ACADEMIC REGULATIONS, COURSE STRUCTUREAND DETAILED SYLLABUS

Effective from the Academic Year 2021-22 onwards

Course Structure and Syllabus
B.Tech. CSE (Data Science) Programme

(MR21 Regulations – Effective from Academic Year 2021-22 onwards)

For
B.Tech. - Four-Year Degree Programme

MALLA REDDY ENGINEERING COLLEGE

(Autonomous)

(An UGC Autonomous Institution, Approved by AICTE and Affiliated to JNTUH,Hyderabad)
Recognized under section 2(f) &12 (B) of UGC Act 1956, Accredited by NAAC with 'A^{++}' Grade (II Cycle) and NBA
Maisammaguda, Dhulapally (Post Via Kompally), Secunderabad - 500 100.

MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)
MR21 – ACADEMIC REGULATIONS (CBCS)
for B.Tech. (REGULAR) DEGREE PROGRAMME

Applicable for the students of B.Tech. (Regular) programme admitted from the Academic Year 2020-21 onwards

The B.Tech. Degree of Jawaharlal Nehru Technological University Hyderabad, Hyderabad shall be conferred on candidates who are admitted to the programme and who fulfill all the requirements for the award of the Degree.

VISION

To be a premier center of professional education and research, offering quality programs in a socio-economic and ethical ambience.

MISSION

- To impart knowledge of advanced technologies using state-of-the-art infrastructural facilities.
- To inculcate innovation and best practices in education, training and research.
- To meet changing socio-economic needs in an ethical ambience.

DEPARTMENT VISION

To attain global standards in Computer Science and Engineering education, training and research to meet the growing needs of the industry with socio-economic and ethical considerations.

DEPARTMENT MISSION

- To impart quality education and research to undergraduate and postgraduate students in Computer Science and Engineering.
- To encourage innovation and best practices in Computer Science and Engineering utilizing state-of-the-art facilities.
- To develop entrepreneurial spirit and knowledge of emerging technologies based on ethical values and social relevance.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO 1: To impart with a sound knowledge in scientific and engineering technologies necessary to formulate, analyze, design and implement solutions to computer technology related problems.

PEO 2: To carry out research in frontier areas of computer science and engineering with the capacity to learn independently throughout life to develop new technologies.

PEO 3: To train to exhibit technical, communication and project management skills in their profession and follow ethical practices.

PEO 4: To possess leadership and team working skills to become a visionary and an inspirational leader and entrepreneur.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO 1: Apply the knowledge gained during the course of the program from mathematics, basics Computing, Basic Sciences and all computer science courses in particular to identify, formulate and solve real life complex engineering problems faced in industries and /or during research work with due consideration for the public health and safety, in the context of cultural, societal, and environmental situations.

PSO 2: Provide socially acceptable technical solutions to complex computer science engineering problem with the application of modern and appropriate techniques for sustainable development relevant to professional engineering practice.

PSO 3: Comprehend and write effective project in multi-disciplinary environment in the context of changing technologies.

PROGRAMME OUTCOMES (POs)

PO1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem analysis**: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions using First principles of mathematics, natural sciences, and engineering sciences.
PO3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information toprovide valid conclusions.
PO5	**Modern tool usage**: Create, select, and apply appropriate techniques,resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	**The engineer and society**: Apply reasoning informed by thecontextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professionalengineering practice.
PO7	**Environment and sustainability**: understand the impact of the professional engineering solutions in societal and environmental contexts, demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethics**: Apply ethical principles and commit to professional ethics, responsibilities, and norms of the engineering practice.
PO9	**Individual and team work**: Function effectively as an individual andas a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	**Life-long learning**: Recognize the need for, and have the preparationand ability to engage in independent and life-long learning in the broadest context of technological change.

Malla Reddy Engineering College (Autonomous) (MREC-A) offers **Four** Year (**Eight** Semesters) **Bachelor of Technology** (**B.Tech**.) with Choice Based Credit System (CBCS) in the following Branches of Engineering.

S. No.	Branch Code	Branch	Intake
1	01	Civil Engineering (CE)	120
2	02	Electrical and Electronics Engineering (EEE)	60
3	03	Mechanical Engineering (ME)	120
4	04	Electronics and Communication Engineering (ECE)	180
5	05	Computer Science and Engineering (CSE)	240
6	12	Information Technology (IT)	60
7	62	Computer Science and Engineering (Cyber Security)	60
8	66	Computer Science and Engineering (AI &ML)	60
9	67	Computer Science and Engineering (Data Science)	60
10	69	Computer Science and Engineering (IOT)	60
11	25	Mining Engineering (Min.E)	60

- **Eligibility for Admission**

Admission to the B.Tech. programme shall be made either on the basis of the merit rank obtained by the qualifying candidate in entrance test conducted by the Telangana State Government (TSEAMCET) or on the basis of any other order of merit approved by the University, subject to reservations as prescribed by the Government of Telangana from time to time.

The medium of instructions for the entire B.Tech. programme will be ENGLISH.

- **B.Tech. Programme Structure & Duration of Study**

A student after securing admission shall pursue the B.Tech. programme in a minimum period of four academic years (8 semesters) and a maximum period of eight academic years (16 semesters) starting from the date of commencement of first year first semester. Further 2 years of extension is allowed for appearing examinations, failing which student shall forfeit seat in B.Tech. Course. The total credits for the entire B.Tech. programme is 160 as prescribed by AICTE. Each student shall secure 160 credits (with CGPA ≥ 5) required for the completion of the B.Tech. programme and award of the B.Tech. degree*.

UGC/ AICTE specified Definitions/ Descriptions are adopted appropriately for various terms and abbreviations used in these Academic Regulations/ Norms, which are as listed below.

- **Semester Scheme**:

Each B.Tech. programme is of 4 academic years (8 Semesters), with the academic year being divided into two semesters of 22 weeks (≥90 instructional days) each, having 'Continuous Internal Evaluation (CIE)' and 'Semester End Examination (SEE)' under Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) as indicated by UGC. The Curriculum/ Course Structure is defined based on the model curriculum defined by AICTE.

- **Credit Courses**:

All Subjects/ Courses are to be registered by a student in a semester to earn credits. Credits shall be assigned to each Subject/ Course in a L: T: P: C (Lecture Periods: Tutorial Periods: Practical Periods: Credits) Structure, based on the following general pattern.

- One Credit - for one hour/ Week/ Semester of Lecture (L) / Tutorials (T).
- One Credit - for two hours/ Week/ Semester of Practical's (P).

Courses like Environmental Sciences, Induction Programme, Gender Sensitization and students activities like Internship, Sports/Yoga/NSS and courses relevant to emerging technologies are identified as Mandatory/Audit courses. These courses will not carry any credits.

- **Subject/ Course Classification:**

All subjects/ courses offered for the B.Tech. Programmes are broadly classified asfollows.

- Foundation Courses (FC)
- Core Courses (CC)
- Elective Courses (EC)
- Mandatory Courses (MC)
- Audit Courses (AC)

- **Foundation Courses (FC)** are further categorized as:

- Humanities and Social Sciences including Management courses (HSMC)
- Basic Science Courses (BSC)
- Engineering Science Courses (ESC).

Core Courses (CC) and Elective Courses (EC) are categorized as

- Professional Core Courses (PCC)
- Professional Elective Courses (PEC)
- Open Elective Courses (OEC)
- Project (PROJ)
- Mandatory Courses (MC - Non-credit with evaluation).
- Audit Courses (AC – Non- credit without evaluation).

-Course Nomenclature:

The curriculum nomenclature or course structure grouping for each of the B.Tech. Programmes, is as listed below (along with AICTE specified range of total credits).

S.No	AICTE	UGC	Course Work – Subject Area	Distribution of credits	Suggested Breakup of Credits
					(Total 160)
1	**HSMC**	Foundation Courses	Humanities and Social sciences including Management courses.	11	12
			Basic Sciences (BSC) including		
2	**BSC**		Mathematics, Physics, Chemistry and Biology.	21	25
			Engineering Science Courses (ESC) including Engineering Workshop		
3	**ESC**		Engineering Graphics, Basics of Electrical and Electronics Mechanical/Computer Engineering.	39	24
4	PCC	Core Courses	Professional core Courses are relevant to the chosen specialization/branch; [May be split in to Hard (no choice) and Soft (with choice)], if required.	47	48
5	PEC	Professional Electives	Professional electives are relevant to the chosen specialization/ branch.	18	18
6	OEC	Open Electives	Open electives are the courses from other technical and/or Emerging subject areas.	9	18
7	PROJ	Project	Mini Project, Project and Seminar	15	15
8	MC	Mandatory Courses	These courses are non-credit Courses with evaluation.	-	-
9	AC	Audit Courses	These courses are non-credit Courses without evaluation.	-	-
Total credits for B.Tech. Programme					**160**

Course Registration

A ‘Faculty Advisor or Counselor’ shall be assigned to each student, who will advise him on the B.Tech. Programme, its Course Structure and Curriculum, Choice/Option for Subjects/ Courses, based on his competence, progress, pre- requisites and interest.

The students have to submit registration form (Online/Offline) to the Academic section of the college within 15 days from the commencement of class work for the first semester. The registration forms for the *subsequent semester* shall be completed before the commencement of SEEs (Semester End Examinations) of the *current semester*.

A Student has to submit the registration form through the Head of Department (a copy of it being retained with Head of Department).

A Student may be permitted to register for the Subjects/ Course of CHOICE with a typical deviation of □3 credits of the semester, based on his PROGRESS and SGPA/CGPA and completion of the ‘PRE-REQUISITES’ as indicated for various Subjects/ Courses in the department course structure and syllabus contents. It needs specific approval and signature of the Faculty Advisor/Counselor and Head of the Department, ‘within a period of 15 days’ from the beginning of the current semester.

If the student submits ambiguous choices or multiple options or erroneous entries during ON-LINE registration for the Subject(s) / Course(s) under a given specified Course/ Group/ Category as listed in the course structure, only the first mentioned Subject/ Course in that category will be taken into consideration.

Subject/ Course options exercised through registration forms will be treated as final and cannot be changed, nor can they be inter-changed; further, alternate choices will also not be considered. However, if the Subject/ Course that has already been listed for registration (by the Head of Department) in a semester could not be offered due to any unforeseen or unexpected reasons, then the student shall be allowed to have alternate choice - either for a new Subject (subject to offering of such a Subject), or for another existing subject (subject to availability of seats), which may be considered. Such alternate arrangements will be made by the Head of the Department, with due

notification and time- framed schedule, within the FIRST WEEK from the commencement of Class- work for that semester. Such changes are to be intimated to Chief Controller of Examinations/Principal immediately.

Open Electives: A student has to complete 3 Open Electives during the period of B.Tech. Programme. However, the student cannot opt for an open elective subject offered by their own (parent) department, if it is already listed under any category of the subjects offered by parent department in any semester.

Professional Electives: A student has to complete 6 Professional Electives during the period of B.Tech. Programme. Students have to choose professional electives from III year I semester onwards from the list of professional electives offered by their departments.

For Audit Courses, a '**Satisfactory Participation Certificate**' from the authorities concerned for the relevant semester is essential. No Marks or Credits shall be awarded for these activities.

For Mandatory Courses, a '**Satisfactory / Not Satisfactory' grade** is awarded based on the performance in both CIE and SEE.

Subjects/ Courses to be offered

A typical Section (or Class) strength for each semester shall be 60. A Subject/ Course may be offered to the students, only if a minimum of **40 students** opt for the same. The maximum strength of a section is limited to 72.

More than one teacher may offer the same subject (Lab / Practical may be included with the corresponding theory subject in the same semester) in any semester. However, selection choice for students will be based on 'First Come First Serve' basis and 'CGPA Criterion'(i.e., the first focus shall be on early On-Line Entry from the student for registration in that semester and the second focus, if needed, will be on CGPA of the student).

If more entries for registration of a subject come into picture, then the concerned Head of the Department shall take necessary actions, whether to offer such a Subject/ Course for TWO (or multiple) SECTIONS or NOT.

Attendance Requirements:

A student shall be eligible to appear for the Semester End Examinations, if he / she acquire a minimum of 75% of attendance in aggregate of all the Subjects/ Courses (including Non-Credit Courses) for that semester.

Condoning of shortage of attendance in aggregate up to 10%(>= 65% and < 75%) in each semester may be granted by the College Academic Committee (CAC) on genuine and **valid grounds** based on the student's representation with supporting evidence.

A stipulated fee prescribed by the CAC, shall be payable towards condoning of shortage of attendance.

Shortage of attendance below 65% in aggregate shall in NO case be condoned. Students whose attendance is < 65% are not eligible to register for Semester End Examinations, they get detained and their registration for that semester shall stand cancelled. They will not be promoted to the next semester. They may seek re- registration for all those Subjects registered in that Semester in which he got detained, by seeking re- admission for that semester as and when offered; in case if there are any Professional Electives and/ or Open Electives, the same may also be **re- registered** if offered, however, if those electives are not offered in later semesters, then alternate electives may be chosen from the **same** set of elective subjects offered under that category.

If any student fulfills the attendance requirement in the present semester shall not be eligible for readmission into the same semester.

Academic Requirements: The following Academic Requirements have to be satisfied, in addition to the attendance requirements mentioned in item No.**6.** A student shall be deemed to have satisfied the Academic requirements and earned the credits allotted to each Subject/ Course, if he / she secures not less than 35% marks in the Semester End Examination and with a minimum of 40% of the total marks allocated for the course; in terms of Letter Grades, this implies securing 'P' Grade or above in that Subject/ Course. If the student secured 'F' grade in any subject he/she can apply for recounting / revaluation by paying prescribed fee. If the student is not satisfied after the results declaration of recounting / revaluation he/she can apply

for challenge valuation with the prescribed fee. College appoints a faculty member; student can bring another faculty member who taught the respective subject at least once (proof should be provided).The faculty member should be from any autonomous college affiliated to JNTUH or JNTUH constituent colleges.

A student shall be deemed to have satisfied the Academic Requirements and earned the credits allotted to Mini Project/Seminar/ Project, if he/ she secure not less than 40% of the total marks to be awarded for each. The student would be treated as failed, if he/ she (i) does not submit a report on his/ her Mini Project / Seminar / Project or does not make a presentation of the same before the Evaluation Committee as per schedule or (ii) secures less than 40% of marks in Mini Project/ Seminar/ Project evaluations.

He/ She may reappear once for each of the above evaluations, when they are scheduled again; if he/ she fails in such **'one-reappearance'** evaluation also, he/ she has to reappear for the same in the next subsequent semester, as and when it is scheduled.

Promotion Rules: Every student has to fulfil the Attendance and Academic requirements by securing the required credits against registered credits as shown below:

S.No.	Promotion	Conditions to be fulfilled
1	First year first semester (I Semester) to first year second semester (II Semester)	Regular course of study of first year first semester.(I Semester)
2	First year second semester (II Semester) to second year first semester (III Semester)	Regular course of study of first year second semester (II Semester). Must have secured at least 50% credits up to first year second semester (II Semester) from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
3	Second year first semester (III Semester) to second year second semester (IV Semester)	Regular course of study of second year first semester (III Semester)
4	Second year second semester (IV Semester) to third year first semester (V Semester)	Regular course of study of second year second semester (IV Semester).

		Must have secured at least 60% credits up to second year second semester (IV Semester) from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
5	Third year first semester (V Semester) to third year second semester (VI Semester)	Regular course of study of third year first semester (V Semester).
6	Third year second semester (VI Semester) to fourth year first semester (VII Semester)	Regular course of study of third year second semester (VI Semester). Must have secured at least 60% credits up to third year second semester (VI Semester) from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
7	Fourth year first semester (VII Semester) to fourth year second semester (VIII Semester)	Regular course of study of fourth year first semester (VII Semester).

A Student shall register for all subjects covering 160 credits as specified and listed (with the relevant Course/ Subject Classifications as mentioned) in the Course Structure, fulfils all the Attendance and Academic requirements for 160 credits securing a minimum of 'P' Grade (Pass Grade) or above in each subject and earn 160 credits securing SGPA ≥5.0 (in each semester) and CGPA (at the end of each successive semester) ≥ 5.0, to successfully complete the B.Tech. Programme.

After securing the necessary 160 credits as specified for the successful completion of the B.Tech. Programme, the student can avail exemption of two subjects up to 6 credits, that is, one open elective and one professional elective subject or two professional elective/open electives subjects for optional drop out from these 160 credits earned; resulting in 154 credits for B.Tech. Programme performance evaluation, i.e., the performance of the student in these 154 credits shall alone be taken into account for the calculation of the final CGPA (at the end of B.Tech. Programme, which takes the SGPA of the IV year II semester into account) and shall be indicated in the grade card of IV year II semester. However, the performance of student in the earlier individual semesters, with the corresponding SGPA and CGPA for which grade cards have already been given will not be altered.

If a student registers for some more **'Extra Subjects'** (in the parent Department or other Departments/ Branches of Engineering) other than those listed subjects totaling to 160 credits as specified in the Course Structure of his/ her department, the performances in those 'extra Subjects' (although evaluated and graded using the same procedure as that of the required 160 credits) will not be taken into account while calculating the SGPA and CGPA. For such extra subjects registered, Letter Grade alone will be indicated in the Grade Card, as a performance measure, subject to completion of the Attendance and Academic Requirements as stated in items No.6 and 7.1 to7.5.

When a student is detained due to shortage of attendance in any semester, he/ she 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 student has been readmitted shall be applicable. However, no Grade Allotments or SGPA/ CGPA calculations will be done for that entire semester in which he/ she got detained. When a student is detained due to lack of credits in any year, shall be promoted to the next academic year only after acquiring the required academic credits. The academic regulations under which student has been readmitted shall be applicable to him.

A student eligible to appear in the Semester End Examination in any Subject/ Course, but absent from it or failed (thereby failing to secure 'P' Grade or above) may reappear for that Subject/ Course at the supplementary examination as and when conducted. In such cases, his / her Internal Marks (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 his/ her performance in that subject.

8.0 Evaluation, Distribution and Weightage of Marks

8.1.1 The performance of a student in each semester shall be evaluated subject - wise (irrespective of credits assigned) for 100 marks for Theory, Practical's, Seminar, Drawing / Design, Mini Project, Project and Minor Courses etc.,. The Theory / Practical courses are evaluated with two components. 1. Continuous Internal Evaluation (CIE), 2. Semester End Examination (SEE). The distribution of 30 Marks for CIE and 70 Marks for SEE decided in the Academic Council.

Theory Courses:

Continuous Internal Evaluation (CIE):

CIE shall be carried out for all courses of B.Tech. Programme twice in a semester (2 Midterm examinations) with the help of objective evaluation, subjective evaluation and regular assignments. Each mid-term examination shall consist of objective test with a duration of 20 minutes, subjective paper shall be conducted with a duration of 90 minutes and one assignment. The composition of objective test, subjective test and assignment shall be evaluated for 40%, 50% and 10% of the allocated internal marks.

Mid - Term Examination –UG				
Part	Type of Questions	No. of Questions	Marks per Question	Total
Part - A	Multiple – Choice Questions	20	1	20
Part - B	Internal choice questions(Module-wise)	5	5	25
Mid Term Exam Total				45
Assignment				5
Grand Total				**50**

The first mid-term examination shall be conducted for the first 50% of the syllabus, and the second mid-term examination shall be conducted for the remaining 50% of the syllabus. First Assignment should be submitted before the conduct of the first mid-term examinations, and the Second Assignment should be submitted before the conduct of the second midterm examinations.

The weightage for the midterm examination shall be given as average of both mid- term examination. The student shall appear for both midterm examinations, in case of any specific reason the student appears only one midterm examination, 50% weightage of that examination shall be considered.

Semester End Examination (SEE):

Semester End Examination (SEE) shall be conducted for all courses of B.Tech. Programmes at the end of the Semester. Duration of the examination is 3 hours. The paper setting and evaluation of all courses carried out by external examiners. The examiners will be selected by the Chief Controller of Examinations/Principal, from the panel of examiners submitted by the head of the respective department.

Semester End Examination- UG			
Type of Questions	No. of Questions	Marks per Question	Total
Internal choice questions (Module-wise)	5	14	70

Practical Courses:

Continuous Internal Evaluation (CIE):

CIE marks shall be awarded with a distribution of 40% for day-to-day performance and timely submission of lab records, 40% for internal lab exam (average of the two exams) and 20% for viva-voce. The CIE will be conducted for 50 marks and scaled to 30 marks.

Semester End Examination (SEE):

SEE marks shall be awarded with a distribution of 20% for design/procedure/schematic diagram of the given experiment, 40% for conduction of experiment, 20% for results and 20% for viva-voce. For conducting SEE (with duration of 3hours), one internal examiner and one external examiner will be appointed by the Chief Controller of Examinations/Principal of the college. The external examiner should be selected from the outside college among the autonomous/reputed institutions from a panel of three examiners submitted by the concerned Head of the Department.

Engineering Graphics:

CIE: There will be 30% of total marks for CIE shall be awarded with a distribution of 40% of the

CIE marks for day to day performance and timely submission of drawing sheets and remaining 60% of CIE marks for midterm examinations.

The distribution of marks for CIE is given below

CIE for Engineering Graphics				
Part	Type of Questions	No. of Question s	Marks per Question	Total
Part - A	Day – to – Day Work			20
Mid – Term Examination				
Part - B	Internal choice questions (Module- wise)	5	6	30
Total				50

The distribution of marks for SEE is given below

SEE for Engineering Graphics			
Type of Questions	No. of Questions	Marks per Question	Total
Internal choice questions (Module-wise)	5	14	70

Machine Drawing:

CIE: There will be 30% of total marks for CIE shall be awarded with a distribution of 40% of the CIE marks for day to day performance and timely submission of drawing sheets and remaining 60% of CIE marks for midterm examinations.

The distribution of marks for CIE is given below

CIE for Machine Drawing			
Type of Questions	No. of Questions	Marks per Question	Total
Day to Day Work			20
I Mid Term Examination			
Part Drawing (4 out of 6)	4	7.5	30
II Mid Term Examination			
Assembly Drawing (1 out of 2)	1	30	30
Total			50

*The CIE will be conducted for 50 marks and scaled to 30 marks. The distribution of marks for SEE is given below

SEE for Machine Drawing			
Type of Questions	No. of Questions	Marks per Question	Total
Part A - Part Drawing (2 out of 4)	2	15	30
Part B - Assembly Drawing (Compulsory Question)	1	40	40
Total			70

Projects:

Internship-III/Mini Project:

There shall be an Internship-III/Mini Project, for which the students will register after the completion of III year II semester (VI Semester) end examinations and pursue it during summer vacation. The evaluation of Mini project will be done at the end of IV Year I semester (VII

semester). It shall be evaluated internally for 100 marks. The committee consisting Project Coordinator, Supervisor of the project and one senior faculty of the department will evaluate the Internship- III/Mini Project and award appropriate Grade, based on the report submitted to the department and presentation provided by the student in front of the committee.

Project:

Major Project has to be carried out during the VIII semester, as per the instructions of the project supervisor assigned by the Head of the Department for 200 marks. Out of total 200 marks allotted for the major project, 60 marks shall be for CIE (Continuous

Internal Evaluation) and 140 marks for the SEE (Semester End Viva-voce Examination). CIE marks shall be awarded by a Departmental Committee consisting of Project coordinator, Supervisor of Major Project and a senior Faculty member, from two reviews (average). Review - I will be conducted within a month from the commencement of class work (problem definition, objective, literature survey and brief description - each 10 marks) and Review - II will be conducted before second mid examination (progress of work, results, discussion and presentation - each 10 marks). The Major Project Viva-voce (SEE) shall be conducted by a committee comprising of an External Examiner, Head of the Department and Project Supervisor. In SEE of 140 marks, 70 marks for working model / simulation / data collection, 35 marks for report preparation and 35 marks for presentation and viva - voce. The external examiner should be selected by Chief Controller of Examinations from outside the college among the autonomous / reputed institutions from a panel of three examiners submitted by the concerned Head of the Department / Board of Studies (BOS) Chairman.

The topics for mini project and seminar shall be different from one another.

The student is deemed to be failed, if he/ she (i) does not submit a report on Project, 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. A student who has failed may reappear once for the above evaluation, when it is scheduled again; if student fails in such 'one reappearance' evaluation also, he has to reappear for the same in the next subsequent semester, as and when it is scheduled.

Seminar:

For Seminar presentation, the student shall collect the information on a specialized topic, prepare a report and submit to the department at the time of seminar presentation. The seminar presentation (along with the report) shall be evaluated by a committee consisting of Seminar coordinator and two senior faculty members with appropriate grade. The seminar report shall be evaluated internally for 100 marks. There shall be no semester end examination for the seminar.

Non-Credit Courses:

Mandatory Courses:

For Mandatory Courses offered in any semester, a 'Satisfactory/ Not Satisfactory' shall be awarded to the student based on the performance in both CIE and SEE.

Audit Courses:

For Audit Courses offered in any Semester, the student must submit a '**Participation Certificate**' from the concerned authorities. Internship program is also conducted under the category of Audit Courses. The student needs to submit a detailed report to the department after internship program. No marks or Letter Grade shall be allotted for these activities.

Grading Procedure

Grades will be awarded to indicate the performance of each student in each theory subject, or Lab/ Practical or Seminar or Project or Mini-Project or Minor Course etc., based on the % of marks obtained in CIE + SEE both taken together as specified in Item No. 8 and a corresponding Letter Grade shall be given.

As a measure of the student's performance, a 10-point Absolute Grading System using the following Letter Grades (UGC Guidelines) and corresponding percentage of marks shall be followed.

% of Marks	Grade Points	Letter Grade
≥90	10	(Out Standing)
≥80 to < 90	9	A^+ (Excellent)
≥70 to < 80	8	A (Very Good)
≥60 to < 70	7	B^+ (Good)
≥50 to <60	6	B (Average)
≥40 to < 50	5	C (Pass)
< 40	0	F (Fail)
Absent	0	Ab

A student obtaining 'F' Grade in any subject shall be considered 'Failed' and will be required to reappear as 'Supplementary Candidate' in the Semester End Examination (SEE) as and when conducted. In such cases, his / her Internal Marks (CIE Marks) in those subject(s) will remain same as those he / she obtained earlier.

A Letter Grade does not imply any specific % of marks.

In general, a student shall not be permitted to repeat any Subject/ Course (s) only for the sake of 'Grade Improvement' or 'SGPA / CGPA Improvement'. However, he / she has to repeat all the Subjects/ Courses pertaining to that semester, when he / she is detained (as listed in Items Nos.7.7 &7.8).

A student earns Grade Point (GP) in each Subject/ Course, on the basis of the Letter Grade obtained by him in that Subject/ Course (excluding Mandatory non- credit Courses). Then the corresponding 'Credit Points' (CP) are computed by multiplying the Grade Point with credits for that particular Subject/ Course.

Credit Points (CP) = Grade Point (GP) x Credits …For a Course

The Student passes the Subject/ Course only when he / she gets GP ≥ 5('C' Grade or above).

The Semester Grade Point Average (SGPA) is calculated by dividing the Sum of Credit Points (ΣCP) secured from all Subjects/ Courses registered in a semester by the Total Number of Credits registered during that semester. SGPA is rounded off to two decimal places. SGPA is thus computed as

$SGPA = \{\sum_{i=1}^{N} C_i G_i\} / \{\sum_{i=1}^{N} C_i\}$ … for each semester

where 'i' is $CGPA = \{\sum_{j=1}^{M} C_j G_j\} / \{\sum_{j=1}^{M} C_j\}$akes into account all subjects in a semester), 'N' is the number of subjects registered for the semester (as specifically required and listed under the Course Structure of the parent department) is the number of credits allotted to the i^{th} subject and represents the Grade Points (GP)corresponding to the Letter Grade awarded for that i^{th} subject. The Cumulative Grade Point Average (CGPA) is a measure of the overall cumulative performance of a student over 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 off to two decimal places. CGPA is thus computed from the II semester onwards, at the end of each semester, as per the formula. … for all 'S' semesters registered(i.e., up to and inclusive of 'S' semesters, $S \geq 2$)

where 'M' is the total number of subjects (as specifically required and listed under the

course structure of the parent department) the student has registered from the 1^{st}semesteronwards up to and inclusive of the semester 'S' (obviously M > N), 'j' is the subject indicator index (takes in to account all subjects from '1' to 'S' semesters) is the number of credits allotted to the j^{th} subject, and represents the Grade Points (GP) corresponding to the Letter Grade awarded for that j^{th} subject. After registration and completion of I Year I Semester however, the SGPA of that semester itself may be taken as the CGPA, as there are no cumulative effects.

ILLUSTRATION OF CALCULATION OF SGPA

Course/ Subject	Credits	Letter Grade	Grade Points	Credit Points
Course 1	3	A	8	3 x 8 = 24
Course 2	3	O	10	3 x 10 = 30
Course 3	3	C	5	3 x 5 = 15
Course 4	3	B	6	3 x 6 = 18
Course 5	3	A+	9	3 x 9 = 27
Course 6	1.5	B	6	1.5 x 6 = 09
Course 7	1.5	A	8	1.5 x 8 = 12
Course 8	2	A	8	2 x 8 = 16
	Total = 20			Total Credit Points = 151

SGPA = 151/20 = 7.55

ILLUSTRATION OF CALCULATION OF CGPA:

Semester	Credits	SGPA	Credits X SGPA
Semester I	21	7	21 X 7 = 147
Semester II	19	6	19 X 6 = 114
Semester III	22	6.5	22 X 6.5 = 143
Semester IV	20	6	20 X6 = 120
Semester V	22	5.75	22 X 5.75 = 126.5
Semester VI	18	7.25	18 X 7.25 = 130.5
Semester VII	18	8	18 X 8 = 144
Semester VIII	20	8.5	20 X 8.5 = 170
	160		1095

CGPA = 1095/160 = 6.84

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

For calculations listed in Item Nos.9.6 to 9.10, performance in failed Subjects/ Courses (securing 'F' Grade) will also be taken into account and the credits of such Subjects/Courses will also be included in the multiplications and summations. However, Mandatory Courses will not be taken into consideration.

Passing Standards:

A student shall be declared successful or 'passed' in a semester, only when he / she gets a SGPA ≥ 5.00 (at the end of that particular semester); and a student shall be declared successful or 'passed' in the entire B.Tech Programme, only when he / she gets a CGPA ≥ 5.00; subject to the condition that he / she secures a GP ≥ 5 ('C' Grade or above) in every registered Subject/ Course in each semester (during the entire B.Tech Programme) for the award of degree, as required.

In spite of securing 'P' Grade or above in some (or all)Subjects/ Courses in any semester, if a student receives a SGPA < 5.00 and/ or CGPA < 5.00 at the end of such a semester, then he / she 'may be allowed' (on the 'specific recommendations' of the

Head of the Department and subsequent approval from the Principal) (i) to go into the next subsequent semester (subject to fulfilling all other attendance and academic requirements as listed under Item Nos. 7&8);(ii) to 'improve his / her SGPA of such a semester (and hence CGPA) to 5.00 or above', by reappearing for one or more (as per student's choice) of the same course(s) in which he / she has secured 'P' Grade(s) in that semester, at the Supplementary Examinations to be held in the next subsequent semester(s). In such cases, his / her Internal Marks (CIE Marks) in those subject(s) will remain same as those he / she obtained earlier. In these considerations, the newly secured Letter Grades will be recorded and taken into account for calculation of SGPA and CGPA, only if there is an improvement.

A student shall be declared successful in any Non-Credit Course, if he / she secures a 'Participation Certificate' for that Audit Course and "Satisfactory Grade' for Mandatory Course.

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.

10 Declaration of Results

Computation of SGPA and CGPA are done using the procedure listed in items 9.6 to9.10.

For final % of marks equivalent to the computed final CGPA, the following formula may be used …

% of Marks = (final CGPA – 0.5) x 10

11 Award of Degree

A student who register for all the specified courses as listed in the Course Structure, satisfies all the course requirements, passes all the examinations prescribed in the entire B.Tech Programme within the specified period (refer 4.1) and secures the required 160 Credits (with CGPA ≥ 5.0) 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.

A student who qualifies for the award of the degree as listed in Item 11.1, shall be placed in one of the following classes:

Class Awarded	CGPA
First Class with Distinction	≥ 8.00
First Class	≥ 6.50 and < 8.00
Second Class	≥ 5.50 and < 6.50
Pass Class	≥ 5.00 and < 5.50

A student with final CGPA (at the end of the B.Tech Programme) <5.00 will not be eligible for the award of the degree. Students will be eligible for the award of '**Gold Medal**', if he/she should

have passed all the subjects/courses in first appearance within the first academic years (or eight sequential semesters) from the date of commencement of first year first semester and should have secure CGPA ≥ 8.00 at the end of eight sequential semesters.

A student will be eligible to get under graduate with honours or additional minor engineering if he/she completes an additional 20 credits through MOOCs.

- Withholding of Results

If the student has not paid fees to college at any stage or has pending dues against his / her name due to any reason whatsoever or if any case of indiscipline is pending against him, the result of the student may be with-held and he / she will not be allowed to go into the next higher semester. The award or issue of the degree may also be withheld in such cases.

- **Transitory Regulations**
- **For students detained due to shortage of attendance**:

- A student who has been detained in I year of MR15 (2016 admitted)/ MR17/MR18 regulations due to lack of attendance, shall be permitted to join I year I Semester of MR20 regulations and he / she is required to complete the study of B.Tech Programme within the stipulated period of eight academic years from the date of first admission in I Year.

- A student who has been detained in any semester of II, III and IV years of MR15/MR17/MR18 regulations for want of attendance shall be permitted to join the corresponding semester of MR20 regulations and is required to complete the study of B.Tech., within the stipulated period of eight academic years from the date of first admission in I Year. The MR20 academic regulations under which a student has been readmitted shall be applicable to that student from that semester. See rule (C) for further transitory regulations.

- **For students detained due to shortage of credits:**

- A student of MR15/MR 17/MR18 regulations, who has been detained due to lack of credits, shall be promoted to the next semester of MR20 regulations only after acquiring the required credits as per the corresponding regulations of his/her first admission. The student is required to complete the B.Tech Programme within the stipulated period of eight academic years from the year of first admission. The MR20

academic regulations are applicable to a student from the year of readmission onwards. See rule (C) for further Transitory Regulations.

- **For readmitted students in MR20 regulations:**

- A student who has failed in any subject under any regulation has to pass those subjects in the same regulations.

- The maximum credits that a student acquires for the award of degree, shall be the sum of the total number of credits secured in all the regulations of his/her study including MR20 regulations. The performance evaluation of the student will be done after the exemption of two subjects if total credits acquired are ≤ 160, (see item 7.5).

- If a student readmitted to MR20 regulations, has any subject with 80% of syllabus common with his/her previous regulations, that particular subject in MR20 regulations will be substituted by another subject to be suggested by the College Academic Committee (CAC).

Note: If a student readmitted to MR20 regulations, has not studied any subjects/topics in his/her earlier regulations of study which is prerequisite for further subjects in MR20 regulations, the departments concerned shall conduct remedial classes to cover those subjects/topics for the benefit of the students.

- **Student Transfers**

There shall be no branch transfer after the completion of admission process. The students seeking transfer to MALLA REDDY ENGINEERINF COLLEGE(Autonomous) - MREC(A) from variousother Universities/ Institutions have to pass the failed subjects which are equivalent to the subjects of MREC(A) and also pass the subjects of MREC(A) which the students have not studied at the earlier institution. Further, though the students have passed some of the subjects at the earlier institutions, if the same subjects are prescribed in different semesters of MREC(A), the students have to study those subjects in MREC(A) inspite of the fact that those subjects are repeated.

The transfer students from other Universities / Institutions to MREC(A) who are on rolls will be provided one chance to write internal examinations in the failed subjects and/or subjects not studied as per the clearance letter issued by the JNTUH.

- **Scope**
    - Where the words “he”, “him”, “his”, occur in the write – up of regulations, they include “she”, “her”, “hers”.
    - Where the words “Subject” or “Subjects”, occur in these regulations, they also imply “Course” or “Courses”.
    - The academic regulations should be read as a whole, for the purpose of any interpretation.
    - In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the College Academic Committee headed by the Principal will be considered as final.

Academic Regulations for B.Tech.(Lateral Entry Scheme)

w.e.f. the A Y 2021-22

Eligibility for award of B. Tech. Degree (LES)

The LES students after securing admission shall pursue a course of study for not lessthan three academic years and not more than six academic years.

- The student shall register for 120 credits and secure 120 credits with CGPA ≥ 5 from II year to IV year B.Tech. Programme (LES) for the award of B.Tech. degree. **Out of the 120 credits secured, the student can avail exemption up to 6 credits**, that is, one open elective subject and one professional elective subject or two professional elective subjects resulting in 114 credits for B.Tech. Programme performance evaluation**.**
- The students, who fail to fulfill the requirement for the award of the degree in six academic years from the year of admission, shall forfeit their seat in B.Tech. Programme.
- The attendance requirements of B. Tech. (Regular) shall be applicable to B.Tech.(LES).

Promotion Rule:

Sl.No.	Promotion	Conditions to be fulfilled
1	Second year first semester (III Semester) to second year second semester (IV Semester)	• Regular course of study of second year first semester (III Semester).
2	Second year second semester (IV Semester) to third year first semester (V Semester).	• Regular course of study of second year second semester (IV Semester) • Must have secured at least 60% credits up to second year second semester (IV Semester) from all the relevant regular and supplementary examinations, whether the student takes those
3	Third year first semester (V Semester) to third year second semester (VI Semester)	• Regular course of study of third year first semester (V Semester).
4	Third year second semester (VI Semester) to fourth year first semester (VII Semester)	• Regular course of study of third year second semester (VI Semester) • Must have secured at least 60% credits up to third year second semester (VI Semester) from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
5	Fourth year first semester (VII Semester) to fourth year second semester (VIII Semester)	• Regular course of study of fourth year first semester (VII Semester)

- All the other regulations as applicable to B. Tech. 4-year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme).

MALPRACTICES RULES

DISCIPLINARY ACTION FOR IMPROPER CONDUCT IN EXAMINATIONS

Sl.No.	Nature of Malpractices/Improper conduct	Punishment
If the candidate:		
1 a)	Possesses or keeps accessible in 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 student is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the course of the examination)	Expulsion from the examination hall and cancellation of the performance in that course only.
b)	Gives assistance or guidance or receives it from any other student orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that course only of all the students involved. In case of an outsider, he will be handed 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 that course of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the student has already appeared including practical examinations and project

		work and shall not be permitted to appear for the remaining examinations of the courses of that semester. The hall ticket of the candidate shall be cancelled.
3	Impersonates any other candidate in connection with the examination.	The student who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original student who has been impersonated, shall be cancelled in all the courses of the examination (including practical's and project work) already appeared and shall not be allowed to appear for examinations of the remaining courses of that semester. The candidate is also debarred for two consecutive semesters from class work and all SEE. The continuation of the programme by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an

		outsider, he will be handed over to the police and a case is 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 cancellation of performance in that course and all the other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester. The student is also debarred for two consecutive semesters from class work and all SEE. The continuation of the programme by the candidate is subject to the academic regulations in connection with forfeiture of seat
5	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that course.
6	Refuses to obey the orders of the Chief Controller of Examinations (CCE) / Controller of Examinations (CE) / Assistant Controller of Examinations (ACE) / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that

	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 to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-incharge, 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 the tendency to disrupt the orderly conduct of the examination	course and all other courses the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the courses of that semester. The students also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police cases registered against them.
7	Leaves the exam hall taking away answer script 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 in that course and all the other courses the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester. The candidate is also debarred for two consecutive semesters from class work and all SEE. The continuation of the programme by the student is subject to the academic

		regulations in connection with forfeiture of seat.
8	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester. The candidate is also debarred and forfeits the seat.
9	If student of the college, who is not a student for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses 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 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 of the performance in that course and all other courses the candidate has already appeared including practical

		examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester.
11	Copying internal detected evidence, based on such as, during valuation or during special scrutiny.	Cancellation of the performance in that course and all other courses the student has appeared including practical examinations and project work of that SEE.
12	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the CCE for further action toward suitable punishment.	

