

**G.Pullaiah College of Engineering and Technology**  
**(Autonomous)**

**(Approved by AICTE | NAAC Accreditation with 'A' Grade | Accredited by NBA (CSE, ECE & EEE) | Permanently Affiliated to JNTUA)**

**Nandikotkur Road, Venkayapalli (V), Kurnool - 518452, Andhra Pradesh**

**BACHELOR OF TECHNOLOGY**

**ACADEMIC REGULATIONS**  
**GPCET - R19**

**B.Tech Regular Four Year Degree Programme**  
**(for the batches admitted from the academic year 2019- 2020)**  
**&**  
**B.Tech (Lateral Entry Scheme)**  
**(for the batches admitted from the academic year 2020 - 2021)**

## Preliminary Definitions and Nomenclature

**AICTE:** Means All India Council for Technical Education, New Delhi.

**Autonomous Institute:** Means an institute designated as Autonomous by University Grants Commission(UGC), New Delhi in concurrence with affiliating University (Jawaharlal Nehru Technological University Ananthapur).

**Academic Autonomy:** Means freedom to an institute in all aspects of conducting its academic programs, granted by UGC for Promoting Excellence.

**Academic Council:** The Academic Council is the highest academic body of the institute and is responsible for the maintenance of standards of instruction, education and examination within the institute. Academic Council is an authority as per UGC regulations and it has the right to take decisions on all academic matters including academic research.

**Academic Year:** It is the period necessary to complete an actual course of study within a year. It comprises two main semesters i.e., (one odd and one even).

**Branch:** Means specialization in a program like B.Tech degree program in Civil Engineering, B.Tech degree program in Computer Science and Engineering etc.

**Board of Studies (BOS):** BOS is an authority as defined in UGC regulations, constituted by Head of the Organization for each of the departments separately. They are responsible for curriculum design and updation in respect of all the programs offered by a department.

**Backlog Course:** A course is considered to be a backlog course, if the student has obtained a failure grade in that course.

**Basic Sciences:** The courses offered in the areas of Mathematics, Physics, Chemistry etc., are considered to be foundational in nature.

**Commission:** Means University Grants Commission (UGC), New Delhi.

**Choice Based Credit System:** The credit-based semester system is one which provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching along with provision of choice for the student in the course selection.

**Certificate Course:** It is a course that makes a student to have hands-on expertise and skills required for holistic development in a specific area/field.

**Compulsory course:** Course required to be undertaken for the award of the degree as per the program.

**Internal Examination:** It is an examination conducted towards sessional assessment.

**Core:** The courses that are essential constituents of each engineering discipline are categorized as professional core courses for that discipline.

**Course:** A course is a subject offered by a department for learning in a particular semester.

**Course Outcomes:** The essential skills that need to be acquired by every student through a course.

**Credit:** A credit is a unit that gives weight to the value, level or time requirements of an academic course. The number of 'Contact Hours' in a week of a particular course determines its credit value. One credit is equivalent to one lecture/tutorial hour per week.

**Credit point:** It is the product of grade point and number of credits for a course.

**Cumulative Grade Point Average (CGPA):** It is a measure of cumulative performance of a student overall the completed semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to two decimal places.

**Curriculum:** Curriculum incorporates the planned interaction of students with instructional content, materials, resources, and processes for evaluating the attainment of Program Educational Objectives.

**Department:** An academic entity that conducts relevant curricular and co-curricular activities, involving both teaching and non-teaching staff, and other resources in the process of study for a degree.

**Detention in a Course:** Student who does not obtain minimum prescribed attendance in a course shall be detained in that particular course.

**Elective Course:** A course that can be chosen from a set of courses. An elective can be Professional Elective and/or Open Elective.

**Evaluation:** Evaluation is the process of judging the academic performance of the student in her/his courses. It is done through a combination of continuous internal examinations and semester end examinations.

**Grade:** It is an index of the performance of the students in a said course. Grades are indicated by alphabets.

**Grade Point:** It is a numerical weight allotted to each letter grade on a 10 - point scale.

**Institute:** Means G.Pullaiah College of Engineering and Technology, Kurnool unless indicated otherwise by the context.

**Massive Open Online Courses (MOOC):** MOOC courses inculcate the habit of self-learning. MOOC courses would be additional choices in all the elective group courses.

**Minor:** Minor are coherent sequences of courses which may be taken in addition to the courses required for the B.Tech degree.

**Pre-requisite:** A specific course or subject, the knowledge of which is required to complete before student register another course at the next grade level.

**Professional Elective:** It indicates a course that is discipline centric. An appropriate choice of minimum number of such electives as specified in the program will lead to a degree with specialization.

**Program:** Means, UG degree program: Bachelor of Technology (B.Tech); PG degree program: Master of Technology (M.Tech) / Master of Business Administration (MBA).

**Program Educational Objectives:** The broad career, professional and personal goals that every student will achieve through a strategic and sequential action plan.

**Project work:** It is a design or research-based work to be taken up by a student during his/her final year to achieve a particular aim. It is a credit-based course and is to be planned carefully by the student.

**Registration:** Process of enrolling into a set of courses in a semester of a program.

**Regulations:** The regulations, common to all B.Tech programs offered by Institute, are designated as “GPCET Regulations - R18” and are binding on all the stakeholders.

**Semester:** It is a period of study consisting of 16 to 18 weeks of academic work equivalent to normally 90 working days. Odd semester commences usually in July and even semester in December of every year.

**Semester End Examinations:** It is an examination conducted for all courses offered in a semester at the end of the semester.

**Student Outcomes:** The essential skill sets that need to be acquired by every student during her/his program of study. These skill sets are in the areas of employability, entrepreneurial, social and behavioural.

**University:** Means Jawaharlal Nehru Technological University Ananthapur (JNTUA), Ananthapuramu.

# **G. Pullaiah College of Engineering and Technology (Autonomous)**

## **Academic Regulations**

**Regulations for Four Year Bachelor of Technology (B.Tech) Degree programme for the batches  
admitted from the academic year 2019-20**

**&**

**For B.Tech Lateral Entry batches admitted from the academic year 2020 -2021**

### **1. Award of B.Tech. Degree**

A student will be declared eligible for the award of the B.Tech. degree if he/she fulfils the following academic regulations:

- i. Pursues a course of study for not less than four academic years and in not more than eight academic years. However, for the students availing Gap year facility this period shall be extended by two years at the most and these two years would not be counted in the maximum time permitted for graduation.
  - ii. Registers for 160 credits and secures all 160 credits.
  - iii. The student will be eligible to get Under graduate degree with honours or additional minor engineering if he/she completes an additional 20 credits
  - iv. A student will be permitted to register either for Honours degree or additional minor engineering but not both.
2. Students, who fail to fulfill all the academic requirements for the award of the degree within eight academic years from the year of their admission, shall forfeit their seat in B.Tech. course and their admission stands cancelled.

### **3. Courses of study**

The following courses of study are offered at present as specializations for the B. Tech. course

<b>S.No.</b>	<b>Name of the Branch</b>	<b>Branch Code</b>
1.	Civil Engineering	01
2.	Electrical and Electronics Engineering	02
3.	Mechanical Engineering	03
4.	Electronics and Communication Engineering	04
5.	Computer Science and Engineering	05

### **4. Credits:**

- i. *Credit*: A unit by which the course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching (Lecture) or two hours of practical work/field work per week.
- ii. *Academic Year*: Two consecutive (one odd + one even) semesters constitute one academic year.
- iii. *Choice Based Credit System (CBCS)*: The CBCS provides choice for students to select from the prescribed courses.

iv. Each course is assigned certain number of credits based on following

	Semester	
	Periods / Week	Credits
Theory	03	03
Tutorial	01	01
Practical	03	1.5
Mini project/Internship	04	02
Project work Phase I/Phase II	04/16	02/08

## 5. Course Structure

Every course of the B.Tech program will be placed in one of the 8 categories with minimum credits as listed below.

S.No.	Category	Category Description	Abbreviated Category	Credits
1	Basic Sciences	Basic Science Courses	BS	21
2	Mandatory Courses	Mandatory Courses [Environmental Sciences, Induction training, Indian Constitution, Essence of Indian Traditional Knowledge] (Non-Credit)	MC	0
3	Engineering Sciences	Engineering Science Courses including workshop, drawing, basics of electrical/mechanical/computer etc.	ES	18
4	Professional Core	Professional core courses	PC	71
5	Professional Electives	Professional Elective Courses relevant to chosen specialization/branch	PE	12
6	Open Electives	Open Subjects-Electives from other technical and / or emerging subjects	OE	12
7	Humanities & Social Sciences	Humanities and Social Sciences including Management courses	HS	13
8	Projects	Project work, Seminar and Internship in industry or elsewhere	PR	13
	Total			160

## 6. Weightage for course evaluation

### Course Pattern

- ❖ The entire course of study is for four academic years. Semester pattern shall be followed in all years.
- ❖ A student eligible to appear for the end examination in a subject, but absent or has failed in the end examination may appear for that subject at the next supplementary examination when offered.
- ❖ When a student is detained due to lack of credits/shortage of attendance he/she may be re-admitted when the semester is offered after fulfillment of academic regulations. In such case, he/she shall be in the academic regulations into which he/she is readmitted.

## **Evaluation Process**

The performance of a student in each semester shall be evaluated subject wise with a maximum of 100 marks for theory and 100 marks for practical subject. In addition, Project Work Phase-1, Socially Relevant projects and Internships are evaluated for 100 marks each and Project Work Phase- 2 shall be evaluated for 200 marks.

- ❖ For theory subjects the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End-Examination.
- ❖ For practical subjects the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End- Examination.

### **Internal Examinations:**

- i. For theory subjects, during the semester, there shall be two midterm examinations. Each midterm examination consists of objective paper for 10 marks and subjective paper for 20 marks with duration of 1 hour 50 minutes (20 minutes for objective and 90 minutes for subjective paper)

Objective paper shall be for 10 marks. Subjective paper shall contain 5 questions of which a student has to answer 3 questions evaluated\* for 20 marks

\*Note: The subjective paper shall contain 5 questions of equal weightage of 10 marks and the marks obtained for 3 questions shall be condensed to 20 marks, any fraction shall be rounded off to the next higher mark.

If the student is absent for the internal examination, no re-exam shall be conducted and internal marks for that examination shall be considered as zero.

First midterm examination shall be conducted for I, II units of syllabus and second midterm examination shall be conducted for III, IV and V units.

Final Internal marks shall be arrived at by considering the marks secured by the student in both the mid examinations with 80% weightage to the better mid exam and 20% to the other.

### **End Examinations:**

End examination of theory subjects shall have the following pattern:

There shall be 6 questions and all questions are compulsory. Question 1 shall contain 10 compulsory short answer questions for a total of 20 marks such that each question carries 2 marks. There shall be 2 short answer questions from each unit. In each of the questions from 2 to 6, there shall be either/or type questions of 10 marks each. Student shall answer any one of them. Each of these questions from 2 to 6 shall cover one unit of the syllabus.

End examination of theory subjects consisting of two parts of different subjects, for eg: Electrical & Mechanical Technology, shall have the following pattern:

Question paper shall be in two parts viz., Part A and Part B with equal Weightage. In each part, there shall be 3 either-or type questions for 12, 12 and 11 marks.

**Note:** The answers for Part A and Part B shall be written in two separate answer books.

For practical subjects there shall be a continuous evaluation during the semester for 30 sessional marks and end examination shall be for 70 marks. Day-to-day work in the laboratory shall be evaluated for 30 marks by the concerned laboratory teacher based on the regularity/record/viva. The end examination shall be conducted by the concerned laboratory teacher and senior expert in the same subject of the department.

In a practical subject consisting of two parts (Eg: Electrical & Mechanical Lab), the end examination shall be conducted for 35 marks in each part. Internal examination shall be evaluated as above for 30 marks in each part and final internal marks shall be arrived by considering the average of marks obtained in two parts.

There shall be mandatory courses with zero credits. There shall be no external examination. However, attendance in the audit course shall be considered while calculating aggregate attendance and student shall be declared to have passed the mandatory course only when he/she secures 40% or more in the internal examinations. In case, the student fails, a re-examination shall be conducted for failed candidates every six months/semester at a mutually convenient date of college/student satisfying the conditions mentioned in item 1 & 2 of the regulations.

For the subject having design and/or drawing, such as Engineering Drawing, the distribution shall be 30 marks for internal evaluation and 70 marks for end examination.

Day-to-day work shall be evaluated for 10 marks by the concerned subject teacher based on the reports/submissions prepared in the class. And there shall be two midterm examinations in a semester for duration of 2 hours each for 30 marks with consideration of 80% weightage to the better mid exam and 20% to the other for the finalization of Internal marks. The subjective paper shall contain 5 questions of equal weightage of 10 marks and the marks obtained for 3 questions shall be condensed to 20 marks, any fraction (0.5 & above) shall be rounded off to the next higher mark. There shall be no objective paper in internal examination. The sum of day to day evaluation and the internal test marks will be the final sessional marks for the subject.

In the end examination pattern for Engineering Drawing there shall be 5 questions, either/or type, of 14 marks each. There shall be no objective type questions in the end examination. However, the end examination pattern for other subjects related to design/drawing is mentioned along with the syllabus.

There shall be two comprehensive assessments, one at the end of IV Semester and the other at the end of VI Semester, with 100 objective questions for 100 marks on the subjects studied in the respective years. A student shall acquire 1 credit assigned to each of the comprehensive online examination when he/she secures 40% or more marks. In case, if a student fails in comprehensive online examination, he/she shall reappear/re-register by following a similar procedure adopted for the lab examinations.

There shall be an Open Elective/**Choice Based Credit Course (CBCC)** from V Semester, where in the students have to choose an elective offered by various departments including his/her own department.

**Minor in a discipline** (Minor degree/programme) concept is introduced in the curriculum for all conventional B. Tech programmes in which it offers a major. The main objective of Minor in a discipline is to provide additional learning opportunities for academically motivated students and it is an optional feature of the B. Tech. programme. In order to earn a Minor in a discipline a student has to earn 20 extra credits by studying four theory subjects and a minor discipline project.



- a. Students who have a CGPA 8.5 (for SC/ST students CGPA 8.0) or above (up to II year-I semester) and without any backlog subjects will be permitted to register for Minor discipline programme. An SGPA and CGPA of 8.0 has to be maintained in the subsequent semesters without any backlog subjects in order to keep the Minor discipline registration active else Minor discipline registration will be cancelled.
- b. Students aspiring for a Minor must register from **third year first** semester onwards and must opt for a Minor in a discipline other than the discipline he/she is registered in. However, Minor discipline registrations are not allowed in the **Fourth** year.
- c. Students are not allowed to register and pursue more than two subjects in any semester. Students may register for minor discipline project from **third year first** semester onwards and may complete the same before **fourth year second** semester.
- d. Each department enlisted a set of subjects from its curriculum which are core for the discipline without any prerequisites. The Evaluation pattern of theory subjects and minor discipline project work will be similar to the regular programme evaluation. The minor discipline project shall be evaluated by the committee consisting of Head of the Department along with the two senior faculty members of the department.
- e. Students are not allowed to pursue minor discipline programme subjects under Self study and/or MOOCs manner.
- f. Student may enlist their choices of Minor discipline programmes in order of preference, to which they wish to join. It will not be permissible to alter the choices after the application has been submitted. However, students are allowed to opt for only one Minor discipline programme in the order of preference given by the student.
- g. Minimum strength for offering Minor in a discipline is considered as One-Fifth (i.e., 20% of the class) of the class size and Maximum size would be Four-Fifth of Class size (i.e., 80% of the class).
- h. Completion of a Minor discipline programme requires no addition of time to the regular Four year Bachelors' programme. That is, Minor discipline programme should be completed by the end of final year B. Tech. program along with the major discipline.
- i. The Concerned Head of the department will arrange separate course/class work and time table of the various Minor programmes. Attendance regulations for these Minor discipline programmes will be as per regular courses.
- j. A Student registered for Minor in a discipline and pass in all subjects that constitute the requirement for the Minor discipline programme. No class/division (i.e., second class, first class and distinction etc.) shall be awarded for Minor discipline programme.
- k. This Minor in a discipline will be mentioned in the degree certificate as Bachelor of Technology in XXX with Minor in YYY. For example, Bachelor of Technology in **Computer Science & Engineering** with Minor in **Electronics & Communication Engineering**. The fact will also be reflected in the transcripts, along with the list of courses and a project taken for Minor programme with CGPA mentioned separately.

#### **Honors degree in a discipline:**

This concept is introduced in the curriculum for all conventional B. Tech. programmes. The main objective of Honors degree in a discipline is to provide additional learning opportunities for academically motivated students and it is an optional feature of the B. Tech. programme. In order to earn a Honors degree in his/her discipline, a student has to earn 20 extra credits by studying five advanced courses for 15 credits and by carrying out a mini project for 5 credits in the concerned branch of Engineering. In place of advanced courses, he/she can study equivalent MOOC courses available under SWAYAM platform, as decided by the University from time to time. The Evaluation pattern of theory subjects will be similar to the regular programme evaluation. The mini project shall be evaluated by the committee consisting of Head of the department, Supervisor and External examiner. Students aspiring for Honors degree must register from V semester onwards. However, Honors degree registrations are not

allowed before V semester and after VI semester. Student may register for mini project from V semester onwards and complete the same before VIII semester after completing at least two advanced courses or equivalent.

**Procedure for Conduct and Evaluation of Honors degree Mini project:**

- ❖ Out of a total of 100 marks for the Mini project, 30 marks shall be for Internal Evaluation and 70 marks for the End Semester Examination (Viva-voce). The Viva-Voce shall be conducted by a committee consisting of HOD, Project Supervisor and an External Examiner nominated by the University. The evaluation of project work shall be conducted at the end of the VIII semester. The Internal Evaluation shall be made by the departmental committee (Head of the Department and one senior faculty member of the Department and Supervisor).

Students having a CGPA of 8.0 (for SC/ST students CGPA of 7.5) or above up to II year-I semester and without any backlog subjects will be permitted to register for degree with Honors. An SGPA and CGPA of 7.5 (for SC/ST students CGPA of 7.0) has to be maintained in the subsequent semesters without any backlog subjects in order to keep the degree with Honors registration live or else it will be cancelled.

A Socially relevant Project is introduced in IV & V/VI semesters for 1 credit in each semester. The student has to work on any socially relevant project and submit a report for evaluation. This shall be evaluated for 100 marks in each of the above semesters by a committee consisting of Head of the department, Project mentor and one senior faculty member of the department. A student shall acquire 1 credit assigned, when he/she secures 40% or more marks for the total of 100 marks. In case, if a student fails, he/she shall resubmit the report. There shall be no external evaluation.

An Internship/Mini Project is introduced for 2 credits in the curriculum. The students need to take up the Internship during the break of end of VI Semester for a period of four weeks. The students who have not taken up the Internship may take up the Mini Project during the VII semester. The student who has taken up Internship shall submit a technical report along with internship certificate from the Internship organization in order to obtain the 2 credits. The organization in which the student wishes to carry out Internship need to be approved by Internal Department Committee comprising of Head of Department and 2 senior faculty. The evaluation of Mini Project shall be conducted at the end of the VII semester. The Internal Evaluation shall be made by the departmental committee (Head of the Department, two senior faculty members of the department and Supervisor), on the basis of project submitted by the student.

B. Tech Civil Engineering students need to take up the Mini project on Water Resource Engineering during the break of end of VI Semester for a period of four weeks for 2 credits. This shall be evaluated at the end of IV Year by a committee consisting of Head of Civil Engineering Department along with two senior faculty members of the department

**Procedure for Conduct and Evaluation of Project I:**

There shall be a presentation of Abstract of the main project in the VII Semester. After selecting the specific topic, the student shall collect the information and prepare a report, showing his/her understanding of the topic and submit the same to the department before presentation. The report and the presentation shall be evaluated by the departmental committee consisting of Head of the Department, Project supervisor and a senior faculty member. It shall be evaluated for 100 marks. A student shall acquire 2 credits assigned to the Project 1, when he/she secures 40% or more marks for the total of 100 marks. The Project 1 shall be evaluated at the end of VII semester by the department committee. There shall be no external evaluation for Project I. In

case, if a student fails in Project I, a re examination shall be conducted within a month. In case if he/she fails in the re examination also, he/she shall not be permitted to register for Project II. Further, such students shall reappear as and when VII semester supplementary examinations are conducted.

#### Procedure for Conduct and Evaluation of Project II:

Out of a total of 200 marks for the Project stage - II, 60 marks shall be for Internal Evaluation and 140 marks for the End Semester Examination (Viva-voce). The Viva-Voce shall be conducted by a committee consisting of HOD, Project Supervisor and an External Examiner. Project work shall start in VII semester and shall continue in the VIII semester. The evaluation of project work shall be conducted at the end of the VIII semester. The Internal Evaluation shall be made by the departmental committee (Head of the Department, two senior faculty members of the department and Supervisor), on the basis of two seminars given by each student on the topic of his/her project.

### 7. Attendance Requirements:

- ❖ A student shall be eligible to appear for University examinations if he/she acquires a minimum of 75% of attendance in aggregate of all the subjects in a semester.
- ❖ Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the College Academic Committee.
- ❖ Shortage of Attendance below 65% in aggregate shall in NO case be condoned.
- ❖ Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examination of that class and their registration shall stand cancelled.
- ❖ A student will not be promoted to the next semester unless he satisfies the attendance requirements of the present semester. They may seek readmission for that semester when offered next.

### 8. Minimum Academic Requirements:

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no.7

A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory, practical, design, drawing subject or project if he secures not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the internal evaluation and end examination taken together. In case of audit courses and technical seminar & comprehensive viva – voce he/she should secure 40% of the total marks.

A student shall be promoted from II to III year only if he/she fulfils the academic requirement of securing 40% of the credits in the subjects that have been studied up to III Semester from the following examinations.

One regular and two supplementary examinations of I Semester. One regular and one supplementary examination of II Semester. One regular examination of III semester.

A student shall be promoted from III year to IV year only if he/she fulfils the academic requirements of securing 40% of the credits in the subjects that have been studied up to V semester from the following examinations, irrespective of whether the candidate takes the end examination or not as per the normal course of study.

One regular and four supplementary examinations of I Semester.

One regular and three supplementary examinations of II Semester.  
 One regular and two supplementary examinations of III Semester.  
 One regular and one supplementary examinations of IV Semester.  
 One regular examination of V Semester.

And in case if student is detained for want of credits for particular academic year by sections 8.2 and 8.3 above, the student may make up the credits through supplementary examinations and only after securing the required credits he/she shall be permitted to join in the V Semester or VII Semester as the case may be.

A student shall register and put up minimum attendance in all 160 credits and earn all the 160 credits. Marks obtained in all 160 credits shall be considered for the calculation of aggregate percentage of marks obtained.

Students who fail to earn 160 credits as indicated in the course structure within eight academic years from the year of their admission shall forfeit their seat in B.Tech. course and their admission shall stand cancelled.

#### 9. Course Pattern:

- (i) A student eligible to appear for the end examination in a subject, but absent or has failed in the end examination may appear for that subject at the next supplementary examination when offered.

When a student is detained due to lack of credits/shortage of attendance he/she may be re-admitted when the semester is offered after fulfillment of academic regulations. In such case, he/she shall be in the academic regulations into which he/she is readmitted.

- (ii) **With-holding of Results:**

If any case of indiscipline or malpractice is pending against candidate, the result of the candidate shall be with held and he/she will not be allowed/promoted into the next higher semester. The issue of awarding degree is liable to be withheld in such cases.

#### (iii) Grading

After each subject is evaluated for 100 marks, the marks obtained in each subject will be converted to a corresponding letter grade as given below, depending on the range in which the marks obtained by the student fall.

**Table – Conversion into Grades and Grade Points assigned**

Range in which the marks in the subject fall	Grade	Grade points Assigned
≥ 90	S (Superior)	10
80-89	A (Excellent)	9
70-79	B (Very Good)	8
60-69	C (Good)	7
50-59	D (Average)	6
40-49	E (Below Average)	4
< 40	F (Fail)	0
Absent	Ab (Absent)	0

A student obtaining Grade F shall be considered failed and will be required to reappear for that subject when the next supplementary examination offered. Same is the case with a student who obtains 'Ab' in end examination.

For **audit** courses "Satisfactory" or "Unsatisfactory" shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.

#### 10. Semester Grade Point Average (SGPA) and Cumulative Grade Point Average(CGPA):

- (i) The Semester Grade Point Average (SGPA) is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.,

$$SGPA = \frac{\sum_{i=1}^n C_i \times GP_i}{\sum_{i=1}^n C_i}$$

where,  $C_i$  is the number of credits of the  $i^{th}$  subject and  $GP_i$  is the grade point scored by the student in the  $i^{th}$  course.

- (ii) The Cumulative Grade Point Average (CGPA) will be computed in the same manner taking into account all the courses undergone by a student over all the semesters of a program, i.e.,

$$CGPA = \frac{\sum_{j=1}^m SGPA_j \times TC_j}{\sum_{j=1}^m TC_j}$$

where "SGPA<sub>j</sub>" is the SGPA of the  $j^{th}$  semester and  $TC_j$  is the total number of credits in that semester.

- (iii) Both SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

- (iv) While computing the SGPA the subjects in which the student is awarded Zero grade points will also be included.

- (v) *Grade Point*: It is a numerical weight allotted to each letter grade on a 10-point scale.

- (vi) *Letter Grade*: It is an index of the performance of students in a said course. Grades are denoted by letters S, A, B, C, D, E and F.

#### 11. Award of Class:

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of B. Tech. degree he shall be placed in one of the following four classes.

Class Awarded	CGPA Secured
First Class with Distinction	$\geq 7.5$
First Class	$\geq 6.5 < 7.5$
Second Class	$\geq 5.5 < 6.5$
Pass Class	$\geq 4.0 < 5.5$

## **12. Gap Year:**

Gap year concept of Student Entrepreneur in Residence shall be introduced and outstanding students who wish to pursue entrepreneurship are allowed to take a break of one year at any time after II year to pursue entrepreneurship full time. This period may be extended to two years at the most and these two years would not be counted for the time for the maximum time for graduation. An evaluation committee shall be constituted by the College to evaluate the proposal submitted by the student and the committee shall decide whether or not to permit the student(s) to avail the Gap Year.

## **13. Transitory Regulations:**

Discontinued, detained, or failed candidates are eligible for readmission as and when the semester is offered after fulfillment of academic regulations. Candidates who have been detained for want of attendance or not fulfilled academic requirements or who have failed after having undergone the course in earlier regulations or have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same or equivalent subjects as and when subjects are offered, and they will be in the academic regulations into which they getreadmitted.

Candidates who were permitted with Gap Year shall be eligible for rejoining into the succeeding year of their B. Tech from the date of commencement of class work, and they will be in the academic regulations into which the candidate is presently rejoining.

## **14. Minimum Instruction Days:**

The minimum instruction days including exams for each semester shall be 90 days.

## **15. Medium of Instruction**

The Medium of Instruction is **English** for all courses, laboratories, internal and external examinations, Comprehensive Viva-Voce and project reports.

## **16. Rules of Discipline**

- (i) Use of mobile phones with camera, in the campus is strictly prohibited.
- (ii) Students shall behave and conduct themselves in a dignified and courteous manner in the campus/Hostels.
- (iii) Students shall not bring outsiders to the institution or hostels.
- (iv) Students shall not steal, deface, damage or cause any loss to the institution property.
- (v) Students shall not collect money either by request or coercion from others within the campus or hostels.
- (vi) Students shall not resort to plagiarism of any nature/extent. Use of material, ideas, figures, code or data without appropriate acknowledgement or permission of the original source shall be treated as cases of plagiarism. Submission of material, verbatim or paraphrased, that is authored by another person or published earlier by oneself shall also be considered as cases of plagiarism.
- (vii) Use of vehicles by the students inside the campus is prohibited.
- (viii) Any conduct which leads to lowering of the esteem of the organization is prohibited.

(ix) Any student exhibiting prohibited behaviour shall be suspended from the institute. The period of suspension and punishment shall be clearly communicated to the student.

The student shall lose the attendance for the suspended period

(x) Dress Code

Boys : All the boy students should wear formal dresses. Wearing T-shirts and other informal dresses in the campus is strictly prohibited.

Girls : All the girls students shall wear saree/chudidhar with dupatta

#### **17. Punishments for Malpractice cases – Guidelines**

The examinations committee may take the following guidelines into consideration while dealing with the suspected cases of malpractice reported by the invigilators/squad members etc; during end examinations. The punishment may be more severe or less severe depending on the merits of the individual cases.

S.No.	Nature of Malpractice/Improper conduct	Punishment
1	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cellphones, pager, palm computers or any other form of material concerned with or related to the course of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the student 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.
2	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.
3	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that course and all other courses the candidate has appeared including practical examinations and project work of that semester/year examinations.
4	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 other student 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 shall be registered against him.
5	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the course of the examination (theory or practical) in which the student is appearing.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses including practical examinations and project work of that

		semester/year.
6	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 including practical examinations and project work of that semester/year.
7	Smuggles in the Answer book or takes out or arranges to send out the question paper during the examination or answer book during or after the examination	Expulsion from the examination hall and cancellation of performance in that course and all the other courses including practical examinations and project work of that semester/year. The student is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeit of seat.
8	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury 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-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that course and all other courses of that semester/year. The students also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case shall be registered against them.
9	Leaves the exam hall taking away answer script or intentionally tears up the script or any part there of inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses including practical examinations and project work of that semester/year. The candidate is also debarred for two consecutive semesters from classwork and all end examinations. The continuation of the course by the



		candidate is subject to the academic regulations in connection with forfeiture of seat.
10	Possesses 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 including practical examinations and project work of that semester/year. The student is also debarred and forfeits the seat.
11	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in S.No7 to S.No 9.	For Student of the college: Expulsion from the examination hall and cancellation of the performance in that course and all other courses including practical examinations and project work of that semester/year. 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 shall be registered against them.
12	Impersonates any other student in connection with the examination	The student who has impersonated shall be expelled from examination hall. The student is debarred from writing the remaining exams, and rusticated from the college for one academic year during which period the student will not be permitted to write any exam. If the imposter is an outsider, he will be handed over to the police and a case shall be registered against him. The performance of the original student who has been impersonated, shall be cancelled in all the courses of the examination including practicals and project work of that semester/year. The student is rusticated from the college for two consecutive years during which period the student will not be permitted to write any exam. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat.
13	If any malpractice is detected which is not covered in the above S.No 1 to S.No 12 items, it shall be reported to the college academic council for further action and award suitable punishment.	
14	Malpractice cases identified during sessional examinations will be reported to the examination committee nominated by Academic council to award suitable punishment.	

**ACADEMIC REGULATIONS FOR B. TECH.(R19)  
(LATERAL ENTRY SCHEME)**

**(Effective for the students getting admitted into II year through Lateral Entry Scheme from the Academic Year 2020-2021 and onwards)**

**1. Award of B.Tech. Degree**

A student admitted in Lateral Entry Scheme (LES) will be declared eligible for the award of the B.Tech degree if he fulfills the following academic regulations:

- a) Pursues a course of study for not less than three academic years and in not more than six academic years.
- b) Registers for 120.5 credits and secures all 120.5 credits from II to IV year of Regular B. Tech. program.
- (a) Students, who fail to fulfill the requirement for the award of the degree in six consecutive academic years from the year of admission, shall forfeit their seat.
- (b) The regulations 3 to 7 are to be adopted as that of B. Tech.(Regular).

**2. Minimum Academic Requirements:**

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no.7

- i. A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory, practical, design, drawing subject or project if he secures not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the internal evaluation and end examination taken together. For the Seminar & Comprehensive viva-voce he should secure 40% in the internal evaluation.
- ii. A student shall be promoted from third year to fourth year only if he fulfills the academic requirements of 40% credits obtained till III-I from the following examinations, irrespective of whether the candidate takes the end examination or not as per the normal course of study.
  - One regular and Two supplementary examinations of III semester.
  - One regular and one supplementary examinations of IV semester.
  - One regular examination of V semester.

And in case if student is already detained for want of credits for particular academic year, the student may make up the credits through supplementary exams of the above exams before the commencement of VII semester class work of next year.

**3. Course Pattern**

- ❖ The entire course of study is three academic years on semester pattern.
- ❖ A student eligible to appear for the end examination in a subject, but absent at it or has failed in the end examination may appear for that subject at the next supplementary examination offered.

- ❖ When a student is detained due to lack of credits/shortage of attendance he may be re-admitted when the semester is offered after fulfillment of academic regulations, he shall be in the academic regulations into which he is readmitted.

**4.** The regulations **9** to **10** are to be adopted as that of B. Tech. (Regular).

**5. Award of Class:**

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of B. Tech. Degree he shall be placed in one of the following four classes:

FirstClass Distinction	with	70% and above	From the aggregate Marks secured for 120.5 Credits (i.e. II year to IV year)
First Class		Below 70% but not less than 60%	
Second Class		Below 60% but not less than 50%	
Pass Class		Below 50% but not less than 40%	

- 6.** The regulations **11** to **17** are to be adopted as that of B. Tech. (Regular). All other regulations as applicable for B. Tech. Four-year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme).



**G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL**

**(An Autonomous Institute affiliated to JNTUA, Ananthapuramu)**

**NAAC Accreditation with 'A' Grade, Permanent Affiliation Status from JNTUA**

**Pasupula Village, Nandikotkur Road, Kurnool – 518002, Andhra Pradesh, India,**

**[www.gpcet.ac.in](http://www.gpcet.ac.in)**

## **CURRICULUM FRAMEWORK**

**UG- BACHELOR OF TECHNOLOGY**

**COMPUTER SCIENCE AND ENGINEERING**

**Under R19 Regulations**

**B. Tech. - Regular Four-Year Degree Program**

**(For batches admitted from the Academic Year 2019 - 2020)**

**&**

**B. Tech. - Lateral Entry Scheme**

**(For batches admitted from the Academic Year 2020 - 2021)**

**G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL**  
**(An Autonomous Institute affiliated to JNTUA, Ananthapuramu)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**PROGRAMME CURRICULUM STRUCTURE UNDER R19 REGULATIONS**

**B. TECH – COMPUTER SCIENCE AND ENGINEERING**

<b>I SEMESTER (I YEAR)</b>									
<b>Course Code</b>	<b>Title of the Course</b>	<b>Category</b>	<b>Periods per Week</b>			<b>Credits</b>	<b>Scheme of Examination Maximum Marks</b>		
			<b>L</b>	<b>T</b>	<b>P</b>		<b>Internal</b>	<b>External</b>	<b>Total</b>
<b>A2002</b>	Mathematics-I	BS	3	1	0	4	30	70	100
<b>A2004</b>	Applied Physics	BS	3	0	0	3	30	70	100
<b>A2501</b>	Computer Programming	ES	3	1	0	4	30	70	100
<b>A2001</b>	Communicative English	HS	2	0	0	2	30	70	100
<b>A2006</b>	Communicative English Laboratory	HS	0	0	3	1.5	30	70	100
<b>A2008</b>	Applied Physics Laboratory	BS	0	0	3	1.5	30	70	100
<b>A2502</b>	Computer Programming Laboratory	ES	0	0	3	1.5	30	70	100
<b>TOTAL</b>			<b>11</b>	<b>02</b>	<b>09</b>	<b>17.5</b>	<b>210</b>	<b>490</b>	<b>700</b>

<b>II SEMESTER (I YEAR)</b>									
<b>Course Code</b>	<b>Title of the Course</b>	<b>Category</b>	<b>Periods per Week</b>			<b>Credits</b>	<b>Scheme of Examination Maximum Marks</b>		
			<b>L</b>	<b>T</b>	<b>P</b>		<b>Internal</b>	<b>External</b>	<b>Total</b>
<b>A2011</b>	Probability & Statistics	BS	3	1	0	4	30	70	100
<b>A2005</b>	Chemistry	BS	3	0	0	3	30	70	100
<b>A2503</b>	Data Structures	ES	3	0	0	3	30	70	100
<b>A2201</b>	Basic Electrical and Electronics Engineering	ES	3	0	0	3	30	70	100
<b>A2301</b>	Engineering Graphics and Computer Aided Drafting	ES	1	0	4	3	30	70	100
<b>A2009</b>	Chemistry Laboratory	BS	0	0	3	1.5	30	70	100
<b>A2504</b>	Data Structures Laboratory	ES	0	0	3	1.5	30	70	100
<b>A2204</b>	Basic Electrical and Electronics Engineering Laboratory	ES	0	0	3	1.5	30	70	100
<b>A2302</b>	Co-Engineering Laboratory	ES	0	0	3	1.5	30	70	100
<b>TOTAL</b>			<b>13</b>	<b>01</b>	<b>17</b>	<b>22</b>	<b>270</b>	<b>630</b>	<b>900</b>

**PROGRAMME CURRICULUM STRUCTURE UNDER R19 REGULATIONS**

**B. TECH – COMPUTER SCIENCE AND ENGINEERING**

III SEMESTER (II YEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A2701	Managerial Economics & Financial Analysis	HS	3	0	0	3	30	70	100
A2505	Object Oriented programming through Java	PC	3	1	0	4	30	70	100
A2506	Database Management System	PC	3	0	0	3	30	70	100
A2507	Software Engineering	PC	3	0	0	3	30	70	100
A2508	Discrete Mathematics	PC	3	0	0	3	30	70	100
A2509	Object Oriented programming through Java Laboratory	PC	0	0	4	2	30	70	100
A2510	Database Management System Laboratory	PC	0	0	3	1.5	30	70	100
A2511	IoT and Robotics Laboratory	PC	0	0	3	1.5	30	70	100
A2016	Quantitative Aptitude and Reasoning – I	BS	1	0	0	1	30	70	100
A2031	Environment Science	MC	2	0	0	0	100*	0	100*
<b>TOTAL</b>			<b>18</b>	<b>01</b>	<b>10</b>	<b>22</b>	<b>270</b>	<b>630</b>	<b>900</b>

IV SEMESTER (II YEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A2541	Formal Language Automata Theory	PC	3	0	0	3	30	70	100
A2512	Web Technologies	PC	3	0	0	3	30	70	100
A2513	Design and Analysis of Algorithms	PC	3	0	0	3	30	70	100
A2514	Operating Systems	PC	3	0	0	3	30	70	100
A2515	Computer Networks	PC	3	0	0	3	30	70	100
A2516	Web Technologies Laboratory	PC	0	0	3	1.5	30	70	100
A2517	Algorithms and Networks Laboratory	PC	0	0	3	1.5	30	70	100
A2518	Operating Systems Laboratory	PC	0	0	3	1.5	30	70	100
A2018	Quantitative Aptitude and Reasoning - II	BS	1	0	0	1	30	70	100
A2519	Socially Relevant Project-I	PW	0	0	2	1	100	0	100
A2520	Comprehensive Assessment-I	PC	0	0	0	1	100	0	100
A2047	Human Values and Professional Ethics	MC	2	0	0	0	100*	0	100*
<b>TOTAL</b>			<b>18</b>	<b>00</b>	<b>11</b>	<b>22.5</b>	<b>470</b>	<b>630</b>	<b>1100</b>

\* The marks for Audit Courses/Mandatory Courses are not considered for calculating SGPA

**PROGRAMME CURRICULUM STRUCTURE UNDER R19 REGULATIONS**

**B. TECH – COMPUTER SCIENCE AND ENGINEERING**

<b>V SEMESTER (III YEAR)</b>									
<b>Course Code</b>	<b>Title of the Course</b>	<b>Category</b>	<b>Periods per Week</b>			<b>Credits</b>	<b>Scheme of Examination Maximum Marks</b>		
			<b>L</b>	<b>T</b>	<b>P</b>		<b>Internal</b>	<b>External</b>	<b>Total</b>
<b>A2521</b>	Cloud Computing	PC	3	1	0	4	30	70	100
<b>A2522</b>	Data Mining	PC	3	0	0	3	30	70	100
<b>A2523</b>	Artificial Intelligence	PC	3	0	0	3	30	70	100
	Professional Elective-I	PE	3	0	0	3	30	70	100
	Open Elective-I	OE	3	0	0	3	30	70	100
<b>A2524</b>	Cloud Computing Laboratory	PC	0	0	3	1.5	30	70	100
<b>A2525</b>	Data Mining Laboratory	PC	0	0	3	1.5	30	70	100
<b>A2526</b>	Artificial Intelligence Laboratory	PC	0	0	2	1	30	70	100
<b>A2527</b>	Socially Relevant Project-II	PW	0	0	2	1	100	0	100
<b>A2034</b>	Gender Sensitization	MC	2	0	0	0	100*	0	100*
<b>TOTAL</b>			<b>17</b>	<b>01</b>	<b>10</b>	<b>21</b>	<b>340</b>	<b>560</b>	<b>900</b>

<b>VI SEMESTER (III YEAR)</b>									
<b>Course Code</b>	<b>Title of the Course</b>	<b>Category</b>	<b>Periods per Week</b>			<b>Credits</b>	<b>Scheme of Examination Maximum Marks</b>		
			<b>L</b>	<b>T</b>	<b>P</b>		<b>Internal</b>	<b>External</b>	<b>Total</b>
<b>A2528</b>	Mobile Application & Development	PC	3	1	0	4	30	70	100
<b>A2529</b>	Machine Learning	PC	3	0	0	3	30	70	100
<b>A2530</b>	Compiler Design	PC	3	0	0	3	30	70	100
	Professional Elective-II	PE	3	0	0	3	30	70	100
	Open Elective-II	OE	3	0	0	3	30	70	100
<b>A2531</b>	Mobile Application & Development Laboratory	PC	0	0	3	1.5	30	70	100
<b>A2532</b>	Machine Learning Laboratory	PC	0	0	3	1.5	30	70	100
<b>A2017</b>	Professional English Communication Skills	PC	0	0	2	1	30	70	100
<b>A2533</b>	Comprehensive Assessment-II	PC	0	0	0	1	100	0	100
<b>A2048</b>	Indian Constitution and Multiculturalism	MC	2	0	0	0	100*	0	100*
<b>TOTAL</b>			<b>17</b>	<b>01</b>	<b>08</b>	<b>21</b>	<b>340</b>	<b>560</b>	<b>900</b>

\* The marks for Audit Courses/Mandatory Courses are not considered for calculating SGPA

**PROGRAMME CURRICULUM STRUCTURE UNDER R19 REGULATIONS**

**B. TECH – COMPUTER SCIENCE AND ENGINEERING**

<b>VII SEMESTER(IVYEAR)</b>									
<b>Code</b>	<b>Course</b>	<b>Category</b>	<b>Periods per Week</b>			<b>Credits</b>	<b>Scheme of Examination Maximum Marks</b>		
			<b>L</b>	<b>T</b>	<b>P</b>		<b>Internal</b>	<b>External</b>	<b>Total</b>
<b>A2534</b>	Natural Language Processing	PC	3	0	0	3	30	70	100
<b>A2535</b>	Software Testing	PC	3	0	0	3	30	70	100
<b>A2536</b>	Cryptography and Network Security	PC	3	0	0	3	30	70	100
<b>A2537</b>	Software Testing Laboratory	PC	0	0	2	1	30	70	100
	Professional Elective - III	PE	3	0	0	3	30	70	100
	Open Elective - III	OE	3	0	0	3	30	70	100
<b>A2538</b>	Mini Project/Internship	PW	0	0	4	2	100	0	100
<b>A2540</b>	Project Work Phase - I	PW	0	0	4	2	100	0	100
<b>TOTAL</b>			<b>15</b>	<b>00</b>	<b>10</b>	<b>20</b>	<b>380</b>	<b>420</b>	<b>800</b>

<b>VIII SEMESTER(IVYEAR)</b>									
<b>Code</b>	<b>Course</b>	<b>Category</b>	<b>Periods per Week</b>			<b>Credits</b>	<b>Scheme of Examination Maximum Marks</b>		
			<b>L</b>	<b>T</b>	<b>P</b>		<b>Internal</b>	<b>External</b>	<b>Total</b>
	Professional Elective - IV	PE	3	0	0	3	30	70	100
	Open Elective - IV	OE	3	0	0	3	30	70	100
<b>A2542</b>	Project Work Phase - II	PW	0	0	16	8	60	140	200
<b>TOTAL</b>			<b>06</b>	<b>00</b>	<b>16</b>	<b>14</b>	<b>120</b>	<b>280</b>	<b>400</b>



**Professional Electives**

<b>Professional Elective – 1</b>	
<b>Course Code</b>	<b>Title of the Course</b>
<b>A2551</b>	Distributed Databases
<b>A2552</b>	Enterprise storage Systems
<b>A2553</b>	TCP/IP Protocol
<b>A2554</b>	Angular
<b>Professional Elective – 2</b>	
<b>Course Code</b>	<b>Title of the Course</b>
<b>A2555</b>	Big Data
<b>A2556</b>	Parallel Algorithms
<b>A2557</b>	Networking Architecture and Design
<b>A2558</b>	Design Patterns
<b>Professional Elective – 3</b>	
<b>Course Code</b>	<b>Title of the Course</b>
<b>A2559</b>	Data visualization techniques
<b>A2560</b>	Adhoc and sensor Networks
<b>A2561</b>	Software Defined Networks
<b>A2562</b>	Virtual Reality
<b>Professional Elective – 4</b>	
<b>Course Code</b>	<b>Title of the Course</b>
<b>A2563</b>	Image processing
<b>A2564</b>	Block Chain Technology
<b>A2565</b>	Devops
<b>A2566</b>	Neural Networks and deep learning

**PROGRAMME CURRICULUM STRUCTURE UNDER R19 REGULATIONS****B. TECH – COMPUTER SCIENCE AND ENGINEERING****Open Electives**

<b>Course Code</b>	<b>Title of the Course</b>	<b>L-T-P</b>	<b>Credits</b>	<b>Offered by</b>
<b>A2181</b>	Basic Civil Engineering	3-0-0	3	CE
<b>A2182</b>	Building Planning and Construction	3-0-0	3	CE
<b>A2183</b>	Disaster Management	3-0-0	3	CE
<b>A2184</b>	Water Resources Conservation	3-0-0	3	CE
<b>A2281</b>	Fundamentals of Electrical Engineering	3-0-0	3	EEE
<b>A2282</b>	Renewable Energy Sources	3-0-0	3	EEE
<b>A2283</b>	Electrical Measuring Instruments	3-0-0	3	EEE
<b>A2381</b>	Optimization Techniques	3-0-0	3	ME
<b>A2382</b>	Mechanical Technology	3-0-0	3	ME
<b>A2383</b>	Introduction to Automobile Systems	3-0-0	3	ME
<b>A2481</b>	Basic Electronics	3-0-0	3	ECE
<b>A2482</b>	Introduction to Communication Systems	3-0-0	3	ECE
<b>A2483</b>	Fundamentals of IoT	3-0-0	3	ECE
<b>A2581</b>	Basic Data Structures	3-0-0	3	CSE
<b>A2582</b>	Fundamentals of DBMS	3-0-0	3	CSE
<b>A2583</b>	Basics of Software Engineering	3-0-0	3	CSE
<b>A2584</b>	Fundamentals of Web Technologies	3-0-0	3	CSE
<b>A2585</b>	Computer Organization and Operating Systems	3-0-0	3	CSE
<b>A2586</b>	Fundamentals of Artificial Intelligence and Machine Learning	3-0-0	3	CSE
<b>A2081</b>	Research Methodology	3-0-0	3	H&S
<b>A2082</b>	Intellectual Property Rights	3-0-0	3	H&S
<b>A2083</b>	National Service Scheme	3-0-0	3	H&S
<b>A2084</b>	Yoga	3-0-0	3	H&S
<b>A2085</b>	Design Thinking	3-0-0	3	H&S
<b>A2086</b>	Management Science	3-0-0	3	H&S
<b>A2087</b>	Entrepreneurship Development	3-0-0	3	H&S

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**PROGRAMME CURRICULUM STRUCTURE UNDER R19 REGULATIONS**

**B. TECH – COMPUTER SCIENCE AND ENGINEERING**

<b>I SEMESTER (I YEAR)</b>									
<b>Course Code</b>	<b>Title of the Course</b>	<b>Category</b>	<b>Periods per Week</b>			<b>Credits</b>	<b>Scheme of Examination Maximum Marks</b>		
			<b>L</b>	<b>T</b>	<b>P</b>		<b>Internal</b>	<b>External</b>	<b>Total</b>
<b>A2002</b>	Mathematics-I	BS	3	1	0	4	30	70	100
<b>A2004</b>	Applied Physics	BS	3	0	0	3	30	70	100
<b>A2501</b>	Computer Programming	ES	3	1	0	4	30	70	100
<b>A2001</b>	Communicative English	HS	2	0	0	2	30	70	100
<b>A2006</b>	Communicative English Laboratory	HS	0	0	3	1.5	30	70	100
<b>A2008</b>	Applied Physics Laboratory	BS	0	0	3	1.5	30	70	100
<b>A2502</b>	Computer Programming Laboratory	ES	0	0	3	1.5	30	70	100
<b>TOTAL</b>			<b>11</b>	<b>02</b>	<b>09</b>	<b>17.5</b>	<b>210</b>	<b>490</b>	<b>700</b>

<b>II SEMESTER (I YEAR)</b>									
<b>Course Code</b>	<b>Title of the Course</b>	<b>Category</b>	<b>Periods per Week</b>			<b>Credits</b>	<b>Scheme of Examination Maximum Marks</b>		
			<b>L</b>	<b>T</b>	<b>P</b>		<b>Internal</b>	<b>External</b>	<b>Total</b>
<b>A2011</b>	Probability & Statistics	BS	3	1	0	4	30	70	100
<b>A2005</b>	Chemistry	BS	3	0	0	3	30	70	100
<b>A2503</b>	Data Structures	ES	3	0	0	3	30	70	100
<b>A2201</b>	Basic Electrical and Electronics Engineering	ES	3	0	0	3	30	70	100
<b>A2301</b>	Engineering Graphics and Computer Aided Drafting	ES	1	0	4	3	30	70	100
<b>A2009</b>	Chemistry Laboratory	BS	0	0	3	1.5	30	70	100
<b>A2504</b>	Data Structures Laboratory	ES	0	0	3	1.5	30	70	100
<b>A2204</b>	Basic Electrical and Electronics Engineering Laboratory	ES	0	0	3	1.5	30	70	100
<b>A2302</b>	Co-Engineering Laboratory	ES	0	0	3	1.5	30	70	100
<b>TOTAL</b>			<b>13</b>	<b>01</b>	<b>17</b>	<b>22</b>	<b>270</b>	<b>630</b>	<b>900</b>

G.PULLAIAH COLLEGE OF ENGINEERING & TECHNOLOGY  
(AUTONOMOUS)  
**Mathematics-I**

<b>Title of the Course :</b>	<b>Mathematics-I</b>				
Branches for which this course is offered:	I.B.Tech I Sem (Common to all)	L	T	P	C
		3	1	0	4

**Course Overview:**

This course offers more advanced topics of mathematics required to analyze the problems in engineering. Topics to be covered in this course include: Solution of system of linear equations, Eigen values and Eigen vectors, Quadratic forms, Functions of single variable, Roll's theorem, legranges mean value theorem, cauchy mean value theorem, multivariable calculus, jacobian, maxima&minima Evaluate the double and Triple integrals and its applicatons, Special functions. The mathematical skills derived from this course provides necessary base to analytical and theoretical concepts occurring in the program

**Course Objectives:**

- To enlighten the concepts of calculus and linear algebra
- To prepare the students with standard concepts and tools in mathematics
- To develop the confidence and ability among the students to handle various real world problems and their applications.

**Course Outcomes :**

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

CO1	Develop the use of matrix algebra techniques that is needed by engineers for practical applications
CO2	Interpret the Eigen values and Eigen vectors of matrix in terms of the transformation it represents in to a matrix Eigen value problem
CO3	Utilize mean value theorems to real life problems
CO4	familiarize with functions of several variables which is useful in optimization
CO5	Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional coordinate systems
CO6	Students will become familiar with 3- dimensional coordinate systems and also learn the utilization of special functions

<b>Course Content:</b>		
<b>Unit-I</b>	<b>Matrix Operations And Solving Systems Of Linear Equations</b>	<b>Lecturer Hours:10Hrs</b>
Rank of a matrix by echelon form, solving system of homogeneous and non-homogeneous equations linear equations. Eigen values and Eigen vectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem, diagonalisation of a matrix,		
<b>Unit-II</b>	<b>Quadratic forms and Mean Value Theorems</b>	<b>Lecturer Hours:8Hrs</b>
Quadratic forms and nature of the quadratic forms, reduction of quadratic form to canonical forms by orthogonal transformation. Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin's theorems with remainders (without proof).		
<b>Unit-III</b>	<b>Multivariable Calculus</b>	<b>Lecturer Hours:8Hrs</b>
Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers with three variables only.		
<b>Unit-IV</b>	<b>Double Integrals</b>	<b>Lecturer Hours:8Hrs</b>
Double integrals, change of variables, change of order of integration, double integration in polar coordinates, areas enclosed by plane curves		
<b>UNIT-V</b>	<b>Multiple Integrals and Special Functions</b>	<b>Lecturer Hours:8Hrs</b>
Evaluation of triple integrals, change of variables between Cartesian, cylindrical and spherical polar co-ordinates, Beta and Gamma functions and their properties, relation between beta and gamma functions.		

#### **Text Books:**

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
2. Engineering Mathematics-I by E. Rukmangadachari, E. Keshava Reddy, Pearson Publications

#### **References:**

1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
3. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers.

**G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY  
(AUTONOMOUS)**

**APPLIED PHYSICS**

Title of the Course	Applied Physics				
Branches for which this course is offered	I B.Tech I Sem (CSE) and I B.Tech II Sem (ECE &EEE)	L	T	P	C
		3	0	0	3

**Course Overview**

There has been an exponential growth of knowledge in the recent past opening up new areas and challenges in the understanding of basic laws of nature. This helped to the discovery of new phenomena in macro, micro and nano scale device technologies. The laws of physics play a key role in the development of science, engineering and technology. Sound knowledge of physical principles is of paramount importance in understanding new discoveries, recent trends and latest developments in the field of engineering. To keep in pace with the recent scientific advancements in the areas of emerging technologies, the syllabi of engineering physics has been thoroughly revised keeping in view of the basic needs of all engineering branches by including the topics like physical optics, properties of dielectric and magnetic materials, electromagnetic theory, fiber optics, semiconductors, superconductivity are introduced. The applications of nanomaterials relevant to engineering branches are to be familiarized.

**Course Objectives**

- To impart knowledge in basic concepts of physical optics along with its engineering applications
- To interpret the significant concepts of dielectric and magnetic materials which leads to potential applications in the emerging micro devices
- To disseminate the basic concepts of electromagnetic waves and its propagation in optical fiber along with its engineering applications
- To analyze the importance of semiconductors in the functioning of electronic devices
- To summarize the properties of superconductors along with their applications
- To familiarize the applications of nanomaterials relevant to engineering branches

**Course Outcomes**

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

CO1	<b>Interpret</b> the properties of light waves and its interaction of energy with the matter
CO2	<b>Explain</b> the principles of physics in dielectrics and magnetic materials
CO3	<b>Apply</b> electromagnetic wave propagation in different guided media
CO4	<b>Calculate</b> conductivity of semiconductors
CO5	<b>Interpret</b> the difference between normal conductor and super conductor
CO6	<b>Demonstrate</b> the application of nanomaterials

Course Content			
Unit-I	Physical Optics	Lecture Hours	8
<p><b>Interference:</b> Superposition principle-Interference of light-Theory of Interference fringes-necessary conditions for Interference -Interference in thin films by reflection -Newton's Rings-Determination of Wavelength-Engineering applications of Interference</p> <p><b>Diffraction</b>-Fraunhofer Diffraction-Single slit Diffraction -Diffraction Grating – Grating Spectrum -Determination of Wavelength-Engineering applications of Diffraction</p> <p><b>Polarization</b>-Polarization by birefringence-Nicol's Prism--Half wave and Quarter wave plate- Engineering applications of Polarization.</p>			
Unit-II	Dielectrics and Magnetics	Lecture Hours	12
<p><b>Dielectrics:</b> Introduction to Dielectrics--Electric polarization-Dielectric polarizability, Susceptibility and Dielectric constant- Types of polarizations-Electronic and ionic polarizations with mathematical Derivations-orientation polarization(quantitative) - Frequency dependence of polarization-Lorentz(internal) field-Claussius -Mosotti equation-Applications of Dielectrics .</p> <p><b>Magnetics:</b>Introduction to Magnetics-Magnetic dipole moment-Magnetization-Magnetic susceptibility and permeability- Origin of permanent magnetic moment -Classification of Magnetic materials-Weiss theory of ferromagnetism (qualitative)-Hysteresis-soft and hard magnetic materials-Ferrites-Applications of magnetic materials.</p>			
Unit-III	Electromagnetic Waves and Fiber Optics	Lecture Hours	10
<p><b>Electromagnetic Waves :</b> Divergence of Electric and Magnetic Fields-Gauss theorem for divergence-Curl of Electric and Magnetic Fields-Stokes theorem for curl- Maxwell's Equations- Electromagnetic wave propagation ( conducting and non-conducting media)-Poynting's Theorem.</p> <p><b>Fiber Optics:</b> Introduction to Optical Fibers-Total Internal Reflection-Critical angle of propagation-Acceptance angle-Numerical Aperture-Classification of fibers based on Refractive index profile, modes - Propagation of electromagnetic wave through optical fiber - importance of V number-Medical Applications-Fiber optic Sensors-Block Diagram of Fiber optic Communication.</p>			
Unit-IV	Semiconductors	Lecture Hours	8
<p>Origin of energy bands - Classification of solids based on energy bands – Intrinsic semi -conductors –carrier concentration of charge carriers-Fermi energy – Electrical conductivity - extrinsic semiconductors - P-type &amp; N-type - carrier concentration of charge carriers - Dependence of Fermi energy on carrier concentration and temperature- Direct and Indirect band gap semiconductors-Hall effect- Hall coefficient - Applications of Hall effect - Drift and Diffusion currents - Continuity equation - Applications of Semiconductors.</p>			
Unit-V	Superconductors and Nano materials	Lecture Hours	8
<p><b>Superconductors:</b>Superconductors-Properties-Critical parameters of Superconductors-Meissner effect-BCS Theory- AC &amp; DC Josephson Effect -Types of Superconductors-SQUID-Applications.</p> <p><b>Nano materials:</b>Introduction-significance of nanoscale-Basic Principles of Nano materials – Properties of nanomaterials: optical, mechanical thermal and magnetic materials-Synthesis of nanomaterials: Top-down and bottom-up approach methods-Ball milling-chemical vapour deposition method-Characterization of nanomaterials: X-ray diffraction method (XRD)-Scanning Electron Microscope (SEM) - Applications of Nano materials.</p>			

Text Books	
1	M.N. Avadhanulu, P.G.Kshirsagar& TVS Arun Murthy “A Text book of

	Engineering Physics”-S.Chand Publications,11 <sup>th</sup> Edition 2019
2	B.K.Pandey an S.Chaturvedi, “Engineering Physics”,Cengage Laerning,2012
<b>References</b>	
1	David J.Griffiths, “Introduction to Electrodynamics”- 4/e, Pearson Education,2014
2	P.K.Palaniswamy, “Engineering Physics” Scitech Publications,2011
3	Shatendra Sharma,Jyotsna Sharma, “Engineering Physics” Pearson Education,2018
4	T Pradeep “A Text book of Nano Science and Nano Technology”- Tata Mc GrawHill 2013



**G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY**  
**(AUTONOMOUS)**  
**COMPUTER PROGRAMMING**

<b>Title of the course:</b>	<b>COMPUTER PROGRAMMING</b>				
<b>Branches for which this course is offered:</b>	B.TECH I SEMESTER (Common to all branches)	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		3	1	0	4

**COURSE OVERVIEW :**

- The course covers the basic programming and demonstrates fundamental programming techniques.
- This course helps the students gaining the knowledge to write python language applications, mathematical and engineering problems.
- Helps to undertake future courses that assume this programming language as a background in computer programming.

**COURSE OBJECTIVES :**

- Understand problem solving techniques using python
- Understand representation of a solution to a problem
- Understand the syntax and semantics of Python programming language
- Understand the significance of Control structures
- Learn the features of Python language

**COURSE OUTCOMES:**

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

CO1	Comprehend the fundamental concepts of computer hardware and problem solving abilities
CO2	Knowledge on the basic concepts of algorithms, flow charts and python programming
CO3	Ability to analyze the procedure for providing input and acquire output from the program along with implementation of control statements
CO4	Interpret the importance of functions in programming
CO5	Analyze and Modularize the problem and its solution by using functions.
CO6	Ability to relate the concepts of strings, files and preprocessors to the real world applications

**Course Content:**

<b>UNIT-I</b>	<b>Introduction to Computers and Problem Solving Strategies</b>	<b>LECTURE HOURS: 8</b>
Introduction, Defining a Computer, History of Computers, Characteristics of Computers, Classification of Computers, Applications of Computers, Components and Functions of a Computer System, Concept of Hardware and Software, Central Processing Unit(CPU),I/O Devices, Computer Memory, Classification of Computer Software, Problem Solving Strategies, Program Design Tools.		

<b>UNIT-II</b>	<b>Basics of Python Programming:</b>	<b>LECTURE HOURS: 10</b>
<p><b>Introduction to computer and python programming,</b> History of python, Basics of python programming, python character set, tokens, data types, output function, multiple assignments, formatting numbers and strings</p> <p><b>Operators and Expressions:</b> Arithmetic Operators, Comparison Operators, Assignment and In-place or Shortcut Operators, Unary Operators, Bitwise Operators, Shift Operators, Logical Operators, Membership Operators, Identity Operators, Operator Precedence and Associativity, Expressions in Python.</p>		
<b>UNIT-III</b>	<b>Decision Control Statements and Sequences</b>	<b>LECTURE HOURS: 12</b>
<p><b>Decision statements:</b> Boolean type, Boolean operators, numbers, strings with Boolean operators, decision making statements, conditional expressions.</p> <p><b>Loop control statements:</b> while loop, range function, for loop, nested loops, break and continue statements.</p> <p><b>Data Structures:</b> Sequence, Lists, Tuples, Sets, Dictionaries. Functional Programming: filter(), map(), reduce() , Python Strings.</p>		
<b>UNIT-IV</b>	<b>Functions and Modules</b>	<b>LECTURE HOURS: 10</b>
<p><b>Functions:</b> Basics of functions, syntax, use of a function, local and global scope of a variable, return statement, recursive functions, lambda functions, parameters and arguments in functions.</p> <p><b>Modules:</b> The from...import statement, Name of Module, Making your own Modules, dir() function, The Python Module, Modules and Namespaces, Packages in Python, Standard Library modules, Globals(), Locals() and Reload(), Function Redefinition.</p>		
<b>UNIT-V</b>	<b>Exception and File handling</b>	<b>LECTURE HOURS: 8</b>
<p><b>Exceptions:</b> Introduction, Handling Exceptions, Multiple Except Blocks, else Clause, Raising Exceptions, finally Block, Re-raising Exception.</p> <p><b>File Handling:</b> Introduction, Need of file handling, text input and output files, seek function, binary files. Extracting data from a file and performing some basic operations on it.</p>		

<b>Text Books:</b>	
1	Programming and problem solving with python by Ashok Namdev Kamthane,Amit Ashok Kamthane., McGraw-Hill Education
2	Python programming using problem solving approach by Reema Thareja, Oxford.

<b>Reference Books:</b>	
1	Martin C.Brown, “The Complete Reference: Python”, McGraw-Hill, 2018.
2	Kenneth A. Lambert, B.L. Juneja, “Fundamentals of Python”, CENGAGE, 2015.
3	Allen B. Downey, “Think Python: How to Think like a Computer Scientist”, 2nd edition, O’Reilly, 2016. Or <a href="http://www.ict.ru.ac.za/Resources/cspw/thinkcs3/thinkcs3.pdf">http://www.ict.ru.ac.za/Resources/cspw/thinkcs3/thinkcs3.pdf</a>

**G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY**  
**(AUTONOMOUS)**  
**COMMUNICATIVE ENGLISH**

Title of the Course:	Communicative English			
Branches for which this course is offered:	I B.Tech I Sem (CIV,MEC & CSE)	T	Tu	C
	I B.Tech II Sem (ECE & EEE)	2	0	2

Course Overview	
<p>The course is designed to train students in receptive (listening and reading) as well as productive and interactive (speaking and writing) skills by incorporating a comprehensive, coherent and integrated approach that improves the learners' ability to effectively use English language in academic/ workplace contexts. The shift is from <i>learning about the language</i> to <i>using the language</i>. On successful completion of the compulsory English language course/s in B.Tech., learners would be confident of appearing for international language qualification/proficiency tests such as IELTS, TOEFL, or BEC, besides being able to express themselves clearly in speech and competently handle the writing tasks and verbal ability component of campus placement tests. Activity based teaching-learning methods would be adopted to ensure that learners would engage in actual use of language both in the classroom and laboratory sessions.</p>	
Course Objectives	
<ul style="list-style-type: none"> <li>➤ Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers</li> <li>➤ Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials</li> <li>➤ Help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations</li> <li>➤ Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information</li> <li>➤ Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing.</li> </ul>	
Course Outcomes:	
After successful completion of the course, the student will be able to	
CO 1	Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
CO 2	Apply grammatical structures to formulate sentences and correct word forms
CO 3	Analyze discourse markers to speak clearly on a specific topic in informal discussions
CO 4	Evaluate reading/listening texts and to write summaries based on global comprehension of these texts.

CO 5	Create a coherent paragraph interpreting a figure/graph/chart/table
CO 6	Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English

Course Content		
<b>UNIT – I</b>		<b>Lecture Hours: 10</b>
<b>Listening:</b> Listening for comprehension. <b>Speaking:</b> Introducing oneself and describing people, places and objects. <b>Reading:</b> Skimming and scanning a piece of information. <b>Writing:</b> Paragraph writing ( introduction and summarizing the points) <b>Grammar and Vocabulary:</b> Types of Sentences (Syntax): Parts of Speech (noun, adjectives, verbs, adverbs). One word Substitutes		
<b>UNIT – II</b>		<b>Lecture Hours: 10</b>
<b>Listening:</b> Listening for purpose. <b>Speaking:</b> Short structured talks on specific topics. <b>Reading:</b> Identifying and recognizing verbal techniques to link the ideas in a paragraph together. <b>Writing:</b> Mechanics of paragraph writing <b>Grammar and Vocabulary:</b> Conjunctions and Prepositions. Words often confused		
<b>UNIT-III</b>		<b>Lecture Hours: 10</b>
<b>Listening:</b> Listening for global comprehension. <b>Speaking:</b> Discussing and reporting on specific topics <b>Reading:</b> Reading for comprehension. <b>Writing:</b> Summarizing - identifying main idea/s (paraphrasing, avoiding redundancies) <b>Grammar and Vocabulary:</b> Tenses; Concord; Parallelism. Synonyms		
<b>UNIT-IV</b>		<b>Lecture Hours: 08</b>
<b>Listening:</b> Predicting conversations/ transactional dialogues (without/ with video). <b>Speaking:</b> Role plays (formal and informal). <b>Reading:</b> Interpreting the graphic elements in the texts. <b>Writing:</b> Information transfer, Letter Writing (formal and informal) <b>Grammar and Vocabulary:</b> degrees of comparison; use of antonyms.		
<b>UNIT – V</b>		<b>Lecture Hours: 08</b>
<b>Listening:</b> Listening Comprehension. <b>Speaking:</b> Formal oral presentations. <b>Reading:</b> Reading for comprehension. <b>Writing:</b> Writing structured essays on specific topics. Technical Report Writing <b>Grammar and Vocabulary:</b> Spotting the errors. Idioms and Phrases		

## Reference Books

- ❖ Bailey, Stephen. *Academic writing: A handbook for international students*. Routledge, 2014.
- ❖ Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking*. Heinley ELT; 2nd Edition, 2018.
- ❖ Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
- ❖ Hewings, Martin. *Cambridge Academic English (B2)*. CUP, 2012.

## Sample Web Resources

Grammar/Listening/Writing

1-language.com

<http://www.5minuteenglish.com/>

<https://www.englishpractice.com/>

Grammar/Vocabulary

English Language Learning Online

<http://www.bbc.co.uk/learningenglish>

[h/ http://www.better-english.com/](http://www.better-english.com/)

<http://www.nonstopenglish.com>

<https://www.vocabulary.com/>

BBC Vocabulary

Games Free Rice

Vocabulary Game

Reading

<https://www.usingenglish.com/comprehension/>

[https://www.englishclub.com/reading/short-](https://www.englishclub.com/reading/short-stories.htm)

[stories.htm https://www.english-online.at/](https://www.english-online.at/)

Listening

<https://learningenglish.voanews.com/z/3613>

<http://www.englishmedialab.com/listening.html>

Speaking

<https://www.talken>

[english.com/](https://www.talken)

BBC Learning English – Pronunciation

tips Merriam-Webster – Perfect

pronunciation Exercises

All Skills <https://www.englishclub.com/>

<http://www.world-english.org/>

<http://learnenglish.britishcouncil.org/>

Online Dictionaries

Cambridge dictionary online

MacMillan dictionary

Oxford learner's dictionaries

**G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY  
(AUTONOMOUS)  
COMMUNICATIVE ENGLISH LAB**

Title of the Course:	Communicative English I Lab				
Branches for which this course is offered::	I B.Tech I Sem (CIV,MEC & CSE) I B.Tech II Sem (ECE & EEE)	L	T	P	C
		0	0	3	1.5

**Course Overview:**

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

**.Course Objectives:**

- students will be exposed to a variety of self instructional, learner friendly modes of language learning
- students will cultivate the habit of reading passages from the computer monitor. Thus providing them with the required facility to face computer based competitive exams like GRE, TOEFL, and GMAT etc.
- students will learn better pronunciation through stress, intonation and rhythm
- students will be trained to use language effectively to face interviews, group discussions, public speaking
- students will be initiated into greater use of the computer in resume preparation, report writing, format making etc
- Become active participant in the learning process and acquire proficiency in spoken English
- Speak with clarity and confidence thereby enhances employability skills.

**Course Outcomes:**

CO 1	Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills
CO 2	Apply communication skills through various language learning activities
CO 3	Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
CO4	Evaluate and exhibit acceptable etiquette essential in social and professional settings
CO 5	Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.
CO 6	Improve upon speaking skills over telephone, role plays and public speaking

<b>COMMUNICATIVE ENGLISH LAB</b>	
UNIT I	1. Phonetics for listening comprehension of various accents 2. Reading comprehension 3. Describing objects/places/persons
UNIT II	1. JAM 2. Small talks on general topics 3. Debates
UNIT III	1. Situational dialogues – Greeting and Introduction 2. Summarizing and Note making 3. Vocabulary Building
UNIT IV	1. Asking for Information and Giving Directions 2. Information Transfer 3. Non-verbal Communication – Dumb Charade
UNIT V	1. Oral Presentations 2. Précis Writing and Paraphrasing 3. Reading Comprehension and spotting errors

#### **Suggested Software:**

1. Kvan Advanced Communication Skills.

#### **References:**

1. A Textbook of English Phonetics for Indian Students, T. Balasubramanian, Macmillan, 2012.
2. Effective Technical Communication, M. Ashraf Rizvi The McGraw-Hill Companies, 2007.
3. A Hand book for English Laboratories, E. Suresh Kumar, P. Sreehari, Foundation Books, 2011

#### **Sample Web Resources**

1. <https://learningenglish.voanews.com/z/3613>
2. <http://www.englishmedialab.com/listening.html>
3. Merriam-Webster – Perfect pronunciation
4. <https://www.usingenglish.com/comprehension/>
5. <https://www.englishclub.com/reading/short-stories.htm> <https://www.english-online.at/>
6. [1-language.com](http://1-language.com)
7. <http://www.5minuteenglish.com/>

**G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY  
(AUTONOMOUS)  
APPLIED PHYSICS LAB**

Title of the Course	Applied Physics Lab				
Branches for which this course is offered	I B.Tech I Sem (CSE)	L	T	P	C
	I B.Tech II Sem (EEE&ECE)	0	0	3	1.5

### Course Overview

There has been an exponential growth of knowledge in the recent past opening up new areas and challenges in the understanding of basic laws of nature. This helped to the discovery of new phenomena in macro, micro and nano scale device technologies. The laws of physics play a key role in the development of science, engineering and technology. Sound knowledge of physical principles is of paramount importance in understanding new discoveries, recent trends and latest developments in the field of engineering. To keep in pace with the recent scientific advancements in the areas of emerging technologies, the syllabi of engineering physics lab has been thoroughly revised keeping in view of the basic needs of all engineering branches.

### Course Objectives

The main objective of this lab is the student

- Will recognize the important of optical phenomenon like Interference and diffraction.
- Will understand the role of optical fiber parameters and signal losses in communication.
- Will recognize the importance of energy gap in the study of conductivity and hall effect in a semiconductor
- Will understand the applications of B- H curve.
- Will acquire a practical knowledge of studying the Dielectric constant and dipole moment of molecules
- Will recognize the application of laser in finding Measurement of magnetic susceptibility
- Will determine the thickness of the paper using wedge shape method

### Course Outcomes

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

CO1	<b>Operate</b> optical instruments like microscope and spectrometer and <b>understand</b> the concepts of interference by finding thickness of paper, radius of curvature of Newton's rings
CO2	<b>interpret</b> the concept of diffraction by the determination of wavelength of different colours of white light and dispersive power of grating
CO3	<b>demonstrate</b> the importance of dielectric material in storage of electric field energy in the capacitors
CO4	<b>plot</b> the intensity of the magnetic field of circular coil carrying current with varying distance and B-H curve
CO5	<b>evaluate</b> the acceptance angle of an optical fiber and numerical aperture
CO6	<b>determine</b> the resistivity of the given semiconductor using four probe method, the band gap of a semiconductor and identify the type of semiconductor using Hall effect



Course Content	
Experiment No	Name of the Experiment
1	Determine the thickness of the paper using wedge shape method
2	Determination of the radius of curvature of the lens by Newton's ring method
3	Determination of wavelength by plane diffraction grating method
4	Diffraction due to single slit
5	Dispersive power of a diffraction grating
6	Dielectric constant and dipole moment of molecules
7	Magnetic field along the axis of a circular coil carrying current
8	To determine the self-inductance of the coil (L) using Anderson's bridge
9	B-H Curve
10	To determine the numerical aperture of a given optical fiber and hence to find its acceptance angle
11	Measurement of magnetic susceptibility by Gouy's method
12	Hall effect
13	To determine the resistivity of semiconductor by Four probe method
14	To determine the energy gap of a semiconductor
15	Measurement of resistance with varying temperature

References	
1	S.Balasubramanian , M.N.Srinivasan “ A Text book of Practical Physics”- S. Chand Publishers, 2017
2	<a href="http://vlab.amrita.edu/index.php">http://vlab.amrita.edu/index.php</a> -Virtual Labs, Amrita University

**G.PULLAIAH COLLEGE OF ENGINEERING & TECHNOLOGY  
(AUTONOMOUS)**

**COMPUTER PROGRAMMING LAB**

<b>Title of the course:</b>	<b>COMPUTER PROGRAMMING LAB</b>				
<b>Branches for which this course is offered:</b>	B.TECH I SEMESTER (ALL BRANCHES)	L	T	P	C
		0	0	3	1.5

<b>Title of the course:</b>	<b>COMPUTER PROGRAMMING LAB</b>
<b>Branches for which this course is offered:</b>	B.TECH I SEMESTER(Common to all branches)

**COURSE OBJECTIVES :**

- Demonstrate the use of problem solving techniques.
- Illustrate the Python programming constructs through simple programs
- To train solving computational problems
- To elucidate solving mathematical problems using Python programming language

**COURSE OVERVIEW :**

- This lab helps the students gaining the knowledge to write python language applications, mathematical and engineering problems
- Helps the students to apply python programming libraries in solving the computational problems.

**COURSE OUTCOMES:**

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

CO1	Design solutions to mathematical problems & Organize the data for solving the problem
CO2	Understand and implement modular approach using python
CO3	Learn and implement various data structures provided by python library including string, list, dictionary and its operations etc
CO4	Understands about files and its applications.
CO5	Develop real-world applications, files and exception handling provided by python
CO6	Select appropriate programming construct for solving the problem

<b>Course Content:</b>		
<b>TASK-1</b>		<b>PRACTICAL HOURS: 2</b>
a). Python Program to Calculate the Average of Numbers in a Given List. b). Python Program to Exchange the Values of Two Numbers Without Using a Temporary Variable. c). Python Program to Read a Number n and Compute n+nn+nnn. d). Python Program to Check Whether a Number is Positive or Negative		
<b>TASK-2</b>		<b>PRACTICAL HOURS: 2</b>
a) Accept a number and display its factorial b) Accept a multi digit number and display its sum c) Accept n numbers and display big number out of them d) Accept n numbers and display big and next biggest number e) Accept n and display prime number or not		
<b>TASK-3</b>		<b>PRACTICAL HOURS:2</b>
a). Write a Python Program to find the longest common prefix string amongst an array of strings. b). Write a Python Program to Check if a Number is a Perfect Number. c). Write a Python Program to Check if a Number is a Strong Number. d). Write a Python Program to Generate Random Numbers from 1 to 20 and append them to the List.		
<b>TASK-4</b>		<b>PRACTICAL HOURS: 2</b>
a). Write a Python Program to Form a New String where the First Character and the Last Character have been Exchanged. b). Write a Python Program to Count the Number of Vowels in a String. c). Write a Python Program to Take in a String and Replace Every Blank Space with Hyphen. d). Write a Python Program that Displays which Letters are Present in both the Strings		
<b>TASK-5</b>		<b>PRACTICAL HOURS: 2</b>
Accept 50 student details(sno,name,m1,m2,m3) of a class and display the details along with their total and average marks. Also display the student's name and highest average, student's name with highest m1, highest m2 and highest m3.		
<b>TASK-6</b>		<b>PRACTICAL HOURS: 2</b>
From a class of 50 students, some appeared for JEE mains, Deemed exam and some for EAMCET exam. There are students who attended more than one examination. List out the students who answered only JEE mains, only Deemed and only advanced. Also list out the students who answered all.		
<b>TASK-7</b>		<b>PRACTICAL HOURS: 2</b>

If we list all the natural numbers below 10 that are multiples of 3 or 5, we get 3, 5, 6 and 9. The sum of these multiples is 23. Write a Python program to find the sum of all the multiples of 3 or 5 below 1000.

#### TASK-8

**PRACTICAL  
HOURS: 2**

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 not exceed four million, write a program to find the sum of the even-valued terms.

#### TASK-9

**PRACTICAL  
HOURS: 2**

A palindrome number reads the same both ways. The largest palindrome made from the product of two 2-digit numbers is  $9009 = 91 \times 99$ . Write a program to find the largest palindrome made from the product of two 3-digit numbers.

#### TASK-10

**PRACTICAL  
HOURS: 2**

The following iterative sequence is defined for the set of positive integers:  
 $n \rightarrow n/2$  ( $n$  is even)  
 $n \rightarrow 3n + 1$  ( $n$  is odd)  
 Using the rule above and starting with 13, we generate the following sequence:  $13 \rightarrow 40 \rightarrow 20 \rightarrow 10 \rightarrow 5 \rightarrow 16 \rightarrow 8 \rightarrow 4 \rightarrow 2 \rightarrow 1$   
 It can be seen that this sequence (starting at 13 and finishing at 1) contains 10 terms. Although it has not been proved yet (Collatz Problem), it is thought that all starting numbers finish at 1. Write a program to find the starting number, under one million, produces the longest chain.

#### TASK-11

**PRACTICAL  
HOURS: 2**

Given the following information, you may prefer to do some research for yourself.

- 1 Jan 1900 was a Monday.
- Thirty days for September, April, June and November.
- All the rest have thirty-one days and on leap years, twenty-nine days.
- A leap year occurs on any year evenly divisible by 4, but not on a century unless it is divisible by 400.

Write a program to find how many Sundays fell on the first of the month during the twentieth century (1 Jan 1901 to 31 Dec 2000).

#### TASK-12

**PRACTICAL  
HOURS: 2**

A perfect number is a number for which the sum of its proper divisors is exactly equal to the number. For example, the sum of the proper divisors of 28 would be  $1 + 2 + 4 + 7 + 14 = 28$ , which means that 28 is a perfect number.  
 A number  $n$  is called deficient if the sum of its proper divisors is less than  $n$  and it is called abundant if this sum exceeds  $n$ .  
 As 12 is the smallest abundant number,  $1 + 2 + 3 + 4 + 6 = 16$ , the smallest number that can be written as the sum of two abundant numbers is 24. By mathematical analysis, it can be shown that all integers greater than 28123 can be written as the sum of two abundant numbers. However, this

upper limit cannot be reduced any further by analysis even though it is known that the greatest number that cannot be expressed as the sum of two abundant numbers is less than this limit. Write a program to find the sum of all the positive integers which cannot be written as the sum of two abundant numbers.		
<b>TASK-13</b>		<b>PRACTICAL HOURS: 2</b>
<p>Starting with the number 1 and moving to the right in a clockwise direction a 5 by 5 spiral is formed as follows:</p> <pre> <b>21</b> 22 23 24 <b>25</b> 20  <b>7</b> 8  <b>9</b> 10 19  6 <b>1</b>  2 11 18  <b>5</b> 4  <b>3</b> 12 <b>17</b> 16 15 14 <b>13</b></pre>		
<b>TASK-14</b>		<b>PRACTICAL HOURS: 2</b>
<p>The decimal number, <math>585 = 1001001001_2</math> (binary), is palindrome in both bases. Write a program to find the sum of all numbers, less than one million, which are palindrome in base 10 and base 2.</p>		
<b>TASK-15</b>		<b>PRACTICAL HOURS: 2</b>
<p>Write a program to ensure that the first and last names of people begin with a capital letter in their passports. For example, mohan kumar should be capitalized correctly as Mohan Kumar. Given a full name, your task is to <i>capitalize</i> the name appropriately.</p>		
<b>TASK-16</b>		<b>PRACTICAL HOURS: 2</b>
<p>The professor is conducting a course on Discrete Mathematics to a class of N students. He is angry at the lack of their discipline, and he decides to cancel the class if there are less than K students present after the class starts. Given the arrival time of each student, your task is to find out if the class gets cancelled or not.</p>		
<b>TASK-17</b>		<b>PRACTICAL HOURS: 2</b>
<p>The prime 41, can be written as the sum of six consecutive primes:  <math>41 = 2 + 3 + 5 + 7 + 11 + 13</math>.  This is the longest sum of consecutive primes that adds to a prime below one-hundred. The longest sum of consecutive primes below one-thousand that adds to a prime, contains 21 terms, and is equal to 953. Write a program to find which prime, below one-million, can be written as the sum of the most consecutive primes.</p>		
<b>TASK-18</b>		<b>PRACTICAL HOURS: 2</b>
<p>Given a dictionary and a character array, write a program to print all valid words that are possible using characters from the array. Note: Repetitions of characters is not allowed.  Examples: Input : Dict = ["go","bat","me","eat","goal","boy", "run"]  arr = ['e','o','b', 'a','m','g', 'l']</p>		

Output : go, me, goal.		
<b>TASK-19</b>		<b>PRACTICAL HOURS: 2</b>
Write a Python program to write data into a file Write a Python program to read the content of accepted file Write a Python program to read last n lines of a file. Write a Python program to read a file and list out number of words, lines and characters present in it.		
<b>TASK-20</b>		<b>PRACTICAL HOURS: 2</b>
Write a Python program to copy the contents of a file to another file. Merge two files and write the content into third file Read the CSV file and display its statistics		
<b>TASK-21</b>		<b>PRACTICAL HOURS: 2</b>
In a row of dominoes, A[i] and B[i] represent the top and bottom halves of the i-th domino. (A domino is a tile with two numbers from 1 to 6 - one on each half of the tile.) We may rotate the i-th domino, so that A[i] and B[i] swap values. Return the minimum number of rotations so that all the values in A are the same, or all the values in B are the same. If it cannot be done, return -1.		
<b>TASK-22</b>		<b>PRACTICAL HOURS: 3</b>
Kiran and Ramu take turns playing a game, with Kiran starting first. Initially, there is a number N on the chalkboard. On each player's turn, that player makes a <i>move</i> consisting of: <ul style="list-style-type: none"> <li>• Choosing any x with <math>0 &lt; x &lt; N</math> and <math>N \% x == 0</math>.</li> <li>• Replacing the number N on the chalkboard with <math>N - x</math>.</li> </ul> Also, if a player cannot make a move, they lose the game. Return True if and only if Kiran wins the game, assuming both players play optimally.		
<b>TASK-23</b>		<b>PRACTICAL HOURS: 3</b>
On an infinite plane, a robot initially stands at (0, 0) and faces north. The robot can receive one of three instructions: <ul style="list-style-type: none"> <li>• "G": go straight 1 unit;</li> <li>• "L": turn 90 degrees to the left;</li> <li>• "R": turn 90 degrees to the right.</li> </ul> The robot performs the instructions given in order, and repeats them forever. Return true if and only if there exists a circle in the plane such that the robot never leaves the circle.		

**Text Books:**

1	Allen B. Downey, “Think Python: How to Think like a Computer Scientist”, 2nd edition, O’Reilly, 2016. Or <a href="http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf">http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf</a>
2	Algorithmic Problem Solving with Python, John B. Schneider ,Shira Lynn Broschat, Jess Dahmen
3	Think in Python, Allen Downey, Green Tea Press, Needham, Massachusetts

**Reference Books:**

1	Paul Barry, “Head First Python a Brain Friendly Guide” 2nd Edition, O’Reilly, 2016
2	Daniel Y.Chen “Pandas for Everyone Python Data Analysis” Pearson Education, 2019

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**Probability and Statistics**

<b>Title of the Course :</b>	<b>Probability and Statistics</b>				
Branches for which this course is offered:	I.B.Tech II Sem(CSE)	L	T	P	C
		3	1	0	4

**Course Overview:**

This course offers more advanced topics of mathematics required to analyze the problems in engineering. Topics to be covered in this course include: Descriptive statistics and methods for data science, Probability, Probability distributions, Estimation and Testing of hypothesis, large sample tests, Small sample tests, The mathematical skills derived from this course provides necessary base to analytical and theoretical concepts occurring in the program.

**Course Objectives:**

- To familiarize the students with the foundations of probability and statistical methods.
- To enlighten the students in the concepts of probability and statistical methods which are useful in various applications of Engineering.

**Course Outcomes :**

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

CO1	Make use of the concepts of probability and their applications
CO2	Apply discrete and continuous probability distributions
CO3	Classify the concepts of data science and its importance
CO4	Interpret the association of characteristics and through correlation and regression tools
CO5	Design the components of a classical hypothesis test
CO6	Infer the statistical inferential methods based on small and large sampling tests

**Course Content:**

<b>Unit-I</b>	<b>Descriptive statistics and methods for data science</b>	<b>Lecturer Hours:10Hrs</b>
Data science, Statistics Introduction, Population vs Sample, Collection of data, primary and secondary data, Type of variable: dependent and independent Categorical and Continuous variables, Data visualization, Measures of Central tendency, Measures of Variability (spread		



or variance) Skewness Kurtosis, correlation, correlation coefficient, rank correlation, regression coefficients, principle of least squares, method of least squares, regression lines.

<b>Unit-II</b>	<b>Probability</b>	<b>Lecturer Hours:8Hrs</b>
Probability, probability axioms, addition law and multiplicative law of probability, conditional probability, Baye's theorem, random variables (discrete and continuous), probability density functions, properties, mathematical expectation.		
<b>Unit-III</b>	<b>Probability distributions</b>	<b>Lecturer Hours:6Hrs</b>
Probability distribution - Binomial, Poisson approximation to the binomial distribution and normal distribution-their properties.		
<b>Unit-IV</b>	<b>Estimation and Testing of hypothesis, large sample tests</b>	<b>Lecturer Hours:8Hrs</b>
Estimation-parameters, statistics, sampling distribution, point estimation, Formulation of null hypothesis, alternative hypothesis, the critical and acceptance regions, level of significance, two types of errors and power of the test. Large Sample Tests: Test for single proportion, difference of proportions, test for single mean and difference of means. Confidence interval for parameters in one sample and two sample problems		
<b>UNIT-V</b>	<b>Small sample tests</b>	<b>Lecturer Hours: 8Hrs</b>
Student t-distribution (test for single mean, two means and paired t-test), testing of equality of variances (F-test), $\chi^2$ - test for goodness of fit, $\chi^2$ - test for independence of attributes.		

#### **Textbooks:**

1. Miller and Friends, Probability and Statistics for Engineers, 7/e, Pearson, 2008.
2. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012.

#### **Reference Books:**

1. S. Ross, a First Course in Probability, Pearson Education India, 2002.
2. W. Feller, an Introduction to Probability Theory and its Applications, 1/e, Wiley, 1968.

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**CHEMISTRY**

Title of the Course:	Chemistry			
Branches for which this course is offered:	(CSE,ECE & EEE)	L	T	P
		3	0	0

**Course Overview**

This course acquaint the students with different softening methods and develops the study of electrochemical cells, types of batteries and their applications , Interactions between them, emphasizing their properties and indicating some applications. It deals with more advanced topics, familiarises engineering material, their properties and applications which provides the student to impart knowledge on corrosion and its significance, to explain nano and Smart materials and their uses.

**Course Objectives**

- To instruct electrochemical energy systems and their applications.
- To impart knowledge on the basic concepts of bonding in different molecules.
- To familiarize various sources of polymers technology .
- To impart the knowledge in different instrumental methods.
- To introduce different types of nano-materials.
- To expose the students to latest instrumental techniques such as scanning electronic microscope (SEM) & transmission electron microscope (TEM) and colloidal chemistry.

**Course Outcomes:**

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

CO 1	To illustrate the molecular orbital energy levels for different molecular species and apply Schrödinger wave equation and particle in a box.
CO 2	To differentiate between pH metry Potentio metry and conductometric titrations.
CO 3	Explain the preparation properties and applications of polymers and describe the mechanism of conduction in conducting polymers.
CO 4	Understand the principles of different analytical instruments and explain their applications.
CO 5	Explain the concept of nano clusters nano wires and characterize the applications of SEM & TEM.
CO 6	Explain of different types of colloids ,their preparations , properties and applications

<b>Course Content</b>		
<b>UNIT – I</b>	<b>Structure and Bonding Models</b>	<b>Lecture Hours: 10</b>
Planck's quantum theory, dual nature of matter, Schrodinger equation, significance of $\Psi$ and $\Psi^2$ , applications to hydrogen, particle in a box and their applications for conjugated molecules, molecular orbital theory – bonding in homo- and heteronuclear diatomic molecules – energy level diagrams of O <sub>2</sub> and CO, etc. $\pi$ -molecular orbitals of butadiene and benzene, calculation of bond order, crystal field theory – salient features – energy level diagrams for transition metal ions – splitting in octahedral and tetrahedral environments, magnetic properties and colour, band theory of solids – band diagrams for conductors, semiconductors and insulators, role of doping on band structures		
<b>UNIT – II</b>	<b>Electrochemistry and Applications</b>	<b>Lecture Hours: 10</b>
Electrodes – concepts, reference electrodes (Calomel electrode, Ag/AgCl electrode and glass electrode) electrochemical cell, Nernst equation, cell potential calculations, numerical problems, concept of pH, pH meter and applications of pH metry (acid-base titrations), potentiometry- potentiometric titrations (redox titrations), concept of conductivity, conductivity cell, conductometric titrations (acid-base titrations), photovoltaic cell – working and applications, photogalvanic cells with specific examples. Electrochemical sensors – potentiometric sensors with examples, amperometric sensors with examples. Primary cells – Zinc-air battery, alkali metal sulphide batteries Secondary cells – lead acid, nickel-metal hydride and lithium ion batteries- working of the batteries including cell reactions, button cells. , Fuel cells, hydrogen-oxygen, methanol fuel cells – working of the cells.		
<b>UNIT-III</b>	<b>Polymer Chemistry</b>	<b>Lecture Hours: 10</b>
Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, copolymerization (stereospecific polymerization) with specific examples and mechanisms of polymer formation. Plastomers: Thermoplastics and Thermosetting, Preparation, properties and applications of – Bakelite, urea-formaldehyde, Nylons. Elastomers: Buna-S, Buna-N–preparation, properties and applications. Conducting polymers – polyacetylene, polyaniline,– mechanism of conduction and applications.		
<b>UNIT-IV</b>	<b>Instrumental Methods and Applications</b>	<b>Lecture Hours: 10</b>
Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. Principle and applications of pH metry, potentiometer, conductometry, UV - spectroscopy, IR and NMR. Principles of Gas Chromatography (GC) and High Performance Liquid Chromatography (HPLC)		
<b>UNIT – V</b>	<b>Nano materials and Colloidal chemistry</b>	<b>Lecture Hours: 10</b>
Introduction to nano materials: Nano particles, nano clusters, (CNT's) and nano wires. Chemical synthesis of nano materials- Sol gel method. Characterization: principle and application of scanning electron microscope(SEM) and Transmission Electron Microscope(TEM). Introduction to colloidal chemistry - colloidal, Micelle formation, synthesis of colloids (any two methods with examples ),properties and applications.		

<b>Text Books</b>
<ol style="list-style-type: none"><li>1. Jain and Jain, Engineering Chemistry, 16/e, Dhanpat Rai, 2013.</li><li>2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.</li><li>3. K N Jayaveera, G V Subba Reddy and C Rama Chandraiah, Engineering Chemistry 1/e Mc Graw Hill Education (India) Pvt Ltd, New Delhi 2016</li><li>4. B.K Sharma Engineering Chemistry, Krishna Prakashan, Meerut.</li></ol>
<b>Reference Books</b>
<ol style="list-style-type: none"><li>1. J. D. Lee, Concise Inorganic Chemistry, 5/e, Oxford University Press, 2008.</li><li>2. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.</li><li>3. Ben L. Feringa and Wesley R. Browne, Molecular Switches, 2/e, Wiley-VCH, 2011</li></ol>

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**DATA STRUCTURES**

<b>Title of the course:</b>	<b>Data Structures</b>				
<b>Branches for which this course is offered:</b>	I B.Tech II SEMESTER (Common to all branches)	L 3	T 0	P 0	C 3

**COURSE OVERVIEW :**

- This course covers general purpose data structures and algorithms.
- Topics covered include space and time complexity, analysis, static data and dynamic data structures.

**COURSE OBJECTIVES:**

- Understand problem solving techniques
- Understand representation of a solution to a problem
- Understand the syntax and semantics of programming language
- Understand the significance of Control structures
- Learn the features of language

**COURSE OUTCOMES:**

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

CO1	Learn to choose appropriate data structure as applied to specified problem definition.
CO2	Design and analyze linear and non-linear data structures.
CO3	Design algorithms for manipulating linked lists, stacks, queues, trees and graphs in python
CO4	Demonstrate advantages and disadvantages of specific algorithms and data structures
CO5	Develop a base for advanced computer science study.
CO6	Evaluate algorithms and data structures in terms of time and memory complexity of basic operations.

**Course Content:**

<b>UNIT-I</b>	<b>Introduction to Problem Solving Using C</b>	<b>LECTURE HOURS: 12</b>
<b>Introduction:</b> Structure of C Program, Identifiers, Basic data types, Variables, Constants, I/O functions , Operators, Selection Statements – if and switch statements, Repetition statements – while, for, do-while statements, other statements related to looping – break, continue, goto, Arrays – Concepts, using arrays in C, array applications, two – dimensional, arrays, multidimensional arrays, Functions, Strings, Pointers.		

<b>UNIT-II</b>	<b>Linear Data Structures</b>	<b>LECTURE HOURS: 14</b>
<b>Stacks:</b> Introduction-Definition-Representation of Stack-Operations on Stacks- Applications of Stacks. <b>Queues:</b> Introduction, Definition- Representations of Queues- Various Queue Structures- Applications of Queues.		
<b>UNIT-III</b>	<b>Linked lists:</b>	<b>LECTURE HOURS: 14</b>
Definition- Single linked list- Circular linked list- Double linked list- Circular Double linked list- Application of linked lists		
<b>UNIT-IV</b>	<b>Sorting and Searching:</b>	<b>LECTURE HOURS: 12</b>
<b>Sorting:</b> Bubble Sort, Selection Sort, Insertion Sort, Shell Sort, Merge Sort, Quick Sort, time complexity <b>Search:</b> Sequential Search, Binary Search, Hashing, time complexity		
<b>UNIT-V</b>	<b>Trees and Graphs:</b>	<b>LECTURE HOURS: 12</b>
<b>Trees:</b> examples, vocabulary and definitions, Priority Queues with Binary Heaps, Binary Tree Applications, Tree Traversals, Binary Search Trees, AVL Tree. <b>Graph:</b> Vocabulary and definitions, Applications: BFS and DFS.		

<b>Text Books:</b>	
1	Classic Data Structures, Second Edition by Debasis Samanta, PHI.
2	Ron S.Gottfried, Programming with C, (TMH – Schuam Outline Series) 3rd Edition - 2011.

<b>Reference Books:</b>	
1	B.W. Kernignan and Dennis M.Ritchie, The C Programming Language, (PHI), 2nd Edition 2003.
2	Jean Paul Tremblay and Paul G.Sorenson[2007], An Introduction to DataStructures With Applications, TMH
3	Fundamentals of Data Structures in C – Horowitz, Sahni, Anderson- Freed, Universities Press, Second Edition

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**BASIC ELECTRICAL & ELECTRONICS ENGINEERING**

<b>Title of the Course :</b>	<b>BASIC ELECTRICAL &amp; ELECTRONICS ENGINEERING</b>				
<b>Branches for which this course is offered:</b>	<b>II Semester (CSE)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Overview:**

This is the fundamental course for engineering students. This course is intended to enhance the technical skills in understanding of the operation and design of basic components like resistor, inductor and capacitor voltage and current sources and finally a complex DC circuits. It is also important to learn about basic principles of operations DC and AC electrical machines with their applications.

This course covers fundamental topics that are common to a wide variety of electronic engineering devices and systems. The topics include an introduction to semiconductor devices and their applications. The course creates the background in the physics of the compound semiconductor-based electronic devices and also prepares students to learn about oscillators and op-amps.

**Course Objectives:**

To make the students to learn about

1	Basic Circuits, Network theorems, two port networks and their analysis methods
2	Constructional details of DC generators & motors and evaluation of their performance.
3	Constructional details of Transformers, Induction motors and calculation of efficiency and performance.
4	Basic concepts of semiconductor devices and their applications.
5	Operation of rectifier circuits using with and without filters for various parameters.
6	Design different oscillator circuits, op-amps and the characteristics of BJT,FET

<b>Course Outcomes:</b>	
After successful completion of the course, the student will be able to	
<b>CO1</b>	State the basic laws and usage of components in electric circuits.
<b>CO2</b>	Investigate DC and AC circuits using different methods and laws.
<b>CO3</b>	Analyze the principle of operation of DC machines and AC machines along with the various tests to predetermine the efficiency and regulation.
<b>CO4</b>	Understand the theory, operation and applications of semiconductor devices.
<b>CO5</b>	Determine various parameters of rectifier circuits using with and without filters
<b>CO6</b>	Analyze and Design different oscillator circuits, op-amps and the characteristics of BJT,  FET to meet the given specifications.

<b>Course Content:                      PART A : ELECTRICAL ENGINEERING</b>			
<b>Unit - I</b>	<b>INTRODUCTION TO DC &amp; AC ELECTRICAL CIRCUITS</b>	<b>Lecture Hours:</b>	<b>10</b>
<p>Basic Circuit Components, Ohm's Law, Kirchhoff's Laws, Types of Sources, Resistive Networks, Series Parallel Circuits, Star Delta and Delta Star Transformation. Principle of AC Voltages, Root Mean Square and Average Values of Alternating Currents and Voltage, Form Factor and Peak Factor.</p> <p><b>Network Theorems:</b> Thevenin's, Norton's, and Superposition Theorems for DC Excitations.</p> <p><b>Two Port Networks:</b> Two Port Network Parameters – Impedance, Admittance, Transmission and Hybrid Parameters.</p>			
<b>Unit - II</b>	<b>DC MACHINES</b>	<b>Lecture Hours:</b>	<b>10</b>
<p><b>D.C Generators:</b> Constructional Details of DC Machines, Principle of Operation of DC Generators, E.M.F Equation in D.C Generator, Types of D.C Generators and O.C.C. of a D.C. Shunt Generator.</p> <p><b>D.C Motors:</b> Principle of Operation of DC Motors, Torque Equation, Speed Control of D.C. shunt motor (Armature voltage control and Field flux control). Losses and Efficiency Calculation in D.C Motor- Swinburne's Test.</p>			



<b>Unit - III</b>	<b>AC MACHINES</b>	<b>Lecture Hours:</b>	<b>10</b>
<b>1-phase Transformers:</b> Principle of Operation, Constructional Details, E.M.F. equation, Losses and Efficiency, OC & SC Tests, Regulation of Transformers.  <b>3-Phase Induction Motors:</b> Principle of Operation, Slip, Torque (Simple Problems).  <b>3-phase Alternators:</b> Principle of Operation-Constructional Details-EMF Equation.			

<b>Text Books:</b>	
<b>1</b>	Basic Electrical Engineering, V. N. Mittle and Arvind Mittle, Mc Graw Hill (India) Pvt. Ltd., 2 <sup>nd</sup> Edition, 2005.
<b>2</b>	Basic Electrical Engineering, T.K.Nagsarkar and M.S. Sukhija, Oxford University Press, 2 <sup>nd</sup> Edition, 2011.
<b>References Books:</b>	
<b>1</b>	Basic Electrical Engineering, M.S.Naidu and S. Kamakshiah, Tata Mc Graw Hill, 3 <sup>rd</sup> Edition, 2009.
<b>2</b>	Electrical and Electronic Technology, Hughes, Pearson Education

<b>Course Content</b>		<b>PART B: ELECTRONICS ENGINEERING</b>	
<b>Unit - I</b>	<b>INTRODUCTION TO SEMICONDUCTOR DEVICES</b>	<b>Lecture Hours:</b>	<b>10</b>
<b>Semiconductor Devices:</b> Intrinsic semiconductors-Electron-Hole Pair Generation, Conduction in Intrinsic Semiconductors, Extrinsic Semiconductors-N-Type and P-Type Semiconductors, Comparison of N-Type and P-Type Semiconductors. The p-n Junction – Drift and Diffusion Currents, The p-n Junction Diode-Forward Bias, Reverse Bias, Volt-Ampere Characteristics- Diode Specifications, Applications of Diode, Diode as a Switch. Diode as a Rectifier-Half-wave Rectifier, Full-Wave Rectifier, Full-Wave Bridge Rectifier, Rectifiers with Filters, Zener Diode- Volt-Ampere Characteristics, Zener Diode as Voltage Regulator.			
<b>Unit - II</b>	<b>BJT and JFETs</b>	<b>Lecture Hours:</b>	<b>10</b>
<b>BJT:</b> Bipolar Junction Transistor (BJT) – Types of Transistors, Operation of NPN and PNP Transistors, Input-Output Characteristics of BJT-CB, CE and CC Configurations, Relation between $I_C$ , $I_B$ and $I_E$ . <b>JFET:</b> Junction Field Effect Transistor (JFET)- Theory and Operation of JFET, Output Characteristics, Transfer Characteristics. Comparison of BJT and JFET,MOSFET-The Enhancement and Depletion MOSFET, Static Characteristics of MOSFET, Applications of JFET & MOSFET.			

<b>Unit - III</b>	<b>Oscillators and Op-Amps</b>	<b>Lecture Hours:</b>	<b>10</b>
<p><b>Oscillators</b> : Sinusoidal Oscillators, Barkhausen Criteria for Oscillator Operation, Components of an Oscillator-Transistor Amplifier Circuits, Feedback Circuits and Oscillator Circuits, Classification of Oscillators, LC Tuned, RC Phase Shift Oscillator circuits.</p> <p><b>Operational Amplifiers(Op-Amps)</b>-Symbol of an Op-Amp, single Input and Dual Input Op-Amps(Differential Amplifier), Characteristics of an Ideal Op-Amp, Basic Forms of Op-Amps-Inverting &amp; Non-Inverting Amplifiers, Applications of Op-Amps, summing, Differential, Integrator, differentiator Amplifier.</p>			

<b>Text Books:</b>	
<b>1</b>	Basic Electrical and Electronics Engineering, M.S.Sukhija, T.K.Nagsarkar, Oxford University Press, 1 <sup>st</sup> Edition, 2012.
<b>2</b>	Basic Electrical and Electronics Engineering, S.K Bhattacharya, Pearson Education, 2012.
<b>References Books:</b>	
<b>1</b>	Basic Electrical and Engineering, M.S.Naidu and S. Kamakshiah, Tata Mc Graw Hill, 3 <sup>rd</sup> Edition, 2009.
<b>2</b>	Electrical and Electronic Technology, Hughes, Pearson Education

**G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY  
(AUTONOMOUS)**

**ENGINEERING GRAPHICS AND COMPUTER AIDED DRAFTING**

Title of the Course:	<b>ENGINEERING GRAPHICS AND COMPUTER AIDED DRAFTING</b>				
Branches for which this course is offered:	I B.Tech I Sem (ECE & EEE) I B.Tech II Sem (CIV,MEC & CSE)	L	T	P	C
		1	0	4	3

**Course Objectives:**

Bring awareness that Engineering Drawing is the Language of Engineers.

- Familiarize how industry communicates technical information.
- Teach the practices for accuracy and clarity in presenting the technical information.
- Develop the engineering imagination essential for successful design.
- Instruct the utility of drafting & modeling packages in orthographic and isometric drawings.
- Train the usage of 2D and 3D modeling.
- Instruct graphical representation of machine components.

**Course Outcomes:**

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

CO1	Learning conventions of Drawing, which is an Universal Language Of Engineers. Also Interpret and Sketch the various curves which Including ellipse, parabola, hyperbola
CO2	Analyze and draft the orthographic projections of points and lines
CO3	Analyze and sketch the orthographic projections of planes and solids
CO4	Revise and Improve their visualization skills in the development of new products
CO5	Construct the isometric projection of an object employing orthographic projections
CO6	Drawing 2D and 3D diagrams of various objects

Practice	
S. No	Title of the Experiment
1	Introduction to engineering drawing: Principles of Engineering Graphics and their significance, Usage of Drawing instruments.
2	Lettering and dimensions
3	Conic sections- Ellipse (General methods only)
4	Conic sections- Parabola (General methods only)
5	Conic sections- Hyperbola (General methods only)
6	Principles of Orthographic Projections-Conventions.
7	Projections of Points
8	Projections of lines
9	Projections of lines inclined to one plane.
10	Projections of regular solids: Prism, Cylinder.
11	Projections of Pyramid, Cone
12	Development of surfaces of right regular solids: prism & Cylinder
13	Development of surfaces of right regular solids pyramid & Cone.
14	Isometric projections:Principles of Isometric projection, Isometric Scale
15	Isometric Views of Planes
16	Isometric Views of Simple solids –Prism & Cube
17	Isometric Views of Simple solids –Cylinder and Cone
18	Conversion of Isometric Views to Orthographic Views
19	Introduction to AutoCAD Software: The Menu System, Toolbars, Command Line, Status Bar, Shortcut menus (Button Bars)
20	Customization & CAD Drawing:, Setting of units and drawing limits, drawing simple figures.
21	Producing drawings by using Absolute coordinate input entry method to draw straight lines.
22	Producing drawings by using Relative coordinate input entry method to draw straight lines.
23	Producing drawings by using polar coordinate input entry method to draw straight lines.
24	Applying dimensions to objects.
25	Editing options.

**G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY  
(AUTONOMOUS)  
CHEMISTRY LAB**

Title of the Course	Chemistry Lab				
Branches for which this course is offered:	I B.Tech I Sem (ECE & EEE)	L	T	P	C
	I B.Tech II Sem (CSE)	0	0	3	1.5

**Course Overview:**

- Will learn practical understanding of the redox reactions
- Will learn the preparation and properties of synthetic polymers and other material that would provide sufficient impetus to engineers these to suit diverse applications
- Will learn practical understanding of Potentiometric titrations

**Course Objectives:**

- To familiarize the students with the basic concepts of Engineering Chemistry lab.
- To train the students on how to handle the instruments.
- To demonstrate the digital and instrumental methods of analysis.
- To expose the students in practical aspects of the theoretical concepts.

**Course Outcomes:**

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

CO 1	Determine the cell constant and conductance of solutions
CO 2	Prepare advanced polymer materials
CO 3	Measure the strength of an acid present in secondary batteries
CO 4	pH metric titrations
CO 5	Verify Lambert-Beer's law
CO 6	Potentiometry - determination of redox potentials and emfs

<b>List of Experiments</b>
1. Determination of cell constant and conductance of solutions
2. Conductometric titrations of Strong acid Vs Strong base
3. pH metric titration of weak acid vs. strong base
4. Potentiometry - determination of redox potentials and emfs
5. Estimation of Ferrous Iron by Dichrometry
6. Determination of Strength of an acid in Pb-Acid battery
7. Preparation of a polymer
8. Adsorption of acetic acid by charcoal
9. Verify Lambert-Beer's law
10. Determination of copper by colorimetry
11. Thin layer chromatography
12. Identification of simple organic compounds by UV-Visible Spectral analysis
13. Preparation of nanomaterials
14. HPLC method in separation of gaseous and liquid mixtures

<b>Reference Books</b>
1. Mendham J, Denney RC, Barnes JD, Thomas M and Sivasankar B Vogel's Quantitative Chemical Analysis 6/e, Pearson publishers (2000).
2. N.K Bhasin and Sudha Rani Laboratory Manual on Engineering Chemistry 3/e, Dhanpat Rai Publishing Company (2007).

**G.PULLAIAH COLLEGE OF ENGINEERING & TECHNOLOGY  
(AUTONOMOUS)**

**DATA STRUCTURES LABORATORY**

<b>Title of the course:</b>	<b>DATA STRUCTURES LABORATORY</b>				
<b>Branches for which this course is offered:</b>	B.TECH II SEMESTER	L	T	P	C
		0	0	3	1.5

**COURSE OBJECTIVE:**

- To strengthen the ability to identify and apply the suitable data structure for the given real world problem

**COURSE OVERVIEW:**

- Implement linear and non linear data structures.
- Analyze various algorithms based on their time complexity.
- Choose appropriate data structure and algorithm design method for a specific application.
- Identify suitable data structure to solve various computing problems.

**COURSE OUTCOMES:**

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

CO1	Learn to choose appropriate data structure as applied to specified problem definition.
CO2	Design and analyze linear and non-linear data structures.
CO3	Design and implement algorithms for manipulating linked lists, stacks, queues, trees and graphs in python
CO4	Implement recursive algorithms as they apply to trees and graphs.
CO5	Formulate new solutions for programming problems or improve existing code using learned algorithms and data structures
CO6	Implement operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.

**Course Content:**

<b>TASK-1</b>	<b>Introduction</b>	<b>PRACTICAL HOURS: 2</b>
Write a program to sort the number of elements using sorting by exchange. Write a program to sort the characters in a string using sorting by exchange.		
<b>TASK-2</b>		<b>PRACTICAL HOURS: 2</b>

Write a program to sort numbers using insertion sort. Write a program to sort the elements of an array using Selection Sort.		
<b>TASK-3</b>		<b>PRACTICAL HOURS:2</b>
Write a program to implement heap sort.		
<b>TASK-4</b>		<b>PRACTICAL HOURS: 3</b>
Write a program to search a mobile number in a list of students using linear search.		
<b>TASK-5</b>		<b>PRACTICAL HOURS: 3</b>
Write a program to search a mobile number using Binary Search and compare with linear search with time complexity.		
<b>TASK-6</b>		<b>PRACTICAL HOURS: 3</b>
Write a program to convert infix expression to postfix expression and evaluate postfix expression.		
<b>TASK-7</b>		<b>PRACTICAL HOURS: 3</b>
Write a program to implement stack, queue, circular queue using arrays and linked lists on employee details.		
<b>TASK-8</b>	<b>Linked List, Stack, Queue</b>	<b>PRACTICAL HOURS: 3</b>
Write a program to perform the operations creation, insertion, deletion, and traversing a singly linked list on student structures with members student roll no, name and total marks.		
<b>TASK-9</b>		<b>PRACTICAL HOURS: 3</b>
Write a program to perform the operations creation, insertion, deletion, and traversing a Doubly linked list.		
<b>TASK-10</b>		<b>PRACTICAL HOURS: 3</b>
Write a program to remove duplicates from ordered and unordered arrays.		
<b>TASK-11</b>		<b>PRACTICAL HOURS: 3</b>
Write a program to implement quick sort using non-recursive and recursive approaches. Use randomized element as partitioning element.		
<b>TASK-12</b>		<b>PRACTICAL HOURS: 3</b>
Write a program for tic-tac-toe game.		



<b>TASK-13</b>		<b>PRACTICAL HOURS:3</b>
Write a program to perform operations creation, insertion, deletion and traversing on a binary search tree.		
<b>TASK-14</b>		<b>PRACTICAL HOURS: 3</b>
Write a program to implement depth first search and breadth first search on graphs.		
<b>TASK-15</b>		<b>PRACTICAL HOURS: 3</b>
Write a program to perform different operations on Red Black trees.		
<b>TASK-16</b>		<b>PRACTICAL HOURS: 3</b>
Write a program to implement external sorting.		
<b>TASK-17</b>		<b>PRACTICAL HOURS: 3</b>
Write a program to perform different operations of B Tree.		

<b>Text Books:</b>	
1	Problem Solving with Algorithms and Data Structures Using Python by David L. Ranum, Bradley N. Miller
2	Python Data Structures and Algorithms by Benjamin Baka, Packt Publishing Ltd

<b>Reference Books:</b>	
1	Think Python, How to Think Like a Computer Scientist
2	Python 3 Object-oriented Programming - Second Edition by Dusty Phillips

**G.PULLAIAH COLLEGE OF ENGINEERING & TECHNOLOGY  
(AUTONOMOUS)**

**BASIC ELECTRICAL AND ELECTRONICS LABORATORY**

<b>Title of the Course :</b>	<b>BASIC ELECTRICAL AND ELECTRONICS LABORATORY</b>				
<b>Branches for which this course is offered:</b>	<b>II Semester (CSE)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

**Course Overview:**

This course is designed to provide students with fundamental concepts of Electrical Circuits and Electrical Machines for lab experience. Verification of Thevenin's, Super Position theorems and open and short circuit parameters and determination of efficiency of DC & AC Machines.

This course is designed to provide students with fundamental concepts of Electronic Devices for lab experience. Analysis of V-I characteristics of diodes, BJT and FET. Study of operation of rectifiers with & without filters.

**Course Objectives:**

To make the students to learn about

1	Practical verification of Superposition and Thevenin's theorem O.C. and S.C. parameters of two – port network
2	Swinburne's Test on DC Shunt Machine and Predetermination of Efficiency of a Given DC Shunt Machine (i) while working as a Motor and (ii) while working as a Generator
3	OC & SC Tests on Single-Phase Transformer and Predetermination of Efficiency and Regulation at any given load and Power Factor.
4	V-I characteristics of P -N Junction Diode and Zener Diode.
5	Input and output characteristics of BJT, Common Source Configuration Output and Transfer Characteristics of JFET.

<b>Course Outcomes:</b>	
After successful completion of the course, the student will be able to	
<b>CO1</b>	Practically verify Superposition , Thevenin's theorems and Open and Short circuit parameters.
<b>CO2</b>	Predetermine the Efficiency of a given DC Shunt Machine (i) while working as a Motor and (ii) while working as a Generator by using Swinburne's test.
<b>CO3</b>	Predetermine the Efficiency and Regulation at any given load and Power Factor of a transformer by using OC & SC tests.
<b>CO4</b>	Analyze the V-I characteristics of P -N Junction Diode and Zener Diode.
<b>CO5</b>	Analyze the input and output characteristics of BJT, Common Source Configuration Output and Transfer Characteristics of JFET.
<b>CO6</b>	Determination of efficiency of a Half-Wave Rectifier and Full-Wave Rectifier with and without filters.

## **PART – A**

### **BASIC ELECTRICAL ENGINEERING LAB**

#### **(Any Six Experiments)**

1. Verification of Superposition Theorem.
2. Verification of Thevenin's Theorem.
3. Determination of Open circuit and Short circuit parameters of two – port network.
4. Swinburne's Test on DC Shunt Machine (Predetermination of Efficiency of a Given DC Shunt Machine Working as Motor and Generator).
5. Brake Test on DC Shunt Motor. Determination of Performance Characteristics.
6. OC & SC Tests on Single-Phase Transformer (Predetermination of Efficiency and Regulation at any given load and Power Factor).
7. Open circuit characteristics of DC Shunt Generator and determination of critical field resistance and critical speed.

**PART – B**  
**BASIC ELECTRONICS LAB**  
**(Any Six Experiments)**

1. P-N Junction Diode and Zener Diode Volt-Ampere Characteristics.
2. Bipolar Junction Transistor in CB Configuration-Input and Output Characteristics, Computation of  $\alpha$ .
3. Half-Wave Rectifier- a) Without Filter b) With Capacitor Filter.
4. Full-Wave Rectifier- a) Without Filter b) With Capacitor Filter.
5. Bipolar Junction Transistor in CE Configuration-Input and Output Characteristics, Computation of  $\beta$ .
6. Junction field effect Transistor in Common Source Configuration Output and Transfer Characteristics.
7. Verification of Logic Gates- AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR

<b>Text Books:</b>	
<b>1</b>	Basic Electrical Engineering, V. N. Mittle and Arvind Mittle, Mc Graw Hill (India) Pvt. Ltd., 2 <sup>nd</sup> Edition, 2005.
<b>2</b>	Basic Electrical Engineering, T.K.Nagsarkar and M.S. Sukhija, Oxford University Press, 2 <sup>nd</sup> Edition, 2011.
<b>References Books:</b>	
<b>1</b>	Basic Electrical Engineering, M.S.Naidu and S. Kamakshiah, Tata Mc Graw Hill, 3 <sup>rd</sup> Edition, 2009.
<b>2</b>	Electrical and Electronic Technology, Hughes, Pearson Education

**G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY  
(AUTONOMOUS)**

**CO-ENGINEERING LABORATORY**

Title of the Course:	<b>CO-ENGINEERING LABORATORY</b>				
Branches for which this course is offered:	I B.Tech I Sem (ECE & EEE) I B.Tech II Sem (CIV, MEC & CSE)	L	T	P	C
		0	0	3	1.5

**Course Objectives:**

- understand the basics of resistor and capacitor codes
- To introduce students to the basic theory of power semiconductor devices and passive components, their practical applications in power electronics.
- To provide strong foundation for further study of power electronic circuits and systems.
- To familiarize the characteristics operations, calibrations and applications of the oscilloscope
- to analyse and interpret test results and measurements on electric circuits, in terms of theoretical models, to predict the performance of electric circuits from device characteristics and to design an electronic printed circuit board for a specific application using industry standard software
- To familiarize students with wood working, sheet metal operations, fitting and electrical house wiring skills

**Course Outcomes:**

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

CO1	To acquire the knowledge about the characteristics and working principles of semiconductor diodes, Bipolar Junction Transistor
CO2	Analysis of Single Phase AC Circuits, the representation of alternating quantities and determining the power in these circuits
CO3	Able to Measure the amplitude and frequency utilizing oscilloscope and analyze the fabrication processes of printed circuit boards
CO4	Apply wood working skills in real world applications. Build different parts with metal sheets in real world applications
CO5	Apply fitting operations in various applications
CO6	Apply different types of basic electric circuit connections

S. No	Title of the Experiment
1	<ul style="list-style-type: none"> <li>• Passive Electronic Components</li> <li>• Color code for resistors</li> <li>• Coding for capacitors</li> <li>• Prototyping aids</li> </ul>
2	<ul style="list-style-type: none"> <li>• Active Electronic Components</li> <li>• Power sources</li> </ul>
3	<ul style="list-style-type: none"> <li>• Cathode Ray Oscilloscope (CRO)</li> <li>• Multi meters</li> <li>• DC Power Source</li> <li>• Signal Generator</li> </ul>
4	<ul style="list-style-type: none"> <li>• Printed Circuit Board</li> <li>• Soldering Practice (Soldering &amp; De soldering)</li> </ul>
5	<b>Fitting Trade</b> - To make a L- fit from the given M.S Flat material piece.
6	<b>Carpentry Trade</b> - To make a cross lap joint as per specification.
7	<b>Tin Smithy</b> – To make a open scoop with the given sheet metal
8	<b>Foundry:</b> To prepare a sand mould using a single piece pattern.
9	Residential house wiring using fuse, switch, indicator, lamp and energy meter
10	Tube light wiring
11	Go Down Wiring
12	Stair case wiring

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**COURSE STRUCTURE**  
**III SEMESTER**

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## G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

III SEMESTER (II YEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A2701	Managerial Economics & Financial Analysis	HS	3	0	0	3	30	70	100
A2505	Object Oriented programming through Java	PC	3	1	0	4	30	70	100
A2506	Database Management System	PC	3	0	0	3	30	70	100
A2507	Software Engineering	PC	3	0	0	3	30	70	100
A2508	Discrete Mathematics	PC	3	0	0	3	30	70	100
A2509	Object Oriented programming through Java Laboratory	PC	0	0	4	2	30	70	100
A2510	Database Management System Laboratory	PC	0	0	3	1.5	30	70	100
A2511	IoT and Robotics Laboratory	PC	0	0	3	1.5	30	70	100
A2016	Quantitative Aptitude and Reasoning – I	BS	1	0	0	1	30	70	100
A2031	Environment Science	M C	2	0	0	0	100*	0	100*
TOTAL			18	01	10	22	270	630	900



# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE

### A2701- MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

#### 1. Course Description

##### Course Overview

This Course is designed in such a way that it gives an overview of concepts of economics. Managerial economics enables students to understand micro environment in which markets operate how price determination is done under different kinds of competitions. Financial analysis gives clear idea about concepts and conversions accounting procedures along with introducing students to fundamentals of ratio analysis and interpretation of financial statements.

##### Course Pre/corequisites

The course has no specific prerequisite and corequisite

#### 2. Course Outcomes (COs)

**After completion of the course, the learner will be able to:**

- A2701.1 Apply the knowledge of managerial economics and financial accounting to solve business problems.
- A2701.2 Analyze the demand, production cost and break even with suitable methods.
- A2701.3 Classify the market structure to decide the fixation of suitable price.
- A2701.4 Apply capital budgeting techniques to select best investment opportunity.
- A2701.5 Prepare financial statements to assess financial health of business.

#### 3. Course Syllabus

**UNIT – I INTRODUCTION TO MANAGERIAL ECONOMICS & DEMAND:** Managerial Economics - Definition, Nature and Scope of Managerial Economics, Relation with other disciplines –Demand Analysis: Demand- Types, Demand Determinants, Law of Demand and its exceptions. GST-Implications

**Elasticity of Demand:** Types, Measurement and Significance, Demand Forecasting: Meaning, methods of demand forecasting

**UNIT – II THEORY OF PRODUCTION:** Production function – Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs. Laws of Production, Internal and External Economies of Scale

**Cost & Break Even 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

**UNIT–III INTRODUCTION TO MARKETS & ECONOMIC ENVIRONMENT:** Market structures-Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition, oligopoly - Price-Output Determination in case of Perfect Competition, Monopoly. Forms of business organisations- Economic Environment-LPG

## G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

**Pricing:** Objectives and Policies of Pricing- Methods of Pricing: Cost Plus Pricing, Marginal Cost Pricing, Sealed Bid Pricing, Going Rate Pricing, Limit Pricing, Market Skimming Pricing, Penetration Pricing, Two-part Pricing, Block Pricing, Bundling Pricing, Peak Load Pricing, Cross Subsidization

**UNIT–IV CAPITAL AND CAPITAL BUDGETING:** Capital and its significance, Types of Capital, Components of working capital & Factors determining the need of working capital. 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), Net Present Value Method, Profitability Index, Internal rate of return (simple problems).

**UNIT – V INTRODUCTION TO FINANCIAL ACCOUNTING:** Accounting Principles - Concepts, Conventions, Double Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts with simple adjustments.

**Financial Analysis through Ratios:** Importance, types: Liquidity Ratios, Activity Ratios, Turnover Ratios and Profitability ratios.

### 4. Books and Materials

#### Text Books

1. A.R. Aryasri, *Managerial Economics and Financial Analysis*, TMH, India, 2011.

#### Reference Books

1. Ambrish Gupta, *Financial Accounting for Management: An Analytical Perspective*, 4<sup>th</sup> edition, Pearson Education: New Delhi, 2011.
2. R L Varshney and K L Maheshwari, *Managerial Economics*, Sultan Chand: New Delhi, ISBN: 9788170149903, 2003.
3. Domnick Salvatore, *Managerial Economics in a Global Economy*, 4th edition, Thomson, 2001.

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE

### A2505 –OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	1	0	42	14	0	4	30	70	100

#### 1. Course Description

##### Course Overview

This course provides a comprehensive coverage of Object Oriented Programming concepts using Java. It covers abstract data types, Strings, arrays. It also covers interfaces, inheritance, packages, exception handling, multithreading, files and swings. This course helps the students to choose their career as software engineer.

##### Course Pre/corequisites

A2501- Computer Programming

#### 2. Course Outcomes (COs)

**After completion of the course, the learner will be able to:**

A2505.1 Apply object oriented concepts for solving general purpose problems

A2505.2 Use inheritance, user defined packages and interfaces for code reusability

A2505.3 Apply exception handling and multithreading concepts for robust and efficient application development

A2505.4 Implement collection frameworks to store and retrieve data efficiently

A2505.5 Build GUI applications using swings for user interface design

#### 3. Course Syllabus

**Unit I: The History and Evolution of Java-** History of java, java's magic: the byte code, java buzz-words, evolution of java, object oriented programming.

**Data Types, Arrays, Variables and Operators-** Primitive types, literals, variables, type conversion and casting, arrays, string class, pointers, operators.

**Unit II: Control Statements-** Selection statements, iteration statements, jump statements.

**Introducing classes-** Class fundamentals, objects, methods, constructors, this keyword, garbage collection, overloading, argument passing, recursion, static, command line and variable length arguments.

**Unit III: Inheritance-** Basics, using super, multi level hierarchy, method overriding, dynamic method dispatch, abstract class, final with inheritance.

**Packages and Interfaces-** Packages, access protection, interfaces, default interfaces, default interface methods, static methods in an interface.

**Exception Handling-** Fundamentals, exception types, nested try statements, throw, throws, finally, built-in and user defined exceptions, chained exceptions.

## G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

**Unit IV: Multithreaded Programming:** Thread model, main thread, creating thread, isalive() and join(), thread priorities, synchronization, interthread communication, suspending, resuming and stopping threads, obtaining a thread state.

**Input and Output Operations:** I/O basics, reading console input, writing console output, the PrintWriter class, reading and writing files, automatically closing a file.

**Unit V: Collections Framework:** Collection classes- ArrayList, LinkedList, HashSet, TreeSet, Using an Iterator and Spliterators.

**Swings:** The origins of swing, two key swing features, components and containers, the swing packages, a simple swing application, event handling, create a swing applet, exploring swing.

### 4. Books and Materials

#### Text Book(s)

1. Herbert Schildt, *Java The Complete Reference*, MC Graw Hill Education, 9<sup>th</sup> edition, 2016.

#### Reference Book(s)

1. T. V. Suresh Kumar, B.Eswara Reddy, P.Raghavan, *Programming with Java*, Pearson, 2011.
2. Paul Deitel, Harvey Deitel, *Java – How to Program*, Pearson, 2<sup>nd</sup> edition, 2012.
3. Kathy Sierra, Bert Bates, *Head First Java*, O'Reilly, 2<sup>nd</sup> edition, 2005.

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE

### A2506– DATABASE MANAGEMENT SYSTEMS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

## 1. Course Description

### Course Overview

This course enlightens the learners with the comprehensive concepts of database and its applications. It covers various data models, Entity Relationship diagrams, SQL queries, transactions and indexing techniques. The learners of this course can choose the domain of Data Engineering and can opt their carrier path in database administration or data analytics.

### Course Pre/corequisites

The course has no specific prerequisite and co-requisites.

## 2. Course Outcomes (COs)

**After completion of the course, the learner will be able to:**

- A2506.1 Apply suitable data model for given application
- A2506.2 Construct optimized SQL queries to solve real time problems
- A2506.3 Apply suitable normal form to eliminate data redundancy
- A2506.4 Use suitable transaction model to avoid Deadlock
- A2506.5 Choose appropriate index structure to improve performance

## 3. Course Syllabus

### Unit I

**Introduction**-Basics of Database System and its Applications, Database System Principles

**Data View** - Data Abstraction, Instances and Schemas, Data Models, Database Languages, Database Architecture, Database Users and Administrators, Introduction to Database design

### Unit II

**ER diagrams**- Entities, Attributes and Entity sets, Relationship sets, Additional features of ER Model, Conceptual Design with ER Model

**Relational Algebra** - Selection and Projection, Set operations, Renaming, Joins, Division, Examples of Algebra Queries

### Unit III

**Basic SQL Queries** - Examples of Basic SQL Queries, Introduction to Sub queries, Correlated Sub queries, Set - Comparison Operators, Aggregate Operators, NULL values - Comparison using Null values, AND, OR and NOT - Impact on SQL Constructs, Outer Joins, Disallowing NULL values, Complex Integrity Constraints in SQL Triggers and Active Data bases.

**Schema Refinement** - Redundancy Issues, Decompositions - Examples related to decompositions, Functional Dependencies

### Unit IV

## **G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL**

**Normal Forms** - FIRST, SECOND, THIRD Normal forms – BCNF, FOURTH Normal Form, FIFTH Normal form.

**Transaction Concept** - Transaction State, ACID Properties, Concurrency control, Serializability and Recoverability.

**Concurrency Control** - Lock Based Protocols, Timestamp Based Protocols, Validation Based Protocols.

### **Unit V**

**Data on External Storage** - File Organization and Indexing - Clustered Indexes, Primary and Secondary Indexes, Index data Structures - Hash Based Indexing, Tree based Indexing  
Comparison of File Organizations.

**Tree Structured Indexing**-Indexed Sequential Access Methods(ISAM) , B+ Trees: A Dynamic Index Structure and its operations.

**Hash Based Indexing** - Static Hashing, Extendable hashing, Linear Hashing.

## **4. Books and Materials**

### **Text Book(s)**

1. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, McGrawHill Education, 3<sup>rd</sup> edition, 2017.

### **Reference Book(s)**

1. Database Systems, 6<sup>th</sup> edition Korth Tata Mc Grawhill 2017.

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE

### A2507– SOFTWARE ENGINEERING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

## 1. Course Description

### Course Overview

This course deals with engineering principles and programming languages applied in software development. The course will orient the students to the different software process models, software requirements engineering process, systems analysis and design as a problem-solving activity, with focus on quality. The knowledge acquired through this course is used to handle projects efficiently with minimizing cost and complexity.

### Course Pre/corequisites

A2501- Computer Programming

## 2. Course Outcomes (COs)

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

- A2507.1 Identify the phases of software development life cycle for better design
- A2507.2 Apply different agile principles in developing a project
- A2507.3 Adapt appropriate requirement engineering process for change management
- A2507.4 Propose design as per functional and non-functional requirements using design principles
- A2507.5 Implement various testing techniques for software systems

## 3. Course Syllabus

### Unit-I

**Introduction to Software Engineering:** Nature of software, software engineering, The software processes, software myths.

**Process Models:** A generic process model, process assessment and improvement, prescriptive process models, specialised process models, unified process, personal and team process models.

### Unit-II

**Agile Development:** What is agility, agility and the cost of change, agile process, extreme programming (XP), other agile process models: Adaptive Software Development (ASD), Scrum, Dynamic System Development Method (DSDM).

**Requirements Engineering:** Functional and Non-functional requirements, software requirements document, requirements specification, requirements engineering, requirements elicitation and analysis, requirement validation, requirement management.

### Unit-III

## G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

**Requirements Modelling:** Requirement analysis, scenario-based modelling, data modelling concepts, class-based modelling.

**Design Concepts:** The design process, design concepts, the design models, architectural design, user interface design.

### Unit-IV

**Implementation:** Structured coding techniques, coding styles-standards and guidelines, implementation issues.

**Software Testing Strategies:** Strategic issues and test strategies for conventional software, validation testing, system testing, the art of debugging, white-box testing, black box testing.

### Unit-V

**Quality Management & Assurance:** Quality concepts, achieving software quality, review techniques, elements of software quality assurance.

## 4. Books and Materials

### Text Book(s)

1. Roger S.Pressman, *Software Engineering*, A Practitioner's Approach, McGraw Hill, International Edition, 8<sup>th</sup> edition, 2015.

### Reference Book(s)

1. Sommerville, *Software Engineering*, Pearson education, 7<sup>th</sup> edition, 2008.



# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE

### A2508- DISCRETE MATHEMATICS

HOURS PER WEEK			HOURS PER SEMESTER			CREDITS	ASSESSMENT MARKS		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

## 1. Course Description

### Course Overview

This course will simplify and evaluate basic logic statements. It solves problems using operations on sets, functions, recurrence relations to analyze algorithms, algebraic structure, counting, graph theory and traversal techniques. The learner will be able to develop mathematical models for computing problems.

### Course Pre/co requisites

Mathematics -1

## 2. Course Outcomes (COs)

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

- A2508.1 Apply the logic statements and connectives to solve real time problems
- A2508.2 Classify algebraic structure and relations for a given mathematical problem
- A2508.3 Analyze the basic results in combinatorics and binomial theorems for accuracy
- A2508.4 Apply various recurrence relations to find solutions for numeric sequences
- A2508.5 Apply graph theory techniques to solve network problems

## 3. Course Syllabus

### Unit-I

**Mathematical Logic :** Statements and Notation, Well Formed Formulas, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications, Normal Forms, Validity using Truth Tables, Rules of Inference, Consistency of Premises and Indirect Method of Proof, Automatic Theorem Proving, Predicates, The Statement Function, Variables and Quantifiers, Predicate Formulas

### Unit-II

**Relations And Functions:** Properties of binary Relations in a Set, Relation Matrix and the Graph of a Relation, Partition and Covering of a Set, Equivalence Relations, Compatibility Relations, Partial Ordering, Hasse Diagram. Functions, Composition of Functions.

### Unit-III

**Algebraic Structures:** Algebraic Systems, Simple Algebraic Systems and General Properties, Semi Groups and Monoids, Groups, Subgroups, Homomorphism, Isomorphism.

Elementary Combinatorics: Basics of Counting, Combinations and permutations, Binomial Coefficients, The Binomial and Multinomial Theorems, The Principle of Inclusion-Exclusion, Pigeonhole Principle and its Applications.

### Unit-IV

## G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

**Recurrence Relations :** Generating Functions of Sequences, Calculating Coefficients of Generating functions, Recurrence Relations, Solving Recurrence Relations by Substitution and Generating Functions, The Method of Characteristic Roots, Solutions of Inhomogeneous Recurrence Relations.

### Unit-V

**Graph Theory :** Basic Concepts, Representation of Graphs, Isomorphism and Sub graphs, Spanning Trees, Planar Graphs, Euler's Formula, Multi graphs and Euler circuits, Hamiltonian Graphs, Chromatic Numbers, The Four-Color Problem.

## 4. Books and Materials

### Text Book(s)

1. J.P.Tremblay, R.Manohar, *Discrete Mathematical Structures with Applications to Computer Science*. TMH, 2015.
2. Joe L. Mott. Abraham Kandel and Theodore P. Baker, *Discrete Mathematics for Computer Scientists & Mathematicians*, 2<sup>nd</sup> Edition, Pearson,2015.

### Reference Book(s)

1. N. Chandrasekaran, M. Umaparvathi, *Discrete Mathematics*, PHI Learning Pvt. Ltd,2012.
2. BernandKolman, Roberty C. Busby, Sharn Cutter Ross, *Discrete Mathematical Structures*. Pearson Education, 2014.

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE

### A2509 –OBJECT ORIENTED PROGRAMMING USING JAVA LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	4	0	0	56	2	30	70	100

#### 1. Course Description

##### Course Overview

This course provides hands on experience in applying object oriented concepts using Java. The learner will be able to practically handle problems related to arrays, Strings, interfaces, inheritance, packages, exception handling, multithreading, files and swings and give effective solution programmatically. This helps the students to choose their career as software engineer.

##### Course Pre/corequisites

A2501- Computer Programming

A2505- Object Oriented Programming using Java

#### 2. Course Outcomes (COs)

**After completion of the course, the learner will be able to:**

- A2509.1 Design solutions for the problems of general purpose applications using object oriented concepts.
- A2509.2 Generate reusable code using inheritance, user defined packages and interface
- A2509.3 Write robust and efficient code using exception handling and multithreading concepts
- A2509.4 Implement collection frameworks and file handling techniques to store and retrieve data
- A2509.5 Design user interface using swings

#### 3. Course Syllabus

##### Lab Experiments:

1. Installation of Java software and study of any integrated development environment. Learn to compile, debug and execute java programs.

##### Arrays

2. Write java program that inputs 5 numbers, each between 10 and 100 inclusive. As each number is read, display it only if it is not a duplicate of any number already read. Display the complete set of unique values input after the user enters each new value.

##### Inheritance

3. Write a java program to create a super class called Figure that receives the dimensions of two dimensional objects. It also defines a method called area that computes the area of an object. The program derives two subclasses from Figure. The first is Rectangle and second is Triangle. Each of the sub classes override area() so that it returns the area of a rectangle and triangle respectively.
4. Develop a java application for banking transactions by using inheritance concept.

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5. Develop a java application for daily Attendance by using the concept dynamicbinding.

### **Interfaces**

6. Create an interface for stack with push and pop operations. Implement the stack in two ways: fixed size stack and Dynamic stack (stack size is increased when stack isfull).

7. Develop a java application for ticket reservation by using the concept of polymorphism.

### **Exception Handling**

8. Write Java program(s) which uses the exception handling features of the language, creates exceptions and handles them, uses the predefined exceptions, and create own exceptions.

### **Multithreading**

9. Write a Java program that creates three threads. First thread displays “Good Morning” every one second, the second thread displays “Hello” every two seconds and the third thread displays “Welcome” every three seconds.

10. Write a Java program that correctly implements producer consumer problem using the concept of inter thread communication.

### **Files**

11. Write a java program to split a given text file into n parts. Name each part as the name of the original file followed by .part<n> where n is the sequence number of the partfile.

12. Write a java program to find and replace pattern in a givenfile.

### **Collection Frameworks**

13. Implement collection frameworks to retrieve data.

### **Event Handling**

14. Write a java program to handle mouse events.

15. Write a java program to handle keyboardevents.

### **Swings**

16. Develop a swing program for waving a Flag using applets andthreads.

17. Using swings design a simple calculator which performs all arithmetic operations. The interface should look like the calculator application of the operating system. Handle the exceptions if any.

18. Write a java program that allows conduction of object type examination containing multiple choice questions, and true/false questions. At the end of the examination when the user clicks a button the total marks have to be displayed in the form of themessage.

## **4. Laboratory Equipment/Software/Tools Required**

1. Open source Java Tool kit: JDK 8 and above versions

## **5. Books and Materials**

### **Text Book(s)**

1. Herbert Schildt, *Java The Complete Reference*, MC GRAW HILL Education, 9<sup>th</sup> edition, 2016.

### **Reference Book(s)**

1. T. V. Suresh Kumar, B.Eswara Reddy, P.Raghavan, *Programming with Java*, Pearson, 2011.
2. Paul Deitel, Harvey Deitel, *Java – How to Program*, Pearson, 2<sup>nd</sup> edition, 2012.
3. Kathy Sierra, Bert Bates, *Head First Java*, O’Reilly, 2<sup>nd</sup> edition, 2005.

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE

### A2510– DATABASE MANAGEMENT SYSTEMS LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	30	70	100

## 1. Course Description

### Course Overview

This Laboratory gives hands on experience of designing database and to access it. The learners will be practically able to apply ACID properties, indexing and querying concepts on database for efficient operations. The learners of this course can choose the domain of Data Engineering and can opt their carrier path in database administration or data analytics.

### Course Pre/corequisites

A2506 Database Management Systems

## 2. Course Outcomes (COs)

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

- A2510.1 Design Database tables for the given problem
- A2510.2 Use appropriate querying processing technique to access the data
- A2510.3 Apply suitable normal form to eliminate data redundancy
- A2510.4 Develop PL/SQL routines for reusability of code
- A2510.5 Apply appropriate triggering concepts for automation and performance

## 3. Course Syllabus

Course Content:														
TASK-1	CREATION OF TABLES:													
Create a table called <b>Employee</b> with the following structure.														
<table><tr><th>Name</th><th>Type</th></tr><tr><td>Empno</td><td>Number</td></tr><tr><td>Ename</td><td>Varchar2(20)</td></tr><tr><td>Job</td><td>Varchar2(20)</td></tr><tr><td>Doj</td><td>Number</td></tr><tr><td>Sal</td><td>Number</td></tr></table>			Name	Type	Empno	Number	Ename	Varchar2(20)	Job	Varchar2(20)	Doj	Number	Sal	Number
Name	Type													
Empno	Number													
Ename	Varchar2(20)													
Job	Varchar2(20)													
Doj	Number													
Sal	Number													
<div>a. Add a column commission with domain to the Employee table.</div> <div>b. Insert any five records into the table.</div> <div>c. Update the column details of job</div> <div>d. Rename the column of Employ table using alter command.</div>														

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e. Delete the employee whose empno is 19

### TASK-2

Create **department** table with the following structure.

Name	Type
Deptno	Number
Deptname	Varchar2(20)
location	Varchar2(20)

- Add column designation to the department table.
- Insert values into the table.
- List the records of emp table grouped by deptno.
- Update the record where deptno is 9.
- Delete any column data from the table.

### TASK-3

Create a table called **Customertable**

Name	Type
Cust name	Varchar2(20)
Cust street	Varchar2(20)
Cust city	Varchar2(20)

- Insert records into the table.
- Add salary column to the table.
- Alter the table column domain.
- Drop salary column of the customer table.
- Delete the rows of customer table whose cust\_city is 'kurnool'.

### TASK-4

Create a table called **branchtable**.

Name	Type
Branchname	Varchar2(20)
Branchcity	Varchar2(20) asserts
Branchname	Varchar2(20)

- Increase the size of data type for asserts to the branch.
- Add and drop a column to the branch table.
- Insert values to the table.
- Update the branch name column
- Delete any two columns from the table

### TASK-5

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Create a table called **sailor** table

Name	Type
Sid Number	Sname Varchar2(20)
Rating Varchar2(20)	Varchar2(20)
Sid Number	Sname Varchar2(20)

- a. Add column age to the sailor table.
- b. Insert values into the sailor table.
- c. Delete the row with rating >8.
- d. Update the column details of sailor.
- e. Insert null values into the table.

### TASK-6

Create a table called **reserves** table

Name	Type
Boat id	Integer
sid	Integer
day	Integer

- a. Insert values into the reserves table.
- b. Add column time to the reserves table.
- c. Alter the column day data type to date.
- d. Drop the column time in the table.
- e. Delete the row of the table with some condition.

### TASK-7

#### QUERIES USING DDL AND DML

A college consists of number of employees working in different departments. In this context, create two tables **employee** and **department**. Employee consists of columns empno, empname, basic, hra, da, deductions, gross, net, date-of-birth. The calculation of hra, da are as per the rules of the college. Initially only empno, empname, basic have valid values. Other values are to be computed and updated later. Department contains deptno, deptname, and description columns. Deptno is the primary key in department table and referential integrity constraint exists between employee and department tables. Perform the following operations on the the database:

- Create tables department and employee with required constraints.
- Initially only the few columns (essential) are to be added. Add the remaining columns separately by using appropriate SQL command
- Basic column should not be null
- Add constraint that basic should not be less than 5000.
- Calculate hra, da, gross and net by using PL/SQL program.
- Whenever salary is updated and its value becomes less than 5000 a trigger has to be raised preventing the operation.
- The assertions are: hra should not be less than 10% of basic and da should not be less than 50% of basic.
- The percentage of hra and da are to be stored separately.

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- When the da becomes more than 100%, a message has to be generated and with user permission da has to be merged with basic.
- Empno should be unique and has to be generated automatically.
- If the employee is going to retire in a particular month, automatically a message has to be generated.
- The default value for date-of-birth is 1 jan, 1970.
- When the employees called daily-wagers are to be added the constraint that salary should be greater than or equal to 5000 should be dropped.
- Display the information of the employees and departments with description of the fields.
- Display the average salary of all the departments.
- Display the average salary department wise.
- Display the maximum salary of each department and also all departments put together.
- Commit the changes whenever required and rollback if necessary.
- Use substitution variables to insert values repeatedly.
- Assume some of the employees have given wrong information about date-of-birth. Update the corresponding tables to change the value.
- Find the employees whose salary is between 5000 and 10000 but not exactly 7500.
- Find the employees whose name contains 'en'.
- Try to delete a particular deptno. What happens if there are employees in it and if there are no employees.
- Create alias for columns and use them in queries.
- List the employees according to ascending order of salary.
- List the employees according to ascending order of salary in each department.
- Use '&&' wherever necessary
- Amount 6000 has to be deducted as CM relief fund in a particular month which has to be accepted as input from the user. Whenever the salary becomes negative it has to be maintained as 1000 and the deduction amount for those employees is reduced appropriately.
- The retirement age is 60 years. Display the retirement day of all the employees.
- If salary of all the employees is increased by 10% every year, what is the salary of all the employees at retirement time.
- Find the employees who are born in leap year.
- Find the employees who are born on feb 29.
- Find the departments where the salary of at least one employee is more than 20000.
- Find the departments where the salary of all the employees is less than 20000.
- On first January of every year a bonus of 10% has to be given to all the employees. The amount has to be deducted equally in the next 5 months. Write procedures for it.

### **TASK-8**

### **CURSORS**

1. Write a PL/SQL block that will display the name, dept no, salary of first highest paid employees.
2. Update the balance stock in the item master table each time a transaction takes place in the item transaction table. The change in item master table depends on the item id is already present in the item master then update operation is performed to decrease the balance stock by the quantity specified in the item transaction, in case the item id is not present in the item-



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Master table then the record is inserted in the item master table.

3. Write a PL/SQL block that will display the employee details along with salary using cursors.
4. To write a Cursor to display the list of employees who are working as a Managers or Analyst.
5. To write a Cursor to find employee with given job and deptno.
6. Write a PL/SQL block using implicit cursor that will display message, the salaries of all the employees in the 'employee' table are updated. If none of the employee's salary are updated we get a message 'None of the salaries were updated'. Else we get a message

### TASK-9

#### PROCEDURES AND FUNCTIONS

1. Write a function to accept employee number as parameter and return Basic +HRA together as single column.
2. Accept year as parameter and write a Function to return the total net salary spent for a given year.
3. Create a function to find the factorial of a given number
4. Create function to the reverse of given number.

### TASK-10

#### TRIGGERS

1. Create a row level trigger for the customers table that would fire for INSERT or UPDATE or DELETE operations performed on the CUSTOMERS table. This trigger will display the salary difference between the old values and new values: CUSTOMER table:

Id	Name	Age	Address	Salary
1	Sri Lakshmi	34	Kurnool	50000
2	Sreedhar	36	Hyderabad	80000
3	Neetu	30	Chennai	30000
4	Nymisha	29	Delhi	20000
5	Nishitha	25	Bombay	40000
6	Jyothsna	29	kurnool	60000

Creation of insert trigger, delete trigger, update trigger practice triggers using the passenger database.  
 Passenger( Passport\_ id INTEGER PRIMARY KEY, Name VARCHAR (50) Not NULL, Age); Integer Not NULL, Sex Char, Address VARCHAR (50) Not NULL

Write a Insert Trigger to check the Passport\_id is exactly six digits or not.

Write a trigger on passenger to display messages '1 Record is inserted', '1 record is deleted', '1 record is updated' when insertion, deletion and updation are done on passenger respectively.

3. Insert row in employee table using Triggers. If any employee has same name it must be replaced by new name. These triggers can be raised before insert, update or delete rows on database.
4. Convert employee name into uppercase whenever an employee record is inserted or updated. Trigger to fire before the insert or update.

A Trigger before deleting a record from emp table. Trigger will insert the row to be deleted into table called delete \_emp and also record user who has deleted the record and date and time of delete.

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<b>TASK-11</b>	CASE STUDY GENERAL HOSPITAL	
<p>A General Hospital consists of a number of specialized wards (such as Maternity, Pediatric, Oncology, etc). Each ward hosts a number of patients, who were admitted on the recommendation of their own GP and confirmed by a consultant employed by the Hospital. On admission, the personal details of every patient are recorded. A separate register is to be held to store the information of the tests under taken and the results of a prescribed treatment. A number of tests may be conducted for each patient. Each patient is assigned to one leading consultant but may be examined by another doctor, if required. Doctors are specialists in some branch of medicine and may be leading consultants for a number of patients, not necessarily from the same ward. For the above case study, do the following.</p> <ol style="list-style-type: none"> <li>1. Analyze the data required.</li> <li>2. Normalize the attributes.</li> </ol> <p>Create the logical data model using E-R diagrams. Create tables and generate Queries</p>		
<b>TASK-12</b>	CASE STUDY: CAR RENTAL COMPANY	
<p>A database is to be designed for a car rental company. The information required includes a description of cars, subcontractors (i.e. garages), company expenditures, company revenues and customers. Cars are to be described by such data as: make, model, year of production, engine size, fuel type, number of passengers, registration number, purchase price, purchase date, rent price and insurance details. It is the company policy not to keep any car for a period exceeding one year. All major repairs and maintenance are done by subcontractors (i.e. franchised garages), with whom CRC has long-term agreements. Therefore the data about garages to be kept in the database includes garage names, addresses, range of services and the like. Some garages require payments immediately after a repair has been made; with others CRC has made arrangements for credit facilities. Company expenditures are to be registered for all outgoings connected with purchases, repairs, maintenance, insurance etc. Similarly the cash inflow coming from all sources: Car hire, car sales, insurance claims must be kept of file. CRC maintains a reasonably stable client base. For this privileged category of customers special credit card facilities are provided. These customers may also book in advance a particular car. These reservations can be made for any period of time up to one month. Casual customers must pay a deposit for an estimated time of rental, unless they wish to pay by credit card. All major credit cards are accepted. Personal details such as name, address, telephone number, Driving license, number about each customer are kept in the database. For the above case.</p> <p>study, do the following:</p> <ol style="list-style-type: none"> <li>1. Analyze the data required.</li> <li>2. Normalize the attributes.</li> </ol> <p>Create the logical data model using E-R diagrams. Create tables and generate Queries</p>		
<b>TASK-13</b>	CASE STUDY: STUDENT PROGRESS MONITORING SYSTEM	
<p>A database is to be designed for a college to monitor students' progress throughout their course of study. The students are reading for a degree (such as BA, BA (Hons) M.Sc., etc) within the framework of the modular system. The college provides a number of modules, each being characterized by its code, title, credit value, module leader, teaching staff and the department they come from. A module is coordinated by a module leader who shares teaching duties with one or more lecturers. A lecturer may teach (and be a module leader for) more than one module. Students are free to choose any</p>		

module they wish but the following rules must be observed: Some modules require pre-requisites modules and some degree programmes have compulsory modules. The database is also to contain some information about students including their numbers, names, addresses, degrees they read for, and their past performance i.e. modules taken and examination results. For the above case study, do the following:

1. Analyze the data required.
2. Normalize the attributes.
3. Create the logical data model i.e., ER diagrams.
4. Create tables and generate Queries

#### 4. Books and Materials

##### Text Books

1. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, McGrawHill Education, 3<sup>rd</sup> edition, 2003.

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE

### A2511 – IOT AND ROBOTICS LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	30	70	100

## 1. Course Description

### Course Overview

The aim of the Laboratory is to provide insight of IoT and Robotics architecture and its services. Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design & develop IOT Devices. It also course covers the concepts of data communication, computer networks, cloud computing and network security fundamental techniques, customs and terms including the basic components of hardware and software. This course helps the students in gaining the knowledge about the sensor devices, mathematical and engineering problems.

### Course Pre/corequisites

A2501- Computer Programming

A2502- Computer Programming Laboratory

## 2. Course Outcomes (COs)

**After completion of the course, the learner will be able to:**

- A2511.1 Apply concepts of Internet to Mobile Devices, Cloud and Sensor Networks
- A2511.2 Analyze building blocks of Internet of Things and characteristics
- A2511.3 Implement a Robot for a specific application
- A2511.4 Compare various Servo and hardware components with Controller based projects
- A2511.5 Develop small pervasive applications with the help of Robotics

## 3. Course Syllabus

### List of IOT and ROBOTICS programs

#### IOT Lab Experiments

1. Study and Install Python in Eclipse and WAP for data types in python.
2. Write a Program for arithmetic operation in Python.
3. Write a Program for looping statement in Python.
4. Study and Install IDE of Arduino and different types of Arduino.
5. Write program using Arduino IDE for Blink LED.
6. Write Program for RGB LED using Arduino.
7. Study the Temperature sensor and Write Program for monitor temperature using Arduino.
8. Study and Implement RFID, NFC using Arduino.

#### Robotics Lab Index

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1. Study of different types of robots based on configuration and application.
2. Study of different type of links and joints used in robots
3. Demonstration of Cartesian/ cylindrical/ spherical robot.
4. Demonstration of Articulated/ SCARA robot
5. Study of components of robots with drive system and end effectors.
6. Determination of maximum and minimum position of links.

### **4. Laboratory Equipment/Software/Tools Required**

1. Configure Python in Eclipse
2. Eclipse IDE for Java.
3. Arduino and raspberry pi boards .
4. Boe-Bot's Servo Motors.
5. Whisker Circuit.

### **5. Books and Materials**

#### **Text Book(s)**

1. Thinking Robotics: Teaching Robots to Make Decisions Jeffrey R. Peters and Rushabh Patel. Adapted from Robotics with the Boe-Bot by Andy Lindsay, Parallax, inc., 2010.
2. Arshdeep Bahga, Vijay Madisetti, "Internet of Things: A Hands-on-Approach", VPT, 1st Edition, 2014.

#### **Reference Book(s)**

1. Adrian McEwen, Hakim Cassimally, Designing the Internet of Things, John Wiley and Sons 2014.
2. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", Apress Publications, 1st edition 2013.
3. Matt Richardson, Shawn Wallace, Getting Started with Raspberry Pi, O'Reilly (SPD), 3rd Edition, 2014.

#### **Web References:**

<https://www.upf.edu/practice/en/3376/22580>.  
<https://www.coursera.org/learn/iot>.  
<https://bcourses.berkeley.edu>.  
[www.innovianstechnologies.com](http://www.innovianstechnologies.com).

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE

### A2016 – QUANTITATIVE APTITUDE AND REASONING – I

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
1	0	0	14	0	0	1	30	70	100

#### 1. Course Description

##### Course Overview

The purpose of this course is to familiarize the students in quantitative and logical reasoning methods. The course introduces the fundamentals to enhance the quantitative and logical ability of students. The course also improves the problem-solving skills of the students. The logical and quantitative techniques are mainly useful in competitive level.

##### Course Pre/corequisites

This course has no specific prerequisite and corequisite.

#### 2. Course Outcomes (COs)

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

- A2015.1 Identify the problems by applying mathematical fundamentals
- A2015.2 Apply the suitable logical methods to solve the problems
- A2015.3 Solve the various problems by using quantitative mathematical fundamentals
- A2015.4 Analyse the comprehensive data with logical ability

#### 3. Course Syllabus

##### Coding, decoding and blood relations

Coding and Decoding: Coding and Decoding, Arrow Method, Chinese coding, Series, Analogy, Odd man out.

Blood Relations: Introduction, Direct, Puzzle and Coded models.

##### Direction sense and data arrangement

Direction Sense: Introduction, Distance method, Facing Method and Shadow Method.

Data Arrangements: Linear Arrangement, Circular Arrangement, Multiple Arrangements.

##### Syllogism, Clocks and Calendars

Syllogisms: Introduction, Tick-Cross method, Inferential Technique, Venn-Diagram method.

Clocks: Introduction, Finding angle between hands of clock, Gain/Loss of Time, Finding time, Gain or loss of time.

Calendar: Calendars method- 1, Calendars method -2.

##### Number system

Number System: Numbers, decimal fraction, surds and indices, remainder theorem, last digit, trailing of zeros and HCF and LCM.

##### Ratios, percentages, Profit and Loss

Percentages: Fundamentals of Percentage, Percentage change, successive percentage.

Ratio and Proportion: Ratio, Proportion, Variations, Problems on Ages

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Partnership, Profit And Loss: Basic terminology in profit and loss, Types of partnership, Problems related to partnership.

### 4. Books and Materials

#### Text Book(s)

1. R.S. Aggarwal(2017), *Quantitative Aptitude for competitive examinations*, latest edition, S.Chand publishers.
2. Dinesh Khattar , *Quantitative Aptitude, vol-I*, Pearson Education.
3. Arun Sharma, *How to prepare for quantitative aptitude*, McGraw Hill Publishers.

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## COURSE STRUCTURE

### A2031-ENVIRONMENTAL SCIENCE

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
2	0	0	28	0	0	0	100*	0	100*

#### 1. Course Description

##### Course Overview

This course is designed to create environmental awareness and consciousness among the present generation to become environmental responsible citizens. This course covers multidisciplinary nature of environmental studies, Natural Resources: Renewable and non-renewable resources; Ecosystems; Biodiversity and its conservation; Environmental Pollution; Social Issues and the Environment. Manufacture of Eco friendly products, awareness on environment to the people; Human Population and the Environment; pollution control acts and Field Work. This course is divided into five chapters for convenience of academic teaching followed by field visits.

##### Course Pre/corequisites

This course has no pre/co-requisites.

#### 2. Course Outcomes (COs)

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

A2031.1- Solve environmental problems through higher level of personal involvement and interest.

A2031.2- Apply ecological morals to keep up amicable connection among nature and human beings.

A2031.3- Recognize the interconnectedness of human dependence on the earth's ecosystems.

A2031.4- Apply environmental laws for the protection of environment and wildlife. A2031.5-

Influence society in proper utilization of goods and services.

#### 3. Course Syllabus

**Unit -1:** Introduction: Environment Definition, The multidisciplinary nature of environmental studies, Scope and importance-Need for public awareness.

Natural Resources: Classification of resources: Renewable and Non-renewable resources. Forest resources: Uses and over exploitation of forests. Dams and their effects on forest and tribal people. Water resources: Use and over utilization of surface and ground water, conflicts over water. Food resources: Problems with Chemical fertilizers and pesticides. . Energy resources: Renewable energy resources: solar energy, wind energy and geothermal energy. Role of individual in conservation of natural resources

**Unit – 2:** Ecosystems: Ecosystem Definition. Structure of an ecosystem: Producers, Consumers and Decomposers. Function of ecosystems: Food chains, food webs and energy flow in an ecosystem. Ecological pyramids: Pyramid of number, Pyramid of biomass and Pyramid of energy. Introduction , types ,characteristic features ,structure and function of the following ecosystem- A)Forest ecosystem B) Dessert system C)Aquatic ecosystems(ponds,rivers,ocean,estuaries).



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Biodiversity and Its Conservation: Introduction and definition. Levels of biodiversity, Bio geo- graphical classification of India ,Values of biodiversity(Consumptive value, productive value ,Social ,ethical and aesthetic value)Hot spots and Threats to biodiversity. In-situ and Ex-situ con- servation of biodiversity.

**Unit -3:** Environmental Pollution: Definition, causes, effects and control measures of Air Pollution, Water pollution, Soil pollution, Nuclear hazards, Global warming, Acid rains and Ozone layer depletion. Role of an individual in prevention of pollution. Solid waste management and Disaster management: floods, earthquakes, cyclone and landslides.

**Unit -4:** Social Issues and the Environment: Concept of sustainable development: Sustainable development goals. Threats to sustainability: Population explosion, crazy consumerism. Water conservation, Rainwater harvesting and environmental ethics. Environment Protection Act(Air, water, soil and wild life protection act)- Public awareness.

**Unit -5:** Human population and the Environment: population growth, variation, value education-HIV/AIDS- women and child welfare-Role of IT in environment and human health. Fieldwork- visit to a local area to document environmental assets. Visit to local polluted site – Urban/Rural/Industrial /Agricultural).  
Study of common plants , insects , birds .  
Study of simple ecosystem –pond, river, estuaries)

## 4. Books and Materials

### Text Books:

1. Anubha Kaushik, C.P. Kaushik,Environmental Studies, 4th edition, New age international publishers, 2014.
2. Anil K DE., Environmental Chemistry, New Age International Publica- tion, 9th Edition

### Reference Books:

1. ErachBharucha, Textbook of Environmental Studies for Undergraduate Courses. 1st edi- tion, Universities press, 2005.
2. Benny joseph,Environmental studies, 3rd edition, McGraw Hill Education (India) Private Limited, 2018.

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**COURSE STRUCTURE**  
**IV SEMESTER**

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## G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

IV SEMESTER (II YEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A2541	Formal Language Automata Theory	BS	3	0	0	3	30	70	100
A2512	Web Technologies	PC	3	0	0	3	30	70	100
A2513	Design and Analysis of Algorithms	PC	3	0	0	3	30	70	100
A2514	Operating Systems	PC	3	0	0	3	30	70	100
A2515	Computer Networks	PC	3	0	0	3	30	70	100
A2516	Web Technologies Laboratory	PC	0	0	3	1.5	30	70	100
A2517	Algorithms and Networks Laboratory	PC	0	0	3	1.5	30	70	100
A2518	Operating Systems Laboratory	PC	0	0	3	1.5	30	70	100
A2018	Quantitative Aptitude and Reasoning - II	BS	1	0	0	1	30	70	100
A2519	Socially Relevant Project-I	PW	0	0	2	1	100	0	100
A2520	Comprehensive Assessment -I	PC	0	0	0	1	100	0	100
A2047	Human Values and Professional Ethics	MC	2	0	0	0	100*	0	100*
TOTAL			18	00	11	22.5	470	630	1100

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## COURSE STRUCTURE

### A2541– FORMAL LANGUAGE AUTOMATA THEORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

## 1. Course Description

### Course Overview

Students will demonstrate knowledge of basic mathematical models of computation and describe how they relate to formal languages. Prove the equivalence of languages described by finite state machines and regular expressions. To identify a language's location in the Chomsky hierarchy (regular sets, context-free, context-sensitive, and recursively enumerable languages). Be able to prove the equivalence of languages described by pushdown automata and context free grammars. Understand basic properties of Turing machines and computing with Turing machines and tractability and decidability, and the challenges for Theoretical Computer Science.

### Course Pre/corequisites

The course has no specific prerequisite and corequisites.

## 2. Course Outcomes (COs)

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

- A2515.1** Apply knowledge of computing and mathematics appropriate to the discipline.
- A2515.2** Apply and solve Regular Expressions in Real Time Applications
- A2515.3** Relate the concept of the grammar with the concept of programming language.
- A2515.4** Design solutions for the problems related to Finite Automata, RE, CFG, PDA and Turing Machine.
- A2515.5** Acquire a fundamental understanding of core concepts relating to the theory of computation and computational models including decidability and intractability.

## 3. Course Syllabus

### UNIT-1 INTRODUCTION

fundamentals of set theory, Reduction to definitions, Other theorem forms, Proving equivalences about sets, The Contrapositive, Proof by contradiction, Counter examples, Inductive proofs, Alphabets, Strings, Languages, Problems, Formalization of Grammar, Hierarchy of Chomsky **Finite Automata**: Familiar picture of Finite Automata, Non Deterministic Finite Automata (NFA), Applying FA for Text search, Finite Automata with Epsilon transitions ( $\epsilon$ -NFA or NFA- $\epsilon$ ), Deterministic Finite Automata (DFA), Mealy Machine and Moor Machine, Conversion of Mealy Machine and Moor Machine, Minimization of Finite Automata, Myhill-Nerode Theorem.

### UNIT-2 Fundamentals of Regular Languages

## **G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL**

Introduction to Regular Expressions (RE), Finite Automata and Regular Expressions, Regular Expressions Applications, Laws of Algebraic for Regular Expressions, The Arden's Theorem, Using Arden's theorem to construct RE from FA, Pumping Lemma for RLs, Pumping Lemma Applications, Uniformity of Two FAs, Uniformity of Two REs, Construction of Regular Grammar from RE, Constructing FA from Regular Grammar, Closure properties of RLs, Applications of REs and FAs

### **UNIT-3 Context Free Grammars and Languages**

Introduction of Context Free Grammars (CFG), Derivations and Parse trees, Ambiguity in CFGs, Removing ambiguity, Left recursion and Left factoring-Examples, Generalization of CFGs, Normal Forms, Linear grammars, Closure properties for CFLs, Pumping Lemma for CFLs, CFG and Regular Language.

### **UNIT-4 Push Down Automata (PDA)**

Introduction, The Formal Definition, Graphical notation, Instantaneous description of PDA, The Languages of a PDA, Similarity of PDAs and CFGs, Deterministic Push Down Automata, Non-Deterministic Push Down Automata, Two Stack PDA.

### **UNIT-5 Turing Machines and Undecidability**

Introduction to Turing Machine (TM), Instantaneous description of TMs, Non Deterministic TM, Conversion of Regular Expression to TM, Comparison of PDA, FA and TM, Types of TM, TM as an integer function, Universal TM, LBA, TM Languages, Type 0 grammar, Properties of Recursive and Recursively enumerable languages, Undecidability, Undecidable problems about TMs, PCP, Modified PCP.

## **4. Books and Materials**

### **Text Book(s)**

1. *Shyamalendu kandar*, Pearson, Introduction to Automata Theory, Formal Languages and Computation.
2. *John E.Hopcroft, Rajeev Motwani, Jeffery D. Ullman*, Pearson, Introduction to Automata Theory, Languages, and Computation, Third Edition.

### **Reference Book(s)**

1. Introduction to Languages and the Theory of Computation, John C Martin, TMH, Third Edition.
2. Theory of Computation, Vivek Kulkarni, OXFORD.
3. Introduction to the Theory of Computation, Michel Sipser, 2<sup>nd</sup> edition, Cengage Learning.
4. Theory of computer Science Automata, Languages and Computation, K.L.P. Mishra, N.Chandrasekaran, PHI, Third Edition.
5. Fundamentals of the Theory of Computation, Principles and Practice, Raymond Greenlaw, H. James Hoover, Elsevier, Morgan Kaufmann.
6. Finite Automata and Formal Language A Simple Approach, A.M. Padma Reddy, Pearson

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE A2512- WEB TECHNOLOGIES

HOURS PER WEEK			HOURS PER SEMESTER			CREDITS	ASSESSMENT MARKS		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

### 1. Course Description

#### Course Overview

This course makes the students to enrich their knowledge in web technologies by applying HTML, CSS concepts in developing the web pages. It highlights the importance of client and server side scripting languages like PHP and XML. It also focuses on the web services and their importance. The learners of this course can choose their career as web developer.

#### Course Pre/corequisites

A2505 Object Oriented programming through Java

### 2. Course Outcomes (COs)

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

- A2512.1 Construct a basic website using HTML and Cascading StyleSheets.
- A2512.2 Build dynamic web page using Java Script objects and event handling mechanisms.
- A2512.3 Develop server side programs using Servlets and Java Server Page.
- A2512.4 Construct web pages in PHP to represent data in XML format.
- A2512.5 Use AJAX and web services to develop interactive webapplications

### 3. Course Syllabus

#### Unit-I

**Website Basics, Html 5, CSS 3, Web 2.0 9 Web Essentials:** Clients, Servers and Communication – The Internet – Basic Internet protocols – World wide web – HTTP Request Message – HTTP Response Message – Web Clients – Web Servers – HTML5 – Tables – Lists – Image – HTML5 control elements – Semantic elements – Drag and Drop – Audio – Video controls - CSS3 – Inline, embedded and external style sheets – Rule cascading – Inheritance – Backgrounds – Border Images – Colors – Shadows – Text – Transformations – Transitions – Animations.

#### Unit-II

**Client Side Programming** Java Script: An introduction to JavaScript–JavaScript DOM Model-Date and Objects,-Regular Expressions- Exception Handling-Validation-Built-in objects-Event Handling DHTML with JavaScript- JSON introduction – Syntax – Function Files – Http Request –SQL.

#### Unit-III

**Server Side Programming** Servlets: Java Servlet Architecture- Servlet Life Cycle- Form GET and POST actions Session Handling- Understanding Cookies- Installing and Configuring Apache Tomcat Web Server- DATABASE CONNECTIVITY: JDBC perspectives, JDBC program example - JSP: Understanding Java Server Pages-JSP Standard Tag Library (JSTL)-Creating HTML forms by embedding JSP code.

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## Unit-IV

**PHP and XML** An introduction to PHP: PHP- Using PHP- Variables- Program control- Built-in functions Form Validation- Regular Expressions - File handling – Cookies - Connecting to Database.XML: Basic XML- Document Type Definition- XML Schema DOM and Presenting XML, XML Parsers and Validation, XSL and XSLT Transformation, News Feed (RSS and ATOM).

## Unit-V

**Introduction to Ajax and Web Services:** AJAX: Ajax Client Server Architecture-XML Http Request Object-Call Back Methods; Web Services: Introduction- Java web services Basics – Creating, Publishing, Testing and Describing a Web services (WSDL)-Consuming a web service, Database Driven web service from an application –SOAP.

## 4. Books and Materials

### Text Book(s)

1. Deitel and Deitel and Nieto, *Internet and World Wide Web - How to Program*||,Prentice Hall, 5<sup>th</sup> edition, 2015.

### Reference Book(s)

1. Chris Bates, *Web Programming – Building Intranet Applications*, 3<sup>rd</sup> edition, Wiley Publications, 2009.
2. Gopalan N.P. and Akilandeswari J., —*Web Technology*||, Prentice Hall of India,2011.

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE

### A2513 – DESIGN AND ANALYSIS OF ALGORITHMS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

## 1. Course Description

### Course Overview

This course enables the learner to identify complexity of a given algorithm and techniques. It covers various algorithm design techniques, basic computability concepts and the complexity classes P, NP, NP-Complete are introduced for solving hard problems. The learners of the course can tackle the complex algorithmic problems with great ease in real world situations.

### Course Pre/corequisites

1. A2503- Data Structures

## 2. Course Outcomes (COs)

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

- A2513.1 Analyze the efficiency of algorithm for a given problem.
- A2513.2 Formulate the time order analysis for given algorithm.
- A2513.3 Identify the mathematical techniques required to prove the time complexity of an algorithm.
- A2513.4 Design appropriate algorithm to solve real world problems.

## 3. Course Syllabus

**Unit-I Introduction:** Algorithm, specifications of algorithm, algorithm measurement divide and conquer: general method, binary search, finding the maximum and minimum, merge sort, quick sort, selection sort, stressen's matrix multiplication

**Unit-II Greedy Method & Dynamic Programming:** General method, knapsack problem, job scheduling with deadlines, minimum cost spanning trees, optimal storage on tapes, single-source shortest paths. **Dynamic programming:** General method, multistage graphs, all-pairs shortest paths, optimal binary search trees, 0/1 knapsack, the travelling sales person problem.

**Unit-III Basic Traversal and Search Techniques & Back tracking:** Basic traversal and search techniques: traversal techniques for binary trees, traversal techniques for graphs, connected components and spanning trees, bi-connected components **Back tracking:** Common method, 8 – queens problem, sum of subsets problem, graph coloring and hamiltonian cycles.

**Unit-IV Branch and Bound & Lower Bound Theory:** Branch and bound :the method, travelling salesperson, 0/1 knapsack problem lower bound theory: comparison trees, lower bounds through reductions – multiplying triangular matrices, inverting a lower triangular matrix, computing the transitive closure.



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**Unit-V NP – Hard and NP – Complete Problems:** NP hardness, NP completeness, consequences of being in P, cook,s theorem, halting problem, non-deterministic problem, clique"s, SAT problem.

### 4. Books and Materials

#### Text Book(s)

1. Ellis Horowitz, S. Satraj Sahani and Rajasekhran, *Fundamentals of Computer Algorithms*, 2<sup>nd</sup> edition, University Press.2014.

#### Reference Book(s)

1. Parag Himanshu Dave, Himanshu Bhalchandra Dave, Pearson Education, *Design and Analysis of Algorithms*, Pearson Education, 2<sup>nd</sup> edition, 2009
2. T.H.Cormen, C.E.Leiserson, R.L.Rivest and C.Stein, *Introduction to Algorithms*, 2<sup>nd</sup> edition, PHI Pvt. Ltd./ Pearson Education.

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE A2514– OPERATING SYSTEMS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

### 1. Course Description

#### Course Overview

This course makes the students understand the basic concepts of various operating systems. It covers processes, threads, scheduling, synchronization, deadlocks, memory management, file & I/O subsystems and protection concepts. The learners of this course can choose their career as system programmers.

#### Course Pre/corequisites

A2501- Computer Programming

### 2. Course Outcomes (COs)

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

- A2514.1 Apply the basic principles of Operating Systems in system programming
- A2507.2 Apply the process synchronization concepts in multiprogramming environment
- A2507.3 Solve the memory management problems with paging and segmentation techniques
- A2507.4 Design algorithmic strategies to handle deadlock problems
- A2514.5 Implement the concepts of secured file system for confidentiality and authentication.

### 3. Course Syllabus

#### Unit-I

Operating system functions, structure, Operations, protection and security, Computing Environments, Open- Source OS

**System Structures:** Operating System Services, User and Operating-System Interface, systems calls, Types of System Calls, system programs, operating system structure, operating system debugging, System Boot.

#### Unit-II

**Processes:** Process concept, Scheduling, Operations, Inter process Communication.

**Process Synchronization:** The critical-section problem, Peterson's Solution, Synchronization Hardware, Synchronization algorithms.

#### Unit-III

**CPU Scheduling:** Scheduling-Criteria, Scheduling Algorithms, Thread Scheduling, Multiple-Processor Scheduling, Real-Time CPU Scheduling, Algorithm Evaluation.

Swapping, contiguous memory allocation, segmentation, paging, structure of the page table.

**Virtual memory:** demand paging, page-replacement, Allocation of frames, Thrashing, Memory-Mapped Files, Allocating Kernel Memory

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## Unit-IV

**Deadlocks:** System Model, deadlock characterization, Methods of handling Deadlocks, Deadlock prevention, Detection and Avoidance, Recovery from deadlock.

Overview of Mass-storage structure, Disk structure, Disk attachment, Disk scheduling, Swap-space management, RAID structure, Stable-storage implementation.

## Unit-V

**File system Implementation:** File-system structure, File-system Implementation, Directory Implementation, Allocation Methods, Free-Space management.

**Protection:** Goals of Protection, Principles of Protection, Domain of protection, Access Matrix, Implementation of Access Matrix, Access control, Revocation of Access Rights.

## 4. Books and Materials

### Text Book(s)

1. Abraham Silberchatz, Peter B. Galvin, Greg Gagne, *Operating System Concepts*, Wiley, 8<sup>th</sup> edition, 2014.

### Reference Book(s)

1. Andrew S Tanenbaum, *Modern Operating Systems*, Second Edition, PHI.
2. G.Nutt, N.Chaki and S.Neogy, *Operating Systems*, Third Edition, Pearson Education

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE A2515 – COMPUTER NETWORKS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

### 1. Course Description

#### Course Overview

This course is introduced as a professional core offering insight into important aspects of computer networks. It covers the functionality of each layer in computer networks, besides highlighting the flow of control and congestion control algorithms. This course helps the learner in selecting a domain path leading to cyber security specialization.

#### Course Pre/corequisites

A2503- Data Structures

A2508- Discrete Mathematics

### 2. Course Outcomes (COs)

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

- A2515.1 Apply the networking concepts in configuring the systems
- A2515.2 Illustrates error handling mechanism in data link layer
- A2515.3 Analyze the routing algorithms in finding the shortest path
- A2515.4 Apply transport protocols in network communications
- A2515.5 Implements domain name service and network security in the communication segment.

### 3. Course Syllabus

#### UNIT-I

**Introduction:** network hardware, network software, reference models-OSI,TCP/IP, examples of networks-the internet, 4G mobile phone networks, RFID and sensor networks.

**Physical Layer:** Guided Transmission, Wireless Transmission, Public switched telephone networks-Structure of the telephone system, FDM, TDM, Switching.

#### UNIT-II

**Data Link Layer:** design issues, error detection and correction, elementary data link protocol, sliding window protocols. Medium access sub layer: the channel allocation problem, multiple access protocols, Ethernet, wireless LANs.

#### UNIT-III

**Network Layer:** Network layer design issues, routing algorithms-shortest path routing, flooding, hierarchical routing, broadcast, multicast, distance vector routing, link state routing.

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**Congestion Control:** Congestion control algorithms. Quality of service application requirements, Traffic Shaping, the network layer in the internet-the IPV4 protocol, IP- addresses, internet control protocols, IPV6.

### UNIT-IV

**Transport Layer:** Transport services, elements of transport protocols, the internet transport protocols-TCP and UDP protocols.

### UNIT-V

**Domain Name System:** The DNS name space, domain resource records, name servers. Network security: introduction to cryptography, DES—the Data Encryption Standard, RSA.

## 4. Books and Materials

### Text Book(s)

1. Andrew S. Tanenbaum, David J, *Computer Networks*, Pearson Education /PHI, 5<sup>th</sup> edition 2016.

### Reference Book(s)

1. Behrouz A. Forouzan, *Data Communications and Networking*, TMH, 4<sup>th</sup> edition 2017.
2. S.Keshav, *An Engineering Approach to Computer Networks*, Pearson Education, 2<sup>nd</sup> edition 2014.

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE

### A2516 WEB TECHNOLOGIES LABORATORY

HOURS PER WEEK			HOURS PER SEMESTER			CREDITS	ASSESSMENT MARKS		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	30	70	100

#### 1. Course Description

##### Course Overview

The main aim of this course is to have practical experience on web page designing using HTML/XML, style sheets and also exposed to creation of user interfaces using Java applets. This course also provides hands on practice of dynamic web pages using server side scripting language and the frameworks such as JSP Strut, spring, AJAX. The learners of this course can choose their career as web developer.

##### Course Pre/corequisites

A2512 -Web Technologies

#### 2. Course Outcomes (COs)

**After completion of the course, the learner will be able to:**

- A2516.1 Construct Web pages using HTML/XML and style sheets.
- A2516.2 Build dynamic web pages with validation using Java Script objects and by applying different event handling mechanisms.
- A2516.3 Develop dynamic web pages using server side scripting.
- A2516.4 Use PHP programming to develop web applications.
- A2516.5 Construct web applications using AJAX and webservice.

#### 3. Course Syllabus

List of Experiments:

1. Create a web page with the following using HTML
  - a. To embed a map in a web page
  - b. To fix the hot spots in that map
  - c. Show all the related information when the hot spots are clicked.
2. Create a web page with the following.
  - a. Cascading style sheets.
  - b. Embedded style sheets.
  - c. Inline style sheets. Use our college information for the webpages.
3. Validate the Registration, user login, user profile and payment by credit card pages using JavaScript.
4. Write programs in Java using Servlets:
  - a. To invoke servlets from HTML forms

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- b. Session tracking using hidden form fields and Session tracking for a hitcount
- 5. Write programs in Java to create three-tier applications using servlets for conducting online examination for displaying student mark list. Assume that student information is available in a database which has been stored in a databaseserver.
- 6. Install TOMCAT web server. Convert the static web pages of programs into dynamic web pages using servlets (or JSP) and cookies. Hint: Users information (user id, password, credit card number) would be stored in web.xml. Each user should have a separate Shopping Cart.
- 7. Redo the previous task using JSP by converting the static web pages into dynamic web pages. Create a database with user information and books information. The books catalogue should be dynamically loaded from the database.
- 8. Create and save an XML document at the server, which contains 10 users Information. Write a Program, which takes user Id as an input and returns the User details by taking the user information from the XML document
- 9. Validate the form using PHP regular expression.  
PHP stores a form data into database.
- 10. Write a web service for finding what people think by asking 500 peoples opinion for any consumer product.

### 4. Laboratory Equipment/Software/Tools Required

Dream Weaver or Equivalent, MySQL or Equivalent, Apache Server, WAMP/XAMPP

### 5. Books and Materials

#### Text Book(s)

- 1. Deitel and Deitel and Nieto, *Internet and World Wide Web - How to Program*||, Prentice Hall, 5<sup>th</sup> edition, 2015.

#### Reference Book(s)

- 1. Chris Bates, *Web Programming – Building Intranet Applications*, 3<sup>rd</sup> edition, Wiley Publications, 2014.

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE

### A2517 – ALGORITHMS AND NETWORKS LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	30	70	100

## 1. Course Description

### Course Overview

This Laboratory drives the learners to experience the complexity of a given algorithm and give programmatic solutions. It gives hands on practice in implementing various algorithmic design techniques, in solving problems. This helps the learners to solve the complex problems in any domain demanding algorithmic solutions.

### Course Pre/Corequisites

1. A2504-Data Structures Laboratory
2. A2509-Object oriented programming through java laboratory

## 2. Course Outcomes (COs)

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

- A2517.1 Apply basic programming techniques in solving given problem.
- A2517.2 Design an algorithm for a given application program.
- A2517.3 Utilize wrapper classes as per the demand of problem.
- A2517.4 Apply the appropriate algorithmic technique for efficient problem solving.
- A2517.5 Execute collection classes for dynamic programming.

## 3. Course Syllabus

### List of Experiments

1. A. Create a Java class called Student with the following details as variables within it. (i) USN (ii) Name (iii) Branch (iv) Phone Write a Java program to create n Student objects and print the USN, Name, Branch, and Phone of these objects with suitable headings.  
B. Write a Java program to implement the Stack using arrays. Write Push(), Pop(), and Display() methods to demonstrate its working.
2. Write a Java class called Customer to store their name and date\_of\_birth. The date\_of\_birth format should be dd/mm/yyyy. Write methods to read customer data as <name, dd/mm/yyyy> and display as <name, dd, mm, yyyy> using StringTokenizer class considering the delimiter character as "/".
3. Sort a given set of elements using the best sorting method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator. Demonstrate using Java which technique is good to calculate time complexity analysis: worst case, average case and best case.



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4. Write a java program to implement the following sorting techniques by using Divide and Conquer Method: a) Insertion Sort b) Selection sort
5. Write a java program for an array of jobs where every job has a deadline and associated profit if the job is finished before the deadline. It is also given that every job takes single unit of time, so the minimum possible deadline for any job is 1. How to maximize total profit if only one job can be scheduled at a time.
6. Write java code to check whether a given graph is strongly connected or not.
7. Given an integer array nums, find the contiguous subarray (containing at least one number) which has the largest sum and return its sum.(Using Dynamic Programming) Example: Input: [-2,1,-3,4,-1,2,1,-5,4], Output: 6 Explanation: [4,-1,2,1] has the largest sum =6.
8. Write a java for the given an undirected weighted connected graph consisting of n vertices and m edges. The task is to find any spanning tree of this graph such that the maximum degree over all vertices is maximum possible. The order in which you print the output edges does not matter and an edge can be printed in reverse also i.e. (u, v) can also be printed as (v, u).
9. Java Program is to Implement Knight's Tour Problem. A knight's tour is a sequence of moves of a knight on a chessboard such that the knight visits every square exactly once. If the knight ends on a square that is one knight's move from the beginning square (so that it could tour the board again immediately, following the same path), the tour is closed, and otherwise it is open. The exact number of open tours on an 8x8 chessboard is still unknown
- 10.a. Design and implement in Java to find a subset of a given set  $S = \{S_1, S_2, \dots, S_n\}$  of n positive integers whose SUM is equal to a given positive integer d.
- b. Write a program to print all permutations of a given string using Backtracking
- 11 Study of different types of network cables and practically implement the cross-wired cable and straight through cable using crimping tool.
- 12 Study of network devices in detail.
- 13 Study of network IP.
- 14 Connect the computers in local area network.
- 15 Study of basic network command and network configuration commands.
- 16 Configure a network topology using packet tracer software.
- 17 Configure a network topology using packet tracer software.
- 18 Configure a network using distance vector routing protocol.
- 19 Configure network using link state vector routing protocol.

### 4. Laboratory Equipment/Software/Tools Required

1. Open source Java Tool kit: JDK 8 and above versions
2. A diagramming tool: A diagramming tool lets you draw pictures of your network. Visio (from Microsoft).
3. A network discovery program: For larger networks, you may want to invest in a network discovery program such as Spice works.
4. A protocol analyzer: A *protocol analyzer* monitors and logs the individual packets that travel along your network. (Protocol analyzers are also called *packet sniffers*.) , Network Monitor tool.

**5. Books and Materials**

**Text Book(s)**

1. Ellis Horowitz, S. SatrajSahani and Rajasekhran, *Fundamentals of Computer Algorithms*, 2<sup>nd</sup> edition, University Press. 2014
2. Andrew Tanenbaum, *Computer Networks*, 6<sup>th</sup> edition, Pearson Education, PHI, 2016.

**Reference Book(s)**

1. ParagHimanshu Dave, HimanshuBhalchandra Dave, *Design and Analysis of Algorithms*, Pearson Education, 2<sup>nd</sup> edition, 2009.
2. T.H.Cormen, C.E.Leiserson, R.L.Rivest and C.Stein, *Introduction to Algorithms*, PHI Pvt. Ltd./ Pearson Education
3. R.C.T.Lee, S.S.Tseng, R.C.Chang and T.Tsai, *Introduction to Design and Analysis of Algorithms A strategic approach*, McGraw Hill.
4. S.Keshav, *An Engineering Approach to Computer Networks*, 2<sup>nd</sup> edition, Pearson Education, 2001.
5. William, A. Shay, *Understanding communications and Networks*, 3<sup>rd</sup> edition, Thomson Publication, 2006.

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE

### A2518– OPERATING SYSTEMS LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	3	30	70	100

## 1. Course Description

### Course Overview

This course makes the students practice the basic concepts of various operating systems. It gives hands on experience with lab programs covering the topics of processes, threads, scheduling, synchronization, deadlocks, memory management, file & I/O subsystems. The learners of this course can choose their career as system programmers.

### Course Pre/corequisites

A2514: Operating Systems

## 2. Course Outcomes (COs)

**After completion of the course, the learner will be able to:**

- A2514.1 Apply appropriate CPU scheduling algorithm for the given problem.
- A2514.2 Perform resource management for optimal utility of CPU.
- A2514.3 Implement algorithms handling deadlock problems
- A2514.4 Implement the concepts of secured file system for confidentiality and authentication.
- A2514.5 Apply threading concepts to handle concurrency.

## 3. Course Syllabus

1. Simulate the following CPU scheduling algorithms
  - a) Round Robin b) SJF c) FCFS d) Priority
2. Simulate all file allocation strategies
  - a) Sequential b) Indexed c) Linked
3. Simulate MVT and MFT
4. Simulate all File Organization Techniques
  - a) Single level directory b) Two level c) Hierarchical d) DAG
5. Simulate Bankers Algorithm for Dead Lock Avoidance
6. Simulate Bankers Algorithm for Dead Lock Prevention
7. Simulate all page replacement algorithms
  - a) FIFO b) LRU c) LFU Etc. ...
8. Simulate Paging Technique of memory management
9. Control the number of ports opened by the operating system with

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a) Semaphore b) monitors

10. Simulate how parent and child processes use shared memory and addressspace
11. Simulate sleeping barber problem
12. Simulate dining philosopher's problem
13. Simulate producer and consumer problem using threads (use java)
14. Simulate little's formula to predict next burst time of a process for SJF scheduling algorithm.
15. Develop a code to detect a cycle in wait-for graph
16. Develop a code to convert virtual address to physical address
17. Simulate how operating system allocates frame to process
18. Simulate the prediction of deadlock in operating system when all the processes announce their resource requirement in advance.

### Reference Books:

1. *Operating System Concepts*, Abraham Silberchatz, Peter B. Galvin, Greg Gagne, Eighth edition, John Wiley.
2. *Operating Systems: Internals and Design Principles*, Stallings, Sixth Edition–2009, Pearson Education
3. *Modern Operating Systems*, Andrew S Tanenbaum, Second Edition, PHI.
4. *Operating Systems*, S.Haldar, A.A.Aravind, Pearson Education.
5. *Principles of Operating Systems*, B.L.Stuart, Cengage learning, India Edition.2013-2014
6. *Operating Systems*, A.S.Godbole, Second Edition, TMH.
7. *An Introduction to Operating Systems*, P.C.P. Bhatt, PHI.

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE

### A2018 – QUANTITATIVE APTITUDE AND REASONING – II

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
1	0	0	14	0	0	1	30	70	100

#### 1. Course Description

##### Course Overview

The purpose of this course is to familiarize the students in quantitative methods. The course introduces the fundamentals to enhance the quantitative ability of students. The course also improves the problem-solving skills of the students. The logical and quantitative techniques are mainly useful in competitive level.

##### Course Pre/corequisites

This course has no specific prerequisite and corequisite.

#### 2. Course Outcomes (COs)

**After completion of the course, the learner will be able to:**

- A2016.1 Identify the problems by applying mathematical fundamentals.
- A2016.2 Apply the suitable logical method to solve the problems.
- A2016.3 Solve the various problems by using quantitative mathematical fundamentals.
- A2016.4 Analyse the comprehensive data with logical ability.

#### 3. Course Syllabus

##### Averages, Allegation, and mixtures

Average, Mixtures and Allegation: Averages, Weighted average, Difference between mixture and allegation, % of mixture, 3 mixtures allegation, removal, and replacement.

##### Time and work, pipes, and cisterns

Time and Work: Introduction, alternative approach, work and wages, chain rule, fraction of work, efficiency, leaving and join, group of persons.

Pipes and Cisterns: Introduction, filling and emptying, alternative taps.

##### Time, Speed and Distance

Time speed and distance: introduction, late /early/usual time, average speed, relative speed, chasing, Races and games.

Problems on trains: introduction, relative speed, average speed, chasing, crossing problems.

Boats and streams: introduction, down stream and upstream, average speed, relative speed.

##### Permutations, Combinations and Probability

Permutation And Combination: Fundamentals counting principle, Definition of Permutation, Seating arrangement, Problems related to alphabets, Rank of the word, Problems related to

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numbers, Circular permutation, Combination.

Probability: Introduction, coins, dice, cards, Colour balls.

### **Mensuration**

Introduction, 2-D and 3-D areas and volumes, Inner and Outer circle problems.

#### **4. Books and Materials**

##### **Text Book(s)**

4. R.S. Aggarwal(2017), *Quantitative Aptitude for competitive examinations*, latest edition, S.Chand publishers.
5. Dinesh Khattar , *Quantitative Aptitude, vol-I*, Pearson Education.
6. Arun Sharma, *How to prepare for quantitative aptitude*, McGraw Hill Publishers.

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## COURSE STRUCTURE

### A2047 – HUMAN VALUES & PROFESSIONAL ETHICS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
2	0	0	28	0	0	0	100	0	100

#### 1. Course Description

##### Course Overview

This course has a significant role to play in the betterment of our society through ethics and values. It enables the student to understand the professional values and their role in personal life and professional life to transform individuals with laws and conventions, and then aspiration to live an ethical life for benefit of the society and organization.

##### Course Pre/corequisites:

The course has no specific prerequisite and corequisite.

#### 2. Course Outcomes (COs)

**After completion of the course, the learner will be able to:**

- A2047.1 Apply human values and ethics in professional life
- A2047.2 Develop the moral ideals to maintain good relationships with people
- A2047.3 Solve environmental related problems by keeping health of human being into consideration
- A2047.4 Make use of the fundamental rights and human rights in life for individual dignity
- A2047.5 Build the sound health system both physically and mentally by practicing yoga, karate, sports etc

#### 3. Course Syllabus

##### UNIT-I

**Introduction** and basic concepts of society, family, community, and other community-based organizations, dynamics and impact, human values, gender justice.

**Channels of youth moments for national building - NSS & NCC**, philosophy, aims & objectives; emblems, flags, mottos, songs, badge etc. roles and responsibilities of various NSS functionaries.

##### UNIT-II

**Nehru Yuva Kendra (NYK)**, activities – socio cultural and sports.

Fundamental rights and fundamental duties, human rights, consumer awareness and the legal rights of the consumer, RTI.

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**Youth and crime**, sociological and psychological factors influencing youth crime, peer mentoring in preventing crimes, awareness about anti-ragging, cybercrime and its prevention, role of youth in peace-building and conflict resolution, