure to solve a problem, and evaluate alternatives.
3. Implement a module so that it executes efficiently and correctly.
4. Understand how these patterns related to object-oriented design dependability
5. Have a deeper knowledge of the principles of object-oriented design

UNIT-I

Introduction: What is a design pattern? Design patterns in Smalltalk MVC, Describing Design Patterns, The Catalog of Design Patterns, Organizing the Catalog, How Design Patterns Solve Design Problems, How to Select a Design Pattern, How to Use a Design Pattern.

UNIT-II

Designing a Document Editor: Design Problems, Document Structure, Formatting, Embellishing the User Interface, Supporting Multiple Look-and-Feel Standards, Supporting Multiple Window Systems, User Operations Spelling Checking and Hyphenation, Summary

UNIT-III

Creational Patterns: Definition Types of Creational Patterns- Abstract Factory, Builder, Factory Method, Prototype, Singleton, Object pool Pattern, Discussion of Creational Patterns.

UNIT-IV

Structural Pattern: Definition Types of Structural Patterns-Adapter Design Pattern, Bridge Design Pattern, Composite Design Pattern, Decorator Design Pattern, Façade Design Pattern, Flyweight Design Pattern, Proxy Design Pattern, Representations and Uses of Structural Patterns.

UNIT-V

Behavioral Patterns: Definition Types of Behavioral Patterns- Chain of Responsibility, Command, Interpreter, Iterator, Mediator, Memento, Observer, State, Strategy, Template Method, Visitor, Discussion of Behavioral Patterns

TEXT BOOKS:

1. Design Patterns, Erich Gamma, Pearson Education

REFERENCE BOOKS:

1. Patterns in Java, Vol–I, Mark Grand, Wiley Dream Tech.
2. Patterns in Java, Vol-II, Mark Grand, Wiley Dream Tech.
3. Java Enterprise Design Patterns Vol-III, Mark Grand, Wiley Dream Tech.
4. Head First Design Patterns, Eric Freeman, O'reily publications

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. AIML -I Sem	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

(20AI5PC09) COMPUTER NETWORKS LAB

Course Objectives:

1. To understand the working principle of various communication protocols.
2. To understand the network simulator environment and visualize a network topology and observe itsperformance
3. To analyze the traffic flow and the contents of protocol frames

Course Outcomes:

1. Implement data link layer farming methods
2. Analyze error detection and error correction codes.
3. Implement and analyze routing and congestion issues in network design.
4. Implement Encoding and Decoding techniques used in presentation layer
5. To be able to work with different network tools

List of Experiments:

1. Implement the data link layer framing methods such as character, character-stuffing and bit stuffing.
2. Write a program to compute CRC code for the polynomials CRC-12, CRC-16 and CRCCCIP
3. Develop a simple data link layer that performs the flow control using the sliding windowprotocol, and loss recovery using the Go-Back-N mechanism.
4. Implement Dijsktra's algorithm to compute the shortest path through a network
5. Take an example subnet of hosts and obtain a broadcast tree for the subnet.
6. Implement distance vector routing algorithm for obtaining routing tables at each node.
7. Implement data encryption and data decryption
8. Write a program for congestion control using Leaky bucket algorithm.
9. Write a program for frame sorting technique used in buffers.
10. Wireshark
    i. Packet Capture Using Wire shark
    ii. Starting Wire shark
    iii. Viewing Captured Traffic
    iv. Analysis and Statistics & Filters.
11. How to run Nmap scan
12. Operating System Detection using Nmap
13. Do the following using NS2 Simulator
    a. NS2 Simulator-Introduction
    b. Simulate to Find the Number of Packets Dropped
    c. Simulate to Find the Number of Packets Dropped by TCP/UDP
    d. Simulate to Find the Number of Packets Dropped due to Congestion
    e. Simulate to Compare Data Rate& Throughput.
    f. Simulate to Plot Congestion for Different Source/Destination
    g. Simulate to Determine the Performance with respect to Transmission of Packets

TEXT BOOKS:

1. Computer Networks --Andrew STanenbaum, David.j. Wetherall,5thEdition. Pearson Education/PHI

REFERENCE BOOKS:

1. An Engineering Approach to Computer Networks-S. Keshav, 2nd Edition, Pearson Education Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. AIML -I Sem	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

(20AI5PC10) OOP'S THROUGH JAVA LAB

Course Objectives:

1. To write programs using abstract classes.
2. To write programs for solving real world problems using java collection frame work.
3. To write multithreaded programs.
4. To write GUI programs using swing controls in Java.
5. To introduce java compiler and eclipse platform.
6. To impart hands on experience with java programming.

Course Outcomes: After the completion of the lab, the graduates will be able to:

1. Write programs for given real world problems using java collection frame work.
2. Build the programs using abstract classes to solve the specified problems.
3. Make use the concept of multithreading to allow parallel processing in the given program.
4. Create GUI programs using Java swing controls for the given example program.
5. Create web pages using Applets for given example problem

Note:

1. Use LINUX and MySQL for the Lab Experiments. Though not mandatory, encourage the use ofEclipse platform.
2. The list suggests the minimum program set. Hence, the concerned staff is requested to add moreproblems to the list as needed.

LIST OF EXPERIMENTS:

1. Use Eclipse or Net bean platform and acquaint with the various menus. Create a test project, add a test class, and run it. See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods, and classes. Try debug step by step with a small program of about 10 to 15 lines which contains at least one if else condition and a for loop.
2. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -, *, % operations. Add a text field to display the result. Handle any possible exceptions like divided by zero.
3. A) Develop an applet in Java that displays a simple message.
   B) Develop an applet in Java that receives an integer in one text field, and computes its factorial value and returns it in another text field, when the button named "Compute" is clicked.
4. Write a Java program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num 2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception. Display the exception in a message dialog box.
5. Write a Java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the squareof the number and prints. If the value is odd, the third thread will print the value of cube of the number.
6. Write a Java program for the following: Create a doubly linked list of elements. Delete a given element from the above list. Display the contents of the list after deletion.
7. Write a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with "Stop" or "Ready" or "Go" should appear above the buttons in selected color. Initially, there is no message shown.
8. Write a Java program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle, and

Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.

9 Suppose that a table named Table.txt is stored in a text file. 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 Labels in Grid Layout.

10. Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired (Use Adapter classes).
11. Write a Java program that loads names and phone numbers from a text file where the data is organized as one line per record and each field in a record are separated by a tab (\t). It takes a name or phone number as input and prints the corresponding other value from the hash table. (Hint: use hash tables).
12. Write a Java program that correctly implements the producer – consumer problem using the concept
of inter thread communication.
13. Write a Java program to list all the files in a directory including the files present in all its subdirectories.
14. Write a Java program that implements Quick sort algorithm for sorting a list of names in ascending order.
15. Write a Java program that implements Bubble sort algorithm for sorting in descending order and also shows the number of interchanges occurred for the given set of integers.

TEXT BOOKS:

1. Java for Programmers, P. J. Deitel and H. M. Deitel, 10th Edition Pearson education.
2. Thinking in Java, Bruce Eckel, Pearson Education.
3. Java Programming, D. S. Malik and P. S. Nair, Cengage Learning.
4. Core Java, Volume 1, 9th edition, Cay S. Horstmann and G Cornell, Pearson.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. AIML -I Sem

L	T	P	C
0	0	3	1.5

(20AI5PC11) MACHINE LEARNING LAB

Course Objectives:

1. The objective of this lab is to get an overview of the various machine learning techniques and can able to demonstrate them using python.

Course Outcomes: After the completion of the course the student can able to:

1. Understand basics of Python programming.
2. Understand modern notions in data analysis-oriented computing;
3. Analyzing data sets using python programming.
4. Be capable of confidently applying common Machine Learning algorithms in practice and implementing their own;
5. Be capable of performing experiments in Machine Learning using real-world data.

List of Experiments:

1. The probability that it is Friday and that a student is absent is 3 %. Since there are 5 school days in a week, the probability that it is Friday is 20 %. What is theprobability that a student is absent given that today is Friday? Apply Baye's rule in python to get the result. (Ans: 15%)
2. Extract the data from database using python
3. Implement k-nearest neighbors classification using python
4. Given the following data, which specify classifications for nine combinations of VAR1 and VAR2 predict a classification for a case where VAR1=0.906 and VAR2=0.606, using the result of k- means clustering with 3 means (i.e., 3 centroids)

VAR1	VAR2	CLASS
1.713	1.586	0
0.180	1.786	1
0.353	1.240	1
0.940	1.566	0
1.486	0.759	1
1.266	1.106	0
1.540	0.419	1
0.459	1.799	1
0.773	0.186	1

5. The following training examples map descriptions of individuals onto high, medium and low credit-worthiness. Medium skiing design single twenties no -> high Risk high golf trading married forties yes -> low Risk low speedway transport married thirties yes -> med Risk medium football banking single thirties yes -> low Risk high flying media married fifties yes -> high Risk
low football security single twenties no -> med Risk medium golf media single thirties yes -> med Risk medium golf transport married
forties yes -> low Risk high skiing banking single thirties yes -> high Risk low golf unemployed married forties yes -> high Risk Input attributes are (from left to right) income, recreation, job, status, age-group, home-owner. Find the unconditional probability of `golf' and the conditional probability of `single' given `med Risk' in the dataset?

6. Implement linear regression using python.
7. Implement Naïve Bayes theorem to classify the English text
8. Implement an algorithm to demonstrate the significance of genetic algorithm
9. Implement the finite words classification system using Back-propagation algorithm

TEXT BOOKS:

1. Machine Learning – Tom M. Mitchell, - MGH

REFERENCE BOOK:

1. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Francis

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. AIML -I Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**0**

(20MC5HS05) INTELLECTUAL PROPERTY RIGHTS

UNIT-I

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights

UNIT-II

Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

UNIT-III

Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law. Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT-IV

Trade Secrets: Trade secretes law, determination of trade secretes status, liability for misappropriations of trade secrets, and protection for submission, trade secretes litigation. Unfair competition: Misappropriation right of publicity, false advertising.

UNIT-V

New development of intellectual property: new developments in trade mark law; copy right law, patentlaw, intellectual property audits. International overview on intellectual property, international - trade mark law, copy right law, international patent law, and international development in trade secrets law.

TEXT & REFERENCE BOOK:

1. Intellectual property right, Deborah. E. Bouchoux, Cengage learning.
2. Intellectual property right – Unleashing the knowledge economy, Prabuddha Ganguli, Tata McGrawHill Publishing company ltd

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. AIML -I Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**0**

(20MC5HS06) PERSONALITY DEVELOPMENT AND SOFT SKILLS

Course Objectives:

1. Projecting the Right First Impression
2. Polishing manners to behave appropriately in social and professional circles
3. Enhancing the ability to handle casual and formal situations in terms of personal grooming, dining and entertaining etiquette
4. Developing and maintaining a positive attitude and being assertive
5. Mastering Cross Cultural Etiquette
6. Handling difficult situations with grace, style, and professionalism
7. To understand the importance of oral & written Communication Skills in Corporate Sector.

Course Outcomes:

1. Students will possess the personality development techniques and communication skills.
2. Students will possess knowledge about leadership.
3. Students will be able to acquire the skills to manage stress and conflict.
4. Students will able to acquire Problem Solving & Critical Thinking.
5. Students will able to acquire different resume preparation & Essay Writing Techniques

UNIT-I

Personality Development Body Language: Professional and Casual attire, Public Speaking, Strengths& Weakness, Organizational Skills, Self-Assessment

UNIT-II

Goal Setting: Time Management, Stress Management, Career Management, Confidence /Motivation, Tolerance of Change and Uncertainty.

UNIT-III

Soft Skills Grammar: Noun, Pronoun, Adjectives, Tenses, Verb, Subject + Verb, Agreement, Adverb, Preposition, Article, Conjunction. **Vocabulary:** Synonyms & Antonyms, Words often Confused & Misused **Verbal Ability:** Sentence Improvement, Reading Comprehension, Cloze Test, Sentence Rearrangements, Fill in the Blanks, Theme Detection Analogy.

UNIT-IV

Just A Minute (JAM), Group Discussion (GD), Debate, Role Play, Cognitive Skills, Leadership Qualities, Work Ethics, Problem Solving & Adaptability, Critical Thinking, Random Words, and Interview Skills: Tell me about yourself.

UNIT-V

Team Work, Self-Awareness and Presentation Skills, Resume Building: Normal Resume Preparation, Video Resume & Career Specific Resume, Email Etiquette, Essay Writing.

TEXT BOOKS:

1. Personality Development and Soft Skills - Barun K. Mitra.
2. Personality Development and Soft Skills: Preparing for Tomorrow - Shikha Kapoor.
3. Soft Skills Personality Development for Life Success – Prashanth Sharma.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. AIML -II Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20AI6PC12) ARTIFICIAL INTELLIGENCE

Course Objectives:

1. To learn the distinction between optimal reasoning Vs. human like reasoning
2. To understand the concepts of state space representation, exhaustive search, heuristic search together with the time and space complexities.
3. To learn different knowledge representation techniques.
4. To understand the applications of AI, namely game playing, theoremproving, and machine learning.

Course Outcomes:

1. Ability to formulate an efficient problem space for a problem expressed in natural language.
2. Select a search algorithm for a problem and estimate its time and space complexities.
3. Possess the skill for representing knowledge using the appropriatetechnique for a given problem
4. Possess the ability to apply AI techniques to solve problems of game playing, and machine learning.
5. Ability to design Expert system.

UNIT-I

Problem Solving by Search-I: Introduction to AI, Intelligent Agents

Problem Solving by Search –II: Problem-Solving Agents, Searching for Solutions, Uninformed Search Strategies: Breadth-first search, Uniform cost search, Depth-first search, Iterative deepening Depth-first search, Bidirectional search, informed (Heuristic) Search Strategies: A* search, Heuristic Functions, Beyond Classical Search: Hill-climbing search, Simulated annealing search.

UNIT-II

Problem Solving by Search-II and Propositional Logic

Adversarial Search: Games, Optimal Decisions in Games, Alpha–Beta Pruning.

Constraint Satisfaction Problems: Defining Constraint Satisfaction Problems.

Propositional Logic: Knowledge-Based Agents, Propositional Logic, Propositional Theorem Proving: Inference and proofs, Proof by resolution, Horn clauses and definite clauses, Forward and backward chaining, Effective Propositional Model Checking, Agents Based on Propositional Logic.

UNIT-III

Logic and Knowledge Representation

First-Order Logic: Representation, Syntax and Semantics of First-Order Logic, Using First- Order Logic, Knowledge Engineering in First-Order Logic.

Inference in First-Order Logic: Propositional vs. First-Order Inference, Unification and Lifting, Forward Chaining, Backward Chaining, Resolution.

Knowledge Representation: Ontological Engineering, Categories and Objects, Events. Mental Events and Mental Objects, Reasoning Systems for Categories, Reasoning with Default Information.

UNIT-IV

Planning Classical Planning: Definition of Classical Planning, Algorithms for Planning with State-Space Search, Planning Graphs, other Classical Planning Approaches, Analysis of Planning approaches.

Planning and Acting in the Real World: Time, Schedules, and Resources, Hierarchical Planning, Planning and Acting in Nondeterministic Domains, Multi agent Planning.

UNIT-V

Uncertain knowledge and Learning

Uncertainty: Acting under Uncertainty, Basic Probability Notation, Inference Using Full Joint Distributions, Independence, Bayes' Rule and Its Use,
Learning: Forms of Learning, Supervised Learning, Learning Decision Trees. Knowledge in Learning: Logical Formulation of Learning, Knowledge in Learning, Explanation-Based Learning, Learning Using Relevance Information, Inductive Logic Programming.

TEXT BOOKS:

1. Artificial Intelligence a Modern Approach, Third Edition, Stuart Russell and PeterNorvig, Pearson Education.
2. Artificial Intelligence by Saroj Koushik, IIT Delhi.

REFERENCE BOOKS:

1. Artificial Intelligence, 3rd Edn, E. Rich and K.Knight (TMH)
2. Artificial Intelligence, 3rd Edn., Patrick Henny Winston, Pearson Education.
3. Artificial Intelligence, Shivani Goel, Pearson Education

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. AIML -II Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20AI6PC13) ROBOTICS

Prerequisites: A course on object-oriented programming

Course Objectives:

1. covers the theory of AI and robotics from the hierarchical to the hybrid deliberative/reactive paradigm for organizing intelligence.
2. Includes sensing and programming techniques for reactive behaviors,
3. Covers architectures that provide examples of how to transfer the principles of the paradigm into a coherent, reusable implementation on a single robot or teams of robots.
4. Focuses on navigation, a critical ability for a robot that claims to be mobile.

Course Outcomes:

1. Enables students to embark on a serious robot project.
2. Ability to integrate the sensor with robots.
3. Ability to design an appropriate path paling and navigation of Robot.

UNIT-I

Introduction: Brief history, Classification of robot, Elements of robot's joints, links, actuators, and sensors

UNIT-II

Components of the Industrial Robotics: Position and orientation of a rigid body, Homogeneous transformations, Introduction to D-H parameters and its physical significance, Orientation of Gripper, Direct and inverse kinematics serial robots, Examples of kinematics of common serial manipulators.

UNIT-III

Principles of Robot Control: Planning of trajectory, Calculation of a link velocity andacceleration, Calculation of reactions forces, Trajectory-following control.

UNIT-IV

Robot programming: Robot programming methods, Robot programming languages, Requirements of a programming robots' system, The robot as a multitasking system: Flow Control, Task Control.

UNIT-V

System integration and robotic applications: Robot system integration, Robotic applications**.**

TEXT BOOKS:

1. Industrial Robotics / Groover M P /Pearson Edu.
2. Robot technology fundamentals / James G. Keramas / Cengage Publications

REFERENCE BOOKS:

1. Introduction to Robotics / John J Craig / Pearson Edu.
2. Applied Robotics / Edwin Wise / Cengage Publications.
3. Robotics / Fu K S / McGraw Hill.
4. Robotic Engineering / Richard D. Klafter, Prentice Hall.
5. Robot Analysis and Intelligence / Asada and Slow time / Wiley Inter-Science.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. AIML -II Sem

L	T	P	C
3	0	0	3

(20AI6PC14) DATA SCIENCE

Course Objectives:

1. Provide you with the knowledge and expertise to become a proficient data scientist.
2. Demonstrate an understanding of statistics and machine learning concepts that are vital for data science;
3. Produce Python code to statistically analyse a dataset;
4. Critically evaluate data visualizations based on their design and use for communicating stories from data;

Course Outcomes: After completion of course, students would be able to:

1. Explain how data is collected, managed and stored for data science;
2. Understand the key concepts in data science, including their real-world applications and the toolkit used by data scientists
3. Implement data collection and management scripts using MongoDB

UNIT-I: **Introduction**

Introduction to Data Science – Evolution of Data Science – Data Science Roles – Stages in a Data Science Project – Applications of Data Science in various fields – Data Security Issues.

UNIT-II: Data Collection and Data Pre-Processing

Data Collection Strategies – Data Pre-Processing Overview – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization

UNIT-III: Exploratory Data Analytics

Descriptive Statistics – Mean, Standard Deviation, Skewness and Kurtosis – Box Plots – PivotTable – Heat Map – Correlation Statistics – ANOVA.

UNIT-IV: Model Development

Simple and Multiple Regression – Model Evaluation using Visualization – Residual Plot – Distribution Plot – Polynomial Regression and Pipelines – Measures for In-sample Evaluation – Prediction and Decision Making.

UNIT-V: Model Evaluation

Generalization Error – Out-of-Sample Evaluation Metrics – Cross Validation – Overfitting – Under Fitting and Model Selection – Prediction by using Ridge Regression – Testing Multiple Parameters by using Grid Search.

TEXT BOOKS & REFERENCE BOOKS:

1. Jojo Moolayil, “Smarter Decisions: The Intersection of IoT and Data Science”,PACKT, 2016.
2. Cathy O’Neil and Rachel Schutt, “Doing Data Science”, O'Reilly, 2015.
3. David Dietrich, Barry Heller, Beibei Yang, “Data Science and Big data Analytics”, EMC2013
4. Raj, Pethuru, “Handbook of Research on Cloud Infrastructures for Big Data Analytics”,IGI Global.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. AIML -II Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20AI6PC15) NEURAL NETWORKS

Course Objectives:

1. To understand the biological neural network and to model equivalent neuron models.
2. To understand the architecture, learning algorithm and issues of various feed forward and feedback neural networks.

Course Outcomes: By completing this course the student will be able to:

1. Make use of the concepts of Neural Networks.
2. To select the Learning Networks in modeling real world systems.
3. Create different neural networks of various architectures both feed forward and feed backward.
4. Perform the training of neural networks using various learning rules.
5. Perform the testing of neural networks and do the perform analysis of these networks for various pattern recognition applications.

UNIT-I: **Introduction**

A Neural Network, Human Brain, Models of a Neuron, Neural Networks viewed as Directed Graphs, Network Architectures, Knowledge Representation, Artificial Intelligence and Neural Networks Learning Process: Error Correction Learning, Memory Based Learning, Hebbian Learning, Competitive, Boltzmann Learning, Credit Assignment Problem, Memory, Adaption, Statistical Nature of the Learning Process

UNIT-II: Single Layer Perceptron's

Adaptive Filtering Problem, Unconstrained Organization Techniques, Linear Least Square Filters, Least Mean Square Algorithm, Learning Curves, Learning Rate Annealing Techniques, Perceptron – Convergence Theorem, Relation Between Perceptron and Bayes Classifier for a Gaussian Environment Multilayer Perceptron: Back Propagation Algorithm XOR Problem, Heuristics, Output Representation and Decision Rule, Computer Experiment, Feature Detection.

UNIT-III: Back Propagation:

Back Propagation and Differentiation, Hessian Matrix, Generalization, Cross Validation, Network Pruning Techniques, Virtues and Limitations of Back Propagation Learning, Accelerated Convergence, Supervised Learning

UNIT-IV: Self-Organization Maps (SOM):

Two Basic Feature Mapping Models, Self-Organization Map, SOM Algorithm, Properties of Feature Map, Computer Simulations, Learning Vector Quantization, Adaptive Patter Classification.

UNIT-V: Neuro Dynamics:

Dynamical Systems, Stability of Equilibrium States, Attractors, Neuro Dynamical Models, Manipulation of Attractors as a Recurrent Network Paradigm Hopfield Models – Hopfield Models, Computer Experiment.

TEXT BOOKS:

1. Neural Networks a Comprehensive Foundations, Simon Haykin, PHI edition.

REFERENCE BOOKS:

1. Artificial Neural Networks - B. Vegnanarayana Prentice Hall of India P Ltd 2005
2. Neural Networks in Computer Intelligence, Li Min Fu MC GRAW HILLEDUCATION 2003.
3. Neural Networks -James A Freeman David M S Kapura Pearson Education 2004.
4. Introduction to Artificial Neural Systems Jacek M. Zurada, JAICO Publishing House Ed.2006.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. AIML -II Sem	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1**

(20EN6HS04) ADVANCED COMMUNICATION SKILLS LAB

Course Objectives:

This Lab focuses on using multi-media instruction for language development to meet the following targets:

1. To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
2. Further, they would be required to communicate their ideas relevantly and coherently inwriting.
3. To prepare all the students for their placements.

Course Outcomes:

1. Develop LSRW skills and soft skills.
2. Sketch the nuances of language through group activities and oral presentations.
3. Apply written communication skills to meet the needs of their academics and career endeavors.
4. Express confidence to face interviews thereby enhancing employability skills.
5. Demonstrate their social and professional communication skills.

UNIT-I

Activities on Fundamentals of Inter-personal Communication and Building Vocabulary - Starting a conversation – responding appropriately and relevantly – using the right body language – Role Play in different situations & Discourse Skills- using visuals - Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.

UNIT-II

General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading & effective googling.

UNIT-III

Activities on Writing Skills – Subject-Verb Agreement (Concord), Structure and presentation of different types of writing – letter writing/Resume writing/ e- correspondence/Technical report writing/ – planning for writing – improving one's writing.

UNIT-IV

Oral presentations (individual and group) through JAM sessions/seminars/PPTs and written presentations through posters/projects/reports/ emails/assignments etc.

UNIT-V

Activities on Group Discussion and Interview Skills – Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation- Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video-conferenceand Mock Interviews.

REFERENCE BOOKS:

1. Kumar, Sanjay and PushpLata. English for Effective Communication, Oxford University Press,2015.
2. Konar, Nira. English Language Laboratories – A Comprehensive Manual, PHI Learning Pvt.Ltd., 2011

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. AIML -II Sem	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

(20AI6PC16) TENSOR FLOW LAB

Course Objectives:

The aim of this course is to help students acquire the basic computational skills inTensorFlow and Python to implement machine learning models

Course Outcomes: students are able to

1. Be introduced to the basic concepts of TensorFlow.
2. Explore its main functions, operations, and the execution pipeline.
3. TensorFlow can be used in curve fitting, regression, classification, and the minimization of errorfunctions.
4. Apply TensorFlow for backpropagation to tune weights and biases while neural networks are being trained

1. Introduction to TensorFlow and machine learning concepts
2. Installation and setup of TensorFlow
3. Data preparation and preprocessing with Tensor flow
4. Prediction with TensorFlow
5. Monitoring and evaluating models using Tensor board
6. Building, training, and evaluating simple machine learning models in TensorFlow
7. Building, training, and evaluating convolutional neural networks (CNNs)
8. Building, training, and evaluating recurrent neural networks (RNNs)
9. Deploying TensorFlow models to different platforms
10 Using TensorFlow for computer vision and natural language processing tasks

Textbooks

1. Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems, 2nd Edition, by Aurélien Géron O'Reilly

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. CSD-II Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**0**

(20MC6HS07) CONSTITUTION OF INDIA

The Constitution of India is the supreme law of India. Parliament of India cannot make any law which violates the Fundamental Rights enumerated under the Part III of the Constitution. The Parliament of India has been empowered to amend the Constitution under Article 368; however, it cannot use this power to change the "basic structure" of the constitution, which has been ruled and explained by the Supreme Court of India in its historical judgments. The Constitution of India reflects the idea of "Constitutionalism" – a modern and progressive concept historically developed by the thinkers of "liberalism" – an ideology which has been recognized as one of the most popular political ideology and result of historical struggles against arbitrary use of sovereign power by state. The historic revolutions in France, England, America and particularly European Renaissance and Reformation movement have resulted into progressive legal reforms in the form of "constitutionalism" in many countries. The Constitution of India was made by borrowing models and principles from many countries including United Kingdom and America. The Constitution of India is not only a legal document but it also reflects social, political and economic perspectives of the Indian Society. It reflects India's legacy of "diversity". It has been said that Indian constitution reflects ideals of its freedom movement; however, few critics have argued that it does not truly incorporate our own ancient legal heritage and cultural values. No law can be "static" and here for the Constitution of India has also been amended more than one hundred times. These mendments reflect political, social and economic developments since the year 1950. The Indian judiciary and particularly the Supreme Court of India has played an historic role as the guardian of people. It has been protecting not only basic ideals of the Constitution but also strengthened the same through progressive interpretations of the text of the Constitution. The judicial activism of the Supreme Court of India and its historic contributions has been recognized throughout the world and it gradually made it "as one of the strongest courts in the world"

Course content

1. Meaning of the constitution law and constitutionalism
2. Historical perspective of the Constitution of India
3. Salient features and characteristics of the Constitution of India
4. Scheme of the fundamental rights
5. The scheme of the Fundamental Duties and its legal status
6. The Directive Principles of State Policy – Its importance and implementation
7. Federal structure and distribution of legislative and financial powers between the Union and the States
8. Parliamentary Form of Government in India – The constitution powers and status of the President of India
9. Amendment of the Constitutional Powers and Procedure
10. The historical perspectives of the constitutional amendments in India
11. Emergency Provisions: National Emergency, President Rule, Financial Emergency
12. Local Self Government – Constitutional Scheme in India
13. Scheme of the Fundamental Right to Equality
14. Scheme of the Fundamental Right to certain Freedom under Article 19
15. Scope of the Right to Life and Personal Liberty under Article 21

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. AIML -II Sem

L	T	P	C
3	0	0	3

(20AI5PE21) R PROGRAMMING
(PROFESSIONAL ELECTIVE – II)

Course Objectives:

1. Understanding and being able to use basic programming concepts
2. Automate data analysis
3. Working collaboratively and openly on code
4. Knowing how to generate dynamic documents
5. Being able to use a continuous test-driven development approach

Course Outcomes:

1. Be able to use and programing the programming language R
2. Be able to use R to solve statistical problems
3. Be able to implement and describe Monte Carlo the technology
4. Be able to minimize and maximize functions using R
5. Be able to implement object-oriented concepts in R programming

UNIT-I

Introduction: Overview of R, R data types and objects, reading and writing data, sub setting R Objects, Essentials of the R Language, Installing R, Running R, Packages in R, Calculations, Complex numbers in R, Rounding, Arithmetic, Modulo and integer quotients, Variable names and assignment, Operators, Integers, Factors, Logical operations

UNIT-II

Control structures, functions, scoping rules, dates and times, Introduction to Functions, preview of Some Important R Data Structures, Vectors, Character Strings, Matrices, Lists, Data Frames, Classes
Vectors: Generating sequences, Vectors and subscripts, extracting elements of avector using subscripts, working with logical subscripts, Scalars, Vectors, Arrays, and Matrices, Adding and Deleting Vector Elements, Obtaining the Length of a Vector, Matrices and Arrays as Vectors Vector Arithmetic and Logical Operations, Vector Indexing, Common Vector Operations

UNIT-III

Lists: Creating Lists, General List Operations, List Indexing Adding and DeletingList Elements, Getting the Size of a List, Extended Example: Text Concordance Accessing List Components and Values Applying Functions to Lists, DATA FRAMES, Creating Data Frames, Accessing Data Frames, Other Matrix-Like Operations

UNIT-IV

FACTORS AND TABLES, Factors and Levels, Common Functions Used with Factors, Working with Tables, Matrix/Array-Like Operations on Tables, extracting a Sub table, Finding the Largest Cells in a Table, Math Functions, Calculating a Probability, Cumulative Sums and Products, Minima and Maxima, Calculus,Functions for Statistical Distributions

UNIT-V

OBJECT-ORIENTED PROGRAMMING: S Classes, S Generic Functions, Writing S Classes, Using Inheritance, S Classes, Writing S Classes, Implementing a Generic Function on an S Class, visualization, Simulation, code profiling, Statistical Analysis with R, data manipulation

REFERENCE BOOKS:

1. R Programming for Data Science by Roger D. Peng.
2. The Art of R Programming by Prashanth singh, Vivek Mourya, Cengage LearningIndia.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. AIML -II Sem

L	T	P	C
3	0	0	3

(20AI5PE22) DEEP LEARNING WITH KERAS
(PROFESSIONAL ELECTIVE – II)

Course Objectives:

1. To understand the theoretical foundations, algorithms and methodologies of Neural Network
2. To design and develop an application using specific deep learning models.
3. To provide the practical knowledge in handling and analysing real world applications

Course Outcomes:

1. Recognize the characteristics of deep learning models that are useful to solve real- world problems.
2. Understand different methodologies to create application using deep nets.
3. Identify and apply appropriate deep learning algorithms foranalyzing the data for variety of problems.
4. Implement different deep learning algorithms
5. **Analyze** the concepts of unsupervised learning

UNIT-I DEEP LEARNING CONCEPTS

Fundamentals about Deep Learning Perception Learning Algorithms. Probabilistic modeling. Early Neural Networks. How deep learning different from Machine Learning. Scalars. Vectors. Matrixes, Higher Dimensional Tensors. Manipulating Tensors. Vector Data. Time Series Data.
Image Data, Video Data.

UNIT-II NEURAL NETWORKS

About Neural Network. Building Blocks of Neural Network. Optimizers. Activation Functions. Loss Functions. Data Pre-processing for neural networks, Feature Engineering. Overfitting and under fitting. Hyper parameters.

UNIT-III CONVOLUTIONAL NEURAL NETWORK

About CNN. Linear Time Invariant. Image Processing Filtering. Building a convolutional neural network. Input Layers, Convolution Layers. Pooling Layers. Dense Layers. Backpropagation through the Convolutional Layer. Filters and Feature Maps. Back propagation Through the Pooling Layers. Dropout Layers and Regularization. Batch Normalization. Various Activation Functions. Various Optimizers. LeNet, AlexNet, VGG16, ResNet. Transfer Learning with Image Data. Transfer Learning using Inception Oxford VGG Model, Google Inception Model, Microsoft ResNet Model. R-CNN, Fast R-CNN, Faster R-CNN, Mask-RCNN, YOLO

UNIT-IV NATURAL LANGUAGE PROCESSING USING RNN

About NLP & its Toolkits. Language Modeling. Vector Space Model (VSM). Continuous Bag of Words (CBOW). Skip-Gram Model for Word Embedding. Part of Speech (PoS) Global Co- occurrence Statistics–based Word Vectors. Transfer Learning. Word2Vec. Global Vectors for Word Representation Glove. Backpropagation Through Time. Bidirectional RNNs (BRNN). Long Short-term Memory (LSTM). Bi-directional LSTM. Sequence-to-Sequence Models (Seq2Seq). Gated recurrent unit GRU.

UNIT-V DEEP REINFORCEMENT & UNSUPERVISED LEARNING

About Deep Reinforcement Learning. Q-Learning. Deep Q-Network (DQN). Policy Gradient Methods. Actor-Critic Algorithm. About Autoencoding. Convolutional Auto Encoding. Variational Auto Encoding. Generative Adversarial Networks. Autoencoders for Feature Extraction. Auto Encoders for Classification. Denoising Autoencoders. Sparse Autoencoders

TEXT BOOKS

1. Deep Learning a Practitioner's Approach Josh Patterson and Adam Gibson O'Reilly Media, Inc.2017.
2. Learn Keras for Deep Neural Networks, Jojo Moolayil, Apress,2018

REFERENCE BOOKS:

1. Deep Learning Projects Using TensorFlow 2, Vinita Silaparasetty, Apress, 2020
2. Deep Learning with Python, FRANÇOIS CHOLLET, MANNING SHELTER ISLAND,2017
3. Pro Deep Learning with TensorFlow, Santanu Pattanayak, Apress,2017

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. AIML -II Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20AI5PE23) SOFTWARE TESTING & PROJECT MANAGEMENT
(PROFESSIONAL ELECTIVE – II)

Course Objectives: To understand the software testing methodologies such as flow graphs and path testing, transaction flows testing, data flow testing, domain testing, and logic base testing.

Course Outcomes:

1. Ability to apply the process of testing and various methodologies in testing for developed software.
2. Ability to write test cases for given software to test it before delivery to the customer
3. Identify and describe the key phases of project management
4. Practice the role of professional ethics in successful software development.
5. Determine an appropriate project management approach through an evaluationof the business context and scope of the project.

UNIT-I

Introduction: Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs.

Flow graphs and Path testing: - Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

UNIT-II

Transaction Flow Testing: -transaction flows, transaction flow testing techniques. Dataflow testing: Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing.

UNIT-III

Domain Testing: -domains and paths, Nice & ugly domains, domain testing, domains and interfaces testing, domain and interface testing, domains and testability.

UNIT-IV

Paths, Path products and Regular expressions: - path products & path expression, reduction procedure, applications, regular expressions & flow anomaly detection.

Logic Based Testing: - overview, decision tables, path expressions,

UNIT-V

State, State Graphs and Transition testing: - state graphs, good & bad state graphs, state testing, Testability tips.

Graph Matrices and Application: -Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools. (Student should be given an exposure to a tool like JMeter or Win-runner).

TEXT BOOKS

1. Software Testing techniques – Boris Beizer, Dreamtech, second edition.
2. Software Testing Tools – Dr. K. V. K. K. Prasad, Dreamtech.

REFERENCE BOOKS:

1. The craft of software testing - Brian Marick, Pearson Education.
2. Software Testing, 3rd edition, P.C. Jorgensen, Aurbach Publications (Dist. by SPD).
3. Software Testing, N. Chauhan, Oxford University Press.
4. Introduction to Software Testing, P. Ammann & J. Offutt, Cambridge Univ. Press.
5. Effective methods of Software Testing, Perry, John Wiley, 2nd Edition, 1999.
6. Software Testing Concepts and Tools, P. Nageswara Rao, dreamtech Press.
7. Software Testing, M. G. Limaye, TMH.

8. Software Testing, S. Desikan, G. Ramesh, Pearson.
9. Foundations of Software Testing, D. Graham & Others, Cengage Learning.
10. Foundations of Software Testing, A. P. Mathur, Pearson.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. AIML -II Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20AI5PE24) ADVANCED ALGORITHMS
(PROFESSIONAL ELECTIVE – II)

Course Objectives:

1. Introduces the recurrence relations for analyzing the algorithms.
2. Introduces the graphs and their traversals.
3. Describes major algorithmic techniques (divide-and-conquer, greedy, dynamic programming, Brute Force, Transform and Conquer approaches) and mention problems for which each technique is appropriate.
4. Describes how to evaluate and compare different algorithms using worst-case, average-case and best-case analysis.
5. Introduces string matching algorithms.
6 Introduces linear programming.

Course Outcomes:

1. Ability to analyze the performance of algorithms.
2 Ability to choose appropriate data structures and algorithm design methods for a specified application.
3. Ability to understand how the choice of data structures and the algorithm design methods impact the performance of programs.
4. Ability to come up with analysis of efficiency and proofs of correctness
5. Ability to comprehend and select algorithm design approaches in a problem specific manner

UNIT-I

Introduction: Role of Algorithms in computing, Order Notation, Recurrences, Probabilistic Analysis and Randomized Algorithms. Sorting and Order Statistics: Heap sort, Quick sort and Sorting in Linear Time. Advanced Design and Analysis Techniques: Dynamic Programming- Matrix chain Multiplication, longest common Subsequence and optimal binary Search trees.

UNIT-II

Greedy Algorithms - Huffman Codes, Activity Selection Problem. Amortized Analysis. Graph Algorithms: Topological Sorting, Minimum Spanning trees, Single Source Shortest Paths, Maximum Flow algorithms.

UNIT-III

Sorting Networks: Comparison Networks, Zero-one principle, bitonic Sorting Networks, Merging Network, Sorting Network. Matrix Operations- Strassen's Matrix Multiplication, inverting matrices, Solving system of linear Equations.

UNIT-IV

String Matching: Naive String Matching, Rabin-Karp algorithm, matching with finite Automata, Knuth-Morris - Pratt algorithm.

UNIT-V

NP-Completeness and Approximation Algorithms: Polynomial time, polynomial time verification, NP-Completeness and reducibility, NP-Complete problems. Approximation Algorithms- Vertex cover Problem, Travelling Sales person problem.

TEXT BOOKS

1. Introduction to Algorithms," T. H. Cormen, C.E. Leiserson, R. L. Rivest, and C. Stein,Third Edition, PHI.

REFERENCE BOOKS:

1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharam, Galgotia publications pvt. Ltd.
2. Design and Analysis Algorithms - Parag Himanshu Dave, Himanshu Bhalchandra Dave Publisher: Pearson
3. Algorithm Design: Foundations, Analysis and Internet examples, M.T. Goodrich and
4. R. Tomassia, John Wiley and sons.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. AIML -II Sem	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1**

(20AI5PE26) R PROGRAMMING LAB
(PROFESSIONAL ELECTIVE – II)

Course Objectives:

1. To use R interactive environment
2. Expand R by installing R packages
3. Develop loop constructs in R
4. Use R for Descriptive Statistics

Course Outcomes:

1. Be able to use and programing the programming language R
2 Be able to use R to solve statistical problems
3. Be able to implement and describe Monte Carlo the technology
4. Be able to minimize and maximize functions using R
5. Be able to implement object-oriented concepts in R programming

LIST OF PROGRAMS:

1. Write an R-Program to print Hello World
2. Write an R-Program to take input fromuser.
3. Write an R-Program to demonstrate working with operators (Arithmetic, Relational, Logical, Assignment operators).
4. Write an R Program to Check if a Number is Odd or Even
5. Write an R Program to check if the given Number is a Prime Number
6. Write an R Program to Find the Factorial of a Number
7. Write an R Program to Find the Factors of a Number
8. Write an R Program to Find the Fibonacci sequence Using Recursive Function
9. Write an R Program to Make a Simple Calculator
10. Write an R Program to Find L.C.M of two numbers
11. Write an R Program to create a Vector and to access elements in a Vector
12. Write an R Program to create a Matrix and access rows and columns usingfunctions *colnames()* and *rownames()* .
13. Write an R Program to create a Matrix using *cbind()* and *rbind()* functions.
14. Write an R Program to create a Matrix from a Vector using ***dim ()*** function.
15. Write an R Program to create a List and modify its components.
16. Write an R Program to create a Data Frame.
17. Write an R Program to access a Data Frame like a List.
18. Write an R Program to access a Data Frame like a Matrix.
19. Write an R Program to create a Factor.
20. Write an R Program to Access and Modify Components of a Factor.
21. Write an R Program to create an S3 Class and S3 Objects.
22. Write an R Program to write a own generic function in S3 Class.
23. Write an R Program to create an S4 Class and S4 Objects.
24. Write an R Program to write a own generic function in S4 Class.
25. Write an R Program to create Reference Class and modify its Methods.

TEXT BOOKS

1. R Programming for Data Science by Roger D. Peng.
2. The Art of R Programming by Prashanth singh, Vivek Mourya, Cengage LearningIndia**.**

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. AIML -II Sem	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1**

(20AI5PE27) DEEP LEARNING WITH KERAS LAB
(PROFESSIONAL ELECTIVE – II)

Course Objectives:

1. To Build the Foundation of Deep Learning.
2. To Understand How to Build the Neural Network.
3. To enable students to develop successful machine learning concepts

Course Outcomes: Upon the Successful Completion of the Course, the Students would be able to:

1. Learn the Fundamental Principles of Deep Learning.
2 Identify the Deep Learning Algorithms for Various Types of Learning Tasks in various domains.
3. Implement Deep Learning Algorithms and Solve Real-world problems.

LIST OF EXPERIMENTS:

1. Setting up the Spyder IDE Environment and Executing a Python Program
2. Installing Keras, TensorFlow and Pytorch libraries and making use of them
3. Applying the Convolution Neural Network on computer vision problems
4. Image classification on MNIST dataset (CNN model with Fully connected layer)
5. Applying the Deep Learning Models in the field of Natural Language Processing
6. Train a sentiment analysis model on IMDB dataset, use RNN layers with LSTM/GRU notes
7. Applying the Autoencoder algorithms for encoding the real-world data.
8. Applying Generative Adversial Networks for image generation and unsupervised tasks.

TEXT BOOKS

1. Deep Learning a Practitioner's Approach Josh Patterson and Adam Gibson O'Reilly Media, Inc.2017.
2. Learn Keras for Deep Neural Networks, Jojo Moolayil, Apress,2018

REFERENCES

1. Deep Learning Projects Using TensorFlow 2, Vinita Silaparasetty, Apress, 2020
2. Deep Learning with Python, FRANÇOIS CHOLLET, MANNING SHELTER ISLAND,2017
3. Pro Deep Learning with TensorFlow, Santanu Pattanayak, Apress,2017

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. AIML -II Sem	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1**

(20AI5PE28) SOFTWARE TESTING & PROJECT MANAGEMENT LAB
(PROFESSIONAL ELECTIVE – II)

Course Objectives:

1. To provide knowledge of project and Software Testing Methods.
2. To gain the knowledge on SDLC management
3. To develop skills in software test automation and management using latest tools

Course Outcomes:

1. To understand various SDLC models
2 Design and develop the best test strategies in accordance to the development model.

LAB PROGRAMS

1. Write a program to implement function point analysis method.
2. Write a program to implement Walston-Felix Model and SEL Model and compare both.
3. Design the Constructive Cost Model to calculate effort and development time for organic, semidetached and embedded modes based on estimated size of the project.
4. Write a program to implement intermediate COCOMO model to estimate effort, development time and average staff size.
5. Implement detailed COCOMO model to determine cost and schedule estimates fordifferent phases.
6. Recording in context sensitive mode and analog mode.
7. GUI checkpoint for multiple objects.
8. Database checkpoint for Default check.
9. a) Data driven test for dynamic test data submission.
   b) Data driven test through flat files.
   c) Data driven test through front grids
   d) Data driven test through excel test
10. a) Batch testing without parameter passing.
    b) Batch testing with parameter passing
11. Silent mode test execution without any interruption
12 Test Case for Calculator in Windows Application
13 Test Cases for Mobile Application Testing

TEXT BOOKS

1. Software Testing techniques - Baris Beizer, Dreamtech, second edition.
2. Software Testing Tools – Dr. K. V. K. K. Prasad, Dreamtech.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. AIML -II Sem	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1**

(20AI5PE29) ADVANCED ALGORITHMS LAB
(PROFESSIONAL ELECTIVE – II)

Course Objectives:

1. The fundamental design, analysis, and implementation of basic data structures.
2. Basic concepts in the specification and analysis of programs.
3. Principles for good program design, especially the uses of data abstraction.
4. Sample Problems on Data structures:

Programs

1. Write Java programs that use both recursive and non-recursive functions for implementing the following searching methods:
   i. Linear search
   ii. Binary search
2. Write Java programs to implement the following using arrays and linked lists
   i. List ADT
3. Write Java programs to implement the following using an array.
   i. Stack ADT
   ii. Queue ADT
4. Write a Java program that reads an infix expression and converts the expression to postfix form. (Use stack ADT).
5. Write a Java program to implement circular queue ADT using an array.
6. Write a Java program that uses both a stack and a queue to test whether the given string isa palindrome or not.
7. Write Java programs to implement the following using a singly linked list.
   i. Stack ADT
   ii. Queue ADT
8. Write Java programs to implement the deque (double ended queue) ADT using
   i. Array
   ii. Singly linked list
   iii. Doubly linked list.
9. Write a Java program to implement priority queue ADT.
10. Write a Java program to perform the following operations
    i. Construct a binary search tree of elements.
    ii. Search for a key element in the above binary search tree.
    iii. Delete an element from the above binary search tree.
11. Write a Java program to implement all the functions of a dictionary (ADT) usingHashing.
12. Write a Java program to implement Dijkstra's algorithm for Single source shortest path problem.
13. Write Java programs that use recursive and non-recursive functions to traverse the givenbinary tree in
    i. Preorder
    ii. In order
    iii. Post order.
14. Write Java programs for the implementation of bfs and dfs for a given graph.
15. Write Java programs for implementing the following sorting methods:
    i. Bubble sort
    ii. Merge sort
    iii. Binary tree sort
    iv. Insertion sort

v. Heap sort
vi. Quick sort
vii. Radix sort

16. Write a Java program to perform the following operations:
    i. Insertion into a B-tree
    ii. Searching in a B-tree

17. Write a Java program that implements Kruskal's algorithm to generate minimum costspanning tree.
18. Write a Java program that implements KMP algorithm for pattern matching.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. AIML -II Sem

L	T	P	C
3	0	0	3

(20CS6OE11) JAVA
(OPEN ELECTIVE- I)

Course Objectives:

1. To introduce the object-oriented programming concepts.
2. To understand object-oriented programming concepts, and apply the minsolving problems.
3. To introduce the principles of inheritance and polymorphism; and demonstrate how they relate to the design of abstract classes.
4. To introduce the implementation of packages and interfaces.
5. To introduce the concepts of exception handling and multithreading.
6. To introduce the design of Graphical User Interface using applets and swing controls.

Course Outcomes:

1. Demonstrate the concepts of OOPS using java.
2. Implement complex programs using java standard AP I library.
3. Build java programs using multithreading and exception handling techniques.
4. Solve the problems using java collection framework.
5. Develop inter active programs using applets and swings for the given problem.

UNIT-1

Object-Oriented Thinking- A way of viewing world – Agents and Communities, messages and methods, Responsibilities, Classes and Instances, Class Hierarchies- Inheritance, Method binding, Overriding and Exceptions, Summary of Object-Oriented concepts. Java buzzwords, An Overview of Java, Data types, Variables and Arrays, operators, expressions, control statements, Introducing classes, Methods and Classes, String handling.

I**nheritance**–Inheritance concept, Inheritance basics, Member access, Constructors, Creating Multilevel hierarchy, super uses, using final with inheritance, Polymorphism-ad hoc polymorphism, pure polymorphism, method overriding, abstract classes, Object class, and forms of in heritance: specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance.

UNIT II

Packages- Defining a Package, CLASSPATH, Access protection, importing packages. Interfaces- defining an interface, implementing interfaces, Nested interfaces, applying interfaces, variables in interfaces and extending interfaces. Stream based I/O (java.io) – The Stream classes- Byte streams and Character streams, reading console Input and Writing Console Output, File class, Reading and writing Files, Random-access file operations, The Console class, Serialization, Enumerations, auto boxing, generics.

UNIT III

Exception handling - Fundamentals of exception handling, Exception types, Termination or presumptive models, Uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws and finally, built- in exceptions, creating own exception sub classes. Multithreading- Differences between thread- based multitasking and process-based multitasking, Java thread model, creating threads, thread priorities, synchronizing threads, inter thread communication.

UNIT –IV

The Collections Framework (java. util)-Collections overview, Collection Interfaces, The Collection classes- Array List, Linked List, Hash Set, Tree Set, Priority Queue, Array Deque. Accessing a Collection via an Iterator, Using an Iterator, The For-Each alternative, Map Interfaces and Classes, Comparators, Collection algorithms, Arrays, The Legacy Classes and Interfaces- Dictionary, Hash table, Properties, Stack, Vector More Utility classes, String Tokenizer, Bit Set, Date, Calendar, Random, Formatter, Scanner

UNIT –V

GUI Programming with Swing–

Introduction, limitations of AWT, MVC architecture, components, containers. Understanding Layout Managers, Flow Layout, Border Layout, Grid Layout, Card Layout, Grid Bag Layout.

Event Handling- The Delegation event model- Events, Event sources, Event Listeners, Event classes, Handling mouse and keyboard events, Adapter classes, Inner classes, Anonymous Inner classes.

A Simple Swing Application, Applets – Applets and HTML, Security Issues, Applets and Applications, passing parameters to applets. Creating a Swing Applet, Painting in Swing, A Paint example, Exploring Swing Controls- J Label and Image Icon, Jet Field, The Swing Buttons J Button, J Toggle Button, J Check Box, J Radio Button, J Tabbed Pane, J Scroll Pane, J List, J Combo Box, Swing Menus, Dialogs.

TEXT BOOKS:

1. Java The complete reference,9th edition, Herbert Schildt, McGrawHill Education (India)Pvt. Ltd.
2. Under Standing Object-Oriented Programming with Java Updated edition T Budd Person Education.

REFERENCE BOOKS:

1. An Introduction to programming and OO design using Java, J.Nino and F.A.Hosch, John Wiley &sons.
2. Introduction to Java programming, Y.DanielLiang, Pearson Education.
3. Object Oriented Programming through Java, P.RadhaKrishna, and University Press.
4. Programming in Java, S. Malhotra, S. Chudhary,2ndedition, Oxford Univ. Press.
5. Java Programming and Object- oriented Application Development, R.A.Johnson, Cengage learning.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

III Year B.Tech. AIML-II Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20CS6OE12) COMPUTER ORGANIZATION & ARCHITECTURE
(OPEN ELECTIVE- I)

Course Objectives: To learn

1. To have a thorough understanding of the basic structure and operation of a digital computer.
2. To discuss in detail the operation of the arithmetic unit including the algorithms & implementation of fixed-point and floating-point addition, subtraction, multiplication & division.
3. To study the different ways of communicating with I/O devices and standard I/O interfaces.
4. To study the hierarchical memory system including cache memories and virtual memory.
5. To demonstrate the knowledge of functions of operating system memory management scheduling, file system and interface, distributed systems, security and dead locks.
6. To implement a significant portion of an Operating System.

Course Outcomes: Upon completion of the course, students will have through knowledge about:

1. Sketch the basic structure of a digital computer.
2. Sketch the Arithmetic operations of binary number system.
3. Identify the organization of the Control Unit, Arithmetic and Logical Unit, Memory Unit.
4. Illustrate the design of Memory unit and overview of Principles of Deadlock.
5. Compile the major activities of OS with regard to file management

UNIT-1

Basic Structure of Computers: Computer Types, Functional UNIT, Basic Operational Concepts, Bus, Structures, Software, Performance, Multiprocessors and Multi Computers, Data Representation, Fixed Point Representation, Floating - Point Representation.

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, Instruction Codes, Computer Registers Computer Instructions - Instruction Cycle.

Memory - Reference Instructions, Input - Output and Interrupt, STACK Organization, Instruction Formats, Addressing Modes, DATA Transfer and Manipulation, Program Control, Reduced Instruction Set Computer.

UNIT II

Micro Programmed Control: Control Memory, Address Sequencing, Micro program Examples, Design of Control Unit, Hard Wired Control, Micro programmed Control.

The Memory System: Basic Concepts of Semiconductor RAM Memories, Read-Only Memories, Cache Memories Performance Considerations, Virtual Memories secondary Storage, Introduction to RAID.

UNIT III

Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer Modes, Priority Interrupt, Direct Memory Access, Input-Output Processor (IOP), Serial Communication; Introduction to Peripheral Components, Interconnect (PCI) Bus, Introduction to Standard Serial Communication Protocols like RS232, USB, IEEE1394.

UNIT –IV

Operating Systems Overview: Overview of Computer Operating Systems Functions, Protection and Security, Distributed Systems, Special Purpose Systems, Operating Systems Structures-Operating System Services and Systems Calls, System Programs, Operating System Generation.

Memory Management: Swapping, Contiguous Memory Allocation, Paging, Structure of the Page Table, Segmentation, Virtual Memory, Demand Paging, Page-Replacement Algorithms, Allocation of Frames,

Thrashing Case Studies - UNIX, Linux, Windows
Principles of Deadlock: System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery from Deadlock.

UNIT –V
File System Interface: The Concept of a File, Access Methods, Directory Structure, File System Mounting, File Sharing, Protection.
File System Implementation: File System Structure, File system Implementation, Directory Implementation, Allocation Methods, Free-Space Management.

TEXT BOOKS:

1. Computer Organization - Carl Hamacher, ZvonksVranesic, SafeaZaky, 5th Edition, McGraw Hill.
2. Computer System Architecture - M. moris mano, 3rd edition, Pearson
3. Operating System Concepts - AbrehamSilberchatz, Peter B. Galvin, Greg Gagne, 8th Edition, John Wiley

REFERENCE BOOKS:

1. Computer Organization and Architecture - William Stallings 6th Edition, Pearson
2. Structured Computer Organization - Andrew S. Tanenbaum, 4th Edition, PHI
3. Fundamentals of Computer Organization and Design – Sivaraama Dandamudi, Springer Int. Edition
4. Operating Systems - Internals and Design Principles, Stallings, 6th Edition - 2009, Pearson Education.
5. Modern Operating Systems, Andrew S Tanenbaum 2nd Edition, PHI
6. Principles of Operating System, B. L. Stuart, Cengage Learning, India Edition.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

IV Year B.Tech. AIML -I Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20AI7PC17) DEEP LEARNING

Course Objectives:

1. To introduce the foundations of Artificial Neural Networks
2. To acquire the knowledge on Deep Learning Concepts
3. To learn various types of Artificial Neural Networks
4. To gain knowledge to apply optimization strategies

Course Outcomes:

1. Ability to assess the concepts of Neural Networks
2. Ability to select the Learning Networks in modeling real world systems
3. Ability to use an efficient algorithm for Deep Models
4. Ability to apply optimization strategies for large scale applications.
5. Gain knowledge about auto encoders and encoder models.

UNIT-I

Introduction to Deep Learning, Bayesian Learning, Decision Surfaces, History of Deep Learning, Deep Learning Success Stories, McCulloch Pitts Neuron, Linear Classifiers, Linear Machines with Hinge Loss, Optimization Techniques, Gradient Descent, Batch Optimization, Multilayer Perceptron's (MLPs), Representation Power of MLPs, Sigmoid Neurons, Gradient Descent, Feed Forward Neural Networks, Back propagation.

UNIT-II

Gradient Descent (GD), Momentum Based GD, Nesterov Accelerated GD, Stochastic GD, Principal Component Analysis and its interpretations, Singular Value Decomposition, Auto encoders and relation to PCA, Multilayer Perceptron, Back Propagation Learning, Unsupervised Learning with Deep Network, Auto encoders.

UNIT-III

Convolutional Neural Network, building blocks of CNN, Transfer Learning, Revisiting Gradient Descent, Momentum Optimizer, RMS Prop, Adam, Effective training in Deep Net- early stopping, Dropout.

UNIT-IV

Learning Vectorial Representations of Words, Convolutional Neural Networks, Classical Supervised Tasks with Deep Learning.

UNIT-V

Generative Modeling with DL, Variational Autoencoder, Generative Adversarial Network Revisiting Gradient Descent, Encoder Decoder Models, Attention Mechanism, Attention overimages.

TEXT BOOKS

1. Deep Learning: An MIT Press Book by Ian Goodfellow and Yoshua Bengio and Aaron Courville.
2. Deep Learning, K.Bhargavi, K.M.V Madan Kumar, N.Vadivelan, an Notion Press,2022.
3. Neural Networks and Learning Machines, Simon Haykin, 3rd Edition, Pearson PrenticeHall.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

IV Year B.Tech. AIML-I Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20CS7OE21) OPERATING SYSTEM
OPEN ELECTIVE–II

Prerequisites:

- **A course on "Computer Programming and Data Structures".**
- **A course on "Computer Organization and Architecture".**

Course Objectives: To learn

1. Provide an introduction to operating system concepts (i.e., processes, threads, scheduling, synchronization, dead locks, memory management, file and I/O sub systems and protection.
2. Introduce the issues to be considered in the design and development of operating system.
3. Introduce basic Unix commands, system call interface for process management, interposes communication and I/O in Unix.

Course Outcomes: Upon completion of the course, students will have through knowledge about:

1. Demonstrate the fundamental components of a computer operating system.
2. Identify appropriate scheduling algorithm for process management.
3. Solve the situations occurred by deadlock to maintain appropriate process synchronization.
4. Make use of page replacement algorithm for effective memory management.
5. Apply the various system calls to enable the operating system services.

UNIT-1

Operating System - Introduction, Structures - Simple Batch, Multi programmed, Time-shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating System services, System Calls.

UNIT II

Process and CPU Scheduling - Process concepts and scheduling, Operations on processes, Cooperating Processes, Threads, and Interposes Communication, Scheduling Criteria, Scheduling Algorithms, Multiple -Processor Scheduling.

System call inter face for process management-fork, exit, wait, waitpid, and exec.

UNIT III

Deadlocks-System Model, Deadlocks Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock Process

Management and Synchronization-The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors.

Inter process Communication Mechanisms: IPC between processes on a single computer system, IPC between processes on different systems, using pipes, FIFOs, message queues, shared memory.

UNIT –IV

Memory Management and Virtual Memory-Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging, Demand Paging, Page Fault, Page Replacement, Page Replacement Algorithms.

UNIT –V

File System Interface and Operations -Access methods, Directory Structure, Protection, File System Structure, Allocation methods, Free-space Management. Usage of open, create, read, write, close, lseek, stat, ioctl system calls, System Protection-Goals.

TEXT BOOKS:

1. Operating System Principles-Abraham Silberchatz peter
   B. Galvin, GregGagne7thEdition, JohnWiley
2. Advanced programming in the UNIX environment, W.R.Stevens, Pearson education

REFERENCE BOOKS:

1. Operating Systems – Internals and Design Principles Stallings, Fifth Edition–2005, Pearson Education /PHI.
2. Operating System A Design Approach-Crowley,TMH.
3. Modern Operating Systems, Andrew S.Tanenbaum 2nd edition,Pearson/PHI.
4. UNIX programming environment, Kernighan andPike,PHI/Pearson Education.
5. UNIX Internals-The New Frontiers, U.Vahalia, Pearson Education.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

IV Year B.Tech. AIML-I Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20CS7OE22) ARTIFICIALINTELLIGENCE
OPEN ELECTIVE–II

Course Objectives: To learn

1. To learn the distinction between optimal reasoning Vs. human like reasoning
2. To understand the concepts of state space representation, exhaustive search, heuristic search together with the time and space complexities.
3. To learn different knowledge representation techniques.
4. To understand the applications of AI, namely game playing, theorem proving, and machine learning.

Course Outcomes:

1. Ability to formulate an efficient problem space, expressed in natural language.
2. Select a search algorithm for a problem and estimate its time and space complexities.
3. Possess the skill for representing knowledge using the appropriate technique for a given problem.
4. Apply AI techniques to solve problems of game playing, and machine learning.
5. Acquire the knowledge on machine learning techniques.

UNIT-1

Problem Solving by Search-I: Introduction to AI, Intelligent Agents

Problem Solving by Search –II: Problem-Solving Agents, Searching for Solutions, Uninformed Search Strategies: Breadth-first search, Uniform cost search, Depth-first search, Iterative deepening Depth-first search, Bidirectional search, Informed (Heuristic) Search Strategies: Greedy best-first search, A* search, Heuristic Functions, Beyond Classical Search: Hill-climbing search, Simulated annealing search, Local Search in Continuous Spaces, Searching with Non-Deterministic Actions, Searching with Partial Observations, Online Search Agents and Unknown Environment .

UNIT II

Problem Solving by Search-II and Propositional Logic

Adversarial Search: Games, Optimal Decisions in Games, Alpha–Beta Pruning, Imperfect Real-Time Decisions.

Constraint Satisfaction Problems: Defining Constraint Satisfaction Problems, Constraint Propagation, Backtracking Search for CSPs, Local Search for CSPs, The Structure of Problems.

Propositional Logic: Knowledge-Based Agents, The Wumpus World, Logic, Propositional Logic, Propositional Theorem Proving: Inference and proofs, Proof by resolution, Horn clauses and definite clauses, Forward and backward chaining, Effective Propositional Model Checking, Agents Based on Propositional Logic.

UNIT III

Logic and Knowledge Representation: First-Order Logic: Representation, Syntax and Semantics of First-Order Logic, Using First-Order Logic, Knowledge Engineering in First-Order Logic.

Inference in First-Order Logic: Propositional vs. First-Order Inference, Unification and Lifting, Forward Chaining, Backward Chaining, Resolution.

Knowledge Representation: Ontological Engineering, Categories and Objects, Events. Mental Events and Mental Objects, Reasoning Systems for Categories, Reasoning with Default Information.

UNIT –IV

Planning: Classical Planning: Definition of Classical Planning, Algorithms for Planning with State-Space Search, Planning Graphs, other Classical Planning Approaches, Analysis of Planning approaches.

Planning and Acting in the Real World: Time, Schedules, and Resources, Hierarchical Planning, Planning and Acting in Nondeterministic Domains, Multi agent Planning.

UNIT –V

Uncertain knowledge and Learning: Uncertainty: Acting under Uncertainty, Basic Probability Notation, Inference Using Full Joint Distributions, Independence, Bayes' Rule and Its Use, **Probabilistic Reasoning**: Representing Knowledge in an Uncertain Domain, The Semantics of Bayesian Networks, Efficient Representation of Conditional Distributions, Approximate Inference in Bayesian Networks, Relational and First-Order Probability, Other Approaches to Uncertain Reasoning; Dempster-Shafer theory.

Learning: Forms of Learning, Supervised Learning, Learning Decision Trees. Knowledge in Learning: Logical Formulation of Learning, Knowledge in Learning, Explanation-Based Learning, Learning Using Relevance Information, Inductive Logic Programming.

TEXT BOOKS:

1. Artificial Intelligence a Modern Approach, Third Edition, Stuart Russell and Peter Norvig, Pearson Education.

REFERENCE BOOKS:

1. Artificial Intelligence, 3rd Edn, E. Rich and K.Knight (TMH)
2. Artificial Intelligence, 3rd Edn., Patrick Henny Winston, Pearson Education.
3. Artificial Intelligence, Shivani Goel, Pearson Education.
4. Artificial Intelligence and Expert systems – Patterson, Pearson Education.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

IV Year B.Tech. AIML -I Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20AI7PE31) ADVANCED PYTHON PROGRAMMING
PROFESSIONAL ELECTIVE – III

Course Objectives:
The course should enable the students:
1. Describe the semantics of Python programming language and illustrate the process of structuring the data using lists, dictionaries, tuples, strings and sets.
2. Illustrate the Object-oriented Programming concepts in Python.
3. Demonstrate the basic database design for storing data as part of a multi-step data gathering, analysis, and processing.
4. Familiarize the basics of machine learning using an approachable, and also understand the advantage of using Python libraries for implementing Machine Learning models.

Course Outcomes:
1. Interpret the basic principles of Python programming language.
2. Articulate the Object-Oriented Programming concepts such as encapsulation, inheritance and polymorphism as used in Python
3. Identify the commonly used operations involving file systems and regular expressions.
4. Implement database and GUI applications.
5. Implement Machine Learning algorithms

UNIT-I
Introduction to Python, use IDLE to develop programs, Basic coding skills, working with data types and variables, working with numeric data, working with string data, Python functions, Boolean expressions, selection structure, iteration structure, working with lists, work with a list of lists, work with tuples, work with dates and times, get started with dictionaries.

UNIT-II
Classes in Python: OOPS Concepts, Classes and objects, Classes in Python, Constructors, Data hiding, Creating Classes, Instance Methods, Special Methods, Class Variables, Inheritance, Polymorphism, Type Identification, Custom Exception Classes, Iterators, generators and decorators.

UNIT-III
I/O and Error Handling In Python: Introduction, Data Streams, Creating Your Own Data Streams, Access Modes, Writing Data to a File, Reading Data From a File, Additional File Methods, Handling IO Exceptions, Errors, Run Time Errors, The Exception Model, Exception Hierarchy, Handling Multiple Exceptions, Working with Directories.

UNIT-IV
An Introduction to relational databases: SQL statements for data manipulation, Using SQLite Manager to work with a database, Using Python to work with a database, creating a GUI that handles an event, working with components.

UNIT-V
Implement Machine Learning algorthims: Usage of NumPy for numerical Data, Usage of Pandas for Data Analysis, Matplotlib for Python plotting, Seaborn for Statical plots, interactive Dynamic visualizations, SciKit for Machine learning.

TEXT BOOKS
1. Michael Urban and Joel Murach, Python Programming, Shroff/Murach, 2016.

2. Halterman python
3. Mark Lutz, Programming Python, O`Reilly, 4th Edition ,2010.

REFERENCE BOOKS:

1. Automate the Boring Stuff with Python: Practical Programming for Total Beginners Authors- AI Sweigart.
2. Programming Python: Powerful Object-Oriented Programming Author- Mark Lutz.
3. Introduction to Machine Learning with Python Authors- Andreas C. Muller and Sarah Guido.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

IV Year B.Tech. AIML -I Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20AI7PE32) WEB TECHNOLOGIES
(PROFESSIONAL ELECTIVE – III)

Course Objectives:

1. To introduce HTML Common Tags
2. To introduce PHP language for server-side scripting
3. To introduce XML and processing of XML Data with Java
4. To introduce Server-side programming with Java Servlets and JSP
5. To introduce Client-side scripting with Java script and AJAX.

Course Outcomes:

1. Apply the concepts of PHP in creating web pages and connecting todatabase (My sql)
2. Apply the concepts of XML for structuring the web pages.
3. Make use of Servlets to create dynamic web pages in client-server architecture.
4. Make use of JSP to develop interactive web pages.
5. Apply the techniques of Java script in client-side scripting

UNIT-I

TML Common tags- List, Tables, images, forms, Frames; Cascading Style sheets.

Introduction to PHP: Declaring variables, data types, arrays, strings, operators, expressions, control structures, functions, reading data from web form controls like text boxes, radio buttons, lists etc., Handling File Uploads. Connecting to database (MySQL as reference), executing simple queries, handling results, Handling sessions and cookies

File Handling in PHP: File operations like opening, closing, reading, writing, appending, deleting etc. on text and binary files, listing directories.

UNIT-II

XML: Introduction to XML, Defining XML tags, their attributes and values, Document Type Definition, XML Schemes, Document Object Model, XHTML Parsing XML Data – DOM and SAX Parsers in java.

UNIT-III

Introduction to Servlets: Common Gateway Interface (CGt), Life cycle of a Servlet, deploying a servlet, The Servlet API, Reading Servlet parameters, Reading Initialization parameters, Handling Http Request & Responses, Using Cookies and Sessions, connecting to a database using JDBC.

UNIT-IV

Introduction to JSP: The Anatomy of a JSP Page, JSP Processing, Declarations, Directives, Expressions, Code Snippets, implicit objects, Using Beans in JSP Pages, Using Cookies and session for session tracking, connecting to database in JSP.

UNIT-V

Client-side Scripting: Introduction to Java script, Java script language – declaring variables, scope of variables, functions. event handlers (onclick, on submit etc.), Document Object Model, Form validation.

TEXT BOOKS

1. Web Technologies, Uttam K Roy, Oxford University Press
2. The Complete Reference PHP — Steven Holzner, Tata McGraw-Hill

REFERENCE BOOKS:

1. Web Programming, building internet applications, Chris Bates 2″ edition, Wiley Dreamtech
2. Java Server Pages —Hans Bergsten, SPD O'Reilly,

3. Java Script, D.Flanagan
4. Beginning Web Programming-Jon Duckett WROX.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

IV Year B.Tech. AIML -I Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20AI7PE33) NATURAL LANGUAGE PROCESSING
(PROFESSIONAL ELECTIVE – III)

Prerequisites: Data structures, finite automata and probability theory

Course Objectives: Introduce to some of the problems and solutions of NLP and their relation to linguistics and statistics.

Course Outcomes:

1. Show sensitivity to linguistic phenomena and an ability to model them with formal grammars.
2. Understand and carry out proper experimental methodology for training and evaluating empirical NLP systems
3. Able to manipulate probabilities, construct statistical models over strings and trees, and estimate parameters using supervised and unsupervised training methods.
4. Able to design, implement, and analyze NLP algorithms
5. Able to design different language modeling Techniques.

UNIT-I

Finding the Structure of Words: Words and Their Components, Issues and Challenges, Morphological Models

Finding the Structure of Documents: Introduction, Methods, Complexity of the Approaches, Performances of the Approaches

UNIT-II

Syntax Analysis: Parsing Natural Language, Treebanks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms, Models for Ambiguity Resolution in Parsing, Multilingual Issues

UNIT-III

Semantic Parsing: Introduction, Semantic Interpretation, System Paradigms, Word Sense Systems, Software.

UNIT-IV

Predicate-Argument Structure, Meaning Representation Systems, Software.

UNIT-V

Discourse Processing: Cohesion, Reference Resolution, Discourse Cohesion andStructure **Language Modeling:** Introduction, N-Gram Models, Language Model Evaluation,Parameter Estimation, Language Model Adaptation, Types of Language Models, Language- Specific Modeling Problems, Multilingual and Cross lingual Language Modeling

TEXT BOOKS

1. Multilingual natural Language Processing Applications: From Theory to Practice – Daniel M. Bikel and Imed Zitouni, Pearson Publication.
2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S. Tiwary

REFERENCE BOOKS:

1. Speech and Natural Language Processing - Daniel Jurafsky & James H Martin, Pearson Publications

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

IV Year B.Tech. AIML -I Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20AI7PE34) INTERNET OF THINGS(PROFESSIONAL
(PROFESSIONAL ELECTIVE – III)

Course Objectives:

1. To introduce the terminology, technology and its applications.
2. To introduce the concept of M2M (machine to machine) with necessary protocols.
3. To introduce the Python Scripting Language which is used in many IoT devices.
4. To introduce the Raspberry PI platform, that is widely used in IoT applications.
5. To introduce the implementation of web-based services on IoT devices.

Course Outcomes:

1. To interpret the knowledge on areas to be used and protocols of communication inIoT.
2. To compare and contrast software and hardware things in different networks.
3. To extend the knowledge on python and its libraries used in IoT.
4. To apply the skills to develop the small-scale things.
5. To illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.

UNIT-I

Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT – IoT rotocols, IoT communication models, Iot Communication APIs IoT enabled Technologies-Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates Domain Specific IoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle

UNIT-II

IoTandM2M–Software defined networks, network function virtualization, difference between SDN and NFV for IoT Basics of IoT System Management with NETCONF, YANG- NETCONF, YANG, SNMP NETPEER.

UNIT-III

Introduction to Python - Language features of Python, Data types, data structures, Control of flow, functions, modules, packaging, file handling, data / time operations, classes, Exception handling Python packages- JSON, XML, HTTPLib, URLLib, SMTPLib.

UNIT-IV

IoT Physical Devices and Endpoints - Introduction to Raspberry PI-Interfaces (serial, SPI, I2C) Programming – Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, reading input from pins

UNIT-V

IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage models and communication APIs Webserver – Web server for IoT, Cloud for IoT, Python web application framework designing a RESTful web API.

TEXT BOOKS

1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press,2015, ISBN: 9788173719547.
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN:9789350239759.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

IV Year B.Tech. AIML -I Sem	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1**

(20AI7PE36) ADVANCED PYTHON PROGRAMMING LAB
(PROFESSIONAL ELECTIVE – III)

Course Outcomes:

1. Apply exception handling and user defined exception(s) (L3)
2. Develop Module(s) and Package(s) in python (L3)
3. Make use of Pandas and Numpy Libraries (L4)
4. Implement Object Oriented concepts in programming (L3)
5. Apply Collection modules for the data types (L3)

LIST OF PROGRAMS: (Any 12 programs from the following to be performed)

1. Exception Handling and User defined exception(s)
    a) Write a python program to catch following exception i) Value Error ii) Index Error Name Error iv) Type Error v) Divide Zero Error
    b) Write a python program to create user defined exceptions.
    c) Write a python program to understand the use of else and finally block with try block.
    d) Write a python program that uses raise and exception class to throw an exception.
2. Modules and Packages
    a) Write a python program to create a module and import the module in another python program.
    b) Write a python program to import all objects from a module, specific objects from module and provide custom import name to the imported object from the module.
    c) Create a python package having at least two modules in it.
    d) Create a python package having at least one subpackage in it.
3. Numpy Library
    a) Create a numpy array from list, tuple with float type
    b) Python program to demonstrate slicing, integer and boolean array indexing
    c) Write a python program to find min, max, sum, cumulative sum of array. d) Write a python program to demonstrate use of ndim, shape, size, dtype
4. Numpy Library: Linear Algebra
    a) Write a python program to find rank, determinant, and trace of an array.
    b) Write a python program to find eigenvalues of matrices
    c) Write a python program to find matrix and vector products (dot, inner, outer, product), matrix exponentiation.
    d) Write a python program to solve a linear matrix equation, or system of linear scalar equations
5. Numpy Advanced
    a) Create a white image using NumPy in Python and
    b) Convert a NumPy array to an image and Convert images to NumPy array?
    c) Perform Sorting, Searching and Counting using Numpy methods.
    d) Write a program to demonstrate the use of the reshape () method.
6. Pandas Library
    a) Write a python program to implement Pandas Series with labels.
    b) Create a Pandas Series from a dictionary.
    c) Creating a Pandas DataFrame.
    d) Write a program which make use of following Panda's methods

    i) describe () ii) head () iii) tail ()
7. Pandas Library: Selection
    a) Write a program that converts Pandas Data Frame and Series into numpy.array.
    b) Write a program that demonstrates the column selection, column addition, and

column deletion.

c) Write a program that demonstrates the row selection, row addition, and row deletion.

d) Get n-largest and n-smallest values from a particular column in Panda's data Frame

8. Pandas Library: Visualization

a) Write a program which use pandas' inbuilt visualization to plot following graphs: i.Bar plots ii. Histograms iii. Line plots iv. Scatter plots

b) Write a program to demonstrate use of groupby() method.

c) Write a program to demonstrate pandas Merging, Joining and Concatenating

d) Creating data frames from csv and excel files.

9. Object Oriented Programming: basic

a) Write a Python class named Person with attributes name, age, weight (kgs), height (ft) and takes them through the constructor and exposes a method get_bmi_result() which returns one of "underweight", "healthy", "obese"

b) Write a python program to demonstrate various kinds of inheritance.

10. Object Oriented Programming: advanced

a) Write a python program to demonstrate operator overloading.

b) Write a python program to create abstract classes and abstract methods.

11. Python Collections:

a) Write a Python program to show different ways to create Counter.

b) Write a Python program to demonstrate working of OrderedDict.

c) Write a Python program to demonstrate working of defaultdict

d) Write a python program to demonstrate working of ChainMap

12. Python collections:

a) Write a Python program to demonstrate the working of namedtuple() and _make(),

b) _asdict().

c) Write a Python program to demonstrate the working of deque.

13. Regular Expressions

a) Given an input file which contains a list of names and phone numbers separated by spaces in the following format:

i. Phone Number contains a 3- or 2-digit area code and a hyphen followed by an 8-digit number.

ii. Find all names having phone numbers with a 3-digit area code using regular expressions.

b) Write a python program to check the validity of a password given by the user. The password should satisfy the following criteria:

i. Contain at least 1 letter between a and z

ii. Contain at least 1 number between 0 and 9

iii. Contain at least 1 letter between A and Z

iv. Contain at least 1 character from $, #, @

v. Minimum length of password: 6

vi. Maximum length of password: 12

c) Write a Python program to validate mobile number.

14. Write a Python program to print checkerboard pattern of nxn using numpy
15. Write a Python program to demonstrate working of OS Module.
16. Write a Python program to demonstrate working of Calendar Module.
17. Write a Python program using pandas that finds Missing Data and replace missing data

TEXT BOOKS

1. Michael Urban and Joel Murach, Python Programming, Shroff/Murach, 2016.
2. Halterman python

3. Mark Lutz, Programming Python, O`Reilly, 4th Edition ,2010.

REFERENCE BOOKS:

1. Martin C. Brown (Author), "Python: The Complete Reference" McGraw Hill Education, Fourth edition, 2018
2. R. Nageswara Rao, "Core Python Programming" Dreamtech Press India Pvt Ltd 2018.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

IV Year B.Tech. AIML -I Sem	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1**

(20AI7PE37) WEB TECHNOLOGIES LAB
(PROFESSIONAL ELECTIVE – III)

Course objectives:

1. List various tags in html and use these, apply Cascaded style sheet to create web page.
2. Design and analyse the basic concept of XML and Create XML documents and Schema.
3. understand the usage of web servers and use this to develop webpage and store data in database in JSP on Web server.
4. Develop solution to complex problems using appropriate method, technologies, framework, web services and content management

Course Outcomes

1. Apply the concepts of PHP in creating web pages and connecting todatabase (My sql)
2. Apply the concepts of XML for structuring the web pages.
3. Make use of Servlets to create dynamic web pages in client-server architecture.
4. Make use of JSP to develop interactive web pages.
5. Apply the techniques of Java script in client-side scripting

Lab Exercises:

1. Write a PHP script to print prime numbers between 1-50.
2. PHP script to
    a) Find the length of a string.
    b) Count no of words in a string.
    c) Reverse a string.
    d) Search for a specific string.
3. Write a PHP script to merge two arrays and sort them as numbers, in descending order.
4. Write a PHP script that reads data from one file and write into another file.
5. Develop static pages (using Only HTML) of an online book store. The pages should resemble: www.amazon.com. The website should consist the following pages.
    a) Home page
    b) Registration and user Login
    c) User Profile Page
    d) Books catalog
    e) Shopping Cart
    f) Payment By credit card
    g) Order Conformation
6. Validate the Registration, user login, user profile and payment by credit card pages using JavaScript.
7. Create and save an XML document on the server, which contains 10 users' information. Write a program, which takes User Id as an input and returns the user details by taking the user information from the XML document.
8. Install TOMCAT web server. Convert the static web pages of assignments 2 into dynamic web pages using servlets and cookies. Hint: Users information (user id, password, credit card number)would be stored in web.xml. Each user should have a separate Shopping Cart.
9. Redo the previous task using JSP by converting the static web pages of assignments 2 into dynamic web pages. Create a database with user information and books information. The books catalogue should be dynamically loaded from the database. Follow the MVC architecture while doing the website.

TEXT BOOKS

1. WEB TECHNOLOGIES: A Computer Science Perspective, Jeffrey C. Jackson, Pearson Education

REFERENCE BOOKS:

1. Deitel H.M. and Deitel P.J., "Internet and World Wide Web How to program", Pearson International, 2012, 4th Edition.
2. J2EE: The complete Reference by James Keogh, McGraw-Hill
3. Bai and Ekedhi, The Web Warrior Guide to Web Programming, Thomson
4. Paul Dietel and Harvey Deitel," Java How to Program", Prentice Hall of India, 8th Edition
5. Web technologies, Black Book, Dreamtech press. Gopalan N.P. and Akilandeswari J., "Web Technology", Prentice Hall of Ind.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

IV Year B.Tech. AIML -I Sem	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1**

(20AI7PE38) NATURAL LANGUAGE PROCESSING LAB
(PROFESSIONAL ELECTIVE – III)

Course objectives:

1. Knowledge on basic Language processing features, design an innovative application using NLP components

Course Outcomes

1. Understand and carry out proper experimental methodology for training and evaluating empirical NLP systems
2. Able to design, implement, and analyze NLP algorithms

Lab Exercises (NLP)

1. Preprocessing of text (Tokenization, Filtration, Script Validation, Stop Word Removal, Stemming)
2. Word Analysis
3. Word Generation
4. Morphology
5. N-Grams
6. N-Grams Smoothing
7. POS tagging
8. Chunking
9. Named Entity Recognition
10. Virtual Lab on Word Generator

TEXT BOOKS

1. Multilingual natural Language Processing Applications: From Theory to Practice –Daniel M. Bikel and Imed Zitouni, Pearson Publication.
2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S. Tiwary

REFERENCE BOOKS:

1. Speech and Natural Language Processing - Daniel Jurafsky & James H Martin, Pearson Publications

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

IV Year B.Tech. AIML -I Sem	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1**

(20AI7PE39) INTERNET OF THINGS LAB
(PROFESSIONAL ELECTIVE – III)

Course Outcomes

1. Implement interfacing of various sensors with Arduino/Raspberry Pi.
2. Demonstrate the ability to transmit data wirelessly between different devices.
3. Show an ability to upload/download sensor data on cloud and server.
4. Examine various SQL queries from MySQL database

Lab Exercises:

1. **Functional Testing of Devices**
   Flashing the OS on to the device into a stable functional state by porting desktop environment with necessary packages.
2. **Exporting Display on To Other Systems**
   Making use of available laptop/desktop displays as a display for the device using SSH client & X11display server.
3. **GPIO Programming**
   Programming of available GPIO pins of the corresponding device using native programming language. Interfacing of I/O devices like LED/Switch etc., and testing the functionality.
4. **ON/OFF Control Based on Light Intensity**
   Using the light sensors, monitor the surrounding light intensity & automatically turn ON/OFF the high intensity LED's by taking some pre-defined threshold light intensity value.
5. **Battery Voltage Range Indicator**
   Monitor the voltage level of the battery and indicating the same using multiple LED's (for ex: for 3V battery and 3 led's, turn on 3 led's for 2-3V, 2 led's for 1-2V, 1 led for 0.1-1V & turn off all for 0V).
6. **Dice Game Simulation**
   Instead of using the conventional dice, generate a random value similar to dice value and display the same using a 16X2 LCD. A possible extension could be to provide the user with option of selecting single or double dice game.
7. **Displaying RSS News Feed on Display Interface**
   Displaying the RSS news feed headlines on an LCD display connected to device. This can be adapted to other websites like twitter or other information websites. Python can be used to acquire data from the internet.
8. **Porting Openwrt to the Device**
   Attempt to use the device while connecting to a wifi network using a USB dongle and at the same time providing a wireless access point to the dongle.
9. **Hosting a website on Board**
   Building and hosting a simple website (static/dynamic) on the device and make it accessible online. There is a need to install server (eg: Apache) and thereby host the website.
10. **Webcam Server**
    Interfacing the regular us webcam with the device and turn it into fully functional IP webcam & test the functionality.
11. **FM Transmission**
    Transforming the device into a regular fm transmitter capable of transmitting audio at desired frequency (generally 88-108 Mhz)

Note: Devices mentioned in the above lists include Arduino, Raspbery Pi, Beaglebone.

TEXT BOOKS:

1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press,2015, ISBN: 9788173719547.
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN:9789350239759.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

IV Year B.Tech. AIML -I Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20AI7PE41) DOCUMENT ANALYSIS AND SPEECH RECOGNITION
(PROFESSIONAL ELECTIVE – IV)

Prerequisites

1. A course on "Computer Oriented Statistical Methods"
2. Generally, a basic knowledge of linear algebra, and probability and statistics and programming experience in one high-level language is required.

Objectives

1. The aim of the course is to make the students to understand the basic characteristics ofthe speech signal with regard to the production and perception of speech by humans.
2. To describe the basic techniques and practical aspects of speech analysis.
3. To make the students to understand different speech processing applications such as speech recognition and speaker recognition.

Course Outcomes

1. Ability to understand and describe the mechanisms of speech production.
2. Ability to determine the speech sounds from the acoustic characteristics.
3. Ability to analyze the speech signal in time and frequency domains, and in terms ofthe parameters of a source-filter model.
4. Ability to design a simple speech processing system that recognizes a limited numberof isolated words; and a simple speaker recognition system.

UNIT-I

Fundamentals of Digital Speech Processing: Anatomy & Physiology of Speech Organs, The process of Speech Production, Acoustic Phonetics, Articulatory Phonetics, The Acoustic Theory of Speech Production- Uniform Lossless Tube Model, Effect of Losses in Vocal Tract, Effect of Radiation at Lips, Digital Models for Speech Signals.

UNIT-II

Time Domain Models for Speech Processing: Introduction, Window Considerations, Short- Time-Energy and Average Magnitude Short Time Average Zero Crossing Rate, Speech Vs Silence Discrimination Using Energy and Zero Crossing, Pitch Period Estimation using a Parallel Processing Approach, The Short Time Autocorrelation Function, The Short Time Average Magnitude Difference Function, Pitch Period Estimation using The Autocorrelation Function.

UNIT-III

Linear Predictive Coding (LPC) Analysis: Basic Principles of Linear Predictive Analysis,The Autocorrelation Method, The Covariance Method, Solution of LPC Equations: Cholesky Decomposition Solution for Covariance Method, Durbin's Recursive Solution for the Autocorrelation Equations, Comparison between the Methods of Solution of the LPC Analysis Equations, Applications of LPC Parameters: Pitch Detection Using LPC Parameters, Formant Analysis Using LPC Parameters.

UNIT-IV

Automatic Speech & Speaker Recognition: Basic Pattern Recognition Approaches, Parametric Representation of Speech, Evaluating the Similarity of Speech Patterns, Isolated Digit Recognition System, Continuous Digit Recognition System Hidden Markov Model (HMM) For Speech: Hidden Markov Model (HMM) for Speech Recognition, Viterbi algorithm, Training and Testing using HMMS.

UNIT-V

Speaker Recognition: Recognition techniques, Features that Distinguish Speakers, Speaker Recognition Systems: Speaker Verification System, Speaker Identification System. Overview of speech enhancement and speech synthesis.

TEXT BOOKS:

1. Digital Processing of Speech Signals: L.R Rabinar and R W Jhaung, 1978, Pearson Education.
2. Digital Processing of Speech Signals: L.R. Rabiner and S. W. Schafer, Pearson Education.
3. Speech Communications: Human & Machine - Douglas O'Shaughnessy, 2nd Ed., Wiley India,2000.

REFERENCE BOOKS:

1. Discrete Time Speech Signal Processing: Principles and Practice - Thomas F. Quateri, 1st Ed., PE.
2. Speech & Audio Signal Processing: Ben Gold & Nelson Morgan, 1st Ed., Wiley.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

IV Year B.Tech. AIML -I Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20AI7PE42) APPLICATION OF ML
(PROFESSIONAL ELECTIVE – IV)

Objectives

1. To understand the concepts of state space representation, exhaustive search,heuristic search together with the time and space complexities.
2. To learn different knowledge representation techniques.
3. To provide an approach towards image processing and introduction about 2D transforms.

Course Outcomes

1. Ability to formulate an efficient problem space for a problem expressed in natural language.
2. Select a search algorithm for a problem and estimate its time and space complexities.
3. Understand the Neural Networks and its usage in machine learning application.
4. Application & implementation of Decision trees
5. Explain the basic concepts of two-dimensional signal acquisition sampling, quantization and color model.

UNIT-I

Problem Solving by Search-I: Introduction to AI, Intelligent Agents
Problem Solving by Search –II: Problem-Solving Agents, Searching for Solutions, UninformedSearch Strategies: Breadth-first search, Uniform cost search, Depth-first search, Iterative deepening Depth-first search, Bidirectional search, informed (Heuristic) Search Strategies: A* search, Heuristic Functions, Beyond Classical Search: Hill-climbing search, Simulated annealingsearch.

UNIT-II

Problem Solving by Search-II and Propositional Logic
Adversarial Search: Games, Optimal Decisions in Games, Alpha–Beta Pruning.
Constraint Satisfaction Problems: Defining Constraint Satisfaction Problems.
Propositional Logic: Knowledge-Based Agents, Propositional Logic, Propositional Theorem Proving: Inference and proofs, Proof by resolution, Horn clauses and definite clauses, Forward and backward chaining, Effective Propositional Model Checking, Agents Based on Propositional Logic.

UNIT-III

Genetic Algorithms – Motivation, Genetic algorithms, an illustrative example, hypothesis spacesearch, genetic programming,
Learning Sets of Rules – Introduction, sequential covering algorithms, learning rule sets: summary, learning First-Order rules, learning sets of First-Order rules: FOIL, Induction as inverted deduction, inverting resolution.

UNIT-IV

Artificial Neural Networks-1– Introduction, neural network representation, appropriate problems for neural network learning, perceptions, multilayer networks and the back- propagation algorithm.
Artificial Neural Networks-2- Remarks on the Back-Propagation algorithm, An illustrative example: face recognition, advanced topics in artificial neural networks. Evaluation Hypotheses – Motivation, estimation hypothesis accuracy, basics of sampling theory, a general approach for deriving confidence intervals, difference in error of two hypotheses, comparing learning algorithms.

UNIT-V

DIGITAL IMAGE FUNDAMENTALS: Steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels – Color image fundamentals – RGB, HSI models, Two-dimensional mathematical preliminaries, 2D transforms – DFT, DCT.

TEXT BOOKS:

1. Rafael C. Gonzalez, Richard E. Woods, Digital Image Processing Pearson, 3rd Edition,2010
2. Artificial Intelligence a Modern Approach, Third Edition, Stuart Russell and Peter Norvig, Pearson Education
3. Artificial Intelligence by Saroj Koushik, IIT Delhi.
4. Machine Learning – Tom M. Mitchell, - MGH

REFERENCE BOOKS:

1. Artificial Intelligence, 3rd Edn, E. Rich and K.Knight (TMH)
2. Artificial Intelligence, 3rd Edn., Patrick Henny Winston, Pearson Education.
3. Artificial Intelligence, Shivani Goel, Pearson Education.
4. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Francis

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

IV Year B.Tech. AIML -I Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20AI7PE43) ROBOTICS AND INTELLIGENT SYSTEMS
(PROFESSIONAL ELECTIVE – IV)

Prerequisites: A course on object-oriented programming

Objectives

1. covers the theory of AI and robotics from the hierarchical to the hybrid deliberative/reactive paradigm for organizing intelligence.
2. Includes sensing and programming techniques for reactive behaviors,
3. Covers architectures that provide examples of how to transfer the principles of the paradigm into a coherent, reusable implementation on a single robot or teams of robots.
4. Focuses on navigation, a critical ability for a robot that claims to be mobile

Course Outcomes

1. Acquire basic Knowledge on Robots.
2. Ability to process end effectors and robotic controls.
3. Analyze Robot Transformations and Sensors.
4. Able to understand Robot cell design and applications.

UNIT-I

Introduction Robot Anatomy-Definition, law of robotics, History and Terminology of Robotics-Accuracy and repeatability of Robotics-Simple problems Specifications of Robot-Speed of Robot-Robot joints and links-Robot Classifications-Architecture of robotic systems.

UNIT-II

End Effectors and Robot Controls Mechanical grippers-Slider crank mechanism, Screw type, Rotary actuators, cam type-Magnetic Grippers-Vacuum Grippers-Air operated grippers-Gripper force analysis-Gripper Design-Simple Problems-Robot Controls-Point to point control, Continuous path control, Intelligent robot- Control system for robot joint-Control actions- Feedback Devices-Encoder, Resolver, LVDT- Motion Interpolations-Adaptive control.

UNIT-III

Robot Transformations and Sensors Robot Kinematics-Types- 2D, 3D Transformation-Scaling, Rotation, Translation- Homogeneous coordinates, multiple transformation-Simple problems. Sensors in robot – Touch Sensors-Tactile sensor – Proximity and range sensors – Robotic vision sensor-Force Sensor-Light sensors, Pressure sensors.

UNIT-IV

Knowledge Representation: Data and knowledge: Data representation and data items in traditional databases, Data representation and data items in relational databases. Rules: Logical operations, Syntax and semantics of rules, Data log rule sets, the dependence graph of data log rule sets, Objects, Frames, Semantic nets, Solving problems by reasoning: The structure of the knowledge base, The reasoning algorithm, Conflict resolution, Explanation of the reasoning.

UNIT-V

Rule Based Systems: Forward reasoning: The method of forward reasoning, A simple case study of forward reasoning. Backward reasoning: Solving problems by reduction, the method of backward reasoning, A simple case study of backward reasoning, Bidirectional reasoning. SearchMethods: Depth-first search, Breadth-first search, Hill climbing search, A* search. Contradictionfreeness: The notion of contradiction freeness, Testing contradiction freeness, The search problem of contradiction freeness. Completeness: The notion of completeness, Testing completeness, The search problem of completeness. Decomposition of knowledge bases: Strict decomposition, Heuristic decomposition.

TEXT BOOKS:

1. S.R. Deb, Robotics Technology and flexible automation, Tata McGraw-Hill Education., 2009.
2. Mikell P Groover & Nicholas G Odrey, Mitchel Weiss, Roger N Nagel, Ashish Dutta, Industrial Robotics, Technology programming and Applications, McGraw Hill, 2012.

REFERENCE BOOKS:

1. Carl D. Crane and Joseph Duffy, Kinematic Analysis of Robot manipulators, Cambridge University. press, 2008.
2. Fu. K. S., Gonzalez. R. C. & Lee C.S.G., "Robotics control, sensing, vision and intelligence", McGraw Hill Book co, 1987.
3. Craig. J. J. "Introduction to Robotics mechanics and control", Addison- Wesley, 1999.
4. Ray Asfahl. C., "Robots and Manufacturing Automation", John Wiley & Sons Inc.,1985

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

IV Year B.Tech. AIML -I Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20AI7PE44) VIRTUAL REALITY
(PROFESSIONAL ELECTIVE – IV)

Objectives

1. To make students know the basic concept and framework of virtual reality.
2. To teach students the principles and multidisciplinary features of virtual reality.
3. To teach students the technology for multimodal user interaction and perception in VR, in particular the visual, audial and haptic interface and behavior.
4. To teach students the technology for managing large scale VR environment in real time.
5. To provide students with an introduction to the VR system framework and development tools.

Course Outcomes: After the end of the course students will be able to

1. Design and implement the VR system.
2. Implement the Augmented Reality software.
3. Analyze and design the framework in VR using various software development tools in VR.
4. Design the multi modal user interface.
5. Describe the principles and features of VR and AR.

UNIT-I INTRODUCTION OF VIRTUAL REALITY

Fundamental Concept and Components of Virtual Reality- Primary Features and Present Development on Virtual Reality - VR systems - VR as a discipline-Basic features of VR systems-Architecture of VR systems-VR hardware -VR input hardware: tracking systems, motion capturesystems, data gloves-VR output hardware: visual displays.

UNIT-II I/O INTERFACE & TECHNIQUES IN VR

Multiple Modals of Input and Output Interface in Virtual Reality: Input -- Tracker, Sensor, Digital Glove, Movement Capture, Video-based Input, 3D Menus & 3DScanner etc. Output -- Visual / Auditory / Haptic Devices. Interactive Techniques in Virtual Reality: Body Track, Hand Gesture, 3D Manus, Object Grasp.

UNIT-III VISUAL COMPUTATION IN VIRTUAL REALITY

Fundamentals of Computer Graphics-Software and Hardware Technology on Stereoscopic Display-Advanced Techniques in CG: Management of Large-Scale Environments & Real Time Rendering - Development Tools and Frameworks in Virtual Reality: Frameworks of Software Development Tools in VR. X3D Standard; Vega, MultiGen, Virtools etc.

UNIT-IV INTRODUCTION OF AUGMENTED REALITY

System Structure of Augmented Reality-Key Technology in AR-- AR software development - AR software. Camera parameters and camera calibration. Marker-based augmented reality. Pattern recognition. AR Toolkit.

UNIT-V APPLICATION OF VR IN DIGITAL ENTERTAINMENT

VR Technology in Film & TV Production Technology in Physical Exercises and Games. Demonstration of Digital Entertainment by VR.3D user interfaces - Why 3D user interfaces. Major user tasks in VE. Interaction techniques for selection, manipulation and navigation.3DUI evaluation

TEXT BOOKS:

1. Sherman, William R. and Alan B. Craig. Understanding Virtual Reality – Interface, Application,and Design, Morgan Kaufmann, 2002.
2. Fei GAO. Design and Development of Virtual Reality Application System, Tsinghua Press,March 2012.
3. Guangran LIU. Virtual Reality Technology, Tsinghua Press, Jan. 2011.

4. Burdea, G. C. and P. Coffet. Virtual Reality Technology, Second Edition. Wiley-IEEE Press, 2003/2006.
5. Virtual Reality, Steven M. LaValle, Cambridge University Press, 2016.
6. Understanding Virtual Reality: Interface, Application and Design, William R Sherman And Alan B Craig, (The Morgan Kaufmann Series in Computer Graphics)". Morgan Kaufmann Publishers, San Francisco, CA, 2002.
7. Developing Virtual Reality Applications: Foundations of Effective Design, Alan B Craig, William R Sherman and Jeffrey D Will, Morgan Kaufmann, 2009.

REFERENCE BOOKS:

1. Gerard Jounghyun Kim, "Designing Virtual Systems: The Structured Approach", 2005.
2. Doug A Bowman, Ernest Kuijff, Joseph J LaViola, Jr and Ivan Poupyrev, "3D User Interfaces,Theory and Practice", Addison Wesley, USA, 2005.
3. Oliver Bimber and Ramesh Raskar, "Spatial Augmented Reality: Merging Real and Virtual Worlds", 2005

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

IV Year B.Tech. AIML -I Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20AI7PE51) TEXT RECOGNITION
(PROFESSIONAL ELECTIVE – (V)

Prerequisites

1. Students are expected to have knowledge basic linear algebra, basic probabilitytheory and basic programming techniques;
2. A course on "Computational Mathematics"
3. A course on "Computer Oriented Statistical Methods"

Objectives

1. This course introduces fundamental concepts, theories, and algorithms for text recognition and machine learning.
2. Topics include: Pattern Representation, Nearest Neighbor Based Classifier, Bayes Classifier, Hidden Markov Models, Decision Trees, Support Vector Machines, Clustering, and an application of hand-written digit recognition.

Course Outcomes:

1. Understand the theory, benefits, inadequacies and possible applications of variousmachine learning and pattern recognition algorithms
2. Identify and employ suitable machine learning techniques in classification, pattern recognition, clustering and decision problems.
3. Analyze the concepts of Hidden Markov Models
4. Analyze the concepts of support vector machines

UNIT-I Introduction:

What is Pattern Recognition, Data Sets for Pattern Recognition, Different Paradigms for Pattern Recognition. Representation: Data Structures for Pattern Representation, Representation of Clusters, Proximity Measures, Size of Patterns, Abstractions of the Data Set, Feature Extraction, Feature Selection, Evaluation of Classifier, Evaluation of Clustering.

UNIT-II Nearest Neighbor Based Classifier:

Nearest Neighbor Algorithm, Variants of the NN Algorithm use of the Nearest Neighbor Algorithm for Transaction Databases, Efficient Algorithms, Data Reduction, Prototype Selection. Bayes Classifier: Bayes Theorem, Minimum Error Rate Classifier, Estimation of Probabilities, Comparison with the NNC, Naïve Bayes Classifier, Bayesian Belief Network.

UNIT-III

Hidden Markov Models: Markov Models for Classification, Hidden Morkov Models, Classification using HMMs. Decision Trees: Introduction, Decision Tree for Pattern Classification, Construction of Decision Trees, splitting at the Nodes, Overfitting and Pruning, Examples of Decision Tree Induction.

UNIT-IV

Support Vector Machines:

Introduction, Learning the Linear Discriminant Functions, Neural Networks, SVM for Classification. Combination of Classifiers: Introduction, Methods forConstructing Ensembles of Classifiers, Methods for Combining Classifiers.

UNIT-V

Clustering: Why is Clustering Important, Hierarchical Algorithms, Partitional Clustering, Clustering Large Data Sets. An Application-Hand Written Digit Recognition: Description of the Digit Data, Preprocessing of Data, Classification Algorithms, Selection of Representative Patterns, Results.

TEXT BOOKS:

1. Pattern Recognition: An Algorithmic Approach: Murty, M. Narasimha, Devi, V. Susheela, Spinger Pub,1st Ed.

REFERENCE BOOKS:

1. Machine Learning - Mc Graw Hill, Tom M. Mitchell.
2. Fundamentals Of Speech Recognition: Lawrence Rabiner and Biing- Hwang Juang. Prentice Hall Pub.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

IV Year B.Tech. AIML -I Sem

L	T	P	C
3	0	0	3

(20AI7PE52) BLOCK CHAIN TECHNOLOGY
(PROFESSIONAL ELECTIVE – (V)

Prerequisites

1. Knowledge in security and applied cryptography;
2. Knowledge in distributed databases

Objectives

1. To Introduce block chain technology and Crypto currency.

Course Outcomes:

1. Describe the basic concepts and technology used for block chain.
2. Describe the primitives of the distributed computing and cryptography related to block chain.
3. Illustrate the concepts of Bit coin and their usage.
4. To describe the concepts of currency, Token, and Campus coin.
5. To analyze the challenges and discuss the government regulations.

UNIT-I

Introduction: Block chain or distributed trust, Protocol, Currency, Crypto currency, how a Crypto currency works, Crowd funding.

UNIT-II

Extensibility of Block chain concepts, Digital Identity verification, Block chain Neutrality, Digital art, Block chain Environment.

UNIT-III

Block chain Science: Grid coin, Folding coin, Block chain Genomics, Bit coin MOOCs

UNIT-IV

Currency, Token, Tokenizing, Campus coin, Coin drop as a strategy for public adoption, Currency Multiplicity, Demurrage currency

UNIT-V

Technical challenges, Business model challenges, Scandals and Public perception, Government Regulations

TEXT BOOKS:

1. Block chain blue print for Economy by Melanie Swan.

REFERENCE BOOKS:

1. Block chain Basics: A Non-Technical Introduction in 25 Steps 1st Edition, by Daniel Drescher.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

IV Year B.Tech. AIML -I Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20AI7PE53) GRID COMPUTING
(PROFESSIONAL ELECTIVE – (V)

Objectives

1. To understand the technology application and tool kits for grid computing.

Course Outcomes:

1. To understand the genesis of grid computing.
2. To know the application of grid computing.
3. To understanding the technology and tool kits to facilitated the grid computing

UNIT-I GRID COMPUTING
Introduction - Definition and Scope of grid computing

UNIT-II GRID COMPUTING INITIALIVES
Grid Computing Organizations and their roles – Grid Computing analog – Grid Computing Roadmap.

UNIT-III GRID COMPUTING APPLICATIONS
Merging the Grid sources – Architecture with the Web Devices Architecture.

UNIT-IV TECHNOLOGIES
OGSA – Sample use cases – OGSA platform components – OGSI – OGSA Basic Services.

UNIT-V GRID COMPUTING TOOL KITS
Globus GT 3 Toolkit – Architecture, Programming model, High level services – OGSI .Netmiddleware Solutions.

TEXT BOOKS:

1. Joshy Joseph & Craig Fellenstein, “Grid Computing”, PHI, PTR-2003.

REFERENCE BOOKS:

1. Ahmar Abbas, “Grid Computing: A Practical Guide to technology and Applications”, Charles River media – 2003.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

IV Year B.Tech. AIML -I Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20AI7PE54) AUGMENTED REALITY
(PROFESSIONAL ELECTIVE – (V)

Objectives

1. Understanding of the basic concept and framework of augmented reality.
2. Learning of the methodologies and classification of the Augmented Reality.
3. Possible modes of Augmented Reality on applying it in real time environment.
4. Application of 3D in Augmented Reality and the challenges faced.
5. Types of Augmented Reality Technologies and the case Study on it.

Course Outcomes:

1. Summarize the Augmented Reality basic Concepts
2. Classify the Augmented Reality Methods and the components of it.
3. Differentiate the techniques of augmented reality and the applications.
4. Explain the challenges faced by implementation of Augmented Reality.
5. Aware of the real time applications and the technologies of Augmented Reality

UNIT-I

Augmented Reality- Difference between Augmented Reality and Virtual Reality and Mixed Reality - History of Augmented Reality-characteristics of Augmented Reality Systems-Issues & Challenges in Augmented Reality–The SDK's and Tool's used to build Augmented Reality applications –Advantages and Disadvantages of AR.-Future scope of Augmented Reality

UNIT-II

Concepts of Augmented Reality-Scene Capture, Scene Identification-Scene visualization- visualization techniques for augmented reality- Components of Augmented Reality architecture -Augmented Reality systems and functionality.

UNIT-III

Techniques of Augmented Reality -Augmented reality working planes- infinite carving planes- laser carving- laser coloring- texture map capture -surface of revolution.

UNIT-IV

3D Vision –The challenge of 3D -Challenges in computer vision-Texturize Lighting, weather conditions-Large and volatile databases-Developments in 3D vision theory-Sub-problems &approaches-Camera Parameters-enhancing interactivity in Augmented Reality environments

UNIT-V

Projection based Augmented Reality -Non-interactive Augmented Reality - interactive Augmented Reality - Location Based Augmented Reality - Recognition Based Augmented Reality - Augmented Reality Working on Different Devices-Applications of Augmented Reality in real Time Environment-Famous companies building augmented reality applications.

TEXT BOOKS:

1. Hael Haller Upper Austra Unver's ty of Appl ed Sciences, Austra. Mark Bllnghurst, "Alan B.
2. Craig, Understanding Augmented Reality, Concepts and Applications, Morgan Kaufmann,
3. ANA REGINA MIZRAHY CUPERSCHMID, REGINA COELI RUSCHEL AND MÁRCIA REGINA DEFREITAS," Technologies that support Augmented Reality applied to Architecture and Construction.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

IV Year B.Tech. AIML -II Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20HS8MS02) ORGANIZATIONAL BEHAVIOUR

Objectives

1. To provide the students with the conceptual framework and the theories underlying Organizational Behavior.

Course Outcomes:

1. Upon the completion of the subject, the student will be able to analyze the behavior of individuals and groups in organizations in terms of the key factors that influence organizational behavior.
2. Assess the potential effects of organizational level factors (such as structure, culture and change) on organizational behavior.
3. Critically evaluate the potential effects of important developments in the external environment (such as globalization and advances in technology) on organizational behavior.
4. Analyse organizational behavioral issues in the context of organizational behavior theories, models and concepts.

UNIT-I

Introduction to OB - Definition, Nature and Scope –Environmental and organizational context Impact of IT, globalization, Diversity, Ethics, culture, reward systems and organizational design on Organizational Behavior. Cognitive Processes-I: Perception and Attribution: Nature and importance of Perception – Perceptual selectivity and organization - Social perception – Attribution Theories – Locus of control – Attribution Errors –Impression Management.

UNI Cognitive Processes-II: Personality and Attitudes - Personality as a continuum – Meaning of personality - Johari Window and Transactional Analysis - Nature and Dimension of Attitudes – Job satisfaction and organizational commitment-Motivational needs and processes- Work- Motivation Approaches Theories of Motivation- Motivation across cultures - Positive organizational behavior: Optimism – Emotional intelligence – Self-Efficacy-II

UNIT-III

Dynamics of OB-I: Communication – types - interactive communication in organizations – barriers to communication and strategies to improve the follow of communication - Decision Making: Participative decision-making techniques – creativity and group decision making. Dynamics of OB –II Stress and Conflict: Meaning and types of stress –Meaning and types of conflict - Effect of stress and intra-individual conflict - strategies to cope with stress and conflict.

UNIT-IV

Dynamics of OB –III Power and Politics: Meaning and types of power – empowerment - Groups Vs. Teams – Nature of groups –dynamics of informal groups – dysfunctions of groups and teams, teams in modern work place.

UNIT-V

Leading High performance: Job design and Goal setting for High performance- Quality of Work Life-Socio technical Design and High-performance work practices - Behavioral performance management: reinforcement and punishment as principles of Learning –Process of Behavioral modification - Leadership theories - Styles, Activities and skills of Great leaders.

TEXT BOOKS:

1. Luthans, Fred: Organizational Behavior 10/e, McGraw-Hill, 2009
2. Mc Shane: Organizational Behavior, 3e, TMH, 2008
3. Nelson: Organizational Behavior, 3/e, Thomson, 2008.
4. New storm W. John& Davis Keith, Organizational Behavior-- Human Behavior at Work, 12/e, TMH, New Delhi, 2009.
5. Pierce and Gardner: Management and Organizational Behavior: An Integratedperspective, Thomson, 2009.
6. Robbins, P. Stephen, Timothy A. Judge: Organizational Behavior, 12/e, PHI/Pearson, New Delhi, 2009. 7. Pareek Udai: Behavioral Process at Work: Oxford & IBH, New Delhi, 2009.

REFERENCE BOOKS:

1. Schermerhorn: Organizational behavior 9/e, Wiley, 2008.
2. Hitt: Organizational behavior, Wiley, 2008
3. Aswath Appa: Organizational behavior, Himalaya, 2009
4. Mullins: Management and Organizational behavior, Pearson, 2008.
5. McShane, Glinow: Organizational behavior--Essentials, TMH, 2009. 6. Ivancevich: Organizational behavior and Management, 7/e, TMH, 2008.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

IV Year B.Tech. AIML-II Sem

L	T	P	C
3	0	0	3

(20CS7OE31) CYBER SECURITY
(OPEN ELECTIVE-III)

Course Objectives: To learn

1. Protect your information from getting intercepted on the way while being transferred to a trusted entity.
2. Protect your information from getting discovered by an eavesdropper.
3. Protect an organization from losing internal data.
4. Protect a software from getting cracked.

Course Outcomes:

1. Identify various cybercrimes and attacks-global study.
2. Study of various cybercrimes and bottlenecks.
3. Apply critical thinking and problem-solving skills to detect current and future attacks on an organization's computer systems and networks.
4. Study of various tools involved in cybercrime.
5. Apply critical thinking and problem-solving skills to detect current and future attacks on an organization's computer systems and networks.

UNIT-1

Introduction to Cybercrime: Introduction, Cybercrime and Information Security, who are Cybercriminals, Classifications of Cybercrimes, Cybercrime: The legal Perspectives and Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes.

UNIT II

Cyber Offenses: How Criminals Plan Them: Introduction, How Criminals plan the Attacks, Social Engineering, Cyber stalking, Cyber Cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector, Cloud Computing.

UNIT III

Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies an Measures in Mobile Computing Era, Laptops.

UNIT –IV

Tools and Methods Used in Cybercrime: Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horse and Backdoors, Steganography, DoS and DDoS attacks, SQL Injection, Buffer Overflow.

UNIT –V

Cyber Security: Organizational Implications, Introduction, Cost of Cybercrimes and IPR issues, Web threats for Organizations, Security and Privacy Implications, Social media marketing: Security Risks and Perils for Organizations, Social Computing and the associated challenges for Organizations.

TEXT BOOKS:

1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole and Sunil Belapure, Wiley INDIA.

REFERENCE BOOKS:

1 Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press. 2
2. Introduction to Cyber Security, Chwan-Hwa (john) Wu, J. David Irwin. CRC Press T&F Group

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

IV Year B.Tech. AIML-II Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20CS7OE32) SCRIPTING LANGUAGES
(OPEN ELECTIVE-III)

Prerequisites:
1. A course on "Computer Programming and Data Structures."
2. A course on "Object Oriented Programming Concepts."

Course Objectives: To learn
1. This course introduces the script programming paradigm. Introduces scripting languages such as Perl, Ruby and TCL. Learning TCL.

Course Outcomes:
1. Comprehend the differences between typical scripting languages and typical system and application programming languages.
2. Gain knowledge of the strengths and weakness of Perl, TCL and Ruby; and select an appropriate language for solving a given problem.
3. Acquire programming skills in scripting language.

UNIT-1
Introduction: Ruby, Rails, the structure and Execution of Ruby Programs, Package Management with RUBYGEMS, Ruby and web: Writing CGI scripts, cookies, Choice of Web servers, SOAP and web services RubyTk – Simple Tk Application, widgets, Binding events, Canvas, scrolling

UNIT II
Extending Ruby: Ruby Objects in C, the Jukebox extension, Memory allocation, Ruby Type System, Embedding Ruby to Other Languages, Embedding a Ruby Interpreter

UNIT III
Introduction to PERL and Scripting, Scripts and Programs, Origin of Scripting, Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages. PERL- Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines.

UNIT –IV
Advanced Perl, Finer points of looping, pack and unpack, file system, eval, data structures, packages, modules, objects, interfacing to the operating system, Creating Internet ware applications, Dirty Hands Internet Programming, security Issues.

UNIT –V
TCL: TCL Structure, syntax, Variables and Data in TCL, Control Flow, Data Structures, input/output, procedures, strings, patterns, files, Advance TCL- eval, source, exec and up level commands, Name spaces, trapping errors, event driven programs, making applications internet aware, Nuts and Bolts Internet Programming, Security Issues, C Interface.TK: TK-Visual Tool Kits, Fundamental Concepts of TK, TK by example, Events and Binding, Perl-TK.

TEXT BOOKS:
1. The World of Scripting Languages, David Barron, Wiley Publications.
2. Ruby Programming language by David Flanagan and Yukihiro Matsumoto O'Reilly
3. "Programming Ruby" The Pragmatic Programmers guide by Dabve Thomas Second edition

REFERENCE BOOKS:
1 Open Source Web Development with LAMP using Linux Apache, MySQL, Perl and PHP, J.Lee and B. Ware (Addison Wesley) Pearson Education.

2. Perl by Example, E. Quigley, Pearson Education
3. Programming Perl, Larry Wall, T. Christiansen and J. Orwant, O'Reilly, SPD.

4. Tcl and the Tk Tool kit, Ousterhout, Pearson Education.
5. Perl Power, J.P. Flynt, Cengage Learning.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

IV Year B.Tech. AIML -II Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20AI7PE61) IMAGE PROCESSING
(Professional Elective –(VI)

Prerequisite

Digital Signal Processing.

Objectives

1. To provide a approach towards image processing and introduction about 2D transforms.
2. To expertise about enhancement methods in time and frequency domain.
3. To expertise about segmentation and compression techniques.
4. To understand the Morphological operations on an image.

Course Outcomes:

1. Explain the basic concepts of two-dimensional signal acquisition, sampling, quantizationand color model.
2. Apply image processing techniques for image enhancement in both the spatial andfrequency domains.
3. Apply and compare image restoration techniques in both spatial and frequency domain.
4. Compare edge based and region-based segmentation algorithms for ROI extraction.
5. Explain compression techniques and descriptors for image processing.

UNIT-I

DIGITAL IMAGE FUNDAMENTALS: Steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels – Color image fundamentals – RGB, HSI models, Two-dimensional mathematical preliminaries, 2D transforms – DFT, DCT.

UNIT-II

IMAGE ENHANCEMENT: Spatial Domain: Gray level transformations – Histogram processing Basics of Spatial Filtering Smoothing and Sharpening Spatial Filtering, Frequency Domain: Introduction to Fourier Transform– Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters, Homomorphic filtering, Color image enhancement.

UNIT-III

IMAGE RESTORATION: Image Restoration – degradation model, Properties, Noise models – Mean Filters – Order Statistics –Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering.

UNIT-IV

IMAGE SEGMENTATION: Edge detection, Edge linking via Hough transform – Thresholding Region based segmentation – Region growing – Region splitting and merging – Morphological processing- erosion and dilation, Segmentation by morphological watersheds – basic concepts – Dam construction – Watershed segmentation algorithm.

UNIT-V

IMAGE COMPRESSION AND RECOGNITION: Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, JPEG standard, MPEG. Boundary representation, Boundary description, Fourier Descriptor, Regional Descriptors – Topological feature, Texture – Patterns and Pattern classes – Recognition based on matching.

TEXT BOOKS:

1. Rafael C. Gonzalez, Richard E. Woods, Digital Image Processing Pearson, 3rd Edition, 2010
2. Anil K. Jain, Fundamentals of Digital Image Processing Pearson, 2002.
3. Kenneth R. Castleman, Digital Image Processing Pearson, 2006.
4. Rafael C. Gonzalez, Richard E. Woods, Steven Eddins, Digital Image Processing using MATLAB Pearson Education, Inc., 2011.
5. D, E. Dudgeon and RM. Mersereau, Multidimensional Digital Signal Processing Prentice Hall Professional Technical Reference, 1990.
6. William K. Pratt, Digital Image Processing John Wiley, New York, 2002
7. Milan Sonka et al Image processing, analysis and machine vision Brookes/Cole, Vikas Publishing House, 2nd edition, 1999

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

IV Year B.Tech. AIML -II Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20AI7PE62) BIG DATA COMPUTING
(Professional Elective –VI)

Objectives

1. Understand the Big Data Platform and its Use cases.
2. Provide an overview of Apache Hadoop.
3. Provide HDFS Concepts and Interfacing with HDFS.
4. Understand Map Reduce Jobs.
5. Provide hands on Hadoop Eco System.
6. Apply analytics on Structured, Unstructured Data.

Course Outcomes: The students will be able to:

1. Identify Big Data and its Business Implications.
2. List the components of Hadoop and Hadoop Eco-System.
3. Access and Process Data on Distributed File System.
4. Manage Job Execution in Hadoop Environment.
5. Develop Big Data Solutions using Hadoop Eco System.
6. Analyze Infosphere Big Insights Big Data Recommendations

UNIT-I: **INTRODUCTION TO BIG DATA AND HADOOP**

Types of Digital Data, Introduction to Big Data, Big Data Analytics, History of Hadoop, Apache Hadoop, Analysing Data with Unix tools, Analysing Data with Hadoop, Hadoop Streaming, Hadoop Echo System, IBM Big Data Strategy, Introduction to Infosphere Big Insights and Big Sheets.

UNIT-II HDFS (Hadoop Distributed File System)

The Design of HDFS, HDFS Concepts, Command Line Interface, Hadoop file system interfaces, Data flow, Data Ingest with Flume and Scoop and Hadoop archives, Hadoop I/O: Compression, Serialization, Avro and File-Based Data structures.

UNIT-III

Map Reduce Anatomy of a Map Reduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats, Map Reduce Features.

UNIT-IV

Hadoop Eco System Pig: Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases, Grunt, Pig Latin, User Defined Functions, Data Processing operators. Hive: Hive Shell, Hive Services, Hive Metastore, Comparison with Traditional Databases, HiveQL, Tables, Querying Data and User Defined Functions. HBase: H Basics, Concepts, Clients, Example, HBase Versus Rebasing SQL: Introduction

UNIT-V

Data Analytics with R Machine Learning: Introduction, Supervised Learning, Unsupervised Learning, Collaborative Filtering. Big Data Analytics with Big R

TEXT BOOKS:

1. Tom White “Hadoop: The Definitive Guide” Third Edit on, O’reily Media, 2012.
2. Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015.

REFERENCES

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis”, Springer, 2007.
2. Jay Liebowitz, “Big Data and Business Analytics” Auerbach Publications, CRC press (2013)
3. Tom Plunkett, Mark Hornick, “Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop”, McGraw-Hill/Osborne Media (2013), Oracle press.
4. Anand Rajaraman and Jef rey David Ulman, “Mining of Massive Datasets”,
5. Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, John Wiley & sons, 2012.
6. Glen J. Myat, “Making Sense of Data”, John Wiley & Sons, 2007

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

IV Year B.Tech. AIML -II Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20AI7PE63) PATTERN WAREHOUSE
(Professional Elective –(VI)

Objectives

1. Knowledge of data warehouse concepts, architecture, business analysis and tools
2. Provide various classification and clustering techniques using tools.

Course Outcomes:

1. able to understand various concepts of pattern recognition
2. Able analyse the concepts of Nearest Neighbor Based Classifier
3. Able to describe various Hidden Markov Models
4. To understand data warehouse concepts, architecture, business analysis and tools
5. To understand and apply various classification and clustering techniques using tools.

UNIT-I:

Introduction: What is Pattern Recognition, Data Sets for Pattern Recognition, Different Paradigms for Pattern Recognition. Representation: Data Structures for Pattern Representation, Representation of Clusters, Proximity Measures, Size of Patterns, Abstractions of the Data Set, Feature Extraction, Feature Selection, Evaluation of Classifier, Evaluation of Clustering.

UNIT-II

Nearest Neighbor Based Classifier: Nearest Neighbor Algorithm, Variants of the NN Algorithm use of the Nearest Neighbor Algorithm for Transaction Databases, Efficient Algorithms, Data Reduction, Prototype Selection. Bayes Classifier: Bayes Theorem, Minimum Error Rate Classifier, Estimation of Probabilities, Comparison with the NNC, Naïve Bayes Classifier, Bayesian Belief Network.

UNIT-III

Hidden Markov Models: Markov Models for Classification, Hidden Morkov Models, Classification using HMMs. Decision Trees: Introduction, Decision Tree for Pattern Classification, Construction of Decision Trees, splitting at the Nodes, Overfitting and Pruning, Examples of Decision Tree Induction.

UNIT-IV

Warehouse information, HRS Introduction, Objectives, Importance of Warehouse Information, Decision Making Using Warehouse Information

UNIT-V

ICT Applications in a Warehouse Technology Aids in Retail warehouse Management Introduction, Objectives, Bar Code Scanners, Wireless LAN, Mobile Computers, Radio Frequency Identification (RFID)

TEXT BOOKS:

1. Pattern Recognition: An Algorithmic Approach: Murty, M. Narasimha, Devi, V.Susheela, Spinger Pub,1st Ed.
2. Warehouse Management– Student Study Guide – by Gwynne Richard

REFERENCES

1. Machine Learning - Mc Graw Hill, Tom M. Mitchell.
2. Fundamentals Of Speech Recognition: Lawrence Rabiner and Biing- Hwang Juang. Prentice Hall Pub.
3. Essentials of inventory management by Max muller—publishers-HarperCollins
4. Warehouse distribution & operations handbook by DAVID E MULCAHY
5. Inventory strategy by Edward H Frazelle

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

IV Year B.Tech. AIML -II Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20AI7PE64) AGENT SYSTEMS
(Professional Elective –VI)

Objectives

1. To understand Agent development
2. To gain Knowledge in Multi agent and Intelligent agents
3. To understand Agents and security
4. To gain Knowledge in Agent Applications

Course Outcomes:

1. Understand development of software agents
2. Gain Knowledge in Multi agent and Intelligent agents
3. Understand Agents and security
4. Gain knowledge on applications of agents

UNIT-I

Introduction: Definitions – Foundations – History – Intelligent Agents-Problem Solving- Searching – Heuristics -Constraint Satisfaction Problems – Game playing.

UNIT-II

KNOWLEDGE REPRESENTATION AND REASONING: Logical Agents-First order logic- First Order Inference-Unification-Chaining- Resolution Strategies-Knowledge Representation- Objects-Actions-Events

UNIT-III

PLANNING AGENTS: Planning Problem-State Space Search-Partial Order Planning-Graphs-Nondeterministic Domains-Conditional Planning-Continuous Planning-Multiagent Planning.

UNIT-IV

AGENTS AND UNCERTAINITY: Acting under uncertainty – Probability Notation-Bayes Rule and use – Bayesian Networks-Other Approaches-Time and Uncertainty-Temporal Models- Utility Theory – Decision Network – Complex Decisions.

UNIT-V

HIGHER LEVEL AGENTS: Knowledge in Learning-Relevance Information-Statistical Learning Methods- Reinforcement Learning-Communication-Formal Grammar-Augmented Grammars- Future of AI.

TEXT BOOKS:

1. Stuart Russell and Peter Norvig, "Artificial Intelligence – A Modern Approach",2nd 2. Edition, Prentice Hall, 2002

REFERENCES

1. Michael Wooldridge, "An Introduction to Multi Agent System", John Wiley, 2002.
2. Patrick Henry Winston, Artificial Intelligence, 3rd Edition, AW, 1999.
3. Nils.J.Nilsson, Principles of Artificial Intelligence, Narosa Publishing House, 1992

Program Educational Objectives (PEO's):

PEO1: The students of the program will have strong foundation in the fundamental principles and gain advanced knowledge in the Basic Sciences, Mathematics and other application of Advanced Computer Engineering.

PEO2: The students of the program will be prepared for their successful careers in the software industry / seek higher studies and continue to develop.

PEO3: The students of the program will prepare to engage in professional development through self-study, graduate and professional studies in engineering & business.

PEO4: Graduates shall have good communication skills, leadership skills, professional, ethical and social responsibilities.

Programme Outcomes (PO's) :

PO1.Engineering knowledge: Ability to obtain and apply the knowledge of science and engineering essentials in problem solving.

PO2.Problem Analysis: Ability to undertake problem recognition ,formulation and providing ideal solution.

PO3.Design/ development of solutions: An ability to design, implement a computer based system, with desire program to meet the needs of social and environmental considerations.

PO4.Conduct investigations of complex problems: An ability to apply mathematical formulas, algorithmic principles and computational theory to develop a model and design of computer based system.

PO5. Modern tool usage: An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

PO6.Engineer and society: An ability to analyze the impact of computing in different organizations, society including the varying policy issues that are taken care off.

PO7.Environment and sustainability: Understanding of impact of engineering solutions on the environment and this attains sustainability with responsibility.

PO8.Ethics: An ability to lead a strong professionalism and the ethical values.

PO9.Individual and team work: An ability to function effectively on multidisciplinary environments leads to leadership and member of team work.

PO10. Communication: An ability to communicate effectively in both verbal and written form which enables to prepare well documentation for report writing and a project.

PO11.Project management and finance: Apply project management practices to the launch of new programs, initiatives, products, services, and events relative to the stakeholder needs including – finance.

PO12.Life-long learning: Recognition of the need for higher studies and inspires to update the latest technologies by the way of life long learning process from time to time.

Program Specific Outcomes: (PSO's):

PSO1: Acquired knowledge will be used to design and modify principles in the development of software and hardware systems to get a better quality product.

PSO2: An ability to identify the state of professional development in preparing for competitive examinations that offer successful career and career building.

Institutes Under

TKR EDUCATIONAL SOCIETY

Teegala Krishna Reddy Engineering College(TKEM)

TKR College of Engineering and Technology(TKRC)

TKR Institute of Management and Science(TKRB)

TKR College of Pharmacy(TKRP)