Note: ***The student(s) found indulging in malpractices during the CIE also will be punished based on the recommendations of the College Academic Committee.***

Malpractices identified by squad or special invigilators

- Punishments to the students as per the above guidelines.

MALLA REDDY ENGINEERING COLLEGE (Autonomous)
COURSE STRUCTURE – B.Tech. CSE (Data Science) Programme.
(MR21 Regulations - Effective from Academic Year 2021 – 22 onwards)

CSE DATA SCIENCE				
I SEMESTER				
SL.NO	CATEGORY	SUBJECT CODE	SUBJECT NAME	Credits
1	BSC	B0B01	Linear Algebra and Numerical Methods	4
2	BSC	B0B17	Engineering Chemistry	4
3	BSC	B0B09	Semiconductor Physics	4
4	ESC	B0501	Programming for Problem Solving	3
5	BSC	B0B18	Engineering Chemistry Lab	1
6	BSC	B0B11	Applied Physics Lab	1
7	ESC	B0502	Programming for Problem Solving Lab	1
8	ESC	B0305	Engineering Drawing	3
Total Credits				21

CSE DATA SCIENCE				
II SEMESTER				
SL.NO	CATEGORY	SUBJECT CODE	SUBJECT NAME	Credits
1	HSMC	B0H01	English	3
2	BSC	B0B02	Probability and Statistics	3
3	ESC	B0201	Basic Electrical and Electronics Engineering	3
4	ESC	B0504	Python Programming	4
5	HSMC	B0H02	English Language and Communications Skills Lab	1
6	ESC	B0506	Python Programming Lab	2
7	ESC	B1201	Engineering and IT Workshop	2
8	ESC	B0202	Basic Electrical and Electronics Engineering Lab	1
Total Credits				19

CSE DATA SCIENCE				
III SEMESTER				
SL.NO	CATEGORY	SUBJECT CODE	SUBJECT NAME	Credits
1	PCC	B0507	Discrete Mathematics	3
2	PCC	B0508	Computer Organization and Architecture	3
3	PCC	B0509	Data Structures	3
4	PCC	B0510	Object Oriented Programming through Java	3
5	PCC	B6701	Data Preparation And Analysis	3
6	PCC	B0512	Data Structures Lab	1.5
7	PCC	B0513	Object Oriented Programming Through Java Lab	1.5
8	PCC	B6702	Data Preparation And Analysis Lab	2
9	MCC	B00M1	Gender Sensitization	-
Total Credits				20

CSE DATA SCIENCE				
IV SEMESTER				
SL.NO	CATEGORY	SUBJECT CODE	SUBJECT NAME	Credits
1	BSC	B0B22	Statistics For Data Science	3
2	PCC	B0515	Database Management Systems	3
3	PCC	B6722	Software Engineering	3
4	PCC	B0516	Design and Analysis of Algorithms	3
5	PEC-1	B6601	Fundamentals of Artificial Intelligence	3
		B0518	Free and Open Source Technologies	
		B6703	Matrix Computations for Data Science	
		B0525	Micro Processor and Interfacing	
		B0523	E-Commerce	
6	PCC	B0521	Database Management Systems Lab	2
7	PCC	B6704	Statistics For Data Science Lab	1.5
8	PCC	B0521	Design and Analysis of Algorithms Lab	1.5
9	MC	B00M2	Environmental Science	-
Total Credits				20

CSE DATA SCIENCE				
V SEMESTER				
SL.NO	**CATEGORY**	**SUBJECT CODE**	**SUBJECT NAME**	**Credits**
1	HSMC	B0H09	Management Fundamentals	3
2	PCC	B0511	Operating Systems	3
3	PCC	B6705	Advanced Python Programming	3
4	PCC	B1202	Web Technologies	3
Professional Elective –II				
5	PEC-II	B6201	Computer Networks	3
		B0528	Applied Artificial Intelligence	
		B0534	Animation Techniques	
		B0526	Advanced Databases & Security	
		B6905	Computer Graphics	
Professional Elective –III				
6	PEC-III	B0533	Distributed Systems	3
		B0531	Digital Logic Design	
		B0548	Software Testing Methodologies	
		B6706	R Programming	
		B0524	Formal Language And Automata Theory	
7	PCC	B6707	Advanced Python Programming Lab	1
8	PCC	B0514	Operating Systems Lab	2
9	MC	B00M3	Quantitative Aptitude and Verbal Reasoning-1	0
			Total Credits	21
VI SEMESTER				
SL.NO	**CATEGORY**	**SUBJECT CODE**	**SUBJECT NAME**	**Credits**
1	HSMC	B0H08	Engineering Economics and Accountancy	3
2	PCC	B6610	Computer Vision	3
3	PCC	B0547	Data Mining	3
Professional Elective –IV				
4	PEC-IV	B6713	Introduction to Digital Image Processing	3
		B6708	Data Analysis using Python	
		B0531	Scripting Languages	
		B1212	Information Retrieval System	

		B0537	Natural Language Processing	
Professional Elective –V				
5	PEC-V	B0527	Cloud Computing	3
		B0517	Mobile Application Development	
		B6709	Multivariate Techniques for Data Analytics	
		B6917	Internet of Things	
		B6203	Cryptography and Network Security	
	HSMC	B0H03	English Communication and Presentation Skills Lab	1
6	PCC	B6611	Computer Vision Lab	1
7	PCC	B0544	Data Mining Lab	2
8	MC	B00M3	Quantitative Aptitude and Verbal Reasoning-II	0
			Total Credits	19

VII Semester							
S.No	**Category**	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	PCC	B6710	Machine Learning Techniques	3	-	-	3
2	PCC	B0542	Big Data Analytics	3	-	-	3
3	PCC	B6711	Data Visualization and Application	3	-	-	3
			Professional Elective-VI				
4	PEC-VI	B6614	Pattern Recognition	3	-	-	3
		B1202	Artificial Neural Networks				
		B0528	Semantic web				
		B0545	Block Chain Technologies				
		B0532	Compiler Design				
5	OEC-I		**Open Elective-I**	3	-	-	3
6	PCC	B6712	Machine Learning Techniques Lab	-	-	4	2
7	PCC	B0549	Big Data Analytics Lab	-	-	4	2
8	MC	B00P1	Internship / Mini Project		-	4	2
Total				**18**		**12**	**21**
Total Contact Hours :30							

VIII Semester				
Course Code	**Course Title**	**L**	**T**	**P**
	Open Elective-II	3		
	Open Elective-II	3	-	-
B00P3	Seminar	-	-	2
B00P2	Major Project	-	-	24
Total		**-**	**-**	**26**
Total Contact Hours :26				

2021-22 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
Code: B0B01	Linear Algebra and Numerical Methods (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT) and IT)	L	T	P
Credits: 4		3	1	-

Prerequisites: Matrices, Differentiation and Integration.

Course Objectives:

- To learn types of matrices, Concept of rank of a matrix and applying the concept of rank to know the consistency of linear equations and to find all possible solutions, if exist.
- To learn concept of Eigen values and Eigen vectors of a matrix, diagonalization of a matrix, Cayley Hamilton theorem and reduce a quadratic form into a canonical form through a linear transformation.
- To learn various methods to find roots of an equation.
- To learn Concept of finite differences and to estimate the value for the given data using interpolation.
- To learn Solving ordinary differential equations and evaluation of integrals using numerical techniques.

MODULE I: Matrix Algebra **[12 Periods]**

Vector Space, basis, linear dependence and independence (Only Definitions)

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; solving system of Homogeneous and Non-Homogeneous linear equations, LU – Decomposition Method.

MODULE II: Eigen Values and Eigen Vectors **[12 Periods]**

Eigen values, Eigen vectors and their properties; Diagonalization of a matrix; Cayley- Hamilton Theorem (without proof); Finding inverse and power of a matrix by Cayley- Hamilton Theorem; Singular Value Decomposition.

Quadratic forms: Nature, rank, index and signature of the Quadratic Form, Linear Transformation and Orthogonal Transformation, Reduction of Quadratic form to canonical forms by Orthogonal Transformation Method.

MODULE III: Algebraic &Transcendental equations [12 Periods]

- Solution of Algebraic and Transcendental Equations: Introduction-Errors, types of errors. Bisection Method, Method of False Position, Newton-Raphson Method.
- The Iteration Method, Ramanujan's method to find smallest root of Equation. Jacobi's Iteration method. Gauss seidel Iteration method.

MODULE IV: Interpolation [12 Periods]

Introduction- Errors in Polynomial Interpolation – Finite differences- Forward Differences- Backward differences -Central differences - Symbolic relations and separation of symbols. Differences of a polynomial-Newton's formulae for interpolation; Central difference interpolation Formulae – Gauss Central Difference Formulae; Interpolation with unevenly spaced points-Lagrange's Interpolation formula.

MODULE V: Numerical solution of Ordinary Differential Equations and Numerical Integration [12 Periods]

Numerical solution of Ordinary Differential Equations: Introduction-Solution of Ordinary Differential Equation by Taylor's series method - Picard's Method of successive Approximations - Euler's Method-Modified Euler's Method – Runge-Kutta Methods. Numerical Integration: Trapezoidal Rule, Simpson's 1/3rd Rule, Simpson's 3/8 Rule.

TEXT BOOKS

- B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition,2010.
- Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley &Sons, 2006.
- D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
- M . K Jain, S R K Iyengar, R.K Jain, Numerical Methods for Scientific and Engineering Computation, New age International publishers.
- S.S. Sastry, Introductory Methods of Numerical Analysis,5th Edition, PHI Learning Private Limited

REFERENCES

- G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson,Reprint,2002.
- N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications,

- Reprint, 2008.
- V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, Affiliated East–West press, Reprint 2005.
- Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11thReprint,2010.

Course Outcomes:

- The student will be able to find rank of a matrix and analyze solutions of system of linear equations.
- The student will be able to find Eigen values and Eigen vectors of a matrix, diagonalization a matrix, verification of Cayley Hamilton theorem and reduce a quadratic form into a canonical form through a linear transformation.
- The student will be able to find the root of a given equation by various methods.
- The student will be able to estimate the value for the given data using interpolation.
- The student will be able to find the numerical solutions for a given ODE's and evaluations of integrals using numerical techniques.

CO- PO Mapping

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1- Weak												
COS	**Programme Outcomes(POs)**											
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**
CO1	3	2	2	3	3				2			1
CO2	2	2	2	3	2				2			1
CO3	2	2	2	3	2				2			1
CO4	3	2	2	3	3				2			2
CO5	2	2	2	3	3				2			2

2021-22 Onwards (MR- 21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech I Semester		
Code: B0B17	Engineering Chemistry	L	T	P
Credits: 4	(Common for CE, EEE, ME, ECE, CSE, CSE (AIML),CSE (DS), CSE (CS), CSE (IOT), IT and Min.E))	3	1	-

Course objectives:

The purpose of this course is to emphasize the relevance of fundamentals of chemical sciences in the field of engineering and to provide basic knowledge on atomic- molecular orbital's, electrochemistry, batteries, corrosion and the role of water as an engineering material in domestic-industrial use. They will also impart the knowledge of stereochemistry, understanding the chemical reaction path way mechanisms and synthesis of drugs. Listing out various types of fuels and understanding the concept of calorific value and combustion.

Module I: Water and its treatment **[10 Periods]**

Introduction to water, hardness of water, causes of hardness, expression of hardness, units and types of hardness-Numerical Problems. Alkalinity of water, specifications of potable water (BIS); Estimation of temporary & permanent hardness of water by EDTA method. Boiler troubles - Scale & Sludge, Priming and foaming, caustic embrittlement and boiler corrosion; Treatment of boiler feed water - Internal treatment (colloidal, phosphate, carbonate and calgon conditioning). External treatment- Lime Soda process (cold & hot) and ion exchange process, Numerical Problems. Disinfection of water by chlorination and ozonization. Desalination by Reverse osmosis and its significance.

Module II: Molecular structure and Theories of Bonding: **[10 Periods]**

Introduction to Molecular orbital Theory. Linear Combination of Atomic Orbital's (LCAO), significance of bonding and anti-bonding molecular orbital, Conditions for the formation of molecular orbital's. Molecular orbital energy level diagrams of diatomic molecules -, N2 ,O2 and F2. Introduction to coordination compounds-ligand- coordination number (CN) - spectrochemical series. Salient features of crystal field theory, Crystal field splitting of transition metal complexes in octahedral ([CoF6]3- and [Co(CN)6]3-) and tetrahedral ([NiCl4]2- and [Ni (CO)4]) fields - magnetic properties of complexes. Band structure of solids and effect of doping on conductance.

Module III: Electrochemistry and Corrosion

- **Electrochemistry: [7 Periods]**

Introduction to Electrochemistry-Conductance (Specific and Equivalent) and units. Types of cells-electrolytic & electrochemical cells (Galvanic Cells)-Electrode potential- cell potential (EMF).Electrochemical series and its applications, Nernst equation its applications and numerical problems. Reference electrodes - Calomel Electrode and Glass electrode- determination of pH using glass electrode. Batteries: Primary (dry cells) and secondary(Lead- Acid cell, Ni-Cd cell) - applications of batteries. Fuel cells: Hydrogen - Oxygen fuel cell and its applications.

- **Corrosion: [7 Periods]**

Causes and effects of corrosion:Theories of corrosion – Chemical & Electrochemical corrosion, Pilling-Bedworth rule, Types of corrosion: Galvanic and Water-line corrosion. Factors affecting rate of corrosion-Nature of metal and Nature of Environment, Corrosion control methods - Cathodic protection (Sacrificial anodic and impressed current cathodic methods). Surface coatings: Methods of metallic coatings - hot dipping (Galvanization), Electroplating (Copper) and Electroless plating (Nickel).

Module IV: Stereochemistry, Reaction mechanism & synthesis of drug molecules and NMR spectroscopy: [12 Periods]

Introduction to Isomers - classification of isomers - structural (chain, positional & functional) and stereoisomerism-geometrical (cis-trans & E-Z system) - characteristics of geometrical isomerism, optical isomerism (chirality - optical activity, specific rotation, enantiomers and diastereomers) of tartaric acid and lactic acid. Conformational isomerism of n-Butane. Introduction to bond cleavage (homo & hetero cleavage) - reaction intermediates and their stability. Types of organic reactions - Mechanism of substitution (SN1 & SN2) and (E1&E2) reactions with suitable example. Ring opening (Beckmann rearrangement), oxidation and reduction (Cannizaro reaction), cyclization (Components of Diels-Alder reaction-Mechanism of Diels-Alder reaction with suitable example) reactions. Synthesis of Paracetamol, Aspirin and their applications.

Introduction to Spectroscopy, Basic concepts of nuclear magnetic resonance spectroscopy, chemical shift and spin-spin splitting.

UNIT-V Fuels and Combustion [08 Periods]

Fuels: Classification- solid fuels: coal – analysis of coal – proximate and ultimate analysis and their significance. Liquid fuels – petroleum and its refining, cracking – types – moving bed catalytic cracking. Knocking – octane and cetane rating, synthetic petrol - Fischer- Tropsch's process; Gaseous fuels – composition and uses of natural gas, LPG and CNG. Combustion: Definition, Calorific value of fuel –

HCV, LCV; Calculation of air quantity required for combustion of a fuel. Determination of calorific value by Junkers gas calorimeter-Numerical problems on combustion.

Text Books:

- P.C.Jain and Monica Jain, "A Text Book of Engineering Chemistry", Dhanpat Rai Publications, New Delhi, 16th Edition 2014.
- S.S. Dara and S.S. Umare, "A Text Book of Engineering Chemistry", S Chand Publications, New Delhi, 12th Edition 2010.
- A.Jaya Shree, "Text book of Engineering Chemistry", Wiley, New Delhi, 2018.
- Reference Books:
- B.Rama Devi, Ch.Venkata Ramana Reddy and Prasantha Rath, "Text Book of Engineering chemistry", Cengage Learning India Pvt.Ltd,2016.
- M.G. Fontana and N. D. Greene, "Corrosion Engineering", McGraw Hill Publications, New York, 3rd Edition, 1996.
- K. P. C. Volhardt and N. E. Schore, "Organic Chemistry: Structure and Function", 5th Edition, 2006.

Course Outcomes:

After completion of the course students will be able to:

- Understand water treatment, specifically hardness of water and purification of water by various methods.
- Analyze microscopic chemistry in terms of atomic and molecular orbital's splitting and band theory related to conductivity.
- Acquire knowledge on electrochemical cells, fuel cells, batteries and their applications.
- Acquire basic knowledge on the concepts of stereochemistry, reaction mechanisms and interpretation of NMR in organic molecules.
- Acquire the knowledge of various fuels and identify a better fuel source of less pollution.

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERINGCOLLEGE (Autonomous)	B.Tech. I Semester		
Code:B0B09	Semiconductor Physics (Common for CSE, CSE (Cyber Security),CSE (AI and ML), CSE (DS), CSE (IOT) and IT)	L	T	P
Credits: 4		3	1	-

Prerequisites: Fundamentals of Physics

Course Objectives:

The main objective of this course is to provide an adequate exposure and develop insight about the basic principles of quantum mechanics and semiconductor physicsalong with their possible applications in various branches of engineering.

Module–I: Quantum Mechanics **[08 Periods]**

Introduction, Discussion on Black body radiation spectrum; Louis de Broglie'sconcept of matter waves; Davisson and Germer experiment; G P ThomsonExperiment; Schrodinger's time independent wave equation; Physical significance and properties of wave function; Heisenberg's uncertainty principle - Why anelectron cannot exist inside the nucleus?; Particlein one dimensional infinite potentialwell.

Module – II: Band Theory of Solids **[08 Periods]**

Qualitative discussion of Classical free electron theory; Qualitative treatment ofFermi - Dirac distribution function; Qualitative discussion of Quantum free electrontheory; Density of energy states; Bloch theorem; Qualitative treatment of Kronig -Penney model; E Vs k relationship; Origin of energy band gap; Classification ofmaterials into Conductors, Semi conductors and insulators; Concept of Effectivemass.

Module –III: Semiconductor Physics **[13 Periods]**

A: Elemental and compound semiconductors; Intrinsic and Extrinsic Semiconductors; Expression for carrier concentration in intrinsic and extrinsic semiconductors; Qualitative treatment of Fermi energy level in Intrinsic and extrinsic semiconductors.

B: Direct and indirect band gap semiconductors; Carrier generation and Recombination; Drift

and Diffusion; Equation of Continuity; P-N Junction diode - Formation & V-I Characteristics; LED - Construction and Working Principle; Solar Cell - Construction & I-V Characteristics.

Module – IV **[12 Periods]**

LASER: Introduction, Characteristics of LASER; Absorption, Spontaneous and Stimulated emission; Einstein's coefficients derivation; Population inversion; Pumping mechanisms; Basic components of a LASER system; three and four level LASER systems; Ruby LASER, He-Ne LASER, Semiconductor diode LASER (Homo junction and hetero junction); Applications of LASER - Computers, Medical, Military.

Optical Fibers: Introduction to Optical fibers; Total Internal Reflection; Acceptanceangle and acceptance cone, Numerical aperture; types of optical fibers; Losses in optical fibers - absorption losses, scattering losses and bending losses; Applications of optical fibers - Communications, Level Sensor, LASER angioplasty.

Module – V: Introduction to Digital Electronics **[9 Periods]**

Different types of number systems, Binary logic; Boolean algebra - Basic theorems and properties of Boolean algebra; Boolean functions; logic gates – construction andworking of AND, OR, NOT, NAND, NOR and XOR using discrete components.

Integrated circuits: Levels of integration - SSI, MSI, LSI and VLSI; basic IClogic gates - AND, OR, NOT, NAND, NOR and XOR.

Course Outcomes:

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

- Explain the dual nature of the matter and evaluate the energy of a particletrapped in1D infinite potential well.
- Classify the materials into conductors, semiconductors and insulatorsbased on the outcomes of Kronig - Penney model.
- Analyze the working of semiconductor devices like PN junction diode,LED and Solar cell.
- Explain the working of three LASERs.
- Explain the applications of LASER and optical fibers.

- Describe the Boolean algebra and examine various logic gates.

Text Books:

- K Vijaya Kumar, S Chandralingam, “Modern Engineering Physics’’ Volume I & II,
- S. Chand, 1st Edition, 2017.
- Jasprit Singh, “Semiconductor Optoelectronics: Physics and Technology”, McGraw-Hill, 1995.
- Morris Mano, "Digital Design", Prentice - Hall, 1995.

Reference Books:

- P K Palanisamy, “Engineering Physics”, SciTech Publication, 4th Edition,2014.
- B K Pandey and S. Chaturvedi, “Engineering Physics” Cengage Learning India Revised Edition, 2014.
- P Horowitz and W. Hill, “The Art of Electronics” Cambridge University Press,3rd edition, 2015.
- D K Bhattacharya, Poonam Tandon, “Engineering Physics”, Oxford University Press, 1st Edition, 2015.
- P Bhattacharya, “Semiconductor Optoelectronic Devices”, Prenticehall ofIndia,1997

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERINGCOLLEGE (Autonomous)	B.Tech. I Semester		
Code: B0501	Programming for Problem Solving (Common for CSE, CSE (Cyber Security), CSE (AI and ML),CSE (DS), CSE (IOT) and IT)	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL

Course Objectives:

- Understand the basic terminology, write, compile and debug programs in computer programming
- Implement different control statements for solving problems.
- Understand the concept of structured program and arrays.
- Implement the idea of strings and pointers.
- Analyse the usage of structures and different file operations.

MODULE I: Fundamentals and Introduction to 'C' Language [10 Periods]

Introduction Fundamentals– Computer Systems, Computing Environments, Computer Languages, Creating and running programs, Software Development Method, Algorithms, Pseudo code, flow charts, applying the software development method.

Introduction to 'C' Language: – Background, C-tokens- Keywords, Identifiers, Basic data types, Variables, Constants, Preprocessor directives-include, define, Managing Input / Output functions - formatted input / output functions, Operators. Expressions, Precedence and Associatively, Expression Evaluation, Type conversions, Simple C Programming examples.

MODULE II: Conditional Statements and Repetition Statements [09 Periods]

Conditional Statements: Simple if statement, if-else statement, if-elseif- ladder, nested if- else, Dangling else problem, switch statements.

Repetition statements – while, for, do-while statements, nested looping, other statements related to looping – break, continue, goto, Simple C Programming examples.

MODULE III: Designing Structured Programs and Arrays [10 Periods]

Designing Structured Programs-Introduction to function, Advantages, user defined functions, inter function communication-call by value, Storage classes- auto, register, static, extern, scope rules, type qualifiers, recursion – recursive functions-Towers of Hanoi problem.

Arrays: Basic Concepts, Types of arrays, applications- Selection sort, Bubble sort, Insertion sort, Linear search and Binary search methods, arrays and functions.

MODULE IV: Strings and Pointers [09 Periods]

Strings: Concepts, String Input / Output functions, arrays of strings, string manipulation functions, string conversion, C program examples.

Pointers – Basic Concepts, Pointers for inter function communication-call by reference, pointers to pointers, Pointer arithmetic, array of pointers, pointers to array, applications, pointers to void, pointers to functions, Dynamic memory allocation functions.

MODULE V: Structures and File Handling [10 Periods]

Structures – Declaration, definition and initialization of structures, accessing structure elements, nested structures, arrays of structures, structures and functions, pointers to structures, self-referential structures, unions, difference between structures and union, typedef, bit fields, enumerated types, C programming examples.

Files – Basic Concept of a file, file input / output operations, text files and binary files, file status functions (error handling), Random file access functions, command–line arguments.

C program examples.

TEXTBOOKS

- Computer Fundamentals and Programming in C, P. Dey, M Ghosh, Second edition, Oxford University Press.
- Problem Solving and Program Design in C, J.R. Hanly and E.B. Koffman, Eighth Edition, Pearson Education.
- The C Programming Language, B.W. Kernighan and Dennis M.Ritchie, PHI/Pearson

Education

REFERENCES

- C Programming & Data Structures, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning
- C for Engineers and Scientists, H.Cheng, Mc.Graw-Hill International Edition
- C Programming & Data Structures, P. Dey, M Ghosh R Thereja, Oxford University Press

E–RESOURCES

- http://oxford HYPERLINK "http://oxford/" university press.ac.in/eBooks/ Programming in C.
- https://www.journals.elsevier.com/science-of-computer-programming
- http://www.ejournalofsciences.org
- http://onlinecourses.nptel.ac.in/iiitk_cs-101
- http://onlinevideolecture.com/ebooks/?subject=C-Programming

Outcomes:

At the end of the course, students will be able to

- Translate the algorithms/flowcharts to programs (in C language).
- Decompose a problem into functions and to develop modular reusable code.
- Apply different types of control structures and arrays in a computer programming.
- Develop programs that make use of concepts such as strings, pointers and structures.
- Analyse file operations and command line arguments.

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium,1-Weak

Cos	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	2				2	1	1	3	3	2	2
CO2	3	3	2	2	2				2	1	1	3	3	2	1
CO3	3	3	3	2	2				1			3	3	2	1
CO4	3	2	3	2	2				1		1	2	3	2	1
CO5	3	3	3	2	2				1	1	1	2	3	2	1

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semesterr		
Code: B0B18	**Engineering Chemistry Lab (Common for CE, EEE, ME, ECE, CSE, CSE(AIML),CSE(DS), CSE (CS), CSE(IOT), IT and Min.E))**	**L**	**T**	**P**
Credits: 1		**-**	**-**	**2**

Course Objectives:

To provide the students with practical knowledge of quantitative analysis of materials by classical and instrumental methods for developing experimental skills in building technical competence.

List of Experiments:

- Calibration of Volumetric apparatus.
- Estimation of Total Hardness of water by EDTA Method.
- Estimation of an acid by P^H metry.
- Estimation of alkalinity of water.
- Estimation of strength of an acid by Conductometry.
- Estimation of strength of an acid by Potentiometry.
- Estimation of Mn^{+2} ion in KMnO4 by Colorimetry.
- Determination of viscosity of given liquids by Ostwald's viscometer.
- Determination of surface tension of given sample using stalagmometer.
- Estimation of iron (II) by dichrometry.
- Determination of rate constant of hydrolysis of methyl acetate.
- Preparation of Aspirin.

Course outcomes:

After completion of the course, students will be able to:

- Estimate the hardness of given water samples.
- Select lubricants for various purposes.
- Prepare advanced polymers & drug materials.
- Know the strength of an acid present in batteries.
- Calculate the amount of Mn^{+2} present in unknown substances/ores using instrumental methods.

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERINGCOLLEGE (Autonomous)	B.Tech. I Semester		
Code:B0B11	Applied Physics Lab (Common for CSE, CSE (AI & ML), CSE (Cyb. Sec.),CSE (IoT), CSE (Data Science), IT, ECE and EEE)	L	T	P
Credits: 1		-	-	2

Course objectives:

The main objective of this course is to provide the necessary exposure tothe practical aspects, which is an essential component for learning science.

List of Experiments:

- **Planck's constant**
- To determine Planck's constant using Photo electric effect.
  - *Energy band –gap of a semiconductor*
- To determine the energy band gap of a semiconductor.
  - *V-I and P-I characteristics of light emitting diode*
- Plot V-I and P-I characteristics of light emitting diode.
  - *Laser diode*
- To study the Characteristics of Laser diode.
  - *Solar Cell*
- To study the V-I Characteristics of solar cell.
  - *LCR Circuit*
- To determination of resonant frequency, bandwidth and quality factor of RLCcircuit.
  - *Numerical Aperture of an Optical fiber*
- To determine the Numerical aperture of the given fiber.
  - *Bending Loss of a Fiber*
- To determine the bending loss of the given fiber.
  - *Light Dependent Resistance (LDR)*
- To determine the characteristics of a LDR.
  - *Stewart and Gee's Experiment*
- Determination of Magnetic field along the axis of current carrying circular coil.
  - *B-H Curve*
- To study the magnetization of ferromagnetic material in presence of magneticfield.
  - *Sonometer*
- To verify the frequency of AC Supply.
  - Construction of fundamental logic gates using discrete components and verification of truth tables
  - Verification of truth tables of fundamental logic gates using ICs
  - Construction of universal logic gates using fundamental logic gates.

Course Outcomes:

At the end of the course, students will able to

- Develop skills to impart practical knowledge in real time solution.
- Understand principle, concept, working, application and comparison of results with theoretical calculations.
- Design new instruments with practical knowledge.

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
Code: B0502	Programming for Problem Solving Lab (Common for ALL)	L	T	P
Credits: 1.5		-	-	3

Prerequisites: NIL

Objectives:

- Understand the various steps in Program development
- Identify syntax and semantics of C Programming Language
- Illustrate the usage of structured programming approach in solving problems.
- Develop programs that make use of arrays, strings, pointers and structures in C language
- Analyse different file operations

Software Requirements: C

List of Programs:

- Practice various Internal and External DOS Commands.
- Write sample examples of C programs to implement basic operations.
- Write a C program to find smallest and largest of given three numbers.
- Write a C program to find the roots of a quadratic equation.
- Write a C program to check whether given character is alphabet, digit or special symbol
- Write a C program to find the sum of individual digits of a positive integer.
- Write a C program to generate the first 'n' terms of the sequence.
- [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 find whether the given number is palindrome, perfect, Armstrong or strong.
- Write a C program to generate all the prime numbers between n1 and n2, where n1 and n2 are values supplied by the user.
- Write C programs that use both recursive and non-recursive functions
- To find the factorial of a given integer.
- To find the GCD (greatest common divisor) of two given integers.
- Write a C program to find both the largest and smallest number in a list of integers.
- Write a C program that uses non-recursive function to search for a Key value in a given list of integers using linear search.
- Write a C program that uses recursive and non -function to search for a Key valuein a given sorted list of integers using Binary search.

- Write a C program that implements the Bubble sort method to sort agiven arrayof integers in ascending order.
- Write a C program that implements the Selection sort method to sort agiven listof names in ascending order.
- Write a C program to perform the following:
- Addition of Two Matrices
- Multiplication of Two Matrices.
- Write a C program that uses functions to perform the following operations:
- To insert a sub-string into given main string from a given position.
- To delete n characters from a given position in a given string.
- To find substring in a given string
- Write a C program to determine if the given string is a palindrome or not
- Write a C program to count the lines, words and characters in a given text.
- Write a C program to swap two numbers, which implement call by value andcall by reference.
- Write a C program to display the below student details using structures

Roll Number	Name	Gender	Branch	Attendance percentage
501	John	male	CSE	77.3
502	Alice	male	ECE	80.5
503	Sam	female	IT	90.7

- Write a C program to find grade of a student using structures.
- Write a C program which copies one file to another
- Write a C program to find sum of two numbers using command line arguments
- Develop a mini project which implement the Library Management System
- Develop a mini project which implement the Student Record System

TEXT BOOKS:

- Computer Fundamentals and Programming in C, P. Dey, M Ghosh, Second edition,

  Oxford University Press
- Problem Solving and Program Design in C, J.R. Hanly and E.B. Koffman, Eighth Edition, Pearson Education.
- The C Programming Language, B.W. Kernighan and Dennis M.Ritchie, PHI/Pearson Education

REFERENCES:

- C Programming & Data Structures, B.A. Forouzan and R.F. Gilberg, Third Edition, Cengage Learning
- C for Engineers and Scientists, H. Cheng, Mc. Graw-Hill International Edition
- C Programming & Data Structures, P. Dey, M Ghosh R Thereja, Oxford University Press

Outcomes:

At the end of the course, students will be able to

- Analyze concepts in problem solving and write diversified solutions for a givenproblem.
- Identify situations where computational methods and computers would be useful.
- Understand the programming tasks using techniques learned and write pseudo- code.
- Compare the program on a computer, edit, compile, debug, correct, recompile and execute it.
- Identify tasks in which the numerical techniques learned are applicable and apply them to write programs, and hence use computers effectively to solve the task

CO- PO, PSO Mapping **(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak**															
Cos	**Programme Outcomes(POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	3										2	2	
CO2	3	3	3										2	2	
CO3	2	2	2										2	2	

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
Code: B0305	ENGINEERING DRAWING (Common for CSE, IT, CSE (Cyber Security), CSE (AI and ML), CSE (Data Science), CSE (IoT) and AI)	L	T	P
Credits: 3		2	-	2

PREREQUISITES: NIL

Course Objectives:

To develop in students, graphic skills for communication of concepts and ideas of engineering products.

MODULE I: **10 Periods**

Introduction to Engineering Drawing, Principles of Engineering Graphics and their significance, Lettering.

Geometrical Constructions: Regular polygons only. Conic Sections: Ellipse, Parabola, Hyperbola– General method only Cycloid and Involutes. Scales: Plane Scale, Diagonal scale.

MODULE II: **10 Periods**

Orthographic Projections: Principles of Orthographic Projections – Conventions – First and Third Angle projections.

Projection of Points: Projection of points including all four quadrants. Projection of Lines: Projection of Lines - parallel, perpendicular, inclined to one reference plane.

MODULE III: **9 Periods**

Projection of Planes: Axis inclined to one reference plane. Projection of Solids: Projections of regular solids like cube, prism, pyramid, cylinder and cone by rotating object method. Axis inclined one reference plane.

MODULE IV: **10 Periods**

Section of Solids: Sectioning of single solid with the cutting plane inclined to one plane and perpendicular to the other - true shape of section.

Development of Surfaces: Development of lateral surfaces of Right Regular Solids –Prism, Cylinder, Pyramid and Cone.

MODULE V: **9 Periods**

Isometric Projections: Principles of Isometric Projection – Isometric Scale, Isometric Views– Conventions –Plane Figures, Simple Solids.

Transformation of Projections: Conversion of Isometric Views to Orthographic Views and vice versa–simple objects.

TEXT BOOKS

1. K.L.Narayana, S.Bheemanjaneyulu "Engineering Drawing with Auto CAD-2016" New Age International Publishers, 1st Edition, 2018.
2. N.D. Bhat, "Engineering Drawing", Charotar Publishing House, 53rd Edition, 2014.

REFERENCES

1. K.L.Narayana, P.Kannaiah, "Engineering Drawing", SciTech Publishers. 2nd Edition, 2017
2. K.Venugopal,"Engineering Drawing",New Age International Publishers, 3rd Edition, 2014.
3. K. V. Natarajan, "A text book of Engineering Graphics", Dhana lakshmi Publishers, 2015.
3. M.S. Kumar, "Engineering Graphics", D.D. Publications, 2011.
4. Trymbaka Murthy, "Computer Aided Engineering Drawing", I.K. international Publishing House, 3rd Edition, 2011.

E - RESOURCES

1. http://nptel.ac.in/courses/112103019/
2. https://www.slideshare.net/search/slideshow?searchfrom=header&q=engineering+drawing
3. https://www.wiziq.com/tutorials/engineering-drawing
4. http://freevideolectures.com/Course/3420/Engineering-Drawing
5. http://www.worldcat.org/title/journal-of-engineering-graphics/oclc/1781711
6. http://road.issn.org/issn/2344-4681-journal-of-industrial-design-and-engineeringgraphics nit jalandhar (EG MECI102)

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERINGCOLLEGE (Autonomous)	B.Tech. II Semester		
Code: B0H01	ENGLISH (Common for CE, EEE, ME, ECE, CSE, CSE (AIML),CSE (DS), CSE (CS), CSE(IOT), IT and Min.E)	L	T	P
Credits: 3		3	-	-

Course Objectives:

The objective of this course is to improve the English Language and Literary competence of the students. The course provides requisite insights into grammar, vocabulary, prose, and short stories. Further, it also helps in developing the skills of Reading and Writing. The course also equips students to study their academic subjects more effectively using the theoretical and practical components of theEnglish language and literature.

MODULE – I

Speech **:** "Go Kiss the World" by Subroto Bagchi
Poem **: "**Leisure" by W. H. Davies
Vocabulary **:** Formation of Words, Prefixes, Suffixes, and Root Words
Grammar **:** Articles and Prepositions
Reading **:** Skimming and Scanning
Writing **:** Introduction to Writing Skills, Characteristics of Effective Writing

MODULE – II

Short story **:** "Gift of Magi" by O' Henry
Poem **: "**No Man is an Island" by John Donne
Vocabulary **:** One Word Substitutions; Synonyms andAntonyms
Grammar **:** Degrees of Comparison, Voice– Exercises
Reading **:** Intensive Reading andExtensive Reading
Writing **:** Paragraph Writing- Cohesive devices; Jumbled Sentences; Punctuation

Module – III

Essay **:** "Lucidity, Simplicity, Euphony" by W. Somerset Maugham
Poem **: "**The Mask" by Maya Angelou
Grammar **:** Tense and Aspect
Vocabulary **:** Homonyms, Homophones, Homographs
Reading **:** Reading for Topicand Theme
Writing **:** Letter Writing

MODULE – IV

Short story **:** "The Night Train at Deoli" by Ruskin Bond
Poem **: "**Gift of India" by Sarojini Naidu

Grammar : Question Tags;Concord
Vocabulary : Idiomatic Expressions; Phrasal Verbs
Reading : Reading for Interpretation
Writing : Essay Writing, Describing, Defining and Classifying

MODULE – V

Essay : "Toasted English" by R. K. Narayan
Poem : "If" by Rudyard Kipling
Grammar : Direct and Indirect Speech, Misplaced Modifiers
Vocabulary : Redundancies and Clichés
Reading : Reading for Specific Purposes, Reading Comprehension practice
Writing : Paraphrasing & Summarizing,

* Exercises from the texts not prescribed shall also be used for classroom tasks.

Prescribed Textbook:

Reference Books:

- Chaudhuri, Santanu S. Learn English: A Fun Book of Functional Language**,** Grammar and Vocabulary. Tata McGraw Hill Education,New Delhi, 2013.
- Field, Marion**.** Improve Your Written English. 5th Edition. How to Books, UK, 2009.
- Leech, Geoffrey and Svartvik, J. A Communicative Grammar of English.3rd edition, Routledge, 2013.

Related Websites:

- http://www.slideshare.net/aszardini/word-formationroot-words-prefixes-and-suffixes
- http://www.scribd.com/doc/37085980/Circulars-Circular-Letters-Notices-Memo#scribd.
- http://www.zsme.tarnow.pl/jezykiobce/wp-content/uploads/2013/11/writing-letters1.pdf.

Course Outcomes:

After completion of the course, students will be able to:

- use written and spoken English considerably well for academic purposes.
- communicate in Enrich accurately and fluently.
- employ extensive and intensive reading skills.
- gain confidence in writing for academic and real life situations.

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERINGCOLLEGE (Autonomous)	B.Tech. II Semester		
Code:B0B02	**Probability and Statistics**	**L**	**T**	**P**
Credits: 3	**(Common for CSE, CSE (Cyber Security), CSE(AI and ML), CSE (DS), CSE (IOT) and IT)**	**3**	**-**	**-**

Prerequisites: Basic Probability

Course Objectives:

- Define event, outcome, trial, simple event, sample space and calculate the probability that an event will occur.
- To learn the random variables and its distributions.
- Statistical analyses are very often concerned with the difference between means.
- Investigate the variability in sample statistics from sample to sample
- Identify the direction and strength of a linear correlation between two factors.

MODULEI: Probability: [12 Periods]

Introduction to Probability**:** Events, sample space, mutually exclusive events. Exhaustive events. Addition theorem for 2& n events and their related problems. Dependent and Independent events, conditional probability, multiplication theorem.Boole's inequality, Baye's Theorem.

MODULE II: Random variables: [12 Periods]
Discrete Probability distributions. Bernoulli, Binomial, Poission, Geometric distributions of their mean and variance, moment generating function–related problems. Continuous probability distributions: Normal distribution, Uniform distribution of their mean and variance, moment generating function, Central Limit theorem.

MODULE III: Sampling Distributions: [14 Periods]

- Definitions of population-sampling-statistic, parameter. Types of sampling, expected values of Sample mean and variance, sampling distribution, Standard error, Sampling distribution of means and sampling distribution of variance. Parameter estimations – likelihood estimate, point estimation and interval estimation
- **Testing of hypothesis:** Null hypothesis, Alternate hypothesis, type I, & type II errors – critical region, confidence interval, and Level of significance. One sidedtest, two-sided test.

Large sample tests:

- Test of significance for single mean
- Test of significance for difference of means
- Test of significance for single proportion

- Test of significance for difference of proportions

MODULE IV: Small sample tests: [12 Periods]

Student t-distribution, its properties and its assumptions, Test of significance difference between sample mean and population mean; difference between means of two small samples, Snedecor's, F- distribution and its properties.Test of equality of two population variances, Chi-square distribution, its properties, Chi-square test of goodness of fit, Independence of attributes.

MODULE V: Correlation, Regression: [10 Periods]

Correlation, Coefficient of correlation, the rank correlation. Regression, Regression Coefficient, The lines of regression: simple regression. Multiple regression for three variables.

TEXT BOOKS

- Walpole, Probability & Statistics, for Engineers & Scientists, 8th Edition, Pearson Education.
- Paul A Mayer Introductory Probability and Statistical Applications, John Wiley Publications.
- Monte Geometry, "Applied Statistics and Probability for Engineers", 6th Edition, Wiley Publications.

REFERENCES

- P. G. Hole, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003(Reprint).
- S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
- W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed.,Wiley, 1968.

E – RESOURCES

Concerned Website links:

- http://www.csie.ntu.edu.tw/~sdlin/download/Probability%20 HYPERLINK "http://www.csie.ntu.edu.tw/~sdlin/download/Probability%20%26%20Statistics.pdf(Prob"& HYPERLINK "http://www.csie.ntu.edu.tw/~sdlin/download/Probability%20%26%20Statistics.pdf(Prob"%20Statistics.pdf HYPERLINK "http://www.csie.ntu.edu.tw/~sdlin/download/Probability%20%26%20Statistics.pdf(Prob"(Probability& Statistics for Engineers & Scientists text book)
- http://www.stat.pitt.edu/stoffer/tsa4/intro_prob.pdf (Random variables and itsdistributions)
- http://users.wfu.edu/Cottrell/ecn215/sampling.pdf HYPERLINK "http://users.wfu.edu/Cottrell/ecn215/sampling.pdf" (Notes on Sampling and hypothesistesting)

Course Outcomes:

- The students will understand and appreciate the role of P&S in data analytics and big data analysis.
- Students would be able to find the Probability in certain realistic situation
- Students would be able to identify distribution in certain realistic situation. It is mainly useful for circuit as well as non-circuit branches of engineering. Also able to differentiate among many random variables Involved in the probability models. It is quite useful for all branches of engineering.
- The student would be able to calculate mean and proportions (large and small sample) and to make Important decisions from few samples which are taken out of un manageably huge populations.
- Students will understand how to forecast the future observations.

CO- PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	3		3		2	2			1
CO2	3	3	3		2			2	1	1	1
CO3	3	2	3		2	1	1	1			1
CO4	3	2	2	2	2	2		3	1	1	3
CO5	3	3	2	1	3	1	2	2	1	1	3

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERINGCOLLEGE (Autonomous)	B.Tech. II Semester		
Code: B0201	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING (Common for ALL)	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL

Course Objectives:

To introduce the concept of electrical circuits and its components. To introduce the characteristics of various electronic devices. To impart the knowledge of various configurations, characteristics and applications of electrical & electronic components.

MODULE I: DC Circuits [09 Periods]

Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff'scurrent and voltage laws - Series, parallel, series-parallel, star-to-delta and delta-to-star transformation-analysis of simple circuits with dc excitation. Superposition,Thevenin's and Maximum Power Transfer Theorems with DC excitation.

MODULE II: AC Circuits [09 Periods]

Representation of sinusoidal waveforms, peak and rms values, phasor representation,real power, reactive power, apparent power, power factor. Analysis of single-phaseac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel).

MODULE III: Introduction to Electrical Machines [10 Periods]

A: DC Machines: Construction & Principle of Operation of DC Generators – E.M.FEquation. Principle of operation DC Motors – Back E.M.F. - Torque equation – Brake Test - Characteristics.

B: AC Machines: Construction and Principle of operation of Transformer- EMF Equation. Construction and Principle of Operation of 3 Phase Induction Motors - Brake test on 3-Phase Induction Motor – Applications.

MODULE IV: P-N Junction Diode [10 Periods]

P-N Junction Diode: Diode equation, Energy Band diagram, Volt-Ampere characteristics, Temperature dependence, Ideal versus practical, Static and dynamicresistances, Equivalent circuit, Diffusion and Transition Capacitances. Zener diode operation, Zener diode as voltage regulator.

Rectifiers: P-N junction as a rectifier - Half Wave Rectifier, Ripple Factor - FullWave Rectifier, Bridge Rectifier.

Filters: Filters – Inductor Filters, Capacitor Filters, L- section Filters, π- section Filters.

MODULE V: BJT and Junction Field Effect Transistor (JFET): [10 Periods]

Bipolar Junction Transistor (BJT): Construction, Principle of Operation, Symbol, Amplifying Action, Common Emitter, Common Base and Common Collector configurations and Input-Output Characteristics, Comparison of CE, CB and CCconfigurations

Junction Field Effect Transistor and MOSFET: Construction, Principle of Operation, Symbol, Pinch-Off Voltage, Volt-Ampere Characteristic, Comparison ofBJT and FET.

TEXT BOOKS

- M.Surya Kalavathi, Ramana Pilla, Ch. Srinivasa Rao, Gulinindala Suresh, "Basic Electrical and Electronics Engineering", S.Chand and Company Limited, New Delhi,1st Edition, 2017.
- R.L.Boylestad and Louis Nashlesky, "Electronic Devices & CircuitTheory", Pearson Education, 2007.

REFERENCES

- V.K. Mehtha and Rohit Mehta, "Principles of Electrical Engineering and Electronics",S.Chand& Co., 2009.
- Jacob Milliman, Christos C. Halkias, Satyabrata Jit (2011), "Electronic Devices andCircuits", 3rd edition, Tata McGraw Hill, New Delhi.
- Thomas L. Floyd and R. P. Jain, "Digital Fundamentals", Pearson Education,2009.
- David A. Bell, "Electronic Devices and Circuits", Oxford University Press,2008.
- Nagrath I.J. and D. P. Kothari, "Basic Electrical Engineering", Tata McGraw Hill,2001.
- Mittle N., "Basic Electrical Engineering", Tata McGraw Hill Education,New Delhi,2nd Edition, 2005.

E - RESOURCES

- https://www.electrical4u.com/ohms-law-equation-formula-and- limitation-of-ohms-law/
- https://www.eeweb.com/passives
- http://nptel.ac.in/courses/108108076/
- http://nptel.ac.in/downloads/108105053/

Course Outcomes:

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

- Apply basic laws in electrical circuit.
- Analyze the single phase circuits
- Comprehend the construction and Operation of DC and AC machines
- Know the practical importance of Diode and its characteristics
- Recognize the construction and operation of BJT and JFET

2021-2 Onwards (MR-21)	MALLA REDDY ENGINEERINGCOLLEGE (Autonomous)	B.Tech. II Semester		
Code: B0504	Python Programming (Common for CSE, IT, CSE (Cyber Security), CSE (AI and ML), CSE (Data Science) and CSE (IoT))	L	T	P
Credits: 4		3	1	-

Course Objectives: This course will enable students to

- Learn syntax and semantics along with the basic data structures of Python
- Handle modules, files and exceptions in Python.
- Understand regular expressions and multithreaded programming in Python.
- Implement Object Oriented Programming concepts in Python.
- Build GUI programming and web programming in Python.

MODULE – I **[10 Periods]**

Python Basics, Getting started, Python Objects, Numbers, Sequences: Strings, Lists,Tuples, Set and Dictionary. Conditionals and Loop Structures.

MODULE – II **[9 Periods]**

Modules: Modules and Files, Namespaces, Importing Modules, Importing ModuleAttributes, Module Built-in Functions, Packages, Other Features of Modules

Files: File Objects, File Built-in Function, File Built-in Methods, File Built-in Attributes, Standard Files, Command-line Arguments, File System, File Execution, Persistent Storage Modules.

Exceptions: Exceptions in Python, Detecting and Handling Exceptions, Context Management, Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions, Creating Exceptions, Why Exceptions, Why Exceptions at All? Exceptions and the sys Module.

MODULE – III **[10 Periods]**

Regular Expression (RE): Introduction, Special Symbols and Characters, REs andPython. **Multithreaded Programming:** Introduction, Threads and Processes, Python, Threads, and the Global Interpreter Lock, Thread Module, Threading Module, Related Modules.

MODULE – IV **[10 Periods]**

Classes and Object-Oriented Programming (OOP): OOP, Classes, Class Attributes, Instances, Instance Attributes, Binding and Method Invocation, Composition, Sub classing and Derivation, Inheritance, Built-in Functions for Classes, Instances, and Other Objects, Types vs. Classes/Instances, Customizing Classes with Special Methods, Privacy, Delegation and Wrapping

MODULE – V **[9 Periods]**

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

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

TEXT BOOKS

- Wesley J. Chun, Core Python Programming, Second Edition, Prentice Hall, 2007.
- Kenneth A. Lambert, Fundamentals of Python: First Programs, Cengage Learning, 2011.

REFERENCE BOOKS

- Allen B. Downey, "Think Python, How to think like a Computer Scientist", First Edition, O'reilly Publishing, 2018.
- Vamsi Kurama, "Python Programming: A Modern Approach", Pearson India, 2017.
- Mark Lutz, "Learning Python", Fifth Edition, O'rielly Publishers, 2013.

E–RESOURCES

- "Learn Python - Free Interactive Python Tutorial", https://www.learnpython.org/
- "Free Python Tutorial - Python For Beginner," https://www.udemy.com/share/101EfoBUcccV1SQHw
- "Basics of Python for Data Science", https://olympus.greatlearning.in/courses/11265
- "Beginners Guide / Programmers - Python Wiki", https://wiki.python.org/moin/BeginnersGuide/Programmers
- "Introduction to Python", https://www.datacamp.com/courses/intro-to- python-for-data-science

Course Outcomes

At the end of the course, students will be able to

- Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.
- Demonstrate proficiency in handling modules, strings and file systems.
- Create, run and manipulate Python Programs using regular expressions and multithreaded programming environments.
- Interpret the concepts of object-oriented programming in Python.
- Implement exemplary GUI applications related to Web Programming in Python.

CO- PO,PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2		3		3				1		1	2	2	1	
CO2			2		3							1	1		
CO3			2		2							2			2
CO4	1	2	3	2	3		1		3		1	2			3
CO5					3						1	2			2

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERINGCOLLEGE (Autonomous)	B.Tech. II Semester		
Code: B0H02	English Language and Communications Skills Lab (Common for CE, EEE, ME, ECE, CSE, CSE(AIML),CSE(DS), CSE (CS), CSE(IOT),IT and Min.E)	L	T	P
Credits: 1		-	-	2

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

Course Objectives:

The course aims to develop students' intelligibility in their pronunciation of English - speech sounds, word accent, intonation and rhythm. It also helps to improve thefluency in spoken English and make them aware of nuances of major skills, namely, listening and speaking skills. It also trains students to understand nuances of both verbal and non-verbal communication during all activities. The course enables the learners to develop their confidence levels so as to participate in discussions, debates and public speaking.

Listening Skills:

Objectives:

- To enable students to develop their listening skill so that they may appreciate itsrole in the LSRW skills approach to language and improve their pronunciation
- To equip students with necessary training in listening so that they can comprehendthe speech of people of different backgrounds and regions

*Students should be given practice in listening to the sounds of the language to be able to recognize them, awareness regarding stress and recognize and use the right intonation in sentences.

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

Speaking Skills:

Objectives:

- To make students aware of the role of speaking in English and its contribution to their success.
- To enable students to express themselves fluently and appropriately in social and professional contexts.
- Oral practice
- Describing objects/situations/people

- Just A Minute (JAM) Sessions.

Syllabus: English Language Communication Skills Lab shall have two parts:

- Computer Assisted Language Learning (CALL) Lab
- Interactive Communication Skills (ICS) Lab

The following course content is prescribed for the English LanguageCommunication Skills Lab

Module - I:

CALL Lab : Introduction to Phonetics – Speech Sounds – Vowels and Consonants

ICS Lab : Ice-Breaking activity and JAM session; Listening: listening for sounds in context, for ideas; Speaking: ideation and translation of ideas into sentences.

Module - II:

CALL Lab : Structure of Syllables - Past Tense Marker and Plural Marker – Weak Forms and Strong Forms - ConsonantClusters.

ICS Lab : Situational Dialogues – Role-Play- Expressions in Various Situations – Self-introduction and Introducing others – Greetings – Apologies – Requests– Social and Professional Etiquette - Telephone Etiquette; Listening: listening for specific purposes, for details; Speaking:speaking in the above situations with clarity, connectivity, maintaining voice characters.

Module - III:

CALL Lab : Word accent and Listening Comprehension-reading(aloud)meaningfully.

ICS Lab : Descriptions- Narrations- Giving Directions and guidelines; Listening: listening for intelligible English; Speaking: formaland informal conversations, register.

Module - IV:

CALL Lab: Intonation and Common errors in Pronunciation- reading aloud(evaluating through recording).

ICS Lab: Extempore- Public Speaking, Oral Presentation Skills; Listening: notetaking and listening for speaker's tone/attitude; Speaking: organizing, connecting ideas and sentences, short forms in spoken English, errors in spoken English

Module - V:

CALL Lab : Neutralization of Mother Tongue Influence and Conversation Practice

ICS Lab : Information Transfer, Debate

Minimum Requirement of infra structural facilities for EL Lab:

- Computer Assisted Language Learning (CALL) Lab:

The Computer aided Language Lab for 40 students with 40 systems, one masterconsole, LAN facility and English language software for self- study by learners.

System Requirement (Hardware component):

Computer network with Lan with minimum 60 multimedia systems with thefollowing specifications:

a) P – IV Processor b) Speed – 2.8 GHZ c) RAM – 512 MBMinimum

- Hard Disk – 80 GB e) Headphones of High quality
- Interactive Communication Skills (ICS) Lab:
- The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V., a digital stereo –audio & video system and camcorder etc.

Books Suggested for English Language Lab Library (to be located within the labin additionto the CDs of the text book which are loaded on the systems):

Prescribed Lab Manual:

- Rani, Sudha. English Language Communication Skills Laboratory. 5th edition, Pearson Publication, 2014.

Reference Books:

- Gairns, Ruth and Redman, Stuart. Oxford Word Skills: Learn and Practice EnglishVocabulary. 2nd edition, Oxford University Press, 2008.
- Hughes, John and Mallett, Andrew. Successful Presentations DVD and Student'sBook Pack. Oxford University Press, 2013.
- Hancock, Mark. English Pronunciation in Use (Intermediate). 2nd edition, CambridgeUniversity Press, 2009.
- Karia, Akash. Public Speaking Mastery: Speak Like a Winner. Kindle edition, 2013.
- Lucas, Stephen. The Art of Public Speaking. 11th edition, Tata McGraw Hill, 2011.

Websites:

- http://www.mindtools.com/CommSkll/ActiveListening.htm
- http://www.slideshare.net/alisonkis/dialogue-and-roleplay-activity
- http://www.hse.ru/pubs/lib/data/access/ram/ticket/2/14309868938d576a532b71360b73542683807 27a22/An%20article%20for%20Monika%20(2010).pdf

Course Outcomes:

After completion of the course, students will be able to:

- Understand the nuances of language through audio- visual experience and group activities.
- Neutralize the accent for intelligibility
- realize the importance of listening skills and speaking skills and their application in real life situations.
- Recognize significance of non-verbal communication and develop confidence to face audience and shed inhibitions.
- Speak with clarity and confidence; thereby enhance employability skills of the students.

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERINGCOLLEGE (Autonomous)	B.Tech. II Semester		
Code: B0506	**Python Programming Lab** (Common for CSE, IT, CSE (Cyber Security), CSE (AI and ML), CSE (Data Science)and CSE (IoT))	L	T	P
Credits: 2		-	1	2

Prerequisites: NIL

CourseObjectives:

This course enables the students to develop various applications using python.

Software Requirements: PythonList of Programs:

- a) Write a program to purposefully raise Indentation Error and correct it.
  - Write a program to compute distance between two points taking inputfrom the user (Pythagorean Theorem).
  - Write a program add.py that takes 2 numbers as command line argumentsand prints its sum.
- a) Write a Program for checking whether the given number is a even number or not.
  - Using for loop, write a program that prints out the decimal equivalents of1/2, 1/3,1/4, . . . , 1/10.
  - Write a program using for loop that loops over a sequence. What is sequence?
  - Write a program using a while loop that asks the user for a number, andprints a countdown from that number to zero.
- a) Find the sum of all the primes below two million.
  - Each new term in the Fibonacci sequence is generated by adding the previous two terms. By starting with 1 and 2, the first 10 terms will be: 1,2, 3, 5, 8, 13, 21, 34, 55, 89
  - By considering the terms in the Fibonacci sequence whose values do notexceed four million, find the sum of the even-valued terms.
  - Write a program to count the numbers of characters in the given stringand store them in a dictionary data structure
  - Write a program to use split and join methods in the given string and tracea birthday with a dictionary data structure.
- a) Write a program to combine two lists into a dictionary.
- Write a program to count frequency of characters in a given file. Can youuse character frequency to tell whether the given file is a Python programfile, C program file or a text file?
- a) Write a program to print each line of a file in reverse order.
- Write a program to compute the number of characters, words and lines in a file.
- a) Write a function ball _collide that takes two balls as parameters and computes if they are colliding. Your function should return a Boolean representing whether or not the balls are colliding.
- **Hint:** Represent a ball on a plane as a tuple of (x, y, r), r being the radius.If (distance between two balls centers) <= (sum of their radii) then (theyare colliding)

- Find mean, median, mode for the given set of numbers in a list.
- a) Write a function nearly_ equal to test whether two strings are nearly equal.Two strings a and b are nearly equal when a can be generated by a singlemutation onb.
    - Write a function dups to find all duplicates in the list.
    - Write a function unique to find all the unique elements of a list.
- a) Write a function cumulative_product to compute cumulative productof a list of numbers.
- b) Write a function reverse to reverse a list. Without using the reverse function.
- Create a Regular Expression and implement the following
    - Recognize the following strings: “bat,” “bit,” “but,” “hat,” “hit,” or “hut.”
    - Match any pair of words separated by a single space, i.e., first and last names.
    - Match any word and single letter separated by a comma and singlespace, as in last name, first initial.
- Write a python program to implement multithreading scenarios.
- Write a python program to simulate the banking operations using Class.
- Write a python program to demonstrate the Queue / Stack operations using Class.

TEXT BOOKS

- Wesley J. Chun, Core Python Programming, Second Edition, Prentice Hall, 2007.
- Kenneth A. Lambert, Fundamentals of Python: First Programs, Cengage Learning, 2011.

REFERENCE BOOKS

- Allen B. Downey, “Think Python, How to think like a Computer Scientist”, First Edition, O’reilly Publishing, 2018.
- Vamsi Kurama, “Python Programming: A Modern Approach”, Pearson India, 2017.
- Mark Lutz, “Learning Python”, Fifth Edition, O’rielly Publishers, 2013.

Course Outcomes

At the end of the course, students will be able to

- Develop simple applications using python.
- Make use of functions, methods and classes in python scripts.
- Deploy variety of applications using necessary packages for applications.

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1			1	1							1	1	2	
CO2		1	2	3								3		1	1
CO3	1	1	1	1	2	1	1					3	1	2	3

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERINGCOLLEGE (Autonomous)	B.Tech. II Semester		
Code: B1201	**Engineering and IT Workshop** (Common for CSE and IT)	**L**	**T**	**P**
Credits: 2		**-**	**-**	**3**

Pre requisites: NIL

Course Objectives:

- To understand the usage of hand tools, acquire the skills in model / pattern making and familiarize with various work materials and tools.
- The IT Workshop is a training lab course to get training on PC Hardware, Internet& World Wide Web, and Productivity tools for documentation, Spreadsheet computations, and Presentation.
- To introduce 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, hardware and software level troubleshooting process.
- To introduce connecting 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. To get knowledge in awareness of cyber hygiene, i.e., protecting the personal computer from getting infected with the viruses, worms and other cyber-attacks.
- To introduce the usage of Productivity tools in crafting professional word documents, excel spreadsheets and power point presentations using open office tools and LaTeX.

Engineering Workshop:

Problem 1: Trades for Exercises

At least two exercises from each trade

- House-wiring
- Soldering

Problem 2: Trades for Demonstration & Exposure

- Carpentry
- Wood working lathe

PC Hardware:

The students should work on working PC to disassemble and assemble to working condition and install operating system like Linux or any other on the same PC. Students are suggested to work similar tasks in the Laptop scenario wherever possible.

Problem 3:

Every student should 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. Every student should disassemble and assemble the PC back to working condition.

Problem 4:

Every student should individually install operating system like Linux or MS windowson the personal computer. The system should be configured as dual boot with both windows and Linux.

Problem 5:

Hardware Troubleshooting: Students have to be given a PC which does not boot dueto improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition.

Problem 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. Internet & World Wide Web.

Productivity tools: LaTeX and Word Word Orientation: An overview of LaTeX andMicrosoft (MS) office / equivalent (FOSS) tool word should be learned: Importanceof LaTeX and MS office / equivalent (FOSS) tool Word as word Processors, Detailsof the three tasks and features that should be covered in each, using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter.

Problem 7:

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

Problem 8:

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.

Problem 9:

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 in word.

Problem 10:

Spreadsheet Orientation: Accessing, overview of toolbars, saving spreadsheet files, Using help and resources. Creating a Scheduler: -Gridlines, Format Cells, Summation, auto fill, Formatting Text

Problem 11:

Calculating GPA -. Features to be covered: -Cell Referencing, Formulae in spreadsheet – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, Sorting, Conditional formatting.

Problem 12:

Creating Power Point: Student should work on basic power point utilities and tools in Latex and MS Office/equivalent (FOSS) which help them create basic power pointpresentation. PPT Orientation, Slide Layouts, Inserting Text, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows, Hyperlinks, Inserting Images, Tables and Charts

REFERENCE BOOKS:

- Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
- LaTeX Companion –Leslie Lamport, PHI/Pearson.
- Comdex Information Technology course tool kit Vikas Gupta, WILEY Dreamtech
- IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme.–CISCO Press, Pearson Education.
- PC Hardware and A+ Handbook –Kate J. Chase PHI (Microso

Course Outcomes:

- Knowledge of carpentry process and methods used in the design and fabrication, installation, maintenance and repair of structures and fixtures (e.g., furniture, cabinets) to accomplish work assignments along with the understanding of house wiring components.
- Apply knowledge for computer assembling and software installation and ability how to solve the trouble shooting problems.
- Apply the tools for preparation of PPT, Documentation and budget sheet etc.

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1		3							3	2		
CO2	3	3	1		3							3	2		
CO3	3	3	1		3							3	2		

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERINGCOLLEGE (Autonomous)	B.Tech. II Semester		
Code: B0202	Basic Electrical and Electronics Engineering Lab (Common for ALL)	L	T	P
Credits: 1		-	-	2

Prerequisites: NIL

CourseObjectives:

To get practical knowledge about basic electrical circuits, electronic devices likeDiodes, BJT, JFET and also analyse the performance of DC Motors, AC Motorsand Transformers.

List of Experiments:

- Verification of Kirchhoff's Laws.
- Verification of Maximum Power Transfer Theorem.
- Determination of Phase Angle for RC series circuit.
- Brake Test on DC-Shunt Motor. Determination of Performance curves
- Load Tests on Single Phase Transformer
- Brake Test on Three Phase Induction Motors. Determination of Performance curves
- V-I Characteristics of PN junction Diode
- V-I Characteristics of Zener Diode
- Half Wave Rectifier and Full Wave rectifier.
- Input and Output characteristics of BJT with CE configuration
- Input and Output characteristics of BJT with CB configuration
- Input and Output Characteristics of JFET.

Course Outcomes:

At the end of the course, students will be able to

- Analyze electrical circuits by applying basic laws
- Analyze the performance of DC Motor, three phase Induction motor and transformer
- Understand V-I Characteristics of various diodes
- Design Different Rectifier Circuits
- Differentiate the Transistors and their Operations

2021-22 Onwards (MR-21)	MALLAREDDYENGINEERINGCOLLEGE (Autonomous)	B.Tech. III Semester		
Code:B0507	Discrete Mathematics (Common for CSE,CSE(Cyber Security),CSE(AI and ML),CSE(DS),CSE(IOT) and IT)	L	T	P
Credits:3		3	-	-

Prerequisites: NIL

Course Objectives:

This course provides the concepts of mathematical logic demonstrate predicate logic and Binary Relations among different variables, discuss different type of functions and concepts of Algebraic system and its properties. It also evaluates techniques of Combinatory based on counting methods and analyzes the concepts of Generating functions to solve Recurrence equations.

MODULE I: Mathematical Logic [10 Periods]

Basic Logics - Statements and notations, Connectives, Well-formed formulas, Truth Tables, tautology. Implications and Quantifiers –Equivalence implication, Normal forms, Quantifiers, Universal quantifiers.

MODULE II: Predicate Logic and Relations [10 Periods]

Predicate Logic - Free & Bound variables, Rules of inference, Consistency, proof of contradiction, Proof of automatic Theorem.

Relations -Properties of Binary Relations, equivalence, transitive closure, compatibility and partial ordering relations, Lattices, Hasse diagram.

MODULE III: Functions and Algebraic Structures [10 Periods]

A: Functions - Inverse Function, Composition of functions, recursive Functions - Lattice and its Properties.

B: Algebraic structures - Algebraic systems Examples and general properties, Semi-groups and monoids, groups, sub-groups, homomorphism, Isomorphism, Lattice as POSET, Boolean algebra.

MODULE IV: Counting Techniques and Theorems [09 Periods]

Counting Techniques - Basis of counting, Combinations and Permutations with repetitions, Constrained repetitions Counting Theorems - Binomial Coefficients, Binomial and Multinomial theorems, principles of Inclusion – Exclusion. Pigeon hole principle and its applications.

MODULE V: Generating functions and Recurrence Relation [09 Periods]

Generating Functions - Generating Functions, Function of Sequences, and Calculating Coefficient of generating function. Recurrence Relations - Recurrence relations, Solving recurrence relation by substitution and Generating functions. Method of Characteristics roots, solution of Non-homogeneous Recurrence Relations.

TEXTBOOKS:

- J P Tremblay & R Manohar, “Discrete Mathematics with applications to Computer Science”, Tata McGraw Hill.
- J.L. Mott, A. Kandel, T.P.Baker “Discrete Mathematics for Computer Scientists &Mathematicians”, PHI.

REFERENCES:

- Kenneth H. Rosen, "Discrete Mathematics and its Applications”, TMH, Fifth Edition.
- Thomas Koshy, "Discrete Mathematics with Applications", Elsevier.
- Grass Man & Trembley, "Logic and Discrete Mathematics”, Pearson Education.
- C L Liu, D P Nohapatra, “Elements of Discrete Mathematics - A Computer Oriented Approach”, Tata McGraw Hill, Third Edition.

E-RESOURCES:

- http://www.cse.iitd.ernet.in/~bagchi/courses/discrete-book/fullbook.pdf
- http://www.medellin.unal.edu.co/~curmat/matdiscretas/doc/Epp.pdf
- http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgye1qwH9xY7xPG734QA9tMJN2ncqS12ZbN7pUSSlWCxSgPOZJEokyWJlxQLYsrFyeITA70W9C8Pg
- http://nptel.ac.in/courses/106106094/

Course Outcomes:

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

- Apply the concepts of connectives and normal forms in real time applications.
- Summarize predicate logic, relations and their operations.
- Describe functions, algebraic systems, groups and Boolean algebra.
- Illustrate practical applications of basic countingprinciples, permutations, combinations, and the pigeonhole methodology.
- Analyze techniques of generating functions and recurrence relations.

CO- PO, PSO Mapping
(3/2/1indicates strength of correlation)3-Strong,2-Medium,1-Weak

COs	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2				3							2	3		
CO2	3											2	3		
CO3		3										2	3		
CO4	3	3	2	3								2		3	
CO5					3							2		3	

2021-22 Onwards (MR-21)	MALLAREDDYENGINEERINGCOLLEGE (Autonomous)	B.Tech. III Semester		
Code:B0508	Computer Organization and Architecture (Common for CSE,CSE(DS),CSE(AI and ML),CSE(Cyber Security),CSE(IOT)and IT)	L	T	P
Credits:3		3	-	-

Prerequisites: No prerequisites

Objectives

- The purpose of the course is to introduce principles of Digital fundamentals computer organization and the basic architectural concepts.
- It begins with basic organization, design, and programming of a simple digital computer and introduces simple register transfer language to specify various computer operations.
- Topics include computer arithmetic, instruction set design, micro programmed control unit, pipelining and vector processing, memory organization and I/O systems, and multiprocessors.

UNIT – I **[10 Periods]**

Sequential Circuits Fundamentals: Basic Architectural Distinctions between Combinational and Sequential circuits, SR Latch, Flip Flops: SR, JK, JK Master Slave, D and T Type Flip Flops, Excitation Table of all Flip Flops, Timing and Triggering Consideration, Conversion from one type of Flip-Flop to another.

Registers and Counters: Shift Registers – Left, Right and Bidirectional Shift Registers, Applications of Shift Registers - Design and Operation of Ring and Twisted Ring Counter, Operation of Asynchronous and Synchronous Counters.

UNIT – II **[10 Periods]**

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 – III **[9 Periods]**

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 – IV **[10 Periods]**

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 – V **[9 Periods]**

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.

Textbook:

1. Computer System Architecture, M. Moris Mano, 3rd Edition, Pearson/PHI.

References:

- Computer Organization, Car Hamacher, Zvonks Vranesic, Safea Zaky, 5thEdition,McGraw Hill.
- Computer Organization and Architecture, William Stallings 6th Edition, Pearson/PHI.
- Structured Computer Organization, Andrew S. Tanen baum, 4th Edition, PHI/Pearson.

E-Resources:

- https://books.google.co.in/books?isbn=8131700704
- http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgye1qwH9xY7Eh9eBOsT1ELo HYPERLINK "http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgye1qwH9xY7-
- %20Eh9eBOsT1ELo%20YpKlg_xngrkluevXOJL-s1TbxS8q2icgUs3hL4_KAi5So5FgXcVg"YpKlg_xn grkluevXOJLs1TbxS8q2icgUs3hL4_KAi5So5FgXcVg
- http://nptel.ac.in/courses/106106092/

Outcomes:

- Understand the basics of instructions sets and their impact on processor design.
- Demonstrate an understanding of the design of the functional units of a digital computer system.

- Evaluate cost performance and design trade-offs in designing and constructing a computer processor including memory and computer arithmetic operations of binary number system.
- Design memory organization and control unit operations.

CO-PO, PSO Mapping (3/2/1indicates strength of correlation) 3-Strong,2-Medium,1-Weak															
COs	**Programme Outcomes(POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	2									2			
CO2		2	3									1			
CO3	2	2	3	2	2							2			
CO4	3														
CO5	3														

2021-22 Onwards (MR-21)	MALLAREDDYENGINEERINGCOLLEGE (Autonomous)	B.Tech. III Semester		
Code:B0509	**Data Structures**	L	T	P
Credits:3	(Common for CSE, CSE (DS), CSE (AI and ML),CSE(Cyber Security), CSE(IOT)and IT)	3	-	-

Prerequisites: A course on "Programming for Problem Solving "

Course Objectives:

- Exploring basic data structures such as linked list, stacks and queues.
- Introduces a variety of data structures such as dictionaries and hash tables
- To learn non linear data structures i.e. Binary search trees and height balanced trees.
- To understand the graph traversal algorithms and heap sort.
- Introduces the pattern matching and tries algorithms

MODULE-I: **[10 Periods]**

Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, Stacks- Operations, array and linked representations of stacks, stack applications, Queues- operations, array and linked representations.

MODULE-II: **[09 Periods]**

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, rehashing, extendible hashing.

MODULE-III: **[10 Periods]**

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, Definition and example of Red – Black, Splay Trees.

MODULE-IV: **[10 Periods]**

Graphs: Graph Implementation Methods. Graph Traversal Methods; Sortings: Max Heap, Min Heap,Heap Sort. External Sorting: Model for external sorting, Merge sort.

MODULE-V: **[09 Periods]**

Pattern matching and Tries: Pattern matching algorithms-Brute force, the Boyer – Moore algorithm, the Knuth-Morris-Pratt algorithm, Standard Tries, Compressed Tries, Suffix tries.

TEXT BOOKS:

- Jean Paul Tremblay, Paul G Sorenson, "An Introduction to Data Structures with Applications", Tata McGraw Hills, 2nd Edition, 1984.
- Richard F. Gilberg, Behrouz A. Forouzan, "Data Structures: A Pseudo code approach with C ", Thomson (India), 2nd Edition, 2004.

REFERENCES:

- Horowitz, Ellis, Sahni, Sartaj, Anderson-Freed, Susan, "Fundamentals of Data Structure in C", University Press (India), 2nd Edition, 2008.
- A. K. Sharma, "Data structures using C", Pearson, 2nd Edition, June, 2013.
- R. Thareja, "Data Structures using C", Oxford University Press, 2nd Edition, 2014.

E-RESOURCES:

- http://gvpcse.azurewebsites.net/pdf/data.pdf
- http://www.sncwgs.ac.in/wp-content/uploads/2015/11/Fundamental-Data-Structures.pdf
- http://www.learnerstv.com/Free-Computer-Science-Video-lectures-ltv247-Page1.htm
- http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgye1 qwH9xY7-3lcmoMApVUMmjlExpIb1zste4YXX1pSpX8a2mL gDzZ-E41CJ6PVmY4S0MqVbxsFQ
- http://nptel.ac.in/courses/106102064/1

Course Outcomes:

At the end of the course, students will be able to

- Implement the linear data structures such as linked list, stacks and queues.
- Understand the Dictionaries and Hash table representation.
- Analyze the various non linear data structures with its operations
- Develop the programs by using Graph Traversal and heap sort
- Apply data structure concepts for the implementation of pattern matching and tries.

CO-PO,PSO Mapping
(3/2/1indicates strength of correlation) 3-Strong,2-Medium,1-Weak

COs	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	2										2	3	
CO2	2	2	3										3	2	
CO3		2	2											2	1
CO4		2	3										2	3	
CO5	2	3	3										2	3	

2021-22 Onwards (MR-21)	MALLAREDDYENGINEERINGCOLLEGE (Autonomous)	B.Tech. III Semester		
Code:B0510	Object Oriented Programming through Java (Common for CSE, CSE(DS),CSE(AI and ML),CSE (Cyber Security), CSE (IOT) and IT)	L	T	P
Credits:3		3	-	-

Prerequisites: Computer Programming

Course Objectives:

This course will make students able to learn and understand the concepts and features of object oriented programming to acquire the knowledge in Java's exception handling mechanism, multithreading, to explore concepts of Applets and event handling mechanism. This course makes students to gain the knowledge in programming using Layout Manager and swings.

MODULE-I: OOP concepts & Introduction to C++, Java [9 Periods]

OOP concepts & Introduction to C+: Introduction to object oriented concepts: Object, class, methods, instance variables; C++ program structure; accessing class data members; Overview of Inheritance, Overloading, Polymorphism, Abstraction, Encapsulation.

Introduction to Java - History of JAVA, Java buzzwords, data types, variables, scope and life time of variable, arrays, operators, expressions, control statements, type conversion and type casting, simple Java program.

Module II: Basics of Java [11 Periods]

Classes and Objects - Concepts of Classes, Objects, Constructors, Methods, This Key Word, Garbage Collection, Overloading Methods, Constructors, Parameter Passing, Recursion, String Handling: String, String Buffer, String Tokenizer.

Inheritance - Base Class Object, Subclass, Member Access Rules, Super Uses, Using Final with Inheritance, Method Overriding, Abstract Classes

MODULE III: Interfaces and Exception Handling [10 Periods]

Interfaces - Defining an interface, implementing interface, differences between classes and interfaces, extending interfaces. Packages - Defining, creating and accessing a package, importing packages, access control, exploring package-java.io (file handling).

Exception handling - Concepts of Exception handling, benefits of exception handling, exception hierarchy, checked and unchecked exceptions, usage of try, catch, throw, throws and finally, built-in exceptions, creating own exception subclasses

MODULE IV: Multithreading and Collection Classes [09 Periods]

Multithreading - Differences between multithreading and multitasking, thread life cycle, creating threads, synchronizing threads, daemon threads, thread groups.

Collection Classes –Array List, Linked List, Hash Set, Linked Hash Set, Tree Set, Priority Queue, Array Dequeue, Enum Set.

MODULE V: Event Handling, Layout manager and Swings [09 Periods]

Event handling - Events, Event sources, event classes, event listeners, delegation event model, handling mouse and keyboard events, adapter classes. Layout manager-border, grid, flow, card and grid bag.

Swings - Introduction, limitations of AWT, components, containers, exploring swing- JApplet, JFrame and JComponent, Icons and Labels, Tex tFields, buttons – the JButton class, Checkboxes, Radio buttons, Combo boxes, Tabbed Panes, ScrollPanes, Trees and Tables.

TEXT BOOKS:

- Herbert Schildt, "Java The complete reference", TMH, 8th edition
- T. Budd, "Understanding OOP with Java", updated edition, Pearson Education.
- Joyce Farrell, Cengage, "Object Oriented Programming C++", 4thEdition, 2013.

REFERENCES:

- P.J. Deitel and H.M. Deitel, "Java for Programmers", Pearson education.
- P. Radha Krishna, "Object Oriented Programming through Java", Universities Press.
- S. Malhotra and S. Choudhary, "Programming in Java", Oxford Univ. Press.
- Bruce Eckel, "Programming in Java", Pearson Education.
- Herbert Schildt , "The Complete Reference, C++", TMH, 4th edition.

E-RESOURCES:

- http://ndl.iitkgp.ac.in/document/xttk-4kfhvUwVlXBW- RPf64_TFk2i4LJhgQFPQ WAEt- Zobbm3twyubjRA1YOe9WVwkN2qGcxBwdHaPdi_mMQ
- https://ndl.iitkgp.ac.in/result?q={"t":"search","k":"object%20oriented%20prog ramming","s":["type=\"video\""],"b":{"filters":[]}}
- http://www.rehancodes.com/files/oop-using-c++-by-joyce-farrell.pdf
- http://www.nptel.ac.in/courses/106103115/36

Course Outcomes:

At the end of the course, students will be able to

- Differentiate structured programming and object-oriented programming and know the concepts of classes, objects, members of a class.
- Apply object-oriented programming features and concepts for solving given problems using inheritance and will know how to organize files in packages and concept of interface.
- Capable of handling run time errors using Exceptional Handling and develop applications for concurrent processing using Thread Concept.

- Design Applications that take user response through various peripheral devices such as mouse and keyboard by event handling mechanism.
- Design interactive applications for use on internet.

COs	Programme Outcomes(POs)												PSOs		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	2			2								3		
CO2	2	1			2								3	3	
CO3	3	3							3					3	
CO4	2	2											3		
CO5	2	2													

2021-22 Onwards (MR-21)	MALLAREDDYENGINEERINGCOLLEGE (Autonomous)	B.Tech. III Semester		
Code:B6701	Data Preparation and Analysis (Common for CSE, CSE(DS), CSE(AI and ML),CSE(Cyber Security),CSE(IOT) and IT)	L	T	P
Credits:3		3	-	-

Prerequisites: Nil

MODULE-I **[10 Hours]**

Data Gathering and Preparation: Data formats, parsing and transformation, Scalability and real-time issues

MODULE-II **[10 Hours]**

Data Cleaning: Consistency checking, Heterogeneous and missing data, Data Transformation and segmentation

MODULE- III **[10 Hours]**

Exploratory Analysis: Descriptive and comparative statistics, Clustering and association, Hypothesis generation

MODULE-IV **[10 Hours]**

Visualization: Designing visualizations, Time series, Geolocated data, Correlations and connections, Hierarchies and networks, interactivity

MODULE-V **[8 Hours]**

Visualizations using R, Case Studies.

TEXTBOOK(S):

1. Glenn J. Myatt, Making sense of Data: A practical Guide to Exploratory Data Analysis and Data Mining, John Wiley Publishers, 2007.

Reference Books:

- Tamaraparani Dasu, Exploratory Data Mining and Data Clearning, Wiley-Interscience;1st Edition.
- Ben Fry, Visualizing Data: Exploring and Explaining Data with the Processing Environment
- Edward R. Tufte, The Visual Display of Quantitative Information

CO-PO, PSO Mapping (3/2/1indicatesstrengthofcorrelation)3-Strong,2-Medium,1-Weak															
COs	Programme Outcomes(POs)												PSOs		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3		1									2	1		2
CO2	2	2										2	1		
CO3	2														
CO4	2	2	1										2		
CO5	2	2	1										1		

2021-22 Onwards (MR-21)	MALLAREDDYENGINEERINGCOLLEGE (Autonomous)	B.Tech. III Semester		
Code:B0512	Data Structures Lab (Common for CSE,CSE(Cyber Security),CSE(AI and ML), CSE(DS),CSE(IOT) and IT)	L	T	P
Credits:1.5		-	-	3

Prerequisites: A Course on "Programming for problem solving"

Objectives:

- To learn linear data structures such as linked list, stack and queues with its operations
- Ability to learn programs on binary search tree and graph traversal strategies.
- To understand the pattern matching and hashing techniques.

Software Requirements: C

List of Programs:

1. Write a program that uses functions to perform the following operations on singly linked list:

i) Creation ii) Insertion iii) Deletion iv) Traversal

2. Write a program that uses functions to perform the following operations on doubly linked list:

i) Creation ii) Insertion iii) Deletion iv) Traversal

3. Write a program that uses functions to perform the following operations on circular linked list:

i) Creation ii) Insertion iii) Deletion iv) Traversal

4. Write a program that implement stack (its operations) using

i) Arrays ii) Pointers

5. Write a program that implement Linear Queue (its operations) using

i) Arrays ii) Pointers

6. Write a program that implement Deque (its operations) using

i) Arrays ii) Pointers

7. Write a program to implement all the functions of a dictionary using hashing.
8. Write a program that implement Binary Search Trees to perform the following operations

i) Creation ii) Insertion iii) Deletion iv) Traversal

9. Write a program to implement the tree traversal methods using recursion.
10. Write a program that implements the following sorting methods to sort a given list of integers in ascending order

i) Heap sort ii) Merge sort

11. Write a program to implement the graph traversal methods such as BFS and DFS.
12. Write a program to implement the Knuth-Morris- Pratt pattern matching algorithm.

TEXT BOOKS

- Fundamentals of data structures in C, E.Horowitz, S.Sahni and Susan Anderson Freed,2nd Edition, Universities Press.
- Data structures using C, A.S.Tanenbaum, Y. Langsam, and M.J. Augenste in,PHI/pearson education.

REFERENCES

- Data structures: A Pseudocode Approach with C, R.F.GilbergAndB.A.Forouzan, 2ndEdition, Cengage Learning.
- Introduction to data structures in C, Ashok Kamthane, 1st Edition, PEARSON.

Outcomes:

At the end of the course, students will be able to

- Develop C programs for computing and real life applications using basic data structures like stacks, queues, linked lists, Binary Search Trees.
- Make use of basic data structures implementing various tree and graph traversal operations and algorithms.
- Apply the concepts of basic data structures and implement advanced operations AVL Trees, Red –Black Trees, and Splay Trees concepts.

CO-PO, PSO Mapping (3/2/1indicates strength of correlation) 3-Strong,2-Medium,1-Weak															
COs	**Programme Outcomes (POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	3	2										3	2	
CO2	2	2	3										2	3	
CO3		2	3										2	3	1

2021-22 Onwards (MR-21)	MALLAREDDYENGINEERINGCOLLEGE (Autonomous)	B.Tech. III Semester		
Code:B0513	Object Oriented Programming through Java Lab	L	T	P
Credits:1.5	(Common for CSE, CSE (Cyber Security), CSE (AI and ML),CSE(DS),CSE(IOT) and IT)	-	-	3

Prerequisites: NIL

Course Objectives:

This course will make students able to learn and understand the concepts and features of object-oriented programming and the object-oriented concept like inheritance and will know how to make use of interfaces and package, to acquire the knowledge in Java's exception handling mechanism, multithreading, to explore concepts of Applets and event handling mechanism. This course makes students to gain the knowledge in programming using Layout Manager and swings.

Software Requirements: Java

List of Programs:

1. Write Java Programs that implement the following.
   - Constructor
   - Parameterized constructor
   - Method Overloading
   - Constructor overloading
2. Write a Java program
   - checks whether a given string is a palindrome or not.
   - for sorting a given list of names in ascending order.
   - that reads a line if integers and then displays each integer and the sum of all integers(use string tokenizer class of java.util).
3. Write Java programs that uses the following keywords…
   - this
   - super
   - static
   - final
4. Write a Java program to implement
   - Method Overriding.
   - dynamic method dispatch.
   - multiple inheritance.
   - access specifiers.
5. Write a Java program that
   - reads a file name from the user, and then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes.

- reads a file and displays the file on the screen, with a line number before each line.
- displays the number of characters, lines and words in a test file.

6. Write a Java program for handling
   - Checked exceptions.
   - unchecked exceptions.
7. Write a Java program
   - Creates three threads. First threads displays "Good Morning "for every one
   - Second, the second thread displays "Hello" for every two seconds, the thirdthread Displays "Welcome" for every three seconds.
   - that correctly implements producer consumer problem using concept of inter thread communication.
8. Write a Java program which demonstrates the use of following collection classes
   - Array List
   - Hash Set
   - Deque
9. 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.
10. Write a Java program for handling
    - mouse events.
    - key events.
11. Write a Java program that creates a user interface to perform integer divisions. Theuser enters two numbers in the text fields num1 and num2. The division of num1 and num2 is displayed in the result field when the divide button is clicked. If num1 or num2 were not an integer, the program would throw number format exception. If num2were zero, the program would throw an arithmetic exception and display the exception in the message dialogue box.
12. Write a Java program that
    - Simulates traffic light. The program lets the user select one of three lights: red, yellow or green. When a radio button is selected, the light is turned on and only one light can be on at a time. No light is on when the program starts.
    - Allows the user to draw lines rectangles and ovals.

TEXT BOOKS:

- Herbert Schildt, "Java The complete reference", TMH, 8th edition, 2011.
- T. Budd, "Understanding OOP with Java", Pearson Education, updated edition, 1998.

REFERENCES:

- P.J. Deitel and H.M. Deitel, "Java for Programmers", Pearson education.
- P. Radha Krishna, "Object Oriented Programming through Java", Universities Press.
- Bruce Eckel," Programming in Java", Pearson Education.
- S. Malhotra and S. Choudhary," Programming in Java", Oxford Univ. Press.

Course Outcomes:

At the end of the course, students will be able to

- Build simple java programs using the basic concepts of OOP
- Create user defined packages to build real time applications
- Develop applications on files, exceptions, threads and applets.
- Construct GUI based applications.
- Design Interactive applications for use on internet.

CO-PO, PSO Mapping (3/2/1indicates strength of correlation) 3-Strong,2-Medium,1-Weak															
COs	**Programme Outcomes(POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1		2	3										3	2	
CO2			3		2								2	3	
CO3		2	2		2									2	

2021-22 Onwards (MR-21)	MALLAREDDYENGINEERINGCOLLEGE (Autonomous)	B.Tech. III Semester		
Code:B6702	Data Preparation and Analysis Lab (Common for CSE,CSE(Cyber Security),CSE(AI and ML), CSE(DS),CSE(IOT) and IT)	L	T	P
Credits:2		-	1	2

Prerequisites: NIL

Software Required: R / Python / Weka 3.8

1. Write a program for Data preprocessing methods on student and labor datasets. Implement data cube for data warehouse on 3- dimensional data.
2. Write a program to implement various missing values handling mechanisms
3. Write a program to implement various noisy data handling mechanisms.
4. Develop k-means and MST based clustering techniques, Develop the methodology for assessment of clusters for given dataset.
5. Design algorithms for association rule mining algorithms
6. Derive the hypothesis for association rules to discovery of strong association rules; Use confidence and support thresholds.
7. Implement binning visualizations for any real time dataset and implement linear regression techniques
8. Visualize the clusters for any synthetic dataset, Implement the program for converting the clusters into histograms
9. Write a program to implement agglomerative clustering technique. Write a program to implement divisive hierarchical clustering technique.
10. Develop scalable clustering algorithms.
11. Construct Haar wavelet transformation for numerical data and make an analysis on it performance.
12. Construct Principal Component Analysis (PCA) for 5-dimensional data and analyzeit.

Reference Books:

1. Sinan Ozdemir, “Principles of Data Science”, Packt Publishers, 2016.

Web References:

- https://paginas.fe.up.pt/~ec/files_1112/week_03_Data_Preparation.pdf
- https://socialresearchmethods.net/kb/statprep.
  phphttps://www.quest.com/solutions/data- preparation-and-analysis/

CO-PO, PSO Mapping (3/2/1indicates strength of correlation)3-Strong,2-Medium,1-Weak														
Programme Outcomes(POs)												PSOs		
PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
2	3	1									2	1		
2	2										2	2		
1	2										1	1		

2020-21 Onwards (MR-20)	MALLAREDDYENGINEERINGCOLLEGE (Autonomous)	B.Tech. III Semester		
Code:A00M1	GENDERSENSITIZATION (An Activity-based Course) (Common for CE, EEE, ME, ECE, MiE, CSE, CSE (Cyber Security),CSE(AI and ML),CSE(DS), CSE(IOT) and IT)	L	T	P
Credits: NIL		-	-	2

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, 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.

Objectives of the Course:

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

MODULE I: UNDERSTANDING GENDER [06 Periods]

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.

MODULE II: GENDER ROLES AND RELATIONS [06 Periods]

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

MODULE III: GENDER AND LABOUR [07 Periods]

Division and Valuation of Labour-Housework: The Invisible Labor- "My Mother doesn't Work." "Sharethe 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.

MODULE IV: GENDER - BASED VIOLENCE [07 Periods]

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 Out Is Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Thinking about Sexual Violence Blaming the Victim-"I Fought for my Life…."

MODULE V: GENDER AND CULTURE [06 Periods]

Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature- Gender Development Issues-Gender 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-The Brave Heart.

- Note: Since it is Interdisciplinary Course, Resource Persons can be drawn from thefields of English Literature or Sociology or Political Science or any other qualified faculty who has expertise in this field from engineering departments.
- Classes will consist of a combination of activities: dialogue-based lectures, discussions, collaborative learning activities, group work and in-class assignments. Apart from the above prescribed book, Teachers can make use of any authentic materials related to the topics given in the syllabus on "Gender".
- ESSENTIAL READING: The Textbook, "Towards a World of Equals: A Bilingual Textbook on Gender" written by A.Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu published by Telugu Akademi, Telangana Government in 2015.

ASSESSMENT AND GRADING:

- Discussion & Classroom Participation: 20%
- Project/Assignment: 30%
- End Term Exam: 50%

TEXT BOOKS:

1. Towards a World of Equals: A bilingual Textbook on Gender, A Suneetha -etall

REFERENCES:

- Sen, Amartya. "More than One Million Women are Missing.' New York Review of Books
- 37.20 (20 December 1990). Print. We Were Making History...' Life Stories of Women in theToIrmgana People's Struggle. New Delhi: Kali for Women, 1989.
- TriptiLahiri. "By the Numbers: Where Indian Women Work." Women's Studios Journal (14November 2012) Available online at: http:// blogs.visj.com/ India real time/2012/11/14/by -the-numbers-where-Indan-womenworkP
- K. Satyanarayana and Susie Thant (Ed.) Steel Nibs Are Sprouting: New Dalit Writing From South India, Dossier 2: Telugu And Kannada htto://harooreollins.co.in/BookDetailasp? FlookCndet,3732
- Vimata. "Vantillu (The Kitchen)". Women Writing in India: 600 BC to the Present. VolumeII: The 20th Century. Ed. Susie Thaw and K. Lalita. Delhi: Oxford University Press 1995.599-601.
- Shatrughna, Veena et al. Women's Work and its Impact on Child Health end Nutrition, Hyderabad, National Institute of Nutrition, Indian Council of Medical Research. 1993.
- • Stree Shakti Sanghatana. 'We Were Making Ilistory ' Life Stories of Women in the Telangana People's Struggle. New Delhi: Kali for Women, 1989.

E-RESOURCES:

- http://www.actforyouth.net/resources/rf/rf_gender1_1213.cfm (UNDERSTANDINGGENDER)
- https://www.simplypsychology.org/gender-biology.html(GENDERAND BIOLOGY)
- http://www.yourarticlelibrary.com/essay/essay-on-gender-issues-in-labour-market-in-india/40442/ HYPERLINK "http://www.yourarticlelibrary.com/essay/essay-on-gender-issues-in- labour-market-in-india/40442/" (GENDER AND LABOUR)
- http://journals.sagepub.com/doi/abs/10.1177/107780120000600700 4(ISSUES OFVIOLENCE)
- http://www.nordiclabourjournal.org/emner/likestillingHYPERLINK "http://www.nordiclabourjournal.org/emner/likestilling" (GENDER AND BIOLOGY)

Course Outcomes:

At the end of the course,

- Students will have developed a better understanding of important issues related to gender in contemporary India.
- 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.
- Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.

- Students will acquire insight into the gendered division of labour and its relation to politics and economics.
- Students will develop a sense of appreciation of women in all walks of life.
- 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.

CO-PO, PSO Mapping
(3/2/1indicates strength of correlation) 3-Strong,2-Medium,1-Weak

COs	Programme Outcomes(POs)												PSOs		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1						3		3	3		2	3	1		
CO2						3		3	3		2	3	2		
CO3						3		3	3		2	3	1		

2021-22 Onwards (MR-21)	MALLAREDDYENGINEERINGCOLLEGE (Autonomous)	B.Tech. IV Semester		
Code:B0B22	Statistics for Data Science CSE (Data Science)	L	T	P
Credits:3		3	-	-

Pre-requisite: Basic concepts of statistics

Course Objectives:

- To learn Analysis of variance, ANCOVA and design of experiments in manufacturing firms.
- To learn advanced design of experiments and their applications.
- To learn quality control, Six Sigma and its importance to real life problems.
- To learn multiple regression and Application of Time-series.
- To learn MANOVA and multivariate analysis

Module -I: Analysis of Variance & Analysis of Co-variance [12 Periods]

Analysis of Variance (ANOVA): one-way & two-way ANOVA and multiple comparisons. Analysis of Co-variance (ANCOVA) (Only one way). Conducting ANCOVA – Two way Comparison of the efficiencies of above designs. Introduction to Factorial design - 22 and 2n Factorial design.

Module -II: Design of Experiments [11 Periods]

Design of Experiments: Importance and applications of design of experiments. Principles of experimentation, Analysis of Completely randomized Design (C.R.D), Randomized Block Design (R.B.D) and Latin Square Design (L.S.D) including one missing observation, expectation of various sum of squares.

Module -III: Statistical Quality Control [12Periods]

A: Importance of SQC in industry. Statistical basis of She wart control charts. Construction of control charts for variables (mean, range and standard deviation) and attributes (p, np, c & d charts with fixed and varying sample sizes).

B: Interpretation of control charts. Natural tolerance limits and specification limits process capability index. Concept of Six sigma and its importance, Single and double sampling plans.

Module -IV: Multiple Regression and Time Series [12 Periods]

Multiple Regressions for n- independent variables

Time Series: Fitting a trend line to a time series, Method of least Squares and Method of Moving Averages, Measure of Seasonal Variation.

Module -V: Multi Variate Analysis [12 Periods]

Introduction to Multivariate analysis, Nature of Multivariate analysis, Classification of Multivariate techniques: PCA , Factor analysis, Cluster Analysis, Discriminant Analysis, Mahalanobis D square, MANOVA , Nearest neighborhood method.

Text Books:

- Monte Gomery, "Applied Statistics and Probability for Engineers", 6thEdition, Wiley Publications.
- J. K. Sharma, "Operations research Theory and applications" Macmillan publishers India limited, 4th edition.
- Paul A Maeyer Introductory Probability and Statistical Applications, John Wiley Publications.

Reference Books:

- Willam Feller : "Introduction to Probability theory and its applications". Volume
- –I ,Wiley 2.
- Goon AM, Gupta MK, Das Gupta B : "Fundamentals of Statistics", Vol-I, the World Press Pvt. Ltd. , Kolakota.
- V. K. Kapoor and S. C. Gupta: "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi

E Resources

- Concerned Website links
- https://onlinecourses.science.psu.edu/stat502/node/183 HYPERLINK "https://onlinecourses.science.psu.edu/stat502/node/183" (ANCOVA)
- http://www.uoguelph.ca/~dsparlin/sqc.htm (Statistical Quality control)
- http://irh.inf.unideb.hu/~jsztrik/education/16/SOR_Main_ Angol.pdf(Basic Queueing Theory)
- https://www.math.kth.se/matstat/gru/sf2943/ts.pdf HYPERLINK "https://www.math.kth.se/matstat/gru/sf2943/ts.pdf" (Time Series Analysis)
- Concerned Journals/Magazines links
- https://sci-hub.cc/10.1007/BF02294394 HYPERLINK "https://sci-hub.cc/10.1007/BF02294394" (ANOVA and ANCOVA)
- http://www.ijpcsonline.com/files/34-781.pdf HYPERLINK "http://www.ijpcsonline.com/files/34-781.pdf" (Design of Experiments)
- https://sci-hub.cc/10.1016/0377-2217(95)00069-0 HYPERLINK "https://sci-hub.cc/10.1016/0377-2217(95)00069-0" (Statistical Quality control)
- NPTEL Videos
- http://nptel.ac.in/courses/110106064/5 (Introduction to Data Analysis)
- http://nptel.ac.in/courses/111104075/ HYPERLINK "http://nptel.ac.in/courses/111104075/" (ANOVA and Design of Experiments)
- http://nptel.ac.in/courses/110105039/ HYPERLINK "http://nptel.ac.in/courses/110105039/" (Quality management)

- http://nptel.ac.in/courses/105105045/40 (correlation and regression Analysis)
- https://www.youtube.com/watch?v=RtTfFhK0WE0 HYPERLINK "https://www.youtube.com/watch?v=RtTfFhK0WE0" (MANOVA)

Course Outcomes:

At end of the course student, can able to

- Perform Analysis of variance, ANCOVA and design of experiments in manufacturing firms.
- Understand advanced design of experiments and their applications.
- Understand concept of quality control, Six Sigma and its importance to real life problems.
- Understand the concept of multiple regression and Application of Time-series.
- Perform MANOVA and multivariate analysis

CO-PO, PSO Mapping (3/2/1indicates strength of correlation) 3-Strong,2-Medium,1-Weak															
COs	**Programme Outcomes(POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	1		3										2	3	
CO2	2	1						2					1	2	
CO3								2					3		
CO4															
CO5															

2021-22 Onwards (MR-21)	MALLAREDDYENGINEERINGCOLLEGE (Autonomous)	B.Tech. IV Semester		
Code:A0515	Database Management Systems (Common for CSE,CSE(Cyber Security),CSE(AI and ML), CSE(DS),CSE(IOT) and IT)	L	T	P
Credits:3		3	-	-

Prerequisites

1. A course on "Data Structures"

The purpose of learning this course is to:

- To understand the basic concepts and the applications of database systems and Conceive the database design process through ER Model and Relational Model
- Design Logical Database Schema and mapping it to implementation level schema through Database Language Features
- Familiarize queries using Structure Query Language (SQL) and PL/SQL and Improvement of the database design using normalization criteria and optimize queries
- Understand the practical problems of concurrency control and gain knowledge about failures and recovery.
- Understand with database storage structures and access techniques

MODULE I: Introduction: [10 Periods]

What is Database Management System, Advantage of DBMS over File Processing System, Introduction and applications of DBMS, Purpose of database system, Views of data, Database system Architecture, Data Independence, The evolution of Data Models, Levels of Data Abstraction in DBMS, Database Users and DBA, Database Languages,

Introduction to Database design: Database Design, Design process, Entity Relation Model, ER diagram, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, Keys and Constraints, Mapping Cardinality, Extended ER - Generalization, Specialization and Aggregation, ER Diagram Issues, Weak Entity, Conceptual Design with the ER Model.

MODULE II: [09 Periods]

Introduction to the Relational Model: Relational Model, Conversion of ER to Relational Table. Structure Creation, alternation. Integrity constraint over relations, enforcing integrity constraints - Defining Constraints-Primary Key, Foreign Key, Unique, not null, check. Introduction to views, destroying/altering tables and views. Transaction Control Commands, Commit, Rollback, Save point. Relational Algebra – Fundamental Operators and syntax, relational algebra queries, Tuple relational calculus.

MODULE III: [10 Periods]

SQL Queries: form of basic SQL query, set operations: UNION, INTERSECT, and EXCEPT, Sub Queries, correlated sub queries, Nested Queries, aggregation, IN, ANY, ALL operators,

NULL values, complex integrity constraints in SQL. PL/SQL Concepts- Cursors, Stored Procedure, Functions Triggers and Exceptional Handling.

Schema Refinement and Normal Forms: schema refinement: Pitfalls in Relational database, decomposing bad schema, Functional Dependency – definition, trivial and non- trivial FD, closure of FD set, closure of attributes, irreducible set of FD, Normalization – 1Nf, 2NF, 3NF, Decomposition using FD- dependency preservation, BCNF, Multi- valued dependency, 4NF, Join dependency and 5NF.

MODULE IV: Transaction Management and Concurrency Control: [10 Periods]

Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for serializability, Lock Based Protocols, Timestamp Based Protocols, Validation- Based Protocols, Multiple Granularity, Recovery and Atomicity, Log–Based Recovery, Recovery with Concurrent Transactions, Deadlock

MODULE V: **Storage and Indexing: [09 Periods]**

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

TEXT BOOKS:

- Data base Management Systems, Raghu Rama krishnan, Johannes Gehrke, McGraw HillEducation (India) Private Limited, 6th edition, 2010.
- Database Systems, 6th edition, R Elmasri, Shamkant,B.Navathe, Pearson Education, 7thedition, 2013

REFERENCES:

- Data base System Concepts, A. Silberschatz, Henry. F. Korth, S. Sudarshan, McGrawHill Education(India) Private Limited l, 6th edition, 2011.
- Database Systems design, Implementation, and Management, Peter Rob &CarlosCoronel, 7th Edition.
- SQL The Complete Reference, James R. Groff, Paul N. Weinberg, 3rd Edition,
- Oracle for Professionals, The X Team, S.Shah and V. Shah, SPD.
- Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL,Shah,PHI.

E-RESOURCES:

- https://kakeboksen.td.org.uit.no/Database%20System%20Concepts%206th%20edition.pdf
- http://agce.sets.edu.in/cse/ebook/DBMS%20BY%20RAGHU%20RAMAKRISHNAN.pdf

- http://airccse.org/journal/ijdms/ijdms.html
- http://www.springer.com/computer/database+management+%26+information+retrieval?SGWID=0-153-12-114576-0
- http://textofvideo.nptel.iitm.ac.in/video.php?courseId=106106093
- http://www.nptelvideos.in/2012/11/database-management-system.html

Course Outcomes:

- Gain knowledge of fundamentals of DBMS, database design and normal forms and apply the fundamentals of data models to model an application's data requirements using conceptual modeling tools like ER diagrams
- Apply the method to convert the ER model to a database schema based on the conceptual relational model
- Apply the knowledge to create, store and retrieve data using Structure Query Language (SQL) and PL/SQL and apply the knowledge to improve database design using various normalization criteria and optimize queries
- Appreciate the fundamental concepts of transaction processing- concurrency control techniques and recovery procedures.
- Familiarity with database storage structures and access techniques

CO-PO, PSO Mapping (3/2/1indicates strength of correlation) 3-Strong,2-Medium,1-Weak															
COs	**Programme Outcomes(POs)**												**PSOs**		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2			3				2		3	3	3	
CO2	3	3	3			3				3		3	3	3	
CO3	3	3	3			2				3		2	3	3	
CO4	3	2	1			1				1		1			
CO5	3	1	1			1						1			

2021-22 Onwards (MR-21)	MALLAREDDYENGINEERINGCOLLEGE (Autonomous)	B.Tech. IV Semester		
Code: 67B22	Software Engineering (Common for CSE,CSE(Cyber Security),CSE(AI and ML), CSE(DS),CSE(IOT) and IT)	L	T	P
Credits:3		3	-	-

Prerequisites: NIL

Course Objectives:

Student will be able to learn fundamental aspects of Software Engineering and analyze various process models. To identify various types of requirements and the process for Requirements Engineering. To make use of various System Models to conceptualize and construct a system. To demonstrate different testing tactics and define metrics for software measurement. To classify and mitigate the Software Risks and learn to achieve quality standards.

Module I: Introduction to Software Engineering [09 Periods]

Basics terms of Software Engineering: Evolving role of software, changing nature of Software, Software Myths. A Generic View of Process:-Software engineering-A layered technology, The Capability Maturity Model Integration (CMMI)

Process Models: The waterfall model, Incremental process models, evolutionary process models, and the unified process.

Module II: Requirements of Software Engineering
[09Periods]

Software Requirements: Functional and non functional requirements, User requirements, System requirements, Interface specification, The software requirements document.

Requirements Engineering Process: Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management

Module III: Phases of Software Engineering [09 Periods]

A: System Models: Context models, Behavioral models, Data models, Object models, structured methods

B: Design Engineering: Design process and design quality, design concepts the design model

Creating an architectural design: Software architecture, data design, architectural styles and patterns, architectural design

MODULE IV: Test Strategies [09 Periods]

Methods of Testing: A strategic approach to software testing, Black box and White box Testing, Validation Testing, System Testing.

Product Metrics: Software Quality, Metrics for analysis model, Metrics for design model, Metrics for source code, Metrics for testing, Metrics for maintenance

Metrics for process and products: Software measurement, Metrics for software quality

Module V: Risk Management [09 Periods]

Management of Risk Process: Reactive Vs proactive risk strategies, Software risks, Risk identification, Risk projection Risk refinement, RMMM, RMMM plan

Quality Management: Quality concepts, Software quality assurance, Software reviews, Formal technical reviews, Statistical Software Quality Assurance, Software Reliability, ISO 9000 Quality standards

TEXT BOOKS

- Roger S. Pressman, Software engineering- A practitioner‘s Approach, McGraw Hill International Edition, 5th edition, 2001.
- Ian Summerville, Software engineering, Pearson education Asia, 6th edition, 2000.

REFERENCES:

- Pankaj Jalote- An Integrated Approach to Software Engineering, Springer Verlag, 1997.
- James F Peters and Witold Pedryez, ―Software Engineering – An Engineering Approach, John Wiley and Sons, New Delhi,2000.
- Ali Behforooz and Frederick J Hudson, ―Software Engineering Fundamentals, Oxford University Press, New Delhi,1996.

COURSE OUTCOMES:

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

Analyze the customer business requirements and choose the appropriate Process model for the given project

- Elicit functional and non-functional requirements using rigorous engineering methodology
- Conceptualize and achieve requirements defined for the system using Architectural styles and Design patterns
- Design test cases and define metrics for standardization.
- Assess, mitigate and monitor the risks and assuring quality standards.

CO-PO, PSO Mapping (3/2/1indicates strength of correlation) 3-Strong,2-Medium,1-Weak															
COs	**Programme Outcomes(POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1									3	3			3		3
CO2	2	3								3			3	2	
CO3			3	3						2				3	
CO4				2	3								2		
CO5						2	3	3					3	3	

2021-22 Onwards (MR-21)	MALLAREDDYENGINEERINGCOLLEGE (Autonomous)	B.Tech. IV Semester		
Code:B0516	Design and Analysis of Algorithms (Common for CSE,CSE(Cyber Security),CSE(AI and ML), CSE(DS), CSE(IOT) and IT)	L	T	P
Credits:3		3	-	-

Prerequisites: Data Structures

Course Objectives:

- To Learn fundamental concepts an algorithm, Pseudo code, performance analysis, time complexity, disjoint sets, spanning trees and connected components.
- To Learn and Understanding of divide and conquer, applications, binary search, sorting and Strassen‘s matrix, greedy method, job sequencing, spanning trees and shortest path problem.
- To Learn and understanding dynamic programming, matrix chain, optimal binary search, knapsack problem and optimization methods, all pairs shortest path, travelling sales problem and reliability design.
- To Learn and understanding backtracking, n-queen problems, subset problem, graph coloring, Hamiltonian cycles and branch bound methods, travelling sales, knapsack problem, branch and bound, FIFO branch.
- To Learn and understanding of NP Hard and NP complete problems

MODULE I: Basics of Algorithm Design [09 Periods]

Introduction -Algorithm, Pseudo code for expressing algorithms, Performance, Analysis- Space complexity, Time complexity, Asymptotic Notations, Amortized analysis.

Disjoint Sets -Disjoint set operations, union and find algorithms, spanning trees, connected components and bi connected components.

MODULE II: Algorithm Methods **[10 Periods]**

Divide and Conquer - General method, applications-Binary search, Quick sort, Merge sort, Strassen‘s matrix multiplication

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

MODULEIII: Dynamic Programming and Optimization Techniques [10 Periods]

A: Dynamic Programming - General method, applications-Matrix chain multiplication, Optimal binary search trees, 0/1 knapsack problem.

B: Optimization Techniques - All pairs shortest path problem, travelling sales person problem, Reliability design.

MODULE IV: Backtracking and Branch and Bound [10 Periods]

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

Branch and Bound - General method, applications: Travelling sales person problem, 0/1 knapsack problem- LC Branch and Bound solution, FIFO Branch and Bound solution.

MODULE V: NP-Hard and NP-Complete problems [09 Periods]

NP-Hard and NP-Completeness: Basic concepts, NP - Hard and NP Complete classes, Cook‘s theorem, Deterministic and Non-Deterministic algorithms, NP-hard graph problems and scheduling problem

TEXTBOOKS:

- • Ellis Horowitz, Satraj Sahni and Rajasekharan, "Fundamentals of computer Algorithms" Galgotia publications pvt. Ltd
- T.H.Cormen, C.E.Leiserson, R.L.Rivest, and C.Stein, "Introduction to Algorithms", second edition, PHI Pvt. Ltd./ Pearson Education

REFERENCES:

- M.T.Goodrich and R.Tomassia "Algorithm Design, Foundations, Analysis and Internet examples", John wiley and sons.
- R.C.T.Lee, S.S.Tseng, R.C.Chang and T.Tsai, "Introduction to Design and Analysis of Algorithms A strategic approach", Mc Graw Hill.
- Parag Himanshu Dave, Himanshu Balchandra Dave,"Design and Analysis of algorithms" Pearson

E-RESOURCES:

- https://comsciers.files.wordpress.com/2015/12/horowitz-and-sahani- fundamentals -of-computer-algorithms-2nd-edition.pdf
- https://books.google.co.in/books?id=7qKXCzF1XC8C&printsec=frontcover&dq=T.H.Co rmen,C.E.Leiserson,+R.L.Rivest,and+C.Stein,+%22Introduction+to+Algorithms%22,+second+edition,+PHI+Pvt.+Ltd./+Pearson+Education,ebook,pdf&hl=en&sa=X&ved=0ahUKEwjFupORxdXTAhXLQo8KHU7FC5cQ6AEIKjAB#v=onepage&q&f=false
- http://en.cnki.com.cn/Article_en/CJFDTOTAL-JFYZ200208019.htm
- http://nptel.ac.in/courses/106101060/

Course Outcomes:

At the end of the course, students will be able to

- Analyze performance of algorithms using asymptotic notations, performance analysis, disjoint sets, spanning trees and connected components

- Describe and analyze paradigms for designing good algorithms using Divide- and-Conquer and Greedy Techniques, applications, binary search, sorting and Strassen's matrix, greedy method, job sequencing, spanning trees and shortest path problem.
- Synthesize dynamic-programming algorithms and analyze matrix chain, optimal binary search, knapsack problem and optimization methods, all pairs shortest path, travelling sales problem and reliability design.
- Apply backtracking and branch and bound techniques to solve some complex problems, n-queen problems, subset problem, graph coloring, Hamiltonian cycles and branch bound methods, travelling sales, knapsack problem, branch and bound, FIFO branch
- Apply algorithm design techniques to solve certain NP-complete problems.

CO-PO, PSO Mapping (3/2/1indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes(POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	3	2									3	2	
CO2	3	2	3	2									3	2	
CO3	3	2	3	2									3	2	
CO4	3	2	3	2									3	2	
CO5	3	2	3	2									3	2	

2021-21 Onwards (MR-21)	MALLAREDDYENGINEERINGCOLLEGE (Autonomous)	B.Tech. IV Semester		
Code:B6601	Fundamentals of Artificial Intelligence	L	T	P
Credits:3	[Professional Elective-I] (Common for CSE,CSE(Cyber Security),CSE (AI and ML),CSE(DS),CSE(IOT) and IT)	3	-	-

PRE-REQUISITES

- Basic Programming in Python
- Data Structures

OBJECTIVES

Artificial Intelligence is a major step forward in how computer system adapts, evolves and learns. It has widespread application in almost every industry and is considered to be a big technological shift, similar in scale to past events such as the industrial revolution, the computer age, and the smart phone revolution.

This course will give an opportunity to gain expertise in one of the most fascinating and fastest growing areas of Computer Science through classroom program that covers fascinating and compelling topics related to human intelligence and its applications in industry, defence, healthcare, agriculture and many other areas. This course will give the students a rigorous, advanced and professional graduate-level foundation in Artificial Intelligence.

LEARNING OUTCOMES

After undergoing this course, the students will be able to:

- Build intelligent agents for search and games.
- Solve AI problems through programming with Python.
- Learning optimization and inference algorithms for model learning.
- Design and develop programs for an agent to learn and act in a structured environment.

DETAIL CONTENTS

Module I: Introduction [9 Hours]

Concept of AI, history, current status, scope, agents, environments, Problem Formulations, Review of tree and graph structures, State space representation, Search graph and Search tree.

Module II: Search Algorithms [10 Hours]

Random search, Search with closed and open list, Depth first and Breadth first search, Heuristic search, Best first search, A* algorithm, Game Search.

Module III: Probabilistic Reasoning [10 Hours]

Probability, conditional probability, Bayes Rule, Bayesian Networks- representation, construction and inference, temporal model, hidden Markov model.

Module IV: Markov Decision process [10 Hours]

MDP formulation, utility theory, utility functions, value iteration, policy iteration and partially observable MDPs.

Module V: Reinforcement Learning [09 Hours]

Passive reinforcement learning, direct utility estimation, adaptive dynamic programming, temporal difference learning, active reinforcement learning- Q learning.

LIST OF SUGGESTED BOOKS

- Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", 3rd Edition, Prentice Hall
- Elaine Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw Hill
- Trivedi, M.C., "A Classical Approach to Artificial Intelligence", Khanna Publishing House, Delhi.
- Saroj Kaushik, "Artificial Intelligence", Cengage Learning India, 2011
- David Poole and Alan Mackworth, "Artificial Intelligence: Foundations for Computational Agents", Cambridge University Press 2010.

WEBSITES FOR REFERENCE

- https://nptel.ac.in/courses/106105077 https://nptel.ac.in/courses/106106126
- https://aima.cs.berkeley.edu https://ai.berkeley,edu/project_overview.html (for Practical's)

CO-PO, PSO Mapping
(3/2/1indicates strength of correlation)3-Strong,2-Medium,1-Weak

COs	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-												
CO2	-	2	2										1	2	
CO3	2	2	2	3											
CO4	2	2	2	2										2	2
CO5	1	2													

2021-22 Onwards (MR-21)	MALLAREDDYENGINEERINGCOLLEGE (Autonomous)	B.Tech. IV Semester		
Code:B0518	Free and Open Source Software [Professional Elective-I] (Common for CSE,CSE(Cyber Security),CSE(AI and ML), CSE(DS),CSE(IOT) and IT)	L	T	P
Credits:3		3	-	-

Prerequisites: NIL

Course Objectives:

- Familiarity with Open Source Technologies
- Study some FOSS Projects to under the principles, methodologies of FOSS.
- Understand the policies, licensing procedures and ethics of FOSS.

Module I: [09 Periods]

Introduction to Open Source: Open Source, need and principles of OSS, Open Source Standards, Requirements for Software, OSS success, Free Software, Examples, Licensing, Free Vs. Proprietary Software, Public Domain software, History of free software, Proprietary Vs Open Source Licensing Model, use of Open Source Software.

Module II: [09 Periods]

Fault Tolerant Design: Principles and Open Source Methodology- History, Open Source Initiatives, Open Standards Principles, Methodologies, Philosophy, Software freedom, Open Source Software Development, Licenses, Copyright vs. Copy left, Patents, zero marginal cost, income-generation Opportunities, Internationalization.

Module III: [12 Periods]

Case Studies: Apache, BSD, Linux, Mozilla Firefox, Wikipedia, Git, GNU CC, Libre Office.

Module IV: [09 Periods]

Open Source Project: Starting and Maintaining an Open Source Project, Open Source Hardware, Open Source Design, Open Source Teaching (OST), Open Source Media.

What Is A License, Creation of our own Licenses, Important FOSS Licenses (Apache, BSD,PL, LGPL), copyrights and copy lefts, Patent.

Module V: [09 Periods]

Open Source Ethics: Open Source Vs. Closed Source, Open Source Government, Ethics of Open Source, Social and Financial Impact of Open Source Technology, Shared Software, Shared Source, Open Source as a Business Strategy.

TEXT BOOKS:

- Kailash Vadera, Bhavyesh Gandhi, “Open Source Technology”, University Science Press, 1st Edition, 2009.
- Fadi P. Deek and James A. M. McHugh, “Open Source Technology and Policy”, Cambridge University Press, 2008.

REFERENCES:

- Wale Soyinka, “Linux Administration- A beginner’s Guide”, Tata McGraw Hills,2009
- Andrew M. St. Laurent, “Understanding Open Source and Free Software Licensing”, O’Reilly Media, 2004.
- Dan Woods, Gautam Guliani, “Open Source for the Enterprise”, O’Reilly Media,2005.
- Bernard Golden, “Succeeding with Open Source”, Addison-WesleyProfessional,2004.
- Clay Shirky and Michael Cusumano, “Perspectives on Free and Open Source Software”, MIT press, 2005.

Course Outcomes:

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

- Differentiate between Open Source and Proprietary software and Licensing.
- Recognize the applications, benefits and features of Open Source Technologies.
- Understand and demonstrate Version Control System along with its commands.
- Gain knowledge to start, manage open source projects.
- Understand and practice the Open Source Ethics.

CO-PO, PSO Mapping
(3/2/1indicates strength of correlation) 3-Strong,2-Medium, 1-Weak

COs	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		3	3		2	2	2						2	2	2
CO2		3		3	2	2	1				2		3	2	2
CO3	2	3	3	2	2	2	2				1		3	3	2
CO4		3		2	2	2	2							3	
CO5		3		2	2	2	2							3	

2021-22 Onwards (MR-21)	MALLAREDDYENGINEERINGCOLLEGE(Autonomous)	B.Tech. IV Semester		
Code:B6703	Matrix Computations for Data Science [Professional Elective-I]	L	T	P
Credits:3		3	-	-

Course Objectives:

- Understand the basic concepts of matrix algebra and its applications.
- Solving computational problems of linear algebra.

Module-I **[10 Periods]**

Matrix Theory : Algebra of Matrices, Trace and Rank of a Matrix and their properties, Determinants, Inverse, Eigen values and Eigen vectors, symmetric, orthogonal and idempotent matrices and their Properties.

Module-II **[08 Periods]**

Matrix Factorization: Gauss elimination, row canonical form, diagonal form, triangular form, Gauss-Jordan-LU decomposition, and solving systems of linear equations.

Module-III **10 Periods]**

Decomposition of Matrices: Spectral decomposition, singular value decomposition, Quadratic forms, definiteness and related results with proofs and Inner product spaces.

Module-IV **[10 Periods]**

Vector Spaces: Introduction to vector spaces, Subspaces, Basis and dimension of a vector space, linear dependence and linear independence and spanning set.

Module-V **[10 Periods]**

Linear Transformation: Introduction to Linear Transformation, kernel, range, Matrix Representation of a linear transformation, rank-nullity theorem, change of basis and similar matrices.

Textbooks:

- Gilbert Strang, Introduction to linear algebra, 5/e., Wellesley-Cambridge, 2016.
- David C. Lay, Linear Algebra and Its Applications, Pearson, 5/e 201

Reference books:

- G.Allaire and S.M.Kaber. Numerical Linear Algebra, Texts in Applied Mathematics, Springer, 2008.

- L.Hogben, Handbook of Linear Algebra, CRC Press/Taylor & Franci sGroup,2014. Friedberg, S.,Insel, A.,andSpence,L., Linear Algebra, 5/e, Pearson,2019.
- Nick Fieller,"Basics of Matrix Algebra for Statistics with R", publishedin2015,CRC Press.

Course Outcomes:

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

- Understand basic matrix properties like rank, determinant, inverse and a special type of matrices
- IntroduceGaussian/Gauss-Jordaneliminationmethods,LUfactorizationtechnique
- Use computational techniques for singular valued composition(Computational and Algebraic
- Skills).
- Understand the concepts of vector space and subspaces.
- Find the matrix representation of a linear transformation given bases of the relevant vector spaces.
- Compute inner products on a real vector space and compute angle and orthogonality in inner product spaces.
- Understand the use of linear algebra and matrices in several important, modern applications of research and industrial problems involving statistics.

2021-22 Onwards (MR-21)	MALLAREDDYENGINEERINGCOLLEGE (Autonomous)	B.Tech. IV Semester		
Code:B0521	Database Management Systems Lab (Common for CSE,CSE(Cyber Security),CSE(AI and ML), CSE(DS),CSE(IOT) and IT)	L	T	P
Credits:2		-	1	2

Co-requisites

1. Co-requisite of course "Database Management Systems"

Course Objectives:

This course enables the students to practice the concepts learnt in the subject DBMS by developing a database for an example project.

- The student is expected to practice the designing a database system using ER diagram, developing and querying a relational database using normalization techniques in the context of example database.
- Students are expected to Learn SQL basics for data definition and data manipulation using "MySQL" database.
- Students are expected to apply the learn developing database applications using procedures, cursors and triggers.

List of experiments:

1	Railway Reservation System -(Redesigning IRCTC database) Train (train Number, name, source, destination, start_time, reach_time, traveltime, distance, class,days, type) Ticket (PNRNo, Transactionid, from_station, To_station, date_of_journey, class date_of_booking,total_ticket_fare, train number) Passenger (PNR No, Serial no, Name, Age, Reservation_status) Train_Route(Train_No, route_no, station_code, name, arrival_time, depart_time, distance, day)Train_Ticket_fare(Train_No, class, base_fare, reservation_charge, superfast_charge, other_charge, tatkal_charge, service_tax)
	Create all the tables specified above. Make underlined columns as primary key.(usenumber, number(m,n), varchar(n), date, time, timestamp data types appropriately) Insert atleast 5 rows to each table. (Check www.irctc.co.in HYPERLINK "http://www.irctc.co.in/" website for actual data) • Use Interactive insertion for inserting rows to the table. • Use ADT (varray) for class and days column in Train table.
2	Write simple DDL/DML Queries to • Remove all the rows from Passenger table permanently. • Change the name of the Passenger table to Passenger_Details. • List all train details. • List all passenger details. • Give a list of trains in ascending order of number. • List the senior citizen passengers details. • List the station names where code starts with 'M'. • List the trains details within a range of numbers. • Change the super fast charge value in train fare as zero, if it is null. • List the passenger names whose tickets are not confirmed.

	• List the base_fare of all AC coaches available in each train.Find the ticket details where transaction id is not known. • Use Interactive updation for updating the seat no for particular PNR NO. • Find the train names that are from Secunderabad to Mumbai, but do not have the source ordestination in its name. • Find the train details that are on Thursday (Use the ADT column created).
3	Create (Alter table to add constraint) the necessary foreign keys by identifying the relationships in the table. • Add a suitable constraint to train table to always have train no in the range 10001 to99999. • Add a suitable constraint for the column of station name, so that does not takeduplicates. • Change the data type of arrival time, depart time (date -> timestamp or timestamp todate), and do the necessary process for updating the table with new values. • Add a suitable constraint for the class column that it should take values only as 1A, 2A,3A, SL, C. • Add a not null constraint for the column distance in train_route.
4	Use SQL PLUS functions to. • Find the passengers whose date of journey is one month from today. • Print the train names in upper case. • Print the passenger names with left padding character. • Print the station codes replacing K with M. • Translate all the LC in class column (Train_fare) to POT and display. • Display the fare details of all trains, if any value is ZERO, print as NULL value. • Display the pnrno and transaction id, if transaction id is null, print 'not generated'. • Print the date_of_jounrney in the format '27th November 2010'. • Find the maximum fare (total fare). • Find the average age of passengers in one ticket. • Find the maximum length of station name available in the database. • Print the fare amount of the passengers as rounded value. • Add the column halt time to train route. • Update values to it from arrival time and depart time.High Level: • Update values to arrival time and depart time using conversion functions. • Display the arrival time, depart time in the format HH:MI (24 hours and minutes).
5	Write Queries to. Use SET Operators • Find the train numbers for which reservation have not yet been made. • Find the train names that donot have a first AC class coach. • Print all the PNR nos available in the database. • Find passenger names who have booked to 'Pune'.Use Nested Query(in Operators) • Find the train names that stop in 'Warangal'. • Find the train names that are superfast and the service tax is zero. • Find the Passenger name who have booked for the train that starts from 'Secunderabad'. • Find the trains names that have all the AC coaches and the base fare is less than 3000for each case.
6	Use Join Query • Find the train names that stop in 'Warangal'. • Find the train names that are superfast and the service tax is zero. • Find the Passenger name (and train name) who have booked for the train that starts from 'Secunderabad'. • Display the trains names, each type of class and the total fare for each type of class. • Display all the train details and the ticket details (if booked any). • Create a sequence to provide values for the PNR no. • Write a query for full outer join using any of the tables above.

	Write Queries to. Use Coorelated (and nested) Query • Find the train names for which ten tickets have been reserved. • Find the trains that have more than ten substations. • Find the passengers who do not pass through 'Kachiguda'. • Find passengers who have booked for super fast trains.
7	Complex queries (use groupby/groupby having/join/nested) • Take the start station code and end station code and display the train details. • List the train names and the number of sub stations it has. • List the stations where all types of trains stop. • List the trains names that has atleast four bookings. • Create a table cancellation history (Insert values from ticket and passenger table). • Create a table for all the train numbers and class available in train_ticket_fare withtotal seats. 1. Find the station name that has highest number of trains stopping at.
8	Write a simple PL/SQL block to. • Print the fibonacci series. • Print the factorial of a given number. • Print 'NOT confirmed' based on the reservation status, of a particular passenger. • Print the total seats available for a particular train and for a particular class.
9	Write a cursor for the following. • Retrieve the passenger details for —X train number and given journey date. • Display the train name (once) and the substation names. • Display the fare details of a particular train(use basic exceptions) • Write a cursor to update the reservation status of the passengers (generate seat number, if seats have reached maximum, put waiting list number (30% of total seats), if waiting list number reaches maximum, put PQWL (10%of total seats), RAC-20%)
10	Write a PL/SQL procedure to. • List the details of passengers who has reserved next to —Mr. X. • PNR No. of a passengers for a given source and a destination. • Write a PL/SQL function to. • Get the PNR No and return the total ticket fare. • Get the Passenger name, train no and return the total journey time in hours and minutes.
11	Write a Trigger for the following: • When a passenger cancels a ticket, do the necessary process and update the cancellation history table. • When train number is changed, update it in referencing tables. • When a passenger record is inserted reservation status should be automatically updated.
12	• Use TCL commands for your transactions. (commit,rollback,savepoint) • Create a role named 'clerk', and give permission for him to select only the trains starting from 'Warangal' along with fare details. • Create a nested table containing trainno,name,source,destination and passengers who have booked for it (PNR no,sno, name,age). Find the passengers whose name start with 'S' and train starts from 'Warangal'

Textbooks:

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

References:

- Database Systems design, Implementation, and Management, Peter Rob &CarlosCoronel, 7th Edition.
- SQL The Complete Reference, James R. Groff, Paul N. Weinberg, 3rd Edition,
- Oracle for Professionals, The X Team, S.Shah and V. Shah, SPD.
- Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL,Shah,PHI.

Outcomes:

- Design database schema for a given application and apply normalization
- Acquire skills in using SQL commands for data definition and data manipulation.
- Develop solutions for database applications using procedures, cursors and triggers.

CO-PO, PSO Mapping
(3/2/1indicates strength of correlation) 3-Strong,2-Medium,1-Weak

COs	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-												
CO2	-	2	2										1	2	
CO3	2	2	2	3										2	2

2021-22 Onwards (MR-21)	MALLAREDDYENGINEERINGCOLLEGE (Autonomous)	B.Tech. IV Semester		
Code:B6704	Statistics for Data Science Lab (Common for CSE,CSE(Cyber Security),CSE(AI and ML), CSE(DS),CSE(IOT) and IT)	L	T	P
Credits:1.5		-	-	3

Prerequisites: Python Programming

List of Experiments:

1. Write a Python program to find area and circumference of circle(use mathpkg)
2. Write a Python program to perform the following operations
   - Create and print a list
   - Perform slicing and dicing
   - Create list of lists
   - Replacing list elements
3. Write a Python program to perform the following operations using Numpy Package
   - Creating an Array
   - Indexing an Array
   - Slicing an array
   - Concatenation of Array
4. Write a Python program to perform I/O operations using NumPy
   - Importing data with gen from txt and defining the input
   - Splitting the lines into columns
   - Skipping lines and choosing columns
   - Choosing the data type
   - Setting the names
   - Tweaking the conversion
   - Shortcut functions
5. Write a Python program to perform the following operations on data set using Panda package
   - Create a data frame
   - Summary statistics variables
   - Sort the data frame
   - Sort the data by multiple columns
   - Removing duplicates
   - Categorize a variable.
   - Convert the values to the lower case
6. Write a Python program to perform updating operations on data set using Panda package
   - Create a new variable is by using the assign function
   - Remove the column from data frame
   - Filling the missing value
   - Rename column names and (row names).
   - Categorize (bin) continuous variables.
   - Pass a unique name to each label
   - Calculate cumulative sum
   - Grouping data and creating pivots
   - Calculate the mean of data
7. Write a python Program to perform the following slicing and indexing operations on a data set

- Slice the data frame.
- Slicing based on column names
- Slice based on date range
- Slicing based on both row index labels and column names
- Slicing based on index of columns
- Returns a specific range of rows
- Returns specific rows and columns using lists containing columns or row indexes
- Boolean indexing based on column values
- Get first n rows from the data frame

8. Write a python Program on data set operations
   - Copying the data set
   - Select all rows except those with two and four
   - List all columns where A is greater than C
   - Using OR condition
   - Calculate means of each group
   - Calculate count by each group
9. Exploring a Machine Learning Data set
10. Write a python program to build a Random Forest Model

CO-PO, PSO Mapping
(3/2/1indicates strength of correlation) 3-Strong,2-Medium,1-Weak

COs	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-												
CO2	-	2	2										1	2	
CO3	2	2	2	3										2	2

2021-22 Onwards (MR-21)	MALLAREDDYENGINEERINGCOLLEGE (Autonomous)	B.Tech. IV Semester		
Code:B0521	Design and Analysis of Algorithms Lab (Common for CSE,CSE(Cyber Security),CSE(AI and ML), CSE(DS),CSE(IOT) and IT)	L	T	P
Credits:1.5		-	-	3

COURSE OBJECTIVES:

This course will make students

- To analyze asymptotic performance of algorithms, understand different methods postfix, infix expressions, spanning tree algorithms, Strassen's matrix multiplication.
- To develop solutions to Job sequencing problems, Knapsack algorithm, shortest path algorithms.
- To implement solutions traveling sales person.
- To apply dynamic programming method N-Queen's Problem.
- To learn and apply synthesizing branch and bound, NP problems.

Software Requirements: Turbo C

LIST OF PROGRAMS:

- Write a program to evaluate a postfix expression E. Assume E is presented data String.
- Write a program to obtain the postfix form of an in fix expression E.Again assume E has only the binary operators+,-,*,/,^.
- Implement the minimum cost spanning tree algorithm (Kruskal's algorithm).
- Implement the minimum cost spanning tree algorithm (Prim's algorithm).
- Implement Strassen's matrix multiplication.
- Implement Job sequencing problem with deadlines.
- Implement the Knapsack Algorithm.
- Implement the shortest path Dijkstra's Algorithm.
- Implement SSSP (Single Source Shortest Path) in DAG (Directed Acyclic Graphs).
- Implement travelling sales person problem.
- Implement N-Queen's Problem using Backtracking.
- Implement sum of sub sets problem.

TEXTBOOKS

- Ellis Horowitz, SatrajSahni and Rajasekharan, "Fundamentals of ComputerAlgorithms" Galgotia publications pvt. Ltd
- T.H.Cormen, C.E.Leiserson, R.L.Rivest, and C.Stein, "Introduction to Algorithms", second edition, PHI Pvt. Ltd./ Pearson Education

- Parag Himanshu Dave, Himanshu Balchandra Dave, "Design and Analysis of algorithms" Pearson.

REFERENCES

- M.T.Goodrich and R.Tomassia "Algorithm Design, Foundations, Analysis and Internet examples", John wiley and sons.
- R.C.T.Lee, S.S.Tseng, R.C.Chang and T.Tsai, "Introduction to Design andAnalysis of Algorithms A strategic approach", Mc GrawHill.

COURSE OUTCOMES:

At the end of the course, students will be able to

- Analyze asymptotic performance of algorithms, understand different methods
- Develop solutions to Job sequencing problems, Knapsack algorithm, shortestpath algorithms,
- Implement solutions traveling sales person.
- Apply dynamic programming method N-Queen’s Problem.
- Apply synthesizing branch and bound NP problems.

CO-PO, PSO Mapping (3/2/1indicatesstrengthofcorrelation)3-Strong,2-Medium,1-Weak															
COs	**Programme Outcomes(POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	3	2									3	3	
CO2	3	3	3	2									3	2	
CO3	3	3	3	2									3	2	
CO4	3	3	3	2									3	2	
CO5	3	3	3	2									3	2	

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code:B00M2	Environmental Science (Common for CE, EEE, ME, ECE, MiE, CSE, CSE (Cyber Security),CSE(AI and ML),CSE(DS), CSE(IOT)and IT)	L	T	P
Credits: NIL		2	-	-

Pre-Requisites: NIL

Objectives

- Creating the awareness about environmental problems among students.
- Imparting basic knowledge about the environment and its allied problems.
- Developing an attitude of concern for the environment.
- Motivating students to participate in environment protection and environment improvement.

Outcomes

At the end of the course, it is expected that students will be able to:

- Identify and analyze environmental problems as well as the risks associated with these problems
- Understand what it is to be a steward in the environment
- Studying how to live their lives in a more sustainable manner

UNIT – I: MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES:

Definition, Scope and Importance – Need for Public Awareness.

NATURAL RESOURCES: Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies –Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources –Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams– benefits and problems - Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

UNIT – II: ECOSYSTEMS:

Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. – Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of the following ecosystem:

- Forest ecosystem
- Grassland ecosystem
- Desert ecosystem

- Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

UNIT – III: BIODIVERSITY AND ITS CONSERVATION:

Introduction - Definition: genetic, species and ecosystem diversity. - Bio- geographical classification of India - Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - . Biodiversity at global, National and local levels. - . India as a mega-diversity nation - Hot-sports of biodiversity -Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. - Endangered and endemic species of India– Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT – IVENVIRONMENTAL POLLUTION AND CONTROL:

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: Wastewater Treatment methods: Primary, secondary and Tertiary. Overview of air pollution control technologies, Concepts of bioremediation. Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol.

UNIT – V: SOCIAL ISSUES AND THE ENVIRONMENT:

From Unsustainable to Sustainable development- Urban problems related to energy - Water conservation, rain water harvesting, watershed management - Resettlement and rehabilitation of people; its problems and concerns. Case Studies -

Environmental ethics:

Issues and possible solutions. -Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies -Wasteland reclamation. –Consumerism and waste products. - Environment Protection Act. -Air (Prevention and Control of Pollution) Act. Water(Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act -Issues involved in enforcement of environmental legislation. -Public awareness.

HUMAN POPULATION AND THE ENVIRONMENT: Population growth, variation among nations. Population explosion - Family Welfare Programme. - Environment and human health. -Human Rights. -Value Education. -HIV/AIDS. - Women and Child Welfare. -Role of information Technology in Environment and human health. –Case Studies.

Textbooks:

- Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission., Universities Press

- Environmental Studies by R. Raja gopalan, Oxford University Press.

References:

- Textbook of Environmental Sciences and Technology by M. Anji Reddy, BS Publication.

CO-PO, PSO Mapping (3/2/1indicates strength of correlation) 3-Strong,2-Medium,1-Weak															
COS	**Programme Outcomes(POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	-	-												
CO2	-	2	2										1	2	
CO3	2	2	2	3											
CO4	2	2	2	2										2	2
CO5	1	2													

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code:B0H09	MANAGEMENTFUNDAMENTALS	L	T	P
Credits:3		3	-	-

Pre- requisites: Nill

Through reading the text, references and discussion of cases students should be able to understand the fundamentals underlying the management of an organization.

MODULE – I: Management and Principles of Management [09 Periods]

Introduction to Management: Concepts of Management and organization-nature, importance and Functions of Management, Taylor's Scientific Management Theory, Fayol's Principles of Management.

Management Theories: Mayo's Hawthorne Experiments, Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Herzberg's Two-Factor Theory of Motivation, Systems Approach to Management, Leadership Styles, Corporate Social responsibility.

MODULE – II: Planning, Organization and types of Structures [10 Periods]

Planning: Need for planning- -Steps in the process of planning- Advantages and limitation of planning. Types of planning - Vision, Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of Corporate Planning Process, Management by Objectives (MBO).

Organization and types of Structures: Basic concepts related to Organization - Depart mentation and Decentralization, Types of Organizations- Line organization, Line and staff organization, functional organization, committee organization, matrix organization, Virtual Organization, Cellular Organization, boundary less organization, inverted pyramid structure, lean and flat Organization structure.

MODULE – III: Staffing and controlling [10 Periods]

Staffing: Basic concepts of HRM, functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development. Performance Appraisal, Job Evaluation and Merit Rating.

Controlling: process of controlling, types of controlling, managing productivity, Quality Control: chart, R chart, C chart, P chart, (simple Problems), Deming's contribution to quality.

MODULE – IV: Operations and Materials Management [09 Periods]

Operations Management : Principles and Types of Plant Layout-Methods of production (Job, batch and Mass Production), Work Study -Basic procedure involved in Method Study and Work Measurement.

Materials Management: Objectives, Need for Inventory control, EOQ, ABC Analysis, Purchase Procedure, Stores Management and Stores Records.

MODULE – V: Project Management and Contemporary Practices [10 Periods]

Project Management (PERT/CPM): Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing. (Simple problems) Contemporary Management Practices: Basic concepts of ERP, Just-In- Time (JIT) System, Total Quality Management (TQM), six sigma and Capability Maturity Model(CMM) Levels, Bench marking, Balanced Score card.

TEXT BOOKS:

- Arya sri, Management Science, 4th edition TMH, 2004. (UNITS I,II,III,IV,V)
- Stoner, Freeman, Gilbert, Management, Pearson Education, New Delhi, 6th Ed, 2004. (UNITS I,II)

REFERENCES:

- Kotler Philip & Keller Kevin Lane, "Marketing Management", PHI, 12th edition, 2005
- Koontz &Weihrich, "Essentials of Management", TMH, 6thedition, 2005.
- Thomas N.Duening& John M. Ivancevich "Management -Principles and Guidelines", Biztantra, 5th edition 2003.
- Memoria& S.V. Gauker, "Personnel Management", Himalaya, 25th edition,2005
- Samuel C. Certo, "Modern Management", PHI, 9thedition, 2005.

Course Outcomes:

At the end of the course, students will be able to

- Understand the various concepts, principles and theories of management.
- Understand the basic concepts of planning and various structures of organizations.
- Understand the process of staffing and controlling
- Understand the process of operations management. Also learn the concepts of materials management and marketing management at anorganization.
- Understand the various contemporary management practices. Alsothe project management techniques.

CO-PO Mapping (3/2/1indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak												
COS	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1									2	3	1	
CO2		3							2		1	
CO3		3								2	1	
CO4		3		2	1							
CO5				2			3				1	

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: B0511	OPERATING SYSTEMS	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL

Course Objectives:

This course enable the students to interpret main components of operating system and their working, identify the role of Operating System in process scheduling and synchronization, analyze the way of addressing deadlock, understand memory management techniques and I/O systems, describes the way of handling files and security.

MODULE I: Computer System and Operating System Overview [10 Periods]

Basic System and Process Operations - Overview of Computer System hardware, Operating System Objectives and services, Operating System Structure, System Calls, System Programs.

Process Management - Process Description, Process Control Block, Process States, Inter-process Communication.

MODULE II: Scheduling and Concurrency [10Periods]

CPU Scheduling - Basic Concepts, Scheduling Criteria, Scheduling Algorithms and evaluation, Threads Overview, Threading issues.

Concurrency - Process synchronization, the critical- section problem, Peterson's Solution, synchronization Hardware, semaphores, monitors, classic problems of synchronization.

MODULE III: Deadlocks [08 Periods]

A: Deadlocks - System Model, Deadlock Characterization, Methods for handling Deadlocks, Deadlock Prevention.

B: Detection and Recovery - Deadlock avoidance, Deadlock detection, Recovery from Deadlocks.

MODULE IV: Memory [12 Periods]

Memory Management -Basic concepts, Swapping, Contiguous memory allocation, Paging, Segmentation, Virtual memory, Demand paging, Page-replacement algorithms, Thrashing.

Secondary Storage Structure and I/O Systems - Disk structure; Disk scheduling, Disk management, Swap space Management, RAID structure, Stable storage Implementation, Tertiary Storage Structure, I/O hardware, Application I/O interface, Kernel I/O subsystem.

MODULE V: Files [08 Periods]

File Management - File system-File concepts, Access methods, Directory structure, File system mounting, File sharing and Protection. Implementing file systems-File system structure and implementation, Directory implementation, Allocation methods, Free-space management, Efficiency and performance. Security - Protection, Security threats, Viruses, Cryptography as a security tool.

TEXT BOOKS:

1. Abraham Silberchatz, Peter B. Galvin, Greg Gagne, **"Operating System Principles"** 7th Edition, John Wiley.
2. Stallings, "Operating Systems Internal and Design Principles", 5th Edition, 2005, Pearson education/PHI

REFERENCES:

3. Crowley, "Operating System a Design Approach", TMH.
4. Andrew S Tanenbaum, "Modern Operating Systems", 2nd edition Pearson/PHI.
5. Pramod Chandra P. Bhat, "An Introduction to OperatingSystems, Concepts and Practice", PHI, 2003
6. DM Dhamdhere, "Operating Systems: A concept based approach" , 2nd Edition, TMH

E-**RESOURCES**:

7. https://www.tutorialspoint.com/operating_system/operating_system_tutorial.pdf
8. https://archive.org/details/2005OperatingSystemConcepts7thEditionAbrahamSilb erschatz
9. https://ndl.iitkgp.ac.in/document/BN1jh1UjGAJr_Zl4CiGeVCT3CaRCi4AlvzVW gkNQLQcFt_lb03ZmqLHrc1tBe3aA6pjyl3jlrBqPLRxX2VQUvQ
10. http://nptel.ac.in/courses/106108101/

Course Outcomes:

1. At the end of the course, students will be able to
2. **Determine** the role of Operating System in a computer.
3. **Relate** the methods for providing concurrency, communication and synchronization among concurrenttasks.
4. **Illustrate** the schemes used to address the issues of deadlocks.
5. **Contrast** different memory management techniques.
6. **Examine** various file management strategies and security issues.

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes(POs)**												**PSOs**		
	PO	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3		1									2	1		2
CO2	2	2										2	1		
CO3	2														
CO4	2	2	1										2		
CO5	2	2	1										1		

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code:B6705	ADVANCED PYTHON PROGRAMMING	L	T	P
Credits: 3		3	-	-

Prerequisites: Python programming

Course Objectives:

1. To Proficient data manipulation using NumPy and Pandas, missing data, and arithmetic operations.
2. To know Effective data processing from diverse sources, merging, and group operations with Pandas.
3. To do analysis of time-based data, encompassing date handling, shifting, resampling, and moving window functions.
4. To develop the Competence in GUI development with Tkinter, CRUD operations in SQL and an introduction to Flask and Django.
5. To know about machine learning concepts via scikit-learn, covering preprocessing, supervised/unsupervised learning, and neural networks.

MODULE – I **[10 periods]**

Numpy: Introduction to Numpy, Data types used in Numpy, Array Indexing and Slicing - Transposing Array and Swapping Axes - Saving and Loading Array - Universal Functions - Mathematical and Statistical Functions in Numpy.

Pandas: Introduction to Pandas , Pandas Data Indexing and Slicing, Handling missing data, Aggregation and Grouping , Arithmetic Operations between Data Frames and Series - Function Application.

MODULE – II **[10 periods]**

Data Input, Input from Text files, Visual Inspection, Reading ASCII Data into Python, Read and write from MSExcel and CSV files, Reading Multiple CSV files, Processing a single Worksheet and Multiple Worksheets, Data Wrangling Combining and Merging Data Sets, Data Aggregation and Group Operations GroupBy Mechanics.

MODULE – III **[08 periods]**

Time Series: Date and Time data types and tools, Time series Basics, Date ranges, Frequencies and Shifting, Time Zone Handling, Periods and Arithmetic's, Resampling and Frequency Conversion, Moving window functions.

MODULE – IV **[08 periods]**

GUIS in Python : Tkinter: Introduction, Components and Events, An example GUI, Button, text widgets; SQL: Installation, DB Connection, CRUD operations(Create, Read, Update, Delete), Python package – Flask.

Django: Introduction, Installation, Creating a hello world page; API and Security, scikit-learn Techniques: Data Preprocessing, Supervised and Unsupervised:

MODULE-V **[09 periods]**

Tensorflow: Introduction, create a simple project: Keras: Introduction and applications Data Analysis Use cases: USA.gov data from bitly- counting time zones with pandas, Movie lens 1M dataset-measuring rating disagreement, US Baby names-analyzing naming Trends.

TEXT BOOKS:

- Python Data Science Handbook By Jake Vanderplas, oreally publishers, 2nd edition, 2012
- The Hitchker's Guide to Python By Kenneth reitz and Tanya schelusser,2016 edition

REFERENCES:

- Gowrishanker and Veena, "Introduction to Python Programming", CRC Press, 2019.
- Python Crash Course, 2nd Edition, By Eric Matthes, May 2019 • NumPy Essentials, By Leo Chin and Tanmay Dutta, April 2016
- Joel Grus, "Data Science from scratch", O'Reilly, 2015.
- Wes Mc Kinney, "Python for Data Analysis", O'Reilly Media, 2012.
- Kenneth A. Lambert, (2011), "The Fundamentals of Python: First Programs", Cengage Learning
- Jake Vanderplas. Python Data Science Handbook: Essential Tools for Working with Data 1st Edition.

Course Outcomes:

1. Proficient use of NumPy and Pandas for data manipulation, including indexing, slicing, missing data handling, and arithmetic operations.
2. Skillful processing of data from various sources, merging datasets, group operations, and data aggregation using Pandas.
3. Ability to analyze and manipulate time series data, including date handling, shifting, resampling, and moving window functions.
4. Development of GUIs using Tkinter, CRUD operations with SQL, and introduction to web development with Flask and Django.

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech V Semester		
Code: B1202	WEB TECHNOLOGIES (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT) and IT)	L	T	P
Credits: 3		3	-	-

Course Objectives:

1. To introduce PHP language for server side scripting
2. To introduce XML and processing of XML Data with Java
3. To introduce Server side programming with Java Servlets and JSP
4. To introduce Client side scripting with Javascript and AJAX.

MODULE I: **[10 Periods]**

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, and 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.

MODULE II: **[09 Periods]**

HTML Common tags- List, Tables, images, forms, Frames; Cascading Style sheets;

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.

MODULE III: **[10 Periods]**

Introduction to Servlets: Common Gateway Interface (CGI), 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.

MODULE IV: **[10 Periods]**

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.

MODULE V: **[09 Periods]**

Client side Scripting: Introduction to Javascript, Javascript 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

REFERENCES:

1. Web Programming, building internet applications, Chris Bates, 2nd Edition, Wiley Dreamtech
2. Java Server Pages, Hans Bergsten, SPD O'Reilly,
3. Java Script, D. Flanagan, 6th Edition, O'Reilly Media. 4. Beginning Web Programming-Jon Duckett WROX.
4. Programming world wide web, R.W.Sebesta, 4th Edition, Pearson.
5. Internet and World Wide Web — How to program, Dietel and Nieto, Pearson.

E-RESOURCES:

1. https://kakeboksen.td.org.uit.no/Database%20System%20Concepts%206th%20edition.pdf
2. http://agce.sets.edu.in/cse/ebook/DBMS%20BY%20RAGHU%20RAMAKRISHNAN.pdf
3. http://airccse.org/journal/ijdms/ijdms.html
4. http://www.springer.com/computer/database+management+%26+information+retrieval?SGWID=0- 153-12-114576-0
5. http://textofvideo.nptel.iitm.ac.in/video.php?courseId=106106093
6. http://www.nptelvideos.in/2012/11/database-management-system.html

Outcomes

1. Gain knowledge of client side scripting, validation of forms and AJAX programming
2. Have understanding of server side scripting with PHP language
3. Have understanding of what is XML and how to parse and use XML Data with Java
4. To introduce Server side programming with Java Servlets and JSP

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1- Weak

COs	Programme Outcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2				3				2		3	3	3	
CO2	3	3				3				3		3	3	3	
CO3	3	3				2				3		2	3	3	
CO4	2	1				1				1		1			
CO5	1	1				1						1			

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: B6201	COMPUTER NETWORKS	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL

Course Objectives:

This course provides students to understand the fundamental concepts of computer networking and communications make use of IEEE standards in the construction of LAN,build the skills of subnetting and supernetting, explain the concepts of protocols ofTransport Layer, QoS and Congestion control mechanisms and demonstrate different protocols of Application Layer.

MODULE I: Basics of Networking and Physical layer [10 Periods]

Basics of Networking - Components – Direction of Data flow – Networks – Components and Categories – Types of Connections – Topologies –Protocols and Standards – ISO / OSImodel, TCP/IP model.

Physical layer - Digital transmission, Multiplexing, Transmission Media, Switching, Circuit Switched Networks, Datagram Networks, Virtual Circuit Networks.

MODULE II: Data link layer [11 Periods]

Functionalities of Data link layer - Introduction, Framing, Error Detection and Correction – Parity – LRC – CRC- Hamming code, Flow and Error Control, Noiseless Channels, Noisy Channels, HDLC, Point to Point Protocols. Random access, Controlled access, Channelization, Collision Free Protocols.

LAN - LAN - Ethernet IEEE 802.3 - IEEE 802.4 - IEEE 802.5 - IEEE 802.11

MODULE III: Network Layer [09 Periods]

A: Basics of Network Layer - Logical Addressing, Internetworking, Tunneling, Address mapping,

B: Communication Protocols - ICMP, IGMP, Forwarding, Unicast Routing Protocols, Multicast Routing Protocols.

MODULE IV: Transport Layer [09 Periods]

Connection Oriented and Connectionless Protocols -Process to Process Delivery, UDP and TCP protocols, SCTP.

Congestion Control - Data Traffic, Congestion, Congestion Control, QoS, Integrated Services, Differentiated Services, QoS in Switched Networks.

MODULE V: Application layer [09 Periods]

DNS - Domain name space, DNS in internet, Electronic mail

Protocols and Network Security - FTP, WWW, HTTP, SNMP, Network Security, Cryptography.

TEXT BOOKS:

1. Behrouz A. Forouzan, **"Data Communications and Networking"**, 4th Edition, TMH,2006.
2. Andrew S Tanenbaum, **"Computer Networks"**, 4th Edition, Pearson Education/PHI.

REFERENCES:

1. P.C .Gupta, **"Data communications and computer Networks"**, PHI.
2. S.Keshav, **"An Engineering Approach to Computer Networks"**, 2nd Edition, Pearson Education.
3. W.A. Shay, **"Understanding communications and Networks"**, 3rd Edition, CengageLearning.
4. James F.Kurose & Keith W. Ross, **"Computer Networking: A Top-Down ApproachFeaturing the Internet"**, 3rd Edition, Pearson Education.

E-RESOURCES:

3. https://www.saylor.org/site/wp-content/uploads/2012/02/Computer-Networking- Principles-Bonaventure-1-30-31-OTC1.pdf
4. http://ebook-dl.com/downloadbook/230
5. https://doi.org/10.1016/0169-7552(89)90019-6
6. http://nptel.ac.in/courses/106105081/

Course Outcomes:

At the end of the course, students will be able to

- **Understand** the Layered Architecture of Computer Networks.
- **Conceptualize** the protocols of Data Link Layer and can buildLocal area networks.
- **Apply** Subnet and Supernet concepts in the construction of computer network**.**
- **Summarize** the protocols used in Transport Layer, QoS and Congestioncontrol mechanisms.
- **Analyze** different protocols of Application Layer and various security risks.

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes(POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1			3											2	
CO2			2												2
CO3						3							3		
CO4					2										

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERINGCOLLEGE (Autonomous)	B.Tech. V Semester		
Code: B0528	APPLIED ARTIFICIALINTELLIGENCE [Professional Elective - II]	L	T	P
Credits: 3		3	-	-

Prerequisites: Discrete Mathematics

Course Objectives:

This course enable the students to understand the basic fundamentals of Artificial Intelligence, determine various problem solving strategies, understand the logic concepts, different approaches to represent the knowledge, develop the expert systems in various phases and its applications, apply the fuzzy logic in various problem solving techniques

MODULE I: Introduction [10 Periods]

The AI basics, AI Problems, The core assumptions of AI, The need of AI over the traditional methods, the AI Techniques, The level of the Model, Criteria for success and failure of the models, Artificial intelligence fundamentals, Machine learning, Human languages technologies, Distributed systems: paradigms and models for AI, Intelligent systems for pattern recognition, Smart applications using AI, Computational mathematics for learning and data analysis.

MODULE II: Algorithms [09 Periods]

Evolutionary Algorithms like Genetic Programming, Genetic Algorithm, Optimization of ANN using Evolutionary Algorithms, Fuzzy Logic, Member ship function, how to improve the model, diversity, training time, partitions of datasets.

MODULE III: [09 Periods]

Application of AI in Natural language processing, Introduction, syntactic processing, semantic analysis, discourse and pragmatic processing, spell checking, Measures of WordNet similarity, Sentiment analysis and opinions on the web.

Module IV: [09 Periods]

Exploring sub-discipline of AI: Machine Learning, Supervised learning, Unsupervised learning, Reinforcement learning, Classification problems, Regression problems, Clustering problems, Introduction to neural networks and deep learning.

Module V: [09 Periods]

Statistical Reasoning: Probability and Bays' Theorem, Certainty Factors and Rule-Base Systems, Bayesian Networks, Dempster-Shafer Theory, Fuzzy Logic. AI for knowledge representation, rule- based knowledge representation, procedural and declarative knowledge, Logic programming, Forward and backward

reasoning.

TEXTBOOKS/LEARNING RESOURCES:

- Nils J. Nilsson, Artificial Intelligence: A New Synthesis (1 ed.), Morgan-Kaufmann,1998. ISBN 978-1558605350.
- Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach (3 ed.),Pearson, 2010.ISBN 978-0136042594.

REFERENCE BOOKS/LEARNING RESOURCES:

- Bishop, Christopher M, Pattern Recognition and Machine Learning (1 ed.), Springer, 2006. ISBN978-1493938438.
- Daniel Jurafsky and James H. Martin, Speech & language processing (2 ed.), Pearson Education India,2000. ISBN 978-0131873216.
- Shalev-Shwartz, Shai, and Shai Ben-David, Understanding machine learning:From theory to algorithms (3 ed.), Cambridge university press, 2014. ISBN 978-1107512825. st rd st nd rd

Course Outcomes:

At the end of the course, students will be able to

- Describe the key components of the Artificial Intelligence field.
- Identify various problem solving strategies.
- Construct the solution for the problem using various logic and knowledge representation techniques.
- Interpret the knowledge in various domains using expert systems.
- Discover the solutions by using the probability theory and fuzzy logic.

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COS	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-												
CO2	-	2	2										1	2	
CO3	2	2	2	3											
CO4	2	2	2	2										2	2
CO5	1	2													

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: B0534	**Animation Techniques [Professional Elective - III] (Common for CSE, CSE (Cyber Security), CSE (AI andML), CSE (DS), CSE (IOT), AI and IT)**	**L**	**T**	**P**
Credits: 3		**3**	**-**	**-**

PREREQUISITES: NIL

Course Objectives:

This course will enable the students to learn the fundamental concepts of animation,

1. creating flash animation concepts,
2. learn the 3d animation technique with concepts and apply the motion capture software in animation techniques.
3. Outline 3D Animation and its Concepts and Tracking Applications and Software of 3D Animation.
4. It also introduces students with the advanced scripting skills necessary for implementing Script Animation among the Software
5. The course allows students to Story Developing Audio and Video Color Model Device Independent Color Model's

Module I: Introduction [09 Periods]

What is mean by Animation, Why we need Animation, History of Animation, Uses of Animation, Types of Animation, Principles of Animation, Some Techniques of Animation, Animation on the WEB, 3D Animation, Special Effects Creating Animation?

MODULE II: Creating Animation in Flash [10 Periods]

Introduction to Flash Animation, Introduction to Flash, working with the Timeline and Frame based Animation, Working with the Time line and Twin-based animation, Understanding Layers, Action script.

MODULE III: 3D Animation Effects [09 Periods]

A: 3D Animation and its Concepts Types of 3D Animation Skeleton and Kinetic 3D Animation

B: Texturing and Lighting of 3D Animation 3D Camera Tracking Applications and Software of 3D Animation.

MODULE IV: Motion Capture [10 Periods]

Motion Caption, Formats, Methods, Usages, Expression Motion Capture, Script Animation

Usage, Different Language of Script Animation among the Software.

MODULE V: Animated movies **[10 Periods]**

Concept Development, Story Developing, Audio and Video Color, Model Device Independent Color Model, Gamma and Gamma Correction - Production Budgets- 3DAnimated Movies.

TEXTBOOKS:

1. Juke Parent, Animation: Algorithms and Techniques 3rd Edition, (Hard cover, Rick Parent).
2. Williams Richars, The Animator's Survival Kit--Revised Edition: A Manual of Methods, Principles and Formulas for Classical, Computer, Games, Stop Motion and Faber and Faber, 2012.

REFERENCES:

1. Ranjan Parekh, Principles of Multimedia TMH,2007.
2. Ashok Banerji, Ananda Mohan Ghosh, Multimedia Technologies McGraw Hill.

E- Resources:

1. http://www.bkstr.com/floridastore/home Autodesk Maya 2016
2. https://itunes.apple.com/us/app/the-animators-survival-kit/id627438690?mt=8
3. http://ieeexplore.ieee.org/document/7239940/
4. nptel.ac.in/courses/106102063/25

Course Outcomes:

At the end of the course, students will be able to

- Develop Fundamental concepts of animation
- Analyze the flash animation and scripting concepts
- Outline the scripting concepts in 3D animation methods.
- Understand the different language of scripting animation techniques
- Apply the story developing and color model in 3D animated movies

COs	CO-PO,PSO Mapping (3/2/1indicatesstrengthofcorrelation)3-Strong,2-Medium,1-Weak														
	POs												PSOs		
	Po1	Po2	Po3	Po4	Po5	Po6	Po7	Po8	Po9	Po10	Po11	Po12	Pso1	Pso2	Pso3
CO 1	3	1	1	-	-	-	-	-	-	-	-	1	3	2	-
CO 2	3	3	1	1	1	-	-	-	-	-	-	1	3	2	1
CO 3	2	1	1	1	1	-	-	-	-	-	-	1	3	2	-
CO 4	2	1	-	-	-	-	-	-	-	-	-	1	3	1	1
CO 5	3	2	1	1	1	-	-	-	-	-	-	1	3	2	1

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: B**0526**	**ADVANCED DATABASES AND SECURITY**	**L**	**T**	**P**
Credits: 3	**[Professional Elective –II]**	**3**	**-**	**-**

Prerequisites: Database Management Systems

Course Objectives:

- To learn the security of databases
- To learn the design techniques of database security
- To learn the secure software design.
- To learn about Protection of new generation Database Systems
- To learn about Protection of active database systems

Module I: Introduction: [10 Periods]

Introduction to Databases Security Problems in Databases Security Controls Conclusions Security Models -1: Introduction Access Matrix Model Take-Grant Model Acten Model PN Model Hartson and Hsiao's Model Fernandez's Model Bussolati and Martella's Model for Distributed databases

Module II : Security Models [9 Periods]

Bell and LaPadula's Model Biba's Model Dion's Model Sea View Model Jajodia and Sandhu's Model The Lattice Model for the Flow Control conclusion Security Mechanisms: Introduction User Identification/Authentication Memory Protection Resource Protection Control Flow Mechanisms Isolation Security Functionalities in Some Operating Systems Trusted Computer System Evaluation Criteria

Module III: Security Software Design [10 Periods]

Introduction A Methodological Approach to Security Software Design Secure Operating System Design Secure DBMS Design Security Packages Database Security Design Statistical Database Protection & Intrusion Detection Systems: Introduction Statistics Concepts and Definitions Types of Attacks Inference Controls Evaluation Criteria for Control Comparison. Introduction IDES System RETISS System ASES System Discovery

Module IV: Models for the Protection of New Generation Database Systems-1 [10 Periods]
Introduction A Model for the Protection of Frame Based Systems A Model for the Protection of Object-Oriented Systems SORION Model for the Protection of Object-Oriented Databases

Module V: Models for the Protection of New Generation Database Systems -2 [9 Periods]

A Model for the Protection of New Generation Database Systems: The Orion Model ajodia and Kogan's Model A Model for the Protection of Active Databases Conclusions.

TEXT BOOKS

1. Database Security by Castano, Pearson Edition
2. Database Security and Auditing: Protecting Data Integrity and Accessibility, 1st Edition, Hassan Afyouni, THOMSON Edition.

REFERENCES

1. Database security by Alfred basta, melissazgola, CENGAGE learning.

E-RESOURCES

1. https://books.google.co.in/books?id=qNCmBRufKBAC&dq=Parallel+Systems+Distributed+Systems+%E2%80%93+Parallel+Databases:+I/O+Parallelism+%E2%80%93+Inter+and+Intra+Query+Parallelism&hl=en&sa=X&ved=0ahUKEwj83K-18bncAhUMLY8KHX2qCI8Q6AEIKDAA.

2. http://www.inf.ed.ac.uk/teaching/courses/adbs/slides/adbs.pdf
3. https://books.google.co.in/books?id=qNCmBRufKBAC&dq=Parallel+Systems-+Distributed+Systems+%E2%80%93+Parallel+Databases:+I/O+Parallelism+%E2%80%93+Inter+and+Intra+Query+Parallelism&hl=en&sa=X&ved=0ahUKEwj83K-18bncAhUMLY8KHX2qCI8Q6AEIKDAA.
4. http://nptel.ac.in/courses/106104135/

Course Outcomes:

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

- Ability to carry out a risk analysis for large database
- Ability to set up, and maintain the accounts with privileges and roles.
- Ensure that only authorized user has access to the data
- Able to Design and Implement secure database systems.
- Solve Complex Problems in a Team of database works

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: B0522	Computer Graphics [Professional Elective - I] (Common for CSE, CSE (Cyber Security), CSE (AI andML), CSE (DS), CSE (IOT), AI and IT)	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL

Course objectives:

This course allows the students to:

1. Understand the fundamental concepts and theory of computer graphics
2. Understand modeling, and interactive control of 3D computer graphics applications
3. The underlying parametric surface concepts be understood
4. Learn multimedia authoring tools.
5. Understand 3-D Geometric Transformations

Module I: Introduction: [9 Periods]

Application areas of computer graphics, overview of graphic system, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices.

Module II: Output Primitives: [9 Periods]

Output Primitives: Points and lines, line drawing algorithms, mid-point circle algorithm, Filled area primitives: scan-line polygon fill algorithm, boundary-fill and flood-fill algorithm.

Module III: 2-D Geometrical Transformations and 2-D Viewing: [12 Periods]

2-D Geometrical Transformations: Translation, scaling, rotation, reflection and shear transformation matrix representations and homogeneous co-ordinates, composite transformations, transformations between coordinates.

2-D Viewing: The viewing pipe-line, viewing coordinate reference frame, window to view- port co-ordinate transformations, viewing function, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland-Hodgeman polygon clipping algorithm

Module IV: 3-D Object Representation: [9 Periods]

spline representation, Hermite curve, Bezier curve and B-spline curve, Polygon surfaces, quadric surfaces, Solid modeling Scalars – wire frame, CSG, B-rep. Bezier and B-spline surfaces, Basic illumination models, shading algorithms

Module V: 3-D Geometric Transformations: [9 Periods]

3-D Geometric Transformations: Translation, rotation, scaling, reflection and shear transformation and composite transformations. Visible surface detection methods: Classification, back-face detection, depth-buffer, scan-line, depth sorting.

Text Books:

1. Computer Graphics C version/ Donald Hearn and M. Pauline Baker/Pearson/PHI, 2002
2. Computer Graphics Principles & Practice, Second edition in C/ Foley, VanDam, Feiner and Hughes/Pearson Education, 2013

References:

1. Computer Graphics Second edition, Zhigandxiang, Roy Plastock, Schaum's outlines, Tata Mc-Graw hill edition,2002.
2. Procedural elements for Computer Graphics, David F Rogers, Tata McGraw hill, 2nd edition,1988.
3. Principles of Interactive Computer Graphics, Neuman and Sproul, TMH, 1979.
4. Computer Graphics, Steven Harrington, TMH, 1987.

E-RESOURCES:

1. http://www.hiteshpatel.co.in/ebook/cg/Computer_Graphics_C_Version.pdf
2. http://ptgmedia.pearsoncmg.com/images/9780321399526/samplepages/0321399528.pdf
3. http://social.cs.uiuc.edu/papers/pdfs/g5kar.pdf
4. http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgye1qwH9xY7y_TqI7sLJ_1X3zVWNHhVwSwBCdfRRvSTrPP45TFWuzrxWT5ea_k_dP1rirZCeNbWw

Course outcomes:

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

1. Use the principles and commonly used paradigms and techniques of computer graphics
2. Write basic graphics application programs including animation
3. Design programs to display graphic images to given specifications
4. Design programs to display3D graphic images
5. Design programs to display3D Geometric Transformations

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COS	Programme Outcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1			3											3	
CO2	3												2		
CO3				2										2	
CO4					3									2	
CO5						2									3

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: B0533	**Distributed Systems** [Professional Elective - III] (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI and IT)	**L**	**T**	**P**
Credits: 3		**3**	**-**	**-**

Prerequisites: Computer Networks, DBMS and Operating Systems

Course Objectives:

1. Student will be able to learn fundamental aspects of Distributed systems
2. Analyze basics of Architectural and Fundamental Models.
3. To identify various types of requirements and the process for Distributed objects.
4. To make use of various OS layers to conceptualize and construct a system
5. To demonstrate different file systems tactics and define Events and time ordering in distributed transactions.

MODULE I: Basic Concepts [09 Periods]

Characterization of Distributed Systems - Examples - Resource Sharing and the Web - Challenges- System Models-Architectural and Fundamental Models-Networking and Internetworking-Types of Networks – Internet Protocols

MODULE II: Processes and Distributed Objects [09 Periods]

Inter-process Communication - The API for the Internet Protocols - External Data Representation and Marshalling - Client -Server Communication - Group Communication - Distributed Objects and Remote Invocation - Communication Between Distributed Objects - Remote Procedure Call - Events and Notifications -

MODULE III: Operating System Issues I [10 Periods]

The OS Layer- Protection - Processes and Threads - Communication and Invocation- OS Architecture - Security - Overview - Cryptographic Algorithms - Digital Signatures - Distributed File Systems- File Service Architecture- Sun Network File System-The Andrew File System.

MODULE IV: Operating System Issues II [10 Periods]

Name Services-Domain Name System - Directory and Discovery Services -Global Name Service - Clocks - Events and Process States - Synchronizing Physical Clocks - Logical Time And Logical Clocks - Global States - Distributed Debugging - Distributed Mutual Exclusion – Elections.

MODULE V: Distributed Transaction Processing [10 Periods]

Transactions - Nested Transactions - Locks - Optimistic Concurrency Control - Timestamp Ordering - Flat and Nested Distributed Transactions - Atomic Commit Protocols - Concurrency Control in Distributed Transactions - Distributed Deadlocks - Transaction Recovery.

COURSE OUTCOMES:

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

1. Design architectural models of distributed systems.

2. Summarize communication between Distributed Objects.
3. Apply security algorithms on distributed systems.
4. Categorize various name services.
5. Examine transaction recovery and concurrency control in distributed transactions

TEXTBOOKS:

1. George Coulouris, Jean Dollimore and Tim Kindberg , "Distributed Systems Concepts and Design", 3rd Edition, Pearson Education, 2002.
2. Andrew S. Tanenbaum, Maartenvan Steen, Distibuted Systems, "Principles and Pardigms", Pearson Education, 2002.

REFERENCES:

1. Sape Mullender, " Distributed Systems", 2nd Edition, Addison Wesley, 1993.
2. Albert Fleishman, Distributes Systems, "Software Design and Implementation", springer, Verlag, 1994 .
3. M. L. Liu, "Distributed Computing Principles and Applications", Pearson Education, 2004.

E- REFERENCES:

1. http://www.gecg .in/papers/ds5thedn.pdf
2. https://cs. uwaterloo.ca /~bemard/courses /cs454 /0.Begin.pdf
3. https://www.cs.helsinki.fi /u/jakangas/Teaching/DistSys/DistSys-08f- l.pdf
4. https: //courses.cs.ut.ee /MTAT.08.009/2014 fall/uplo ads /Main/slides 10-2.pdf

CO'S	Contribution to Program Outcomes														
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO1	3	2	2	1		1							2		2
CO2	3	2	2	1	2								2		2
CO3	3	3	3						2	1		2	2		2
CO4	3	2	2	2	2	1	1					1	2		2
CO5	3	2	2			1	1		2	1		1	2		2

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERINGCOLLEGE (Autonomous)	B.Tech. V Semester		
Code:B0531	DIGITAL LOGIC DESIGN [Professional Elective – III]	L	T	P
Credits: 3		3	-	-

Prerequisites: COA

OBJECTIVES

This course provides in-depth knowledge of switching theory and the logic design techniques of digital circuits, which is the basis for design of any digital circuit. The course objectives are: • To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.

- To understand common forms of number representation in digital electronic circuits and to be able to convert between different representations.
- To implement simple logical operations using combinational logic circuits
- To design combinational logic circuits, sequential logic circuits.
- To impart to student the concepts of sequential circuits, enabling them to analyze sequential systems in terms of state machines.
- To implement synchronous state machines using flip-flops.

MODULE -I: Number System and Boolean Algebra : Number Systems, Base Conversion Methods, Complements of Numbers, Codes- Binary Codes, Binary Coded Decimal Code and its Properties, Unit Distance Codes, Error Detecting and Correcting Codes. Digital Logic Gates(AND,NAND,OR,NOR,EX-OR,EX-NOR), Properties of XOR Gates, Universal Gates, Basic Theorems and Properties, Switching Functions, Canonical and Standard Form.

MODULE II: Minimization Techniques: Introduction, The minimization with theorems, The Karnaugh Map Method, Three, Four and Five variable K- Maps, Prime and Essential Implications, Don't Care Map Entries, Using the Maps for Simplifying, Quine-McCluskey Method, Multilevel NAND/NOR realizations.

MODULE -III: Combinational Circuits: Design Procedure – Half Adder, Full Adder, Half Subtractor, Full Subtractor, Parallel Binary Adder, Parallel binary subtractor, Binary Multiplier, Multiplexers/DeMultiplexers, decoder, Encoder, Code Converters, Magnitude Comparator. classification of sequential circuits, The binary cell, The S-R-Latch Flip-Flop The D-Latch Flip-Flop, The "Clocked T" Flip-Flop, The " Clocked J-K" Flip-Flop, Design of a Clocked Flip-Flop, Timing and Triggering Consideration.

MODULE-IV: Sequential Circuits: Introduction, Basic Architectural Distinctions between Combinational and Sequential circuits, Latches,Flip-Flops, SR,JK,D,T and Master slave, characteristic Tables and equations, Conversion from one type of Flip-Flop to another, Counters - Design of Single Mode Counter, Ripple Counter, Ring Counter, Shift Register, Ring counter using Shift Register

MODULE-V: Memory Devices: Clasification of memories – ROM: ROM organization, PROM, EPROM, EEPROM, RAM: RAM organization, Write operation, Read operation, Static RAM, Programmable Logic Devices: Programmable Logic Array(PLA),Programmable Array Logic, Implementation of Combinational

Logic circuits using ROM,PLA,PAL.

TEXT BOOKS:

1. Digital Design- Morris Mano, PHI, 3rd Edition.
2. Switching Theory and Logic Design-A. Anand Kumar, PHI, 2nd Edition.
3. Switching and Finite Automata Theory- Zvi Kohavi & Niraj K. Jha, 3rd Edition, Cambridge.

REFERENCE BOOKS:

4. Introduction to Switching Theory and Logic Design – Fredriac J. Hill, Gerald R. Peterson, 3rd Ed,John Wiley & Sons Inc.
5. Digital Fundamentals – A Systems Approach – Thomas L. Floyd, Pearson, 2013.
6. Switching Theory and Logic Design – Bhanu Bhaskara –Tata McGraw Hill Publication, 2012
7. Fundamentals of Logic Design- Charles H. Roth, Cengage LEanring, 5th, Edition, 2004.
8. Digital Logic Applications and Design- John M. Yarbrough, Thomson Publications, 2006.
9. Digital Logic and State Machine Design – Comer, 3rd, Oxford, 2013.

OUTCOMES Upon completion of the course, student should possess the following skills: Be able to manipulate numeric information in different forms be able to manipulate simple Boolean expressions using the theorems and postulates of Boolean algebra and to minimize combinational functions. Be able to design and analyze small combinational circuits and to use standard combinational functions to build larger circuits that are more complex. Be able to design and analyze small sequential circuits and to use standard sequential functions to build larger circuits that are more complex.

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COS	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2			2							1	1		
CO2			3		2							3		2	
CO3					3									2	
CO4				2											
CO5			3		3							3		3	3

2021-22 Onwards (MR21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech. V Semester		
Code: B0548	**Software Testing Methodologies [Professional Elective - V] (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI and IT)**	**L**	**T**	**P**
Credits: 3		**3**	**-**	**-**

Prerequisites: Nil

Course Objectives:

1. To study fundamental concepts in software testing and discuss various software testing issues and solutions in software unit, integration, regression and system testing
2. To learn how to plan a test project, design test cases and data, conduct testing, manage software problems and defects, generate a test report
3. To expose the advanced software testing concepts such as object-oriented software testing methods, web-based and component-based software testing
4. To understand software test automation problems and solutions
5. To learn how to write software test documents and communicate with engineers in various forms

MODULE I - The Internet of Things (IOT) [10 Periods]

Software Testing: Introduction, Evolution, Myths & Facts, Goals, Psychology, definition, Model for testing, Effective Vs Exhaustive Software Testing.

Software Testing Terminology and Methodology: Software Testing Terminology, Software Testing Life Cycle, Software Testing Methodology.

Verification and Validation: Verification & Validation Activities, Verification, Verification of Requirements, High level and low level designs, verifying code, Validation.

MODULE II - [09 Periods]

Dynamic Testing-Black Box testing techniques: Boundary Value Analysis, Equivalence class Testing, State Table based testing, Decision table based testing, Cause-Effect Graphing based testing, Error guessing.

White-Box Testing: need, Logic Coverage criteria, Basis Path testing, Graph matrices, Loop testing, data flow testing, mutation testing.

MODULE III – [10 Periods]

Static Testing: Inspections, Structured Walkthroughs, Technical Reviews.

Validation activities: Unit testing, Integration Testing, Function testing, system testing, acceptance testing.

Regression testing: Progressives Vs regressive testing, Regression test ability, Objectives of regression testing, Regression testing types, Regression testing techniques.

MODULE IV – [10 Periods]

Efficient Test Suite Management: growing nature of test suite, Minimizing the test suite and its benefits, test suite prioritization, Types of test case prioritization, prioritization techniques, measuring the effectiveness of a prioritized test suite Software Quality Management: Software Quality metrics, SQA models.

Debugging: process, techniques, correcting bugs.

MODULE V – [10 Periods]

Automation and Testing Tools: need for automation, categorization of testing tools, selection of testing tools, Cost incurred, Guidelines for automated testing, overview of some commercial testing tools such as Win Runner, Load Runner, Jmeter and JUnit. Test Automation using Selenium tool.

Testing Object Oriented Software: basics, Object oriented testing Testing Web based Systems: Challenges in testing for web based software, quality aspects, web engineering, testing of web based systems, Testing mobile systems.

Text Books:

1) Software Testing, Principles and Practices, Naresh Chauhan, Oxford
2) Software Testing, Yogesh Singh, CAMBRIDGE

Reference Books:

1) Foundations of Software testing, Aditya P Mathur, 2ed, Pearson
2) Software testing techniques – Baris Beizer, Dreamtech, second edition.
3) Software Testing, Principles, techniques and Tools, M G Limaye, TMH
4) Effective Methods for Software testing, Willian E Perry, 3ed, Wiley

E-RESOURCES:

1. https://www.tutorialspoint.com/software_testing_dictionary/test_tools.htm

Course Outcomes:

At the end of the course, students will be able to

- Identify and understand various software testing problems, apply software testing knowledge and engineering methods and solve these problems by designing and selecting software test models, criteria, strategies, and methods
- Design and conduct a software test process for a software project
- Analyze the needs of software test automation
- Use various communication methods and skills to communicate with their teammates to conduct their practice-oriented software testing projects
- Basic understanding and knowledge of contemporary issues in software testing, such as component-based, web based and object oriented software testing problems
- Write test cases for given software to test it before delivery to the customer and write test scripts for both desktop and web based applications.

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)												PSOs		
	PO	PO	PO	PO	PO	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3	3	3	3	3						3	3	3
CO2	3	2	3	2	3							2	3	3	3
CO3	3	3	3	3	3							3	3	3	3
CO4	3	3	3	3	3	3						3	3	3	3
CO5	3	3	3	3	3							3	3	3	3

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code:B6706	R PROGRAMMING [Professional Elective – III]	L	T	P
Credits: 3		3	-	-

Prerequisites:

Basic Programming Concepts: Familiarity with basic programming concepts like variables, data types, control structures (e.g., loops and conditionals), functions, and object-oriented programming will make learning R easier. If you haven't programmed before, you might want to start with languages like Python or JavaScript to grasp these fundamental concepts.

Statistics Fundamentals: R is widely used for data analysis and statistics. A basic understanding of statistical concepts like mean, median, standard deviation, hypothesis testing, and probability will be beneficial when using R for data analysis. **Mathematics:** Having a solid understanding of mathematics, including algebra and calculus, can be an advantage, particularly when working with complex statistical models and algorithms.

Course Objectives:

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

Course Outcomes:

- Be able to use and program in the programming language R
- Be able to use R to solve statistical problems
- Be able to implement and describe Monte Carlo the technology
- Be able to minimize and maximize functions using R

MODULE – 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

MODULE – 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 a vector 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.

MODULE – III

Lists: Creating Lists, General List Operations, List Indexing Adding and Deleting List 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.

MODULE - 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.

MODULE - V

OBJECT-ORIENTED PROGRAMMING: S Classes, S Generic Functions, Writing SClasses, 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.

Case Study:

Health care, Retail and Finance real time applications using R Programming.

TEXT BOOKS:

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

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2Medium, 1-Weak

COS	Programme Outcomes(POs)												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	2	-	-												
CO2	-	2	2										1	2	
CO3	2	1	1	3											1
CO4	2	1	2	2										2	2
CO5	1	2												1	

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: B0524	FORMAL LANGUAGES AND AUTOMATA THEORY	L	T	P
Credits: 4		3	1	-

Prerequisites: NIL

Course Objectives:

This course enables the students to define basic properties of formal languages, explain the Regular languages and grammars, inter conversion, Normalizing CFG, describe the context free grammars, minimization of CNF, GNF and PDA, designing Turing Machines and types of Turing Machines, church's hypothesis counter machines, LBA, P & NP problems and LR grammar.

MODULE I: Introduction [10 Periods]

Basics of Formal Languages - Strings, Alphabet, Language, Operations, Chomsky hierarchy of languages, Finite state machine Definitions, finite automation model, acceptance languages.

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, Moore and Melay machines

MODULE II: Regular Languages [10 Periods]

Representation of Regular Expressions - Regular Sets, Regular Expressions, identity Rules, Constructing Finite automata for the given regular expressions, Conversion of Finite automata to regular expressions.

Pumping Lemma - Pumping lemma of regular sets, closure properties of regular sets (proofs not required). Regular Grammars – right linear and left linear grammars, equivalence between regular grammar and FA.

MODULE III: CFG and PDA [10 Periods]

A: Context Free Grammar - Derivation trees, sentential forms, right most and left most derivations of strings. Ambiguity in Context frees Grammars. Minimization of Context free grammars, CNF, GNF, Pumping Lemma for Context Free Languages.

B: Push Down Automata - Definition, model, acceptance of CFL, Acceptance by final state, acceptance by empty state and its equivalence, Equivalence of CFL and PDA (proofs not required), Introduction to DCFL and DPDA.

MODULE IV: Computable Functions **[09 Periods]**

Turing Machine - Definition, model, Design of TM, computable functions. Recursive Enumerable Languages and Theorems - Recursively enumerable languages, Church's hypothesis, counter machine, types of Turing Machines (proofs not required)

MODULE V: Computability Theory **[09 Periods]**

Linear Bounded Automata - Linear Bounded Automata and context sensitive languages, LR (0) grammar, decidability of problems, Universal TM. P and NP Problems - Undecidable problems about Turing Machine – Post's Correspondence Problem, The classes P and NP.

TEXT BOOKS:

1) H.E. Hopcroft, R. Motwani and J.D Ullman, "Introduction to Automata Theory, Languages and Computations", Second Edition, Pearson Education, 2003.
2) KVN SUNITHA N Kalyani, "Formal languages and Automata Theory", Pearson Education

REFERENCES:

1. H.R.Lewis and C.H.Papadimitriou, "Elements of The theory of Computation", Second Edition, Pearson Education/PHI, 2003
2. J.Martin, "Introduction to Languages and the Theory of Computation", Third Edition, TMH, 2003.
3. Micheal Sipser, "Introduction of the Theory and Computation", Thomson Brokecole, 1997.

E-RESOURCES:

1. https://books.google.co.in/books?isbn=8184313020
2. https://www.iitg.ernet.in/dgoswami/Flat-Notes.pdf
3. http://www.jalc.de/
4. https://arxiv.org/list/cs.FL/0906
5. http://freevideolectures.com/Course/3379/Formal-Languages-and-Automata-Theory
6. http://nptel.ac.in/courses/111103016/

Course Outcomes:

At the end of the course, students will be able to

1) Define the theory of automata types of automata and FA with outputs.
2) Differentiate regular languages and applying pumping lemma.

3) Classify grammars checking ambiguity able to apply pumping lemma for CFL various types of PDA.
4) Illustrate Turing machine concept and in turn the technique applied in computers.
5) Analyze P vs NP- Class problems and NP-Hard vs NP-complete problems, LBA, LR Grammar, Counter machines, Decidability of Problems.

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2									2	2	2	
CO2		2	2	2	2							2	2	2	
CO3		2	2	2	2							2	2	2	
CO4		2	2	2	2							2	2	2	
CO5		2	2	2	2							2	2	2	

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERINGCOLLEGE (Autonomous)	B.Tech. V Semester		
Code:B6707	ADVANCED PYTHON PROGRAMMING LAB	L	T	P
Credits: 3		3	-	-

Prerequisites: Python programming

1. Create NumPy arrays, perform arithmetic operations, and demonstrate array indexing and slicing.
2. Handle missing data in a dataset using Pandas by replacing NaN values.
3. Load data from a CSV file using Pandas, clean the data, and calculate statistical measures.
4. Read data from multiple CSV files, merge and aggregate data using Pandas.
5. Read data from an Excel file, process different sheets, and perform data wrangling.
6. Handle time series data, manipulate date and time, and calculate basic statistics.
7. Analyze time series data by resampling and applying moving window functions.
8. Create a GUI application using Tkinter that takes user inputs and displays results.
9. Establish an SQLite database connection, perform CRUD operations on a table, and display results.
10. Load a dataset using scikit-learn, preprocess data, and split into training and testing sets.
11. Build and train a simple linear regression model using scikit-learn, and evaluate its performance.

TEXT BOOKS:

1) Python Data Science Handbook By Jake Vanderplas, oreally publishers, 2nd edition, 2012
2) The Hitchker's Guide to Python By Kenneth reitz and Tanya schelusser,2016 edition

REFERENCES:

1) Gowrishanker and Veena, "Introduction to Python Programming", CRC Press, 2019.
2) Python Crash Course, 2nd Edition, By Eric Matthes, May 2019 • NumPy Essentials, By Leo Chin and Tanmay Dutta, April 2016
3) Joel Grus, "Data Science from scratch", O'Reilly, 2015.

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: B0514	Operating Systems Lab (Common for CSE, CSE (Cyber Security), CSE (AI andML), CSE (DS), CSE (IOT), AI and IT)	L	T	P
Credits: 2		-	1	2

Prerequisites: NIL

Course Objectives:

This course enable the students to interpret main components of operating system and their working, identify the role of Operating System in process scheduling and synchronization, analyze the way of addressing deadlock, understand memory management techniques and I/O systems, describes the way of handling files and security.

Software Requirements: C++/JDK

List of Programs:

1. Simulate the following CPU scheduling algorithms
a) FCFS b) SJF
2. Simulate the following CPU scheduling algorithms
a) Priority b) Round Robin
3. Simulate the Producer Consumer Problem
4. Simulate Bankers Algorithm for Dead Lock Avoidance
5. Simulate MVT and MFT techniques.
6. Simulate Paging Technique of memory management
7. Simulate page replacement algorithms a) FIFO b) LRU c) Optimal
8. Simulate the following Disk Scheduling Algorithms
(a) First Come-First Serve (FCFS) (b)Shortest Seek Time First (SSTF)
9. Simulate the following Disk Scheduling Algorithms (a)Elevator (SCAN) (b) LOOK
10. Simulate all file allocation strategies a) Sequential b) Indexed c) Linked
11. Simulate File Organization Techniques a) Single level directory b) Two level
12. Simulate File Organization Techniques a) Hierarchical b) DAG

TEXT BOOKS:

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

REFERENCES:

1) Crowley," Operating System A Design Approach",TMH.
2) Andrew S Tanenbaum," Modern Operating Systems", 2nd edition Pearson/PHI.
3) Pramod Chandra P. Bhat, "An Introduction to Operating Systems", Concepts and Practice", PHI, 2003
4) DM Dhamdhere," Operating Systems A concept based approach" ,2nd Edition, TMH

Course Outcomes:

At the end of the course, students will be able to

1) Implement various CPU scheduling algorithms, Bankers algorithms used for deadlock avoidance and prevention.
2) Develop disk scheduling algorithms and apply File organization techniques.
3) Simulate file allocation method

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs)												PSOs		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	3	1									2	1		
CO2	2	2										2	2		
CO3	1	2										1	1		

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: B00M3	Quantitative Aptitude and Verbal Reasoning - I	L	T	P
Credits: -		2	-	-

Course objectives:

The Quantitative Aptitude course is designed to equip students with essential mathematical and analytical skills required for various competitive exams, academic pursuits, and real- world problem-solving scenarios. The primary objective of this course is to enhance participants' numerical ability and logical reasoning, enabling them to tackle quantitative questions with confidence and efficiency.

MODULE - I **[8 Periods]**

Quants: Percentages, Profit and Loss.

Percentages- Percentage Increase/Decrease; Results on Population; Results on Depreciation. Profit & Loss- Cost Price; Selling Price: Profit or Gain; Gain Percentage; Loss Percentage.

Verbal: Sentence Completion

Sentence Completion- Formats of Question; Strategies to solve sentence completion questions- Proactive and reactive solving, Identifying clues- Signposts, Types of signposts, Root words, Sentence structure clues.

Logical: Blood Relation

Blood Relations- Classification of blood relations, Pointing a person, Equation related problems.

MODULE - II **[6 Periods]**

Quants: Interests

Interests- Types of interest; Simple interest; principle; Rate of interest; compound interest; interest is compounded Annually; interest is compounded Half-yearly; interest is compounded Quarterly; Rates are different for different years, say R1%, R2%, R3% for 1st, 2nd and 3rd year respectively; Present worth of Rs. x due n years.

Verbal: Articles, Interrogatives

Articles- Types of articles, Countable nouns, Uncountable nouns, Usage of articles, Omission of articles. Interrogatives- Definition, Types of Interrogatives, Question Tags.

Logical: Clocks

Clocks: Introduction, Derivation of angles, Angles between hands of the clock, Hands together, Hands at angular distance, Gain & Loss problems.

MODULE - III **[6 Periods]**

Quants: Ratio and Proportion, Averages

Ratios & Proportion- The ratio of two quantities a and b in the same units; Proportion; The equality of two ratios is called proportion; Fourth Proportional; Mean Proportional; Comparison of Ratios; Duplicate Ratios; Variations. Averages- Average Speed, Weighted average.

Verbal: Idioms and Miscellaneous Vocabulary

Idioms- Idioms and phrasal verbs, Word Analogy, Patterns of questions on Word Analogy; Miscellaneous Vocabulary.

Logical: Coding and Decoding

Coding and Decoding- Number Series, Alphabet Series, Analogy, Odd Man Out, Visual Reasoning.

MODULE - IV **[6 Periods]**

Quants: Time and Work;

Time & Work- Work from Days: Calculate the one-day work; Days from Work: Shortcut to calculate the work in given time.

Verbal: Voices and Speech

Voices- Introduction- Sentence, Parts of a sentence, Voice of a sentence, Types of voices, Identifying the voice of a sentence, Changing the voice of a sentence.

Speech- Direct & Indirect, Identifying the speech, Change of Speech.

Logical: Directions

Directions - Introduction, Direction based questions, Shadow based problems.

MODULE - V **[6 Periods]**

Quants: Mixtures and Alligations

Alligation- Mean Price; Rule of Alligation; a container contains x of liquid from which y units are

taken out and replaced by water;

Verbal: Reading Comprehension

Reading Comprehension- Speed reading strategies; Reading Comprehension - types of questions, tackling strategies.

Logical: Cubes

Cubes- Cube & cuboid concepts, 3-2-1-0 faced problems.

Text Books:

1. "Quantitative Aptitude for Competitive Examinations" by R.S. Aggarwal
2. "How to Prepare for Quantitative Aptitude for the CAT" by Arun Sharma
3. "Fast Track Objective Arithmetic" by Rajesh Verma

Reference Books:

4. "Magical Book on Quicker Maths" by M. Tyra
5. "Quantitative Aptitude Quantum CAT" by Sarvesh K. Verma

e-Resources: Concerned Website links:

6. Khan Academy (https://www.khanacademy.org/):
7. MathIsFun (https://www.mathsisfun.com/)
8. GMAT Club (https://gmatclub.com/)
9. India BIX (https://www.indiabix.com/)
10. Study to night (https://www.studytonight.com/)

Course Outcomes:

After completion of the course students will be able to:

1. Develop Strong Mathematical Foundations: Gain a comprehensive understanding of fundamental mathematical concepts, including arithmetic, algebra, geometry, and data interpretation, providing a solid basis for tackling quantitative problems.
2. Enhance Problem-Solving Skills: Learn diverse problem-solving techniques and strategies to approach quantitative questions in a systematic manner, enabling efficient and accurate solutions.
3. Improve Speed and Accuracy on Averages: Practice through a variety of exercises and timed quizzes to enhance computational speed and precision, vital for competitive exams and time-sensitive tasks.
4. Master Time and work: Acquire skills in interpreting data from time and work scenarios decisions based on the given information.

5. Build Allegation and mixtures: Strengthen logical reasoning abilities to analyze and deduce patterns, aiding in solving complex quantitative problems.

CO- PO-PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium,1-Weak															
CO S	**Programme Outcomes(POs)**												**PSOs**		
	PO1	**PO 2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO 1	1	2	2							2					
CO 2	1	2	2							2					
CO 3	1	2	2							2					
CO 4	1	2	2							2					
CO 5	1	2	1							2					

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: B0H08	Engineering Economics and Accountancy	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL

Course Objectives: EEA is a think beyond program which will make the student to examine the application of microeconomics theory as applied to the manager's responsibilities in an organization. To explain the basic principles of managerial economics, accounting and current business environment underlying business decision making. This course should emphasize the quantitative and qualitative applications of economic principle to business analysis

MODULE-1 Business Environment and Managerial Economics [10 Periods]

Business Environment: Characteristic features of Business, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, Latest trends in Business Environment (Entrepreneurship).

Managerial Economics: Definition, Nature and Scope of Managerial Economics–Demand Analysis: Demand Determinants, Law of Demand and its exceptions. Elasticity of Demand, Types, Significance of Elasticity of Demand, Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting.

MODULE – II Theory of Production and Cost Analysis [10 Periods]

Theory of Production: Production Function – ISO quants and ISO costs, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale.

Cost Analysis: Cost concepts, Opportunity cost, fixed vs. Variable costs, explicit costs Vs. Implicit costs, Out of pocket costs vs. Imputed costs. Break-even Analysis (BEA)- Determination of Break-Even Point (simple problems) - Managerial Significance and limitations of BEA.

MODULE – III Market structures and Pricing Policies [09 Periods]

A. Introduction to Markets & Market structures: Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly.
B. Pricing Policies & Methods: Cost plus Pricing, Marginal Cost Pricing, Sealed Bid Pricing, Going Rate Pricing, PLC based pricing methods.

MODULE – IV Capital and Capital Budgeting [09 Periods]

Capital: Capital and its significance, Types of Capital, Estimation of Fixed and Working capital

requirements, Methods and sources of raising finance.

Capital Budgeting: Nature and scope of capital budgeting, features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method (simple problems)

MODULE – V Financial Accounting and Ratios [10 Periods]

Financial Accounting: Introduction, Accounting principles, Accounting Cycle, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).

Financial Analysis Through Ratios: Computation, Analysis and Interpretation of Liquidity Ratios (Current Ratio and quick ratio), Activity Ratios (Inventory turnover ratio and Debtor Turnover ratio), Capital structure Ratios (Debt- Equity ratio, Interest Coverage ratio), and Profitability ratios (Gross Profit Ratio, Net Profit ratio, Operating Ratio, P/E Ratio and EPS).

TEXTBOOKS:

1. Aryasri, "Managerial Economics and Financial Analysis", TMH, 2nd edition, 2005.
2. Varshney &Maheswari, "Managerial Economics", 5th edition Sultan Chand, 2003

REFERENCES:

1. H. Craig Peterson & W. Cris Lewis, "Managerial Economics", PHI, 4th Edition.
2. Domnick Salvatore, "Managerial Economics In a Global Economy", Thomson, 4th Edition.
3. Raghunatha Reddy &Narasimhachary, "Managerial Economics& Financial Analysis", 4th Edition Scitech.
4. S.N.Maheswari& S.K. Maheswari, "Financial Accounting", 6th Edition Vikas.
5. Dwivedi, "Managerial Economics", Vikas, 6th Edition.

E-RESOURCES:

1. http://www.learnerstv.com/Free-Economics-video-lecture-courses.htm
2. http://nptel.ac.in/courses/110105067/
3. http://nptel.ac.in/courses/110107073/
4. http://nptel.ac.in/courses/110101005/
5. http://nptel.ac.in/courses/109104073/

Course Outcomes:

At the end of the course, students will be able to

1. Understand the concepts of managerial economics and their application in evaluating the demand.

2. Evaluate the production function and identifies the least cost combination to control the costs of production.
3. Understand the structures of various market types and their pricing policies.
4. Understand the types of business forms and also be able to evaluate the investments using capital budgeting techniques.
5. Understand the basic concepts of financial accounting and evaluation of company performance using ratio analysis.

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		2							1		3		2		
CO2	3			2	1								2		
CO3		1			2						3			2	
CO4	2	1			3									2	
CO5		1			2						3		2		

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code:B6610	COMPUTER VISION	L	T	P
Credits: 3		3	-	-

Course Objectives:

- To review image processing techniques for computer vision.
- To understand shape and region analysis.
- To understand Hough Transform and its applications to detect lines, circles, ellipses.
- To understand three-dimensional image analysis techniques.
- Understand motion analysis.
- Study some applications of computer vision algorithms.

MODULE-I : IMAGE PROCESSING FOUNDATIONS [10 Periods]

Review of image processing techniques – classical filtering operations – thresholding techniques – edge detection techniques – corner and interest point detection – mathematical morphology – texture.

MODULE – II : SHAPES AND REGIONS [09 Periods]

Binary shape analysis – connectedness – object labeling and counting – size filtering – distance functions – skeletons and thinning – deformable shape analysis – boundary tracking procedures – active contours – shape models and shape recognition – centroidal profiles – handling occlusion – boundary length measures – boundary descriptors – chain codes – Fourier descriptors – region descriptors – moments.

MODULE – III : HOUGH TRANSFORM [10 Periods]

Line detection – Hough Transform (HT) for line detection – foot-of-normal method – line localization – line fitting – RANSAC for straight line detection – HT based circular object detection – accurate center location – speed problem – ellipse detection – Case study: Human Iris location – hole detection – generalized Hough Transform (GHT) – spatial matched filtering – GHT for ellipse detection – object location – GHT for feature collation.

MODULE – IV : 3D VISION AND MOTION [09 Periods]

Methods for 3D vision – projection schemes – shape from shading – photometric stereo – shape from texture – shape from focus – active range finding – surface representations – point-based representation – volumetric representations – 3D object recognition – 3D reconstruction – introduction to motion – triangulation – bundle adjustment – translational alignment – parametric motion – spline-based motion – optical flow – layered motion.

MODULE – V **[10 Periods]**

Application: Photo album – Face detection – Face recognition – Eigen faces – Active appearance and 3D shape models of faces Application: Surveillance – foreground-background separation – particle filters – Chamfer matching, tracking, and occlusion – combining views from multiple cameras – human gait analysis Application: In-vehicle vision system: locating roadway – road markings – identifying road signs – locating pedestrians.

TEXT BOOKS:

1. D. L. Baggio et al., ―Mastering OpenCV with Practical Computer Vision Projects‖, Packt Publishing, 2012.
2. E. R. Davies, ―Computer & Machine Vision‖, Fourth Edition, Academic Press, 2012.

REFERENCES:

1. Jan Erik Solem, ―Programming Computer Vision with Python: Tools and algorithms for analyzing images‖, O'Reilly Media, 2012.
2. Mark Nixon and Alberto S. Aquado, ―Feature Extraction & Image
3. Processing for Computer Vision‖, Third Edition, Academic Press, 2012.
4. R. Szeliski, ―Computer Vision: Algorithms and Applications‖, Springer 2011.

Course Outcomes:

Upon completion of this course, the students should be able to

- Implement fundamental image processing techniques required for computer vision.
- Perform shape analysis.
- Implement boundary tracking techniques.
- Apply chain codes and other region descriptors.
- Apply Hough Transform for line, circle, and ellipse detections.
- Apply 3D vision techniques.

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak												
COS	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1		2							3			
CO2					3						2	
CO3			1									
CO4				2			2			1		
CO5		1						3				

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: B0547	**Data Mining**	**L**	**T**	**P**
Credits: 3	**[Professional Elective - III]** **(Common for CSE, CSE (Cyber Security), CSE (AI andML), CSE (DS), CSE (IOT), AI and IT)**	**3**	**-**	**-**

Prerequisites: NIL

Course Objectives:

1. Uunderstands stages in building a Data Warehouse
2. Makes Identify the need and importance of preprocessing techniques
3. Implement similarity and dissimilarity techniques
4. Analyze and evaluate performance of algorithms for Association Rules
5. Analyze Classification and Clustering algorithms.

MODULE I: Introduction and Mining Issues & Data [09 Periods]

Introduction – Data, Why Data Mining? What Is Data Mining? What Kinds of Data Can Be mined? What Kinds of Patterns Can Be Mined? Which Technologies Are Used? Which Kinds of Applications Are Targeted? Mining Issues and Data - Major Issues in Data Mining, Types of Data, Data Quality

MODULE II: Data, Data Preprocessing [9 Periods]

A: Data Pre-processing: Data Warehousing, Data Cleaning, Data Integration, Data Reduction, Data Transformation, Aggregation, Sampling

B: Techniques: Dimensionality Reduction, Feature Subset Selection, Feature Creation, Data Discretization and Binarization, Variable transformation.

MODULE III: Data Similarity and Dissimilarity Classification [10 Periods]

A. Measuring Data Similarity and Dissimilarity - Similarity and Dissimilarity between simple attributes, Dissimilarities and similarities between data objects, Examples of Proximity measures, Issues in Proximity Calculation, Selection of right proximity measure.
B. Classification - Basic Concepts, General Approach to solving a classification problem, Decision Tree Induction: Working of Decision Tree, building a decision tree.

MODULE IV: Classifier and Association Analysis [10 Periods]

Classifiers - Alterative Techniques, Bayes' Theorem, Naïve Bayesian Classification, Bayesian Belief Networks Association Analysis - Basic Concepts and Algorithms: Problem Definition, Frequent Item Set generation, Rule generation, compact representation of frequent item sets, FP-

Growth Algorithm.

MODULE V: Cluster Analysis and DBSCAN [10 Periods]

Cluster Analysis - Basic Concepts and Algorithms: Overview: What Is Cluster Analysis? Different Types of Clustering, Different Types of Clusters; K-means: The Basic K-means Algorithm, K-means Additional Issues, Bisecting K-means, Strengths and Weaknesses; Agglomerative Hierarchical Clustering: Basic Agglomerative Hierarchical Clustering Algorithm DBSCAN - Traditional Density Center-Based Approach, DBSCAN Algorithm, Strengths and Weaknesses.

TEXT BOOKS:

1. Vikram Pudi & P.Radha Krishna, "Data Mining",4th Edition, Oxford Higher Education .
2. Jiawei Han, Michel Kamber," Data Mining concepts and Techniques", 3/e, Elsevier.

REFERENCES:

1. Hongbo Du, "Data Mining Techniques and Applications: An Introduction",Cengage Learning.
2. Vikram Pudi and P. Radha Krishna, "Data Mining", Oxford.
3. Mohammed J. Zaki, Wagner Meira, Jr ,"Data Mining and Analysis-fundamental Concepts and Algorithms", Oxford
4. Alex Berson, Stephen Smith ,"Data Warehousing Data Mining & OLAP" , TMH.

E-RESOURCES:

1. http://www-users.cs.umn.edu/~kumar/dmbook/index.php
2. http://myweb.sabanciuniv.edu/rdehkharghani/files/2016/02/The-Morgan-
1. Kaufmann-Series-in-Data-Management-Systems-Jiawei-Han-Micheline-Kamber-Jian- Pei-Data-Mining.-Concepts-and-Techniques-3rd-Edition-Morgan-Kaufmann-2011.pdf
2. http://www.ijctee.org/files/Issuethree/IJCTEE_1111_20.pdf
3. https://gunjesh.wordpress.com/

COURSE OUTCOMES:

At the end of the course, students will be able to

1. Acquire knowledge in building a Data Warehouse
2. Understand the need and importance of preprocessing techniques
3. Implement Similarity and dissimilarity techniques
4. Analyze and evaluate performance of algorithms for Association Rules.
5. Deploy Classification and Clustering algorithms

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
POs	**Programme Outcomes(POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	1	1	1	1									1	1	1
CO2	1	2	2	2	1							1	1		2
CO3	1	1	1	2	1							1	1		1
CO4	1	1	1	1	1							1	1	1	1
CO5	1	2	2	2	2							2	2	1	3

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech. VI Semester		
Code: B6713	Introduction to Digital Image Processing [Professional Elective - IV] (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI and IT)	L	T	P
Credits: 3		3	-	-

Course Objectives:

1. To become familiar with digital image fundamentals.
2. To get exposed to simple image enhancement techniques in Spatial and Frequency domain.
3. To learn concepts of degradation function and restoration techniques.
4. To study the image segmentation and representation techniques.
5. To become familiar with image compression and recognition methods

MODULE-I **[9 Periods]**

Digital Image Fundamentals: Digital Image through Scanner, Digital Camera. Concept of Gray Levels. Gray Level to Binary Image Conversion. Sampling and Quantization. Relationship between Pixels. Imaging Geometry. 2D Transformations-DFT, DCT, KLT and SVD.

MODULE-II **[10 Periods]**

Image Enhancement in Spatial Domain Point Processing, Histogram Processing, Spatial Filtering, Enhancement in Frequency Domain, Image Smoothing, Image Sharpening.

MODULE-III **[10 Periods]**

Image Restoration Degradation Model, Algebraic Approach to Restoration, Inverse Filtering, Least Mean Square Filters, Constrained Least Squares Restoration, Interactive Restoration.

MODULE-IV **[8 Periods]**

Image Segmentation Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region Oriented Segmentation.

MODULE-V **[10 Periods]**

Image Compression Redundancies and their Removal Methods, Fidelity Criteria, Image Compression Models, Source Encoder and Decoder, Error Free Compression, Lossy Compression.

TEXT BOOKS:

1. Digital Image Processing: R.C. Gonzalez & R. E. Woods, Addison Wesley/ Pearson

Education, 2nd Ed, 2004.

REFERENCES BOOKS:

1. Fundamentals of Digital Image Processing: A. K. Jain , PHI.
2. Digital Image Processing using MAT LAB: Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins: Pearson Education India, 2004.
3. Digital Image Processing: William K. Pratt, John Wilely, 3rd Edition, 2004.

E-RESOURCES:

1. http://www.nptel.iitm.ac.in/courses/IIT-Kanpure.Communication
2. DIP Image Databases
3. http://www.imagescience.org/

COURSE OUTCOMES:

1. Demonstrate the knowledge of the basic concepts of two-dimensional signal acquisition, sampling, and quantization.
2. Apply the knowledge of filtering techniques.
3. Construct the knowledge of 2D transformation techniques.
4. Demonstrate the knowledge of image enhancement, segmentation, restoration and compression techniques.
5. Understand the basics of segmentation, features extraction, compression and recognition methods for color models.

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs)												PSOs		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	1												1	1	
CO2	1	2	2	4		3					2		1	1	
CO3	2	3	2		4		1	4				1	1	1	
CO4	3	2	2						4	5	3			2	2
CO5	4	5	1									4	1		1

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: B6708	DATA ANALYSIS USING PYTHON	L	T	P
Credits: 3		3	-	-

Course Objectives:

This course is designed to teach students how to analyze different types of data using Python. Students will learn how to prepare data for analysis, perform simple statistical analysis, create meaningful data visualizations and predict future trends from data.

MODULE – I **[9 Periods]**

Introduction to Data Understanding and Preprocessing Knowledge domains of Data Analysis, Understanding structured and unstructured data, Data Analysis process, Dataset generation, Importing Dataset: Importing and Exporting Data, Basic Insights from Datasets, Cleaning and Preparing the Data: Identify and Handle Missing Values.

MODULE – II **[9 Periods]**

Data Processing and Visualization Data Formatting, Exploratory Data Analysis, Filtering and hierarchical indexing using Pandas. Data Visualization: Basic Visualization Tools, Specialized Visualization Tools, Seaborn Creating and Plotting Maps.

MODULE – III **[9 Periods]**

Mathematical and Scientific applications for Data Analysis Numpy and Scipy Package, Understanding and creating N-dimensional arrays, Basic indexing and slicing, Boolean indexing, Fancy indexing, Universal functions, Data processing using arrays, File input and output with arrays.

MODULE – IV **[9 Periods]**

Web Data Analyzing- Web Data wrangling, Web scrapping, Combing and merging data sets, Reshaping and pivoting, Data transformation, String Manipulation, case study for web scrapping.

MODULE – V **[9 Periods]**

Model Development and Evaluation - Introduction to machine learning- Supervised and Unsupervised Learning, Model development using Linear Regression, Model Visualization, Prediction and Decision Making, Model Evaluation: Over-fitting, Under-fitting and Model Selection.

TEXT BOOKS:

1. David Ascher and Mark Lutz, Learning Python, Publisher O'Reilly Media.
2. Reema Thareja, "Python Programming using Problem Solving approach",Oxford University press
3. Wes Mckinney "Python for Data Analysis", First edition, Publisher O'Reilly Media

REFERENCES:

1. Allen Downey ,Jeffrey Elkner ,Chris Meyers,: Learning with Python, Dreamtech Press
2. David Taieb ,"Data Analysis with Python: A Modern Approach " 1st Edition, Packt Publishing

Course Outcomes:

On successful completion of the course, students will be able to:

1. Understanding basics of python for performing data analysis
2. Understanding the data, performing preprocessing, processing and data visualization to get insights from data.
3. Use different python packages for mathematical, scientific applications and for web data analysis.
4. Develop the model for data analysis and evaluate the model performance.

CO- PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COS	Program Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: B0531	**Scripting Languages (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI and IT)**	**L**	**T**	**P**
Credits: 3		**3**	**-**	**-**

Prerequisites: Object Oriented Programming

Course Objectives:

The course demonstrates an in depth understanding of the tools and the scripting languages necessary for design and development of applications dealing real time data. Also this course gives the capability and knowledge to analyze requirements of software systems for the purpose of determining the suitability of implementing in Perl, PHP or Ruby.

MODULE I: INTRODUCTION **[09 Periods]**

What is a scripting language, Motivation for and applications of scripting, how scripting languages differ from non-scripting languages, Types of scripting languages, client and server side web scripting. Introduction to PERL and Scripting: PERL- Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines.

MODULE II: Advanced PERL **[09 Periods]**

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.

MODULE III: PHP Basics **[10 Periods]**

PHP BASICS - Features, Embedding PHP Code in your Web pages, Outputting the data to the browser, Data types, Variables, Constants, expressions, string interpolation, control structures, Function, Creating a Function, Function Libraries, Arrays, strings and Regular Expressions.

MODULE IV: Advanced PHP Programming - **[10 Periods]**

PHP and Web Forms, Files, PHP Authentication and Methodologies -Hard Coded, File Based, Database Based, IP Based, Login Administration, Uploading Files with PHP, Sending Email using PHP, PHP Encryption Functions, the Mcrypt package, Building Web sites for the World.

MODULE V: Ruby **[10 Periods]**

What is Ruby, Ruby features, Installation of Ruby, Hello Ruby Program, Operators, data types,

control statements, looping statements, break next, redo retry. Ruby Object class, Methods, Blocks, Modules, Strings, Arrays, Exception Handing.

TEXTBOOKS

1. David Barron, 'The World of Scripting Languages', Wiley Publications.
2. Jason Gilmore, 'Beginning PHP and MySQL', 3" Edition, A press Publications (Dream tech.).

REFERENCES

1. J.Lee and B.Ware, 'Open Source Web Development with LAMP using Linux, Apache, MySQL, Pen and PHP', (Addison Wesley) Pearson Education.
2. Julie Meloni and Matt Telles, 'PHP 6 Fast and Easy Web Development', Cengage Learning Publications.
3. Larry Wall, T.Christiansen and J.Orwant,O'Reilly, 'Programming Perl', SPD
4. V.Vaswani, 'PHP Programming solutions', TMH

E-RESOURCES

1. https://www.w3schools.com/php/
2. https://www.tutorialspoint.com/perl/
3. International journal of Programming Languages and Applications
4. International Journal of Advanced and Innovative Research
5. http://nptel.ac.in/courses/117106113/
6. http://nptel.ac.in/courses/106106145/

Course Outcomes:

At the end of the course, students will be able to

1. Understand the significance of various scripting languages.
2. Apply your knowledge to work on PERL Internet applications.
3. Implement the basic web applications using PHP.
4. Design and implement web applications and database connectivity using PHP.
5. Demonstrate the programs on Ruby scripting language.

CO- PO-PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium,1-Weak

	Programme Outcomes(POs)												PSOs		
CO S	**PO1**	**PO 2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO 1	2	2	2	3	3	-	-	-	-	2	-	2	2	2	3
CO 2	2	2	2	3	3	-	-	-	-	1	-	2	2	2	2
CO 3	2	2	2	3	3	-	-	-	-	1	-	2	1	2	2
CO 4	2	2	2	3	3	-	-	-	-	1	-	2	2	2	2
CO 5	2	2	1	3	3	-	-	-	-	1	-	2	3	3	2

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: B1212	Information Retrieval System (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI and IT)	L	T	P
Credits: 3		3	-	-

Course Objectives:

1. To learn the important concepts and algorithms in IRS
2. To understand the data/file structures that are necessary to design, and implement information retrieval (IR) system.

UNIT – I

Introduction to Information Retrieval Systems: Definition of Information Retrieval System, Objectives of Information Retrieval Systems, Functional Overview, Relationship to Database Management Systems, Digital Libraries and Data Warehouses, Information Retrieval System Capabilities: Search Capabilities, Browse Capabilities, Miscellaneous Capabilities

UNIT – II

Cataloging and Indexing: History and Objectives of Indexing, Indexing Process, Automatic Indexing, Information Extraction, Data Structure: Introduction to Data Structure, Stemming Algorithms, Inverted File Structure, N-Gram Data Structures, PAT Data Structure, Signature File Structure, Hypertext and XML Data Structures, Hidden Markov Models

UNIT – III

Automatic Indexing: Classes of Automatic Indexing, Statistical Indexing, Natural Language, Concept Indexing, Hypertext Linkages, Document and Term Clustering: Introduction to Clustering, Thesaurus Generation, Item Clustering, Hierarchy of Clusters

UNIT – IV

User Search Techniques: Search Statements and Binding, Similarity Measures and Ranking, Relevance Feedback, Selective Dissemination of Information Search, Weighted Searches of Boolean Systems, Searching the INTERNET and Hypertext, Information Visualization: Introduction to Information Visualization, Cognition and Perception, Information Visualization Technologies

UNIT – V

Text Search Algorithms: Introduction to Text Search Techniques, Software Text Search Algorithms, Hardware Text Search Systems, Multimedia Information Retrieval: Spoken Language Audio Retrieval, Non-Speech Audio Retrieval, Graph Retrieval, Imagery Retrieval, Video

Retrieval

Course Objectives

- To learn the important concepts and algorithms in IRS.
- To understand the data/file structures that are necessary to design, and implement information retrieval (IR) systems.

Course Outcomes

- Ability to apply IR principles to locate relevant information large collections of data.
- Ability to design different document clustering algorithms.
- Implement retrieval systems for web search tasks.
- Design an Information Retrieval System for web search tasks.

Text Books

1. Information Storage and Retrieval Systems – Theory and Implementation, Second Edition, Gerald J. Kowalski, Mark T. Maybury, Springer

Reference Books

1. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall, 1992.
2. Information Storage & Retrieval By Robert Korfhage – John Wiley & Sons. Modern Information Retrieval By Yates and Neto Pearson Education.

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes(POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	1	1		1		1						1	1		
CO2	1	2	1	1	1	1						1		2	1
CO3	1	1	2	2	1	1						2		2	2
CO4	1	1	1	2	1	1						3		1	2
CO5	1	1	1	1	1	1						2		1	2

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: B0537	Natural Language Processing [Professional Elective - IV] (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI and IT)	L	T	P
Credits: 3		3	-	-

Course Objectives:

1. Gain a foundational understanding in natural language processing methods and strategies
2. Learn how to evaluate the strengths and weaknesses of various NLP technologies and frameworks as they gain practical experience in the NLP toolkits available.
3. learn how to employ literary-historical NLP-based analytic techniques like stylometry, topic modeling, synsetting also and named entity recognition in their personal research.
4. Enlighten concepts of Predicate – Argument Structure
5. Evaluate various discourse Processing of Cohesion Reference Resolution

Module I: Finding the Structure of Words: [10 Periods]

Words and Their Components, Issues and Challenges, Morphological Models

Finding the Structure of Documents: Introduction, Methods, Complexity of the Approaches, Performances of the Approaches

Module II: Syntax Analysis: [09 Periods]

Parsing Natural Language, Treebanks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms, Models for Ambiguity Resolution in Parsing, Multilingual Issues

Module III: Semantic Parsing: [10 Periods]

Introduction, Semantic Interpretation, System Paradigms, Word Sense Systems, Software.

Module IV: Predicate-Argument Structure [09 Periods]

Predicate-Argument Structure, Meaning Representation Systems, Software.

Module V: Discourse Processing: [10 Periods]

Cohension, Reference Resolution, Discourse Cohension and Structure

Language Modeling: Introduction, N-Gram Models, Language Model Evaluation, Parameter

Estimation, Language Model Adaptation, Types of Language Models, Language-Specific Modeling Problems, Multilingual and Crosslingual 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:

1. Speech and Natural Language Processing - Daniel Jurafsky & James H Martin, Pearson Publications

E-RESOURCES:

1. https://www.cl.cam.ac.uk/teaching/2002/NatLangProc/revised.pdf
2. https://hpi.de/fileadmin/user_upload/fachgebiete/plattner/teaching/NaturalLanguageProcessing/NLP2016/NLP01_IntroNLP.pdf
3. http://www.sciencedirect.com/science/article/pii/S1532046401910299
4. http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.34.1 r036
5. http://nptel.ac.in/courses/106101007/
6. http://nptel.ac.in/courses/106105158/

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.

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	-	-	-	-	2	2	1	-	1	2	2	2
CO2	3	3	2	2	1	-	-	2	2	1	-	2	3	2	2
CO3	3	3	3	1	1	-	-	2	2	1	-	2	3	1	1
CO4	3	3	2	2	1	-	-	3	3	1	-	2	3	2	2
CO5	3	3	2	2	1	-	-	2	2	1	-	2	3	2	2

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: B0527	CLOUD COMPUTING [Professional Elective - V]	L	T	P
Credits: 3		3	-	-

Prerequisites: Computer Networks

Course Objectives:

This course provides the students to gain knowledge in the cloud computing environment, security architecture and development of cloud services. Students will also examine the collaboration of real time cloud services and analyze the case studies from various cloud development tools.

MODULE I: Introduction to Cloud Computing [8 Periods]

Cloud Computing in a Nutshell, System Models for Distributed and Cloud Computing, Roots of Cloud Computing, Grid and Cloud, Layers and Types of Clouds, Desired Features of a Cloud, Basic Principles of Cloud Computing, Challenges and Risks, Service Models.

MODULE II: Virtualization [12 Periods]

Virtual Machines and Virtualization of Clusters and Data Centers : Levels of Virtualization, Virtualization Structures//Tools and Mechanisms, Virtualization of CPU, Memory and I/O Devices, Virtual Clusters and Resource Management, Virtualization Data-Center Automation.

Case studies: Xen Virtual machine monitors- Xen API. VMware - VMware products- VMware Features. Microsoft Virtual Server - Features of Microsoft Virtual Server.

MODULE III: Cloud Computing Architecture over Virtualized Data Centers [8 Periods]

A. A: Data-Center design and Interconnection networks, Architectural Design of Compute and Storage Clouds.
B. B: Public Cloud Platforms, GAE, AWS, Azure, Inter-cloud Resource Management.

MODULE IV: Cloud Security [8 Periods]

Cloud Security and Trust Management, Data Security in the Cloud : An Introduction to the Idea of Data Security, The Current State of Data Security in the Cloud, Crypt Db:Onion Encryption layers-DET,RND,OPE,JOIN,SEARCH, HOM, and Homomorphic Encryption, FPE. Trust, Reputation and Security Management.

MODULE V: Cloud Programming and Standards [12 Periods]

Cloud Programming and Software Environments: Features of Cloud and Grid Platforms, parallel and distributed Programming Paradigms, Programming Support of Google App Engine, Programming on Amazon AWS and Microsoft Azure, Emerging Cloud Software Environments.

Common Standards in Cloud Computing: The Open Cloud Consortium, the Distributed Management Task Force, Standards for Application Developers, Standards for Messaging. Internet Messaging Access Protocol (IMAP), Standards for Security, Examples of End-User Access to Cloud Computing.

TEXT **BOOKS**:

1. John W. Rittinghouse, "Cloud Computing: Implementation, Management, and Security ". James F. Ransome, CRC Press 2009.
2. Kai Hwang. Geoffrey C.Fox, Jack J. Dongarra, " Distributed and Cloud Computing From Parallel Processing to the Internet of Things", Elsevier, 2012.
3. Rajkumar Buyya, James Broberg and Andrzej M. Goscinski," Cloud Computing: Principles and Paradigms (Wiley Series on Parallel and Distributed Computing), Wiley Publishing ©2011

REFERENCES:

1. Raluca Ada Popa, Catherine M.S. Redfield, Nickolai Zeldovich, and Hari Balakrishnan, "CryptDB: Protecting Confidentiality with encrypted Query Processing"23rd ACMSymposium on Operating Systems Principles (SOSP 2011), Cascais, Portugal October 2011.
2. Craig Gentry,"A Fully Homomorhic Encryption Scheme", September 2009.
3. David Marshall, Wade A. Reynolds, "Advanced Server Virtualization: VMware and Microsoft Platform in the Virtual Data Center", Auerbach Publications, 2006.

Course Outcomes:

At the end of the course, students will be able to

1. Understand the cloud enabling technologies and the Cloud service models.
2. Choose the levels of virtualization and tools for resource provisioning.
3. Compare the cloud platform architectures of virtualized data centers and Inter-cloud Resource Management.
4. Analyze the principles of Security and Trust management to protect confidentiality of data in the Cloud.
5. Propose the standards of Parallel and Distributed Programming Paradigms for improving user Access to Cloud Computing.

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes(POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	1				2								1		
CO2		1		2	2							1		1	
CO3		1			3							2		1	
CO4	1											2			1
CO5	1			2								1		1	2

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: B0517	**MOBILE APPLICATION DEVELOPMENT**	**L**	**T**	**P**
Credits: 3	**[Professional Elective – V]**	**3**	**-**	**-**

Course objectives:

1. Mobile Application Development course exposes the students to essentials of mobile apps development.
2. The core modules of this subject include designing, developing, testing, signing, packaging and distributing high quality mobile apps.
3. This course aims to teach mobile app development using Android as the development platform.

MODULE I:

Introduction to Mobile A brief history of Mobile, The Mobile Ecosystem, Why Mobile?, Types of Mobile Applications, Mobile Information Architecture, Mobile Design, Mobile 2.0, Mobile Web development, Small Computing Device Requirements.

J2ME: Overview The World of Java, Inside J2ME, J2ME Architecture, MIDlet Programming, J2ME Wireless Toolkit, Hello World J2ME Style, Multiple MIDlets in a MIDlet Suite

MODULE II:

Introduction to Android: History of Android, Introduction to Android, Operating Systems, Android Development Tools, Android Architecture.

MODULE III:

Development Tools: Installing and using Eclipse with ADT plug-in, Installing Virtual machine for Android sandwich/Jelly bean (Emulator), configuring the installed tools, creating a android project – Hello Word, run on

MODULE IV:

User Interface Architecture: Application context, intents, Activity life cycle, multiple screen sizes User Interface Design: Form widgets, Text Fields, Layouts, Button control, toggle buttons, Spinners(Comboboxes),Images, Menu, Dialog.

MODULE V:

Database: Understanding of SQLite database, connecting with the database

Course Outcomes:

Upon completion of this course, student shall be able to:

1. Appreciate the Mobility landscape
2. Familiarize with Mobile apps development aspects
3. Design and develop mobile apps, using Android as development platform, with key focus on user experience design, native data handling and background tasks and notifications.
4. Perform testing, signing, packaging and distribution of mobile apps.
5. The student can design and develop mobile application using J2ME

TEXTBOOKS:

1. J2ME: The Complete Reference, James Keogh, Tata McGrawHill
2. Android application development for java programmers. By James C. Sheusi. Publisher: Cengage Learning, 2013.
3. Lauren Darcey and Shane Conder, ―Android Wireless Application Development‖, Pearson Education, 2nd ed. (2011)

REFERENCE BOOKS:

1. Reto Meier, ―Professional Android 2 Application Development‖, Wiley India Pvt Ltd
2. Mark L Murphy, ―Beginning Android‖, Wiley India Pvt Ltd
3. Sayed Y Hashimi and Satya Komatineni, ―Pro Android‖, Wiley India Pvt Ltd.
4. devloper.android.com (web)
5. Android Application Development All in one for Dummies by Barry Burd, Edition:

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1- Weak											
Programme Outcomes(POs)											
PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: B6709	MULTIVARIATE TECHNIQUES FOR DATA ANALYTICS	L	T	P
Credits: 3	[Professional Elective-V]	3	-	-

Prerequisites: Environmental Statistics

Course Objectives:

1. Introduce the language of multivariate data analysis
2. Understand the characteristics of multivariate quantitative research, including strengths and weaknesses
3. Understand the principles and characteristics of the multivariate data analysis techniques

MODULE-I **[10 Periods]**

Introduction to Multivariate Techniques Measurement Scales(Metric and Non-metric Measurement Scles) – Classification of Multivariate Techniques(Dependence and Inter-dependence Techniques) – Applications of MultivariateTechniques in different disciplines.

MODULE – II **[10 Periods]**

Factor Analysis Introduction to Factor Analysis – Meaning, Objectives and Assumptions – Designing a Factor Analysis Study – Deriving Factors – Assessing Overall Factors – Validation of Factor Analysis.

MODULE – III **[10 Periods]**

Cluster Analysis Introduction to Cluster Analysis – Objectives and Assumptions – Research Design in Cluster Analysis– Hierarchical and Non-hierarchical Methods – Interpretation of Clusters – Validation of Profiling of Clusters.

MODULE – IV **[10 Periods]**

Discriminant Analysis Introduction to Discriminant Analysis – Concepts, Objectives and Applications – Procedure for conducting Discriminant Analysis – Stepwise Discriminant Analysis – Mahalanobis Procedure – Logit Model.

MODULE – V **[10 Periods]**

Principal Component Analysis Dimensionality Reduction – Deriving Orthogonal Projections – Lower Dimensional Subspaces – Characterization through Singular Value Decomposition and Eigenvalue Analysis – Rayleigh Quotient –Kernel PCA – Functional PCA.

TEXT BOOKS:

1. Joseph F Hair, William C Black etal , ―Multivariate Data Analysis‖ , Pearson Education, 7th edition, 2013.
2. T. W. Anderson , ―An Introduction to Multivariate Statistical Analysis, 3rd Edition‖, Wiley, 2003.

REFERENCES:

1. William r Dillon, John Wiley & sons, ―Multivariate Analysis methods and applications‖, Wiley, 1984.
2. Naresh K Malhotra, Satyabhusan Dash, ―Marketing Research Anapplied Orientation‖, Pearson, 2011.

Course Outcomes:

1. distinguish between dependence and interdependence methods in multivariate data analysis
2. identify the most appropriate statistical techniques for a multivariate dataset
3. carry out and apply commonly used multivariate data analysis techniques, and interpret results
4. use statistical software packages for the analysis of multivariate data

CO- PO Mapping **(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak**												
COS	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1		2							3			
CO2					3						2	
CO3			1									
CO4				2			2			1		
CO5		1						3				

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech. VI Semester		
Code: B6917	Internet of Things [Professional Elective - V] (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI and IT)	L	T	P
Credits: 3		3	-	-

Prerequisites: Basic knowledge of computer architecture, programming and communication protocols

Course Objectives:

- Identify problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem
- Formalize a given problem in the language/framework of different AI methods (e.g., as a search problem, as a constraint satisfaction problem, as a planning problem, as a Markov decision process, etc)
- Implement basic AI algorithms (e.g., standard search algorithms or dynamic programming)
- Design and carry out an empirical evaluation of different algorithms on problem formalization, and state the conclusions that the evaluation supports
- Data Acquiring, Organizing and Analytics IOT

MODULE I - The Internet of Things (IOT) **[10 Periods]**

The Internet of Things: An Overview of Internet of Things, Internet of Things Technology, behind IoTs Sources of the IoTs, M2M Communication, Examples of IoTs, Design Principles for Connected Devices.

MODULE II - **[09 Periods]**

Modified OSI Stack for the IoT/M2M Systems, ETSI M2M domains and High-level capabilities, Communication Technologies, Data Enrichment and Consolidation and Device Management Gateway Ease of designing and affordability.

MODULE III – **[10 Periods]**

Design Principles for the Web Connectivity for connected-Devices, Web Communication protocols for Connected Devices, Message Communication protocols for Connected Devices, Web Connectivity for connected-Devices.

MODULE IV – **[10 Periods]**

Data link layer of IoT, Wireless Communication Technologies, Wired Communication Technologies, Manet Networks: Network Layer of IoT, lowPAN adaptation layer for devices with limited resources, Dynamic routing protocols for wireless adhoc networks Communication

protocols for IoT, Service oriented protocol(COAP), Communication protocols based on the exchange of messages(MQTT), Service discovery protocols.

MODULE V – [10 Periods]

Data Acquiring, Organizing and Analytics in IoT/M2M, Applications/ Services/ Business Processes, IOT/M2M Data Acquiring and Storage, Business Models for Business Processes in the Internet Of Things, Organizing Data, Transactions, Business Processes, Integration and Enterprise Systems.

Text Books:

1) Internet of Things: Architecture, Design Principles And Applications, Rajkamal, McGraw Hill Higher Education.
2) The Internet of Things: Key applications and Protocols ‖ Wiley Publications 2nd Edition
3) Internet of Things: A Hands-On Approach by Arsheep Bahga, Vijay Madisetti

Reference Books:

4) An Introduction to Internet of Things, Connecting devices, Edge Gateway and Cloud with Applications, Rahul Dubey, Cengage, 2019.
5) IoT Fundamentals, Networking Technologies, Protocols and Use Cases for the Internet of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetette, rob Barton, Jerome Henry, CISCO, Pearson, 2018.
6) Designing the Internet of Things, Adrian McEwen and Hakim Cassimally, Wiley.

E-RESOURCES:

7) https://onlinecourses.nptel.ac.in/noc22_cs96/preview
8) https://www.amazon.in/Introduction-IoT-Sudip-Misra/dp/1108959741/ref=sr_1_1?dchild=1&keywords=sudip+misra&qid=1627359928&sr=8-1
9) https://www.amazon.in/dp/1032146753/ref=sr_1_3?dchild=1&keywords=sudip+misra&qid=1627359971&sr=8-3
10) https://www.naukri.com/learning/industrial-internet-of-things-iiot-course-courl4051
11) https://geekflare.com/internet-of-things-iot-learning-resources/

Course Outcomes:

At the end of the course, students will be able to

1. Describe the usage of the term 'the internet of things' in different contexts
2. Discover the various network protocols used in IoTand familiar with the key wireless technologies used in IoT systems, such as Wi-Fi, 6LoWPAN, Bluetooth and ZigBee
3. Define the role of big data, cloud computing and data analytics in a typical IoT system Design a simple IoT system made up of sensors, wireless network connection, data

analytics and display/actuators, and write the necessary control software

4. Build and test a complete working IoT system
5. Data Acquiring, Organizing and Analytics of IoT applications.

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes(POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	3	3	3	3	3	3						3	3	3
CO2	3	2	3	2	3							2	3	3	3
CO3	3	3	3	3	3							3	3	3	3
CO4	3	3	3	3	3	3						3	3	3	3
CO5	3	3	3	3	3							3	3	3	3

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech. VI Semester		
Code: B6203	CRYPTOGRAPHY AND NETWORK SECURITY [Professional Elective - IV] (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI and IT)	L	T	P
Credits: 3		3	-	-

Prerequisites: Computer Networks

Course Objectives:

- Explain the objectives of information security
- Explain the importance and application of each of confidentiality, integrity, authentication and availability
- Understand various cryptographic algorithms.
- Understand the basic categories of threats to computers and networks
- Describe public-key cryptosystem.
- Describe the enhancements made to IPv4 by IPSec.
- Understand Intrusions and intrusion detection
- Discuss the fundamental ideas of public-key cryptography
- Generate and distribute a PGP key pair and use the PGP package to send an encrypted email message.
- Discuss Web security and Firewalls.

MODULE – I: **[10 Periods]**

Security Concepts: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security

Cryptography Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, key range and key size, possible types of attacks.

MODULE – II: **[9 Periods]**

Symmetric key Ciphers: Block Cipher principles, DES, AES, Blowfish, RC5, IDEA, Block cipher operation, Stream ciphers, RC4.

Asymmetric key Ciphers: Principles of public key cryptosystems, RSA algorithm, Elgamal Cryptography, Diffie-Hellman Key Exchange, Knapsack Algorithm.

MODULE – III: **[10 Periods]**

Cryptographic Hash Functions: Message Authentication, Secure Hash Algorithm (SHA- 512), Message authentication codes: Authentication requirements, HMAC, CMAC, Digital signatures,

Elgamal Digital Signature Scheme.

Key Management and Distribution: Symmetric Key Distribution Using Symmetric & Asymmetric Encryption, Distribution of Public Keys, Kerberos, X.509 Authentication Service, Public – Key Infrastructure**.**

MODULE – IV: [9 Periods]

Transport-level Security: Web security considerations, Secure Socket Layer and Transport Layer Security, HTTPS, Secure Shell (SSH) Wireless Network Security: Wireless Security, Mobile Device Security, IEEE 802.11 Wireless LAN, IEEE 802.11i Wireless LAN Security

MODULE – V: [10 Periods]

E-Mail Security: Pretty Good Privacy, S/MIME IP Security: IP Security overview, IP Security architecture, Authentication Header, Encapsulating security payload, combining security associations, Internet Key Exchange

Case Studies on Cryptography and security: Secure Multiparty Calculation, Virtual Elections, Single sign On, Secure Inter-branch Payment Transactions, Cross site Scripting Vulnerability.

TEXT BOOKS:

1. Cryptography and Network Security - Principles and Practice: William Stallings, Pearson Education, 6th Edition
2. Cryptography and Network Security: AtulKahate, McGraw Hill, 3rd Edition

REFERENCE BOOKS:

1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1st Edition.
2. Cryptography and Network Security: ForouzanMukhopadhyay, McGraw Hill, 3rd Edition
3. Information Security, Principles, and Practice: Mark Stamp, Wiley India.
4. Principles of Computer Security: WM. Arthur Conklin, Greg White, TMH
5. Introduction to Network Security: Neal Krawetz, CENGAGE Learning
6. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning

Course Outcomes:

- Student will be able to understand basic cryptographic algorithms, message and web authentication and Security issues
- Ability to identify information system requirements for both of them such as client and server
- Ability to understand the current legal issues towards information security

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes(POs)**												**PSOs**		
	PO1	PO2	PO	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1									2	3	1				2
CO2		3							2		1			2	
CO3		3								2	1		3		
CO4		3		2	1								2		
CO5				2			3				1				

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech. VI Semester		
Code: B0H03	**English Communication and Presentation Skills Lab (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI and IT)**	**L**	**T**	**P**
Credits: 1		**-**	**-**	**2**

Pre-requisites: NIL

Course Objectives:

The learners need to be aware of the characteristics of technical communication in their workplaces; as a result, they are exposed to different channels of technical communication. Hence the acquired skills make the learners effective communicators using persuasive language. Besides the above said, one of the major objectives is to maintain objectivity in writing documents and to produce professional quality documents using different components of the language.

Methodology: Facilitator's role: Since classroom learning augments thinking process, helping them to develop written, spoken and non verbal communication, the facilitator / Faculty would briefly discuss the topics with the students and later on guide them while the students involved in activities, writing work and while making presentations. The facilitator is required to design a lot of practical/industry oriented project works for the students

*Students are required to participate, perform, write and submit the work in the form of written documents or Power Point Presentations to hone their spoken written and non verbal communication skills. Students are to take up field work and submit the project work.

MODULE I: Oral Presentation

Mechanics of Presentations – Methodology of Presentation, Importance of Non-verbal communication during presentations– Nuances of Presentation.

*This particular MODULE is for internal evaluation purpose(s).

MODULE II: E - Correspondence and Email etiquette

Common web mail services, yahoo, gmailetc, fields to pay attention- To:, Cc:, Bcc:, Reply All, Subject, Salutation, Body, Signature, Font, Caps Lock , Highlight, The 'KISS' strategy (Keep It Simple and Short,)Points to remember while signing off, Introduction to Technical Vocabulary.

- This MODULE is purely for internal assessment/evaluation

MODULE III: Group Discussion

Initiators- Contributor-Informer-Team Leader-Motivator-Creative Contributor , Importance of , Non verbal communication -eye contact, voice characters, posture, gestures, do's and don'ts, Role

play and Simulation- Learners assuming the roles of characters and participating in Group discussion, analysis, or prediction with strictly defined goals.

MODULE IV: Interview Skills & Office Etiquette

Preparing for the interview, types of interviews, interview session, importance of non verbal communication during the interview, do's and don'ts of interview, follow up and thanking letter. FAQ's. Formal Conversation, office attire- do's and don'ts, greetings and meetings, speaking to seniors and handshakes, offering and taking visiting cards.

MODULE V: Job Hunt Process

SWOT analysis, correspondence and browsing the internet to search for a suitable job(s), job application-cover letter drafting, drafting a winning resume', types of resume's -electronic, video and printed resume's

Instruction: Students are required to prepare their video resume which will be assessed by the faculty member.

REFERENCES:

1. Chrissie: Handbook of Practical Communication Skills: Jaico Publishing house, 1999.
2. Daniels, Aubrey: Bringing Out the Best in People: Tata McGraw-Hill: New York, 2003.
3. Wright, Goulstone, Mark: Just Listen: Discover the Secret to getting through to absolutely anything : American Management Association, 2010.
4. Leslie. T. Giblin: Skill with people Publication details not known
5. Lewis, Norman: Word Power Made Easy: Goyal Publications: New Delhi, 2009.
6. Murthy, A.G, Krishna,:Ten Much : Tata McGraw-Hill :New Delhi, 2010.

E-RESOURCES:

1. http://www.mindtools.com/pages/article/newTMC_05.htm
2. http://www.kent.ac.uk/careers/intervw.htm
3. http://www.wikihow.com/Write-a-Report

Course Outcomes:

At the end of the course, students will be able to

1. Give Oral Presentations Confidently.
2. Draft appropriate Resume in accordance with the context.
3. Participate and present their view and ideas logically and confidently.
4. Understand the importance of communication in various settings.
5. Utilize the technology for career advancement.

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak												
COs	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1					1					2		2
CO2										1		2
CO3		1		1						2		2
CO4					1	1			1	2		2
CO5				1	1				1	2		2

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: B0544	DATA MINING LAB	L	T	P
Credits: 2		-	-	3

Prerequisites: NIL

Course Objectives:

This course provides the students to understand stages in building a Data Warehouse, identify the need and importance of preprocessing techniques, implement similarity and dissimilarity techniques, analyze and evaluate performance of algorithms for Association Rules, analyze Classification and Clustering algorithms.

Software Requirements: **WEKA TOOL**

List of Programs:

1. Demonstration of preprocessing on dataset student.arff.
2. Implementation of preprocessing on dataset labor.arff.
3. Demonstration of Association rule process on dataset contactlenses.arff using apriori Algorithm.
4. Implement Association rule process on dataset test.arff using apriori algorithm.
5. Apply classification rule process on dataset student.arff using j48 algorithm.
6. Perform classification rule process on dataset employee.arff using j48 algorithm.
7. Use classification rule process on dataset employee.arff using id3 algorithm.
8. Deploy classification rule process on dataset employee.arff using naïve bayes Algorithm.
9. Implement clustering rule process on dataset iris.arff using simple k-means.
10. Make use of clustering rule process on dataset student.arff using simple k- means.
11. Design a decision tree by pruning the nodes on your own. Convert the decision trees into "if- then-else rules". The decision tree must consists of 2-3 levels and convert it into a set of rules.
12. Generate Association rules for the following transactional database using Apriori algorithm.

TID	List of Items
T100	I1,I2,I5
T200	I2,I4
T300	I2,I3
T400	I1,I2,I4
T500	I1,I3
T600	I2,I3
T700	I1,I3
T800	I1,I2,I3,I5

TEXTBOOKS:

1. Pang-Ning Tan & Michael Steinbach, "**Introduction to Data Mining**",Vipin Kumar, Pearson.
2. Jiawei Han, Michel Kamber ,"**Data Mining concepts and Techniques**", 3/e, Elsevier.

REFERENCES:

1. Hongbo Du, "**Data Mining Techniques and Applications: An Introduction**", Cengage Learning.
2. Vikram Pudi and P. Radha Krishna, "**Data Mining**", Oxford.
3. Mohammed J. Zaki, Wagner Meira, Jr ,"**Data Mining and Analysis - Fundamental Concepts and Algorithms**", Oxford
4. Alex Berson, Stephen Smith ,"**Data Warehousing Data Mining & OLAP**" , TMH.

Course Outcomes:

At the end of the course, students will be able to

1. **Analyze** the classification rules on various databases.
2. **Deploy** association rules for any kind of databases.
3. **Develop** clustering rules for applications.

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes(POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	1	1	1	1									1	1	1
CO2	1	2	2	2	2								2		2
CO3	1	2	3	2	1								1		2

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: B6611	**Computer Vision Lab**	**L**	**T**	**P**
Credits: 2		**-**	**-**	**3**

Prerequisites: Computer programming, Python

Software Requirements: Python

Course Objectives:

This objective of the course is to provide the students to study and understand the execute the experiments related to computer vision, Image processing applications using Python.

List of Programs:

1. Installation of Python
2. Python operations and the image processing toolbox
   i) Image enhancement
   ii) Image compression
   iii) color image processing,
   iv) image morphology Python
3. Basic image processing operations and histograms algorithms
   i) Resizing (scaling) and rotation
   ii) Quantization
   iii) Histogram
4. Image filtering in spatial and in frequency domain using Python commands
5. Observe the following
   i) Shift
   ii) Linearity
   iii) Scaling
   iv) Rotation
   v) Exchange between magnitude and phase
6. Image Restoration
7. Image compression
8. Video tracking

BOOKS:

1. Hands-On Image Processing with Python, Sandipan Dey, Pact publishing 1st Edition 2018.
2. Python 3 Image Processing, Ashwinpajankar, BPB publications, 2019
3. Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, Inc Digital Image Processing Second Edition

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code:B00M3	**Quantitative Aptitude and Verbal Reasoning-II**	**L**	**T**	**P**
Credits: 0		**2**	**-**	**-**

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: B6710	Machine Learning Techniques CSE (DS)	L	T	P
Credits: 3		3	-	-

Prerequisites:

1. Data Structures
2. Knowledge on statistical methods

Course Objectives:

- To design a learning system and know about the learning tasks.
- To apply decision tree learning in classification tasks.
- To develop neural networks algorithms in machine learning.
- To illustrate Bayesian learning and instance-based learning.
- To examine the concepts of reinforcement learning and advanced techniques.
- To understand deep learning concepts.

Course Outcomes:

- Students will develop relevant programming abilities.
- Students will demonstrate proficiency with statistical analysis of data.
- Students will develop the ability to build and assess data-based models.
- Students will execute statistical analyses with professional statistical software.
- Students will demonstrate skill in data management.
- Students will apply data science concepts and methods to solve problems in real-world contexts and will communicate these solutions effectively

Module I: Foundation **[8 Periods]**

Introduction- Machine Learning, Need of Machine Learning, Evaluation for Machine Learning Models, Types of Learning;

A Formal Model: The Statistical Learning Framework, Empirical Risk Minimization, Empirical Risk Minimization with Inductive Bias;

A Formal Learning Model: PAC Learning, A More General Learning Model, learning via Uniform Convergence- Uniform Convergence Is Sufficient for Learnability, Finite Classes Are Agnostic PAC Learnable.

Module II: **[12 Periods]**

Supervised Learning

Basic methods: Distance-based methods, Nearest-Neighbours, Naive Bayes Linear models:Linear Regression, Logistic Regression, Generalized Linear Models; Support Vector Machines, Nonlinearity and Kernel Methods.

Ensemble Methods: Boosting, Bagging, Random forests.

Module III: **[9 Periods]**

Unsupervised Learning

Dimensionality: Comparison for K-Mean, K-Medoids, Dimensionality Reduction: PCA and kernel PCA, Matrix Factorization and Matrix Completion.

Generative Models (mixture models and latent factor models), Time series components and decomposition, Forecasting techniques (ARIMA, SARIMA), Time series modeling with machine learning.

Module IV: **[9 Periods]**

Introduction to Deep Learning: Overview of artificial intelligence and machine learning, History and motivation behind deep learning. network basics, Perceptron, activation functions, and learning algorithms.

Neural Network Basic: Perceptron, activation functions, and learning algorithms

Module V: **[8 Periods]**

Multilayer Perceptrons(MLPs): Feedforward neural networks and backpropagation, Loss functions and optimization techniques (SGD, Adam, etc.), Overfitting and regularization (dropout, L1/L2 regularization).

Convolutional Neural Networks (CNNs):

Architecture of CNNs: Convolutional, pooling, and fully connected layers, Popular CNN architectures (e.g., AlexNet, VGG, ResNet), Transfer learning and fine-tuning pre-trained CNN models.

TEXT BOOKS

1. Understanding machine learning from theory to algorithms, Shai Shalev-Shwartz and Shai Ben-David, Cambridge University Press 2014.
2. Machine Learning, Tom M. Mitchell, MGH, 1st Edition, 2013.
3. Machine Learning: An Algorithmic Perspectivel, Stephen Marsland, Chapman and Hall/ CRC, 2nd Edition, 2014.

4. Core Python Programming, Wesley J. Chun, Second Edition, Pearson., 2nd Edition, 2006

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak												
COS	**Programme Outcomes(POs)**											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		2	1						3			
CO2	2			3	3						2	
CO3		3	1		2							
CO4	3			2			2			1		
CO5		1						3				

2021-22 Onwards (MR21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: B0542	BIG DATA ANALYTICS	L	T	P
Credits: 3		3	-	-

Prerequisites: Databases, programming fundamentals.

Course Objectives:

This course enables the students to learn and understand Big data, data analytics, R language, developing map reduce programs, discuss about concepts of big data, make use of Hadoop concepts for designing applications, develop applications using Hadoop I/O and analyze big data using programming tools such as Pig and Hive.

Course Outcomes:

At the end of the course, students will be able to

1. **Develop** simple applications using R language
2. **Analyze** file systems such as GFS and HDFS.
3. **Design** applications by applying Map reduce concepts.
4. **Build** up programs by making use of I/O.
5. **Explore** and inspect the big data using programming tools like Pig and Hive.

MODULE I: Big data overview, data analytics, and R Language [09 Periods]

Big Data Overview: Data Structures, Analyst Perspective on Data Repositories, State of the Practice in Analytics, Bl Versus Data Science, Current Analytical Architecture, Drivers of Big Data, Emerging Big Data Ecosystem and a New Approach to Analytics, Key Roles for the New Big Data Ecosystem, Examples of Big Data Analytics. Data Analytics Lifecycle, Model Building and Basic Data Analytic Methods Using R Data Analytics Lifecycle Overview, Key Roles for a Successful Analytics Project, Background and Overview of Data Analytics Lifecycle - Discovery, Data Preparation, Learning the Business Domain , Model Planning , Model building, Communicate Results, Operationalize and case study example Global Innovation Network and Analysis (GINA)

R Introduction: Introduction to R, Exploratory Data Analysis, Statistical Methods for Evaluation, Hypothesis Testing, Difference of Means, Rank-Sum Test, Errors, Sample Size data

MODULE II: Working with Big Data [09 Periods]

Hadoop - Google File System, Hadoop Distributed File System (HDFS)– Building blocks of Hadoop (Namenode, Datanode, Secondary Namenode, JobTracker, TaskTracker).

Configuring of Hadoop Cluster - Introducing and Configuring Hadoop cluster (Local,Pseudo-distributed mode, Fully Distributed mode), Configuring XML files.

MODULE III: Hadoop API and Map Reduce Programs [09 Periods]

A: Hadoop API - Writing MapReduce Programs: A Weather Dataset, Understanding Hadoop API for MapReduce Framework (Old and New)

B: MapReduce Programs with classes - Basic programs of Hadoop MapReduce: Driver code, Mapper code, Reducer code, RecordReader, Combiner, Partitioner.

MODULE IV: Hadoop I/O and Implementation [09 Periods]

Hadoop I/O - The Writable Interface, Writable Comparable and comparators, Writable Classes: Writable wrappers for Java primitives, Text, BytesWritable, NullWritable, ObjectWritable and GenericWritable, Writable collections.

Implementation - Implementing a Custom Writable: Implementing a Raw Comparator for speed, Custom comparators.

MODULE V: PIG and HIVE HADOOP TOOL [12 Periods]

PIG - HADOOP TOOL - Hadoop Programming Made Easier - Admiring the PigArchitecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the PigScript Interfaces, Scripting with Pig Latin.

HIVE – HADOOP TOOL - Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients, Working with Hive Data Types, Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Data.

TEXTBOOKS:

1. Data Science & Big Data Analytics Discovering, Analyzing, Visualizing and Presenting Data EMC Education Services, Wiley Publishers, 2015.
2. Cay Horstmann, Wiley John Wiley & Sons, "**Big Java**", 4th Edition, INC
3. Tom White, "**Hadoop: The Definitive Guide**" 3rd Edition, O'reilly

REFERENCES:

1. Alex Holmes, "**Hadoop in Practice**", MANNING Publ.
2. Srinath Perera, Thilina Gunarathne, "**Hadoop MapReduce**" Cookbook.

E-**RESOURCES**:

1. http://newton.uam.mx/xgeorge/uea/Lab_Prog_O_O/materiales_auxiliares/Big_Java_4th_Ed.pdf
2. http://www.isical.ac.in/~acmsc/WBDA2015/slides/hg/Oreilly.Hadoop.The.Definitive.Guide.3rd.Edition.Jan.2012.pdf-
3. https://static.googleusercontent.com/media/research.google.com/en//archive/mapreduce-osdi04.pdf
4. http://www.comp.nus.edu.sg/~ooibc/mapreduce-survey.pdf
5. http://freevideolectures.com/Course/3613/Big-Data-and-Hadoop/18
6. http://freevideolectures.com/Course/3613/Big-Data-and-Hadoop/40

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes(POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	3	3	3	1		1	3	2	1	3	3	2	3
CO2	3	2	3	3	3						2	1	3	2	2
CO3	3	3	3	3	3							3	3	2	2
CO4	3	3	3	3	3						1	3	3	2	2
CO5	2	3	3	3	3						1	3	3	2	2

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech. VII Semester		
Code: B6711	**DATA VISUALIZATION AND APPLICATION**	**L**	**T**	**P**
Credits: 3		**3**	**-**	**-**

Prerequisite: Data Preparation and Analysis and Python Programming

Course Objectives:

- To focus on analyzing data, importing, summarizing and visualizing data.
- To make the students to evaluate the advantages and disadvantages of multiple visualization techniques.
- To expose to several tools for visualization.

Course Outcomes (CO):

CO1: Learned introduction to data visualization and its important.
CO2: Best practices in data visualization to develop charts, maps, tables, and other visual representations of data.
CO3: Utilize advanced features in Seaborn.
CO4: To estimate the relationship between with facets along with different plots.
CO5: To learn the advanced visualization techniques.

MODULE-I: **[09 Periods]**

Introduction: What is Data Visualization, Why is Data Visualization important, Data visualization tools and techniques, The future of data visualization, Uses of data visualization for business, Scope of data visualization for business.

MODULE-II: **[09 Periods]**

Direct plotting: Line Plot, Bar plot, Pie chart, Box plot, Histogram plot and Scatter Plot **Matplotlib**: Introduction to Matplotlib, Axes, Axes vs pyplot, Multiple Axes; Line Plot, Bar Chart, Histogram Plot, Scatter Plot, Stack Plot and Pie chart.

MODULE-III: **[09 Periods]**

Seaborn plotting system: Introduction to Seaborn, Installing and importing, Seaborn plotting functions- Figure level and axes level functions, combining multiple views on the data; Strip plot, Box plot, Swarm plot, Joint plot.

Visualizing distribution of data: Plotting univariate histograms, Kernel density stimation, Empirical cumulative distributions, Bivariate distributions.

MODULE-IV: **[09 Periods]**

Plotting with categorical data: categorical scatter plots, distributions of observations within categories, statistical estimation, multiple relationships with facets**.**

Multi-plot Grids: Building structured multi-plot grids, conditional small multiples, Plotting pairwise data relationships.

MODULE-V: **[09 Periods]**

Tableau: Introduction and overview, What Tableau can and cannot do well, Debug and troubleshoot installation and configuration of the software, Creating visualizations with Tableau, Sorting, Top N, bottom N, Filtering, Maps.

TEXT BOOKS:

1. Dr. Ossama Embarak ―Data Analysis and Visualization Using Python‖ a Press(2nd Ed.)2018.
2. Few Stephen, Show Me the Numbers: Designing Tables and Graphs to Enlighten (2 ed.), Analytics Press, 2012. ISBN 978-0970601972.

REFERENCE BOOKS:

1. Steve Wexler, Jeffrey Shaffer and Andy Cotgreave, The Big Book of Dashboards: Visualizing Your Data Using Real-World Business Scenarios (1 ed.), John Wiley & Sons, 2017. ISBN 978- 1119282713.
2. Stephen Few, Information Dashboard Design: Displaying Data for At-a-glance Monitoring (2 ed.), Analytics Press, 2013. ISBN 978-1938377001.
3. Data Visualization with Tableau Specialization

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak												
COS	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1	2		2					3			
CO2			1		3						2	
CO3	2	3	2		1							
CO4		1		3								
CO5		1						3				

2021-22 Onwards (MR- 21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: B6614	PATTERN RECOGNITION	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL

Course Objectives:

- To introduce the fundamental algorithms for pattern recognition
- To instigate the various classification and clustering techniques

Course Outcomes:

The students will be able to

- Design and construct a pattern recognition system
- Know the major approaches in statistical and syntactic pattern recognition.
- Become aware of the theoretical issues involved in pattern recognition system design such as the curse of dimensionally.
- Implement pattern recognition techniques.

MODULE-I **[10 Periods]**

Introduction: Basics of pattern recognition system, various applications, Machine Perception, classification of pattern recognition systems Design of Pattern recognition system, Pattern recognition Life Cycle Statistical Pattern Recognition: Review of probability theory, Gaussian distribution, Bayes decision theory and Classifiers, Optimal solutions for minimum error and minimum risk criteria, Normal density and discriminant functions, Decision surfaces

MODULE – II **[09 Periods]**

Parameter estimation methods: Maximum-Likelihood estimation, Expectation maximization method, Bayesian parameter estimation Concept of feature extraction and dimensionality, Curse of 15% dimensionality, Dimension reduction methods - Fisher discriminant analysis, Principal component analysis Hidden Markov Models (HMM) basic concepts, Gaussian mixture models.

MODULE – III **[10 Periods]**

Non-Parameter methods: Non-parametric techniques for density estimation – Parzen window method, K-Nearest Neighbour method. Non-metric methods for pattern classification: Non-numeric data or 15% nominal data Decision trees: Concept of construction, splitting of nodes, choosing of attributes, overfitting, pruning

MODULE – IV **[09 Periods]**

Linear Discriminant based algorithm: Perceptron, Support Vector Machines, Multilayer perceptrons, Back Propagation algorithm, Artificial Neural networks Classifier Ensembles: Bagging, Boosting / AdaBoost

MODULE – V **[10 Periods]**

Unsupervised learning: Clustering - Criterion functions for clustering, Algorithms for clustering: K-means and Hierarchical methods, Cluster validation

TEXT BOOKS:

- C M Bishop, Pattern Recognition and Machine Learning, Springer
- R O Duda, P.E. Hart and D.G. Stork, Pattern Classification and scene analysis, John Wiley

REFERENCES:

- Morton Nadier and Eric Smith P., Pattern Recognition Engineering, John Wiley & Sons, New York, 1993.
- Robert J. Schalkoff, Pattern Recognition : Statistical, Structural and Neural Approaches, John Wiley & Sons Inc., New York, 2007.
- S.Theodoridis and K. Koutroumbas, Pattern Recognition, 4/e, Academic Press, 2009.
- Tom Mitchell, Machine Learning, McGraw-Hill • Tou and Gonzales, Pattern Recognition Principles, Wesley Publication Company, London, 1974.

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak												
COS	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1		2							3			
CO2					3						2	
CO3			1									
CO4				2			2			1		
CO5		1						3				

2021-22 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: B1202	**ARTIFICIAL NEURAL NETWORKS**	**L**	**T**	**P**
Credits: 3		**3**	**-**	**-**

Course Objectives:

- Define what is Neural Network and model a Neuron and Express both Artificial
- Intelligence and Neural Network
- Analyze ANN learning, Error correction learning, Memory-based learning, Hebbian learning, Competitive learning and Boltzmann learning
- Implement Simple perception, Perception learning algorithm, Modified Perception learning algorithm, and Adaptive linear combiner, Continuous perception, learning in continuous perception.
- Analyze the limitation of Single layer Perceptron and Develop MLP with 2 hidden layers, Develop Delta learning rule of the output layer and Multilayer feed forward neural network with continuous perceptions.

Course Outcomes:

At the end of the course, the student will develop ability to

- Identity the role of neural networks in engineering.
- Implement the back propagation algorithms.
- Examine the auto associative and bidirectional associative memory applications.
- Apply neural networks to particular applications, and to know what steps to take to improve performance.
- Recognize the knowledge of sufficient theoretical background to be able to reason about the behaviour of neural networks.

MODULE-I Introduction [10 Periods]

Definition of ANN-Biological Neural Networks-Applications of ANN-Typical Architectures- Setting the weights-Common Activation functions-Development of Neural Networks- McCulloch-Pitts Neuron

MODULE – II Simple Neural Nets for Pattern Classification [09 Periods]

General discussion - Hebb net – Perceptron - Adaline – Back propagation neural net- Architecture- Delta Learning Rule Algorithm-Applications

MODULE – III Pattern Association [10 Periods]

Training Algorithm for Pattern Association-Hetero associative memory neural network applications-Auto associative net-Iterative, Auto associative net- Bidirectional Associative Memory-Applications

MODULE – IV Neural Nets Based on Competition [09 Periods]

Fixed Weights Competitve Nets- Kohonen's Self-Organizing Map – applications - Learning Vector Quantization – Applications - Counter Propagation Network- Applications.

MODULE – V Adaptive Resonance Theory and Neocognitron [10 Periods]

Motivation – Basic Architecture- Basic Operation-ART1-ART2Architecture- Algorithm- applications-Analysis Probabilistic Neural Net-Cascade Correlation

Neocognitron: Architecture—Algorithm-Applications, Representation Learning Multi Task earning, Deep Reinforcement Learning

TEXT BOOKS:

- LaureneV. Fausett, ―Fundamentals of Neural Networks-Architectures, Algorithms and Applications‖, Pearson Education, 2011.
- Yegnanarayana, Artificial Neural Networks, Prentice Hall India Learning Private Limited;

REFERENCES:

- Martin T Hagan, Howard B Demuth, Mark H Beale, Neural Network Design – 2nd Edition, Martin Hagan publisher.
- Author: Simon Haykin, Neural Networks : A Comprehensive Foundation – 2nd Edition, Prentice Hall

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2Medium, 1-Weak												
COS	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	2	1						3			
CO2		3	2		3						2	
CO3	1		1									
CO4	1	3		2			2			1		
CO5		1						3				

2021-22 Onwards (MR- 21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech VII Semester		
Code:B0528	SEMANTIC WEB [Professional Elective – II]	L	T	P
Credits: 3		3	-	-

Prerequisites: Web Technologies

Course Objectives:

This course enables the students to learn and understand the fundamental technologies for enabling the envisioned semantic web, study various knowledge representation techniques, make use of development tools and methods for ontology engineering, construct application and services using semantic web technologies and analyze various collaboration networks.

Course Outcomes:

At the end of the course, students will be able to

- **Develop** web applications using semantic techniques.
- **Relate** knowledge representation methods for semantic web.
- **Explain** the key aspects of ontology engineering**.**
- **Design** web services and its applications.
- **Analyze** and build a social network.

MODULE I: World Wide Web [09 Periods]

Web Intelligence - Thinking and Intelligent Web Applications, The Information

Age, The World Wide Web, Limitations of today's Web, The Next Generation Web, Machine Intelligence, Artificial Intelligence.

Web Description - Ontology, Inference Engines, Software Agents, Berners-Lee www, Semantic Road Map, Logic on the semantic Web.

MODULE II: Knowledge Representation for the Semantic Web [10 Periods]

Ontology - Ontologies and their role in the semantic web, Ontologies Languages for the Semantic Web - Resource Description Framework (RDF) / RDF Schema, **Web Languages -** Ontology Web Language (OWL), UML, XML, XML Schema.

MODULE III: Ontology Engineering [10 Periods]

A: Ontology Development - Ontology Engineering, constructing Ontology, Ontology Development Tools, Ontology Methods

B: Ontology Sharing and Merging - Ontology Sharing and Merging, Ontology Libraries and Ontology

mapping, Logic, Rule and Inference Engines.

MODULE IV: Semantic Web Applications, Services and Technology [10 Periods]

Semantic Web Services - Semantic Web applications and services, Semantic Search, e-learning **Semantic Web Applications -** Semantic Bioinformatics, Knowledge Base, XML Based Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods

MODULE V: Social Network Analysis and Semantic Web [09 Periods]

Social Network Analysis - What is social Networks analysis, development of the social networks analysis, Electronic Sources for Network Analysis - Electronic Discussion networks.

Semantic Web - Blogs and Online Communities, Web Based Networks, Building Semantic Web Applications with social network features.

TEXT BOOKS:

- Berners Lee, Gödel and Turing, ―**Thinking on the web**‖, Wiley interscience, 2008.
- Peter Mika, ―. **Social Networks and the Semantic Web**‖, Springer, 2007.

REFERENCES:

- J.Davies, R.Studer,P.Warren, Johri.Wiley & Sons,―**Semantic Web** Technologies, Trends and Research in Ontology Based Systems‖
- Liyang Lu Chapman and Hall, **" Semantic Web and Semantic Web Services**‖, CRC Publishers,(Taylor & Francis Group)

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COS	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1			2		2				3					2	
CO2	2	3		1									2		
CO3			2	3	3								2	1	
CO4			2	2	2				3					2	
CO5	2	3			1								2		

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: B0545	BLOCK CHAIN TECHNOLOGIES	L	T	P
Credits: 3	[Professional Elective – V]	3	-	-

PREREQUISITES

- Knowledge in security and applied cryptography;
- Knowledge in distributed databases

COURSE OBJECTIVES:

- To Introduce block chain technology and Cryptocurrency

COURSE OUTCOMES:

- Learn about research advances related to one of the most popular technological areas today.

MODULE- I

Introduction: Block chain or distributed trust, Protocol, Currency, Cryptocurrency, How a Cryptocurrency works, Crowdfunding

MODULE- II

Extensibility of Blockchain concepts, Digital Identity verification, Block chain Neutrality, Digital art, Blockchain Environment

MODULE- III

Blockchain Science: Gridcoin, Folding coin, Blockchain Genomics, Bitcoin MOOCs

MODULE- IV

Currency, Token, Tokenizing, Campus coin, Coin drop as a strategy for Public adoption, Currency Multiplicity, Demurrage currency

MODULE - V

Technical challenges, Business model challenges, Scandals and Public perception,

Government Regulations

TEXTBOOK:

1. Blockchain Blue print for Economy by Melanie Swan

REFERENCE:

1. Blockchain Basics: A Non-Technical Introduction in 25 Steps 1st Edition, by Daniel Drescher

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes(POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	3	3	3	3	3	3						3	3	3
CO2	3	2	3	2	3							2	3	3	3
CO3	3	3	3	3	3							3	3	3	3
CO4	3	3	3	3	3	3						3	3	3	3
CO5	3	3	3	3	3							3	3	3	3

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: B0532	COMPILER DESIGN	L	T	P
Credits: 3		3	-	-

Prerequisites: Formal Languages and Automata Theory.

Course Objectives:

This course outlines the major concept areas of language translation and various phases of compiler, extend the knowledge of parser by parsing LL parser and LR parser, analyze the intermediate forms and the role of symbol table, classify code optimization techniques and analyze the data flow and develop machine code generation algorithms.

MODULE I: Overview of Compilation [8 Periods]

Introduction, Phases of compiler, Analysis and Synthesis phase, Cousins of compilers

Introduction to Lexical Analyzer - Phases of Compilation – Lexical Analysis, Regular Grammar and regular expression for common programming language features, pass and Phases of translation, interpretation.

Bootstrapping and LEX - Bootstrapping, data structures in compilation – LEX lexical analyzer generator.

MODULE II: Parsing [11 Periods]

Top down parsing - Context free grammars, Backtracking, LL (1), recursive descent parsing, Predictive parsing, preprocessing steps required for predictive parsing.

Bottom up parsing - Shift Reduce parsing, LR and LALR parsing, Error recovery in parsing handling ambiguous grammar, YACC – automatic parser generator.

MODULE III: Intermediate Code Generation and Symbol Table [12 Periods]

A: Intermediate Code Generation - Intermediate forms of source Programs – abstract syntax tree, polish notation and three address codes, attributed grammars, Syntax directed translation, Conversion of popular Programming languages, language Constructs into Intermediate code forms, Type checker.

B: Symbol Table - Symbol table format, organization for block structures languages, hashing, tree structures representation of scope information, Block structures and non block structures. storage allocation: static, Runtime stack and heap storage allocation, storage allocation for arrays, strings and records.

MODULE IV: Code Optimization and Data Flow Analysis [09 Periods]

Code optimization - Consideration for Optimization, Scope of Optimization, local optimization, loop optimization, frequency reduction, folding, DAG representation.

Data flow analysis - Flow graph, data flow equation, global optimization, redundant sub expression elimination, Induction variable elements, Live variable analysis, Copy propagation.

MODULE V: Object Code Generation and Memory Allocation [08 Periods]

Object code generation - Object code forms, machine dependent code optimization. Memory Allocation - Register allocation and assignment, generic code generation algorithms, DAG for register allocation

TEXT BOOKS:

- A.V. Aho, J.D.Ullman, Principles of compiler design, Pearson Education.
- Andrew N. Appel, Modern Compiler Implementation in C, Cambridge University Press.

REFERENCES:

- John R. Levine, Tony Mason, Doug Brown, Lex&yacc‖, O'reilly
- Dick Grune, Henry E. Bal, Cariel T. H. Jacobs, Modern Compiler Design‖, Wiley Dream tech.
- Cooper & Linda,‖ Engineering a Compiler, Elsevier. • Louden Compiler Construction‖, Thomson.

Course Outcomes:

At the end of the course, students will be able to

- Distinguish the various phases of compilation.
- Explain the different types of parsing techniques.
- List the intermediate forms of source programs and organize symbol table.
- Make use of code optimization techniques to reduce the code.
- Build the Object code generation algorithms.

CO- PO Mapping

(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COS	Programme Outcomes(P Os)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		2							1		3	
CO2	3			2	1							
CO3		1			2						3	
CO4	2	1			3							
CO5		1			2						3	

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: B6712	**Machine Learning Techniques Lab CSE (DS)**	**L**	**T**	**P**
Credits: 2		**-**	**1**	**2**

Prerequisites: Computer Programming, Python

Course Objectives: This objective of the course is to provide the students to implement the various supervised and unsupervised learning techniques along with the clustering and classification methods.

Course Outcomes:

- Understand the implementation procedures for the machine learning algorithms.
- Design Java/Python programs for various Learning algorithms.
- Apply appropriate data sets to the Machine Learning algorithms.
- Identify and apply Machine Learning algorithms to solve real world problems.

List of experiments:

1. Implement simple linear regression.
2. Implement the multivariate linear regression.
3. Implement simple logistic regression and multivariate logistics regression.
4. Implement decision trees.
5. Implement a classification algorithm.
6. Implement random forests algorithm.
7. Implement K-means with example.
8. Implement KNN algorithms with example.
9. Implement SVM on any applicable datasets.
10. Implement PCA.
11. Implement Basic Neural Network
12. Implement Boosting ensemble method on a given dataset.

REFERENCE BOOKS

- Willi Richert, Luis Pedro Coelho, ―Building Machine Learning with Python‖, Packt Publishing, 2013.

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak												
COS	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1		2							3			
CO2					3						2	
CO3			1									
CO4				2			2			1		
CO5		1						3				

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: B0549	**Big Data Analytics Lab**	**L**	**T**	**P**
Credits: 2		**-**	**1**	**2**

Prerequisites: NIL

Course Objectives:

The course should enable the students to:

- Optimize business decisions and create competitive advantage with Big data analytics
- Practice java concepts required for developing map reduce programs.
- Impart the architectural concepts of Hadoop and introducing map reduce paradigm.
- Practice programming tools PIG and HIVE in Hadoop eco system.
- Implement best practices for Hadoop development.

Course Outcomes:

- Understand the installation of VMWare
- Understand and apply the Perform setting up and Installing Hadoop in its threeoperating modes.
- Implementing the basic commands of LINUX Operating System
- Implement the file management tasks in Hadoop.
- Understand Map Reduce Paradigm.
- Apply Map Reduce program that mines weather data.
- Implement matrix multiplication with Hadoop MapReduce
- Apply Map Reduce program that makes the dataset to be compressed.
- Understand the installation of PIG.
- Understand Pig Latin scripts sort, group, join, project, and filter your data.
- Implement the Pig Latin scripts in two different modes
- Understand the installation of HIVE
- Apply Hive to create, alter, and drop databases, tables, views, functions, and indexes.

Software Requirement: JDK, Hadoop and R Studio

List of Programs

1. INSTALL VMWARE Installation of VMWare to setup the Hadoop environment and its ecosystems.
2. HADOOP MODES
    a. Perform setting up and Installing Hadoop in its three operating modes.

i. Standalone.
ii. Pseudo distributed.
iii. Fully distributed.

b. Use web based tools to monitor your Hadoop setup.

3. USING LINUX OPERATING SYSTEM Implementing the basic commands of LINUX Operating System – File/Directory creation, deletion, update operations.
4. FILE MANAGEMENT IN HADOOP 6 Implement the following file management tasks in Hadoop:

   i. Adding files and directories
   ii. Retrieving files
   iii. Deleting files Hint: A typical Hadoop workflow creates data files (such as log files) elsewhere and copies them into HDFS using one of the above command line utilities.

5. MAPREDUCE PROGRAM 1 Run a basic word count Map Reduce program to understand Map Reduce Paradigm.
6. MAPREDUCE PROGRAM 2 Write a Map Reduce program that mines weather data. Hint: Weather sensors collecting data every hour at many locations across the globe gather a large volume of log data, which is a good candidate for analysis with Map Reduce, since it is semi structured and record-oriented
7. MAPREDUCE PROGRAM 3 Implement matrix multiplication with Hadoop Map Reduce.
8. PIG LATIN LANGUAGE – PIG Installation of PIG.
9. PIG COMMANDS Write Pig Latin scripts sort, group, join, project, and filter your data.
10. PIG LATIN MODES, PROGRAMS a. Run the Pig Latin Scripts to find Word Count
    a. Run the Pig Latin Scripts to find a max temp for each and every year.
11. HIVE Installation of HIVE.
12. HIVE OPERATIONS Use Hive to create, alter, and drop databases, tables, views, functions, and indexes. Reference Books: Jay Liebowitz, ―Big Data And Business Analytics Laboratory, CRC Press.

References:

1. Jay Liebowitz, ―Big Data and Business Analytics Laboratory, CRC Press

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes(POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1		2							3			1		2	
CO2				2	3		2					1			1
CO3			1					3				3	1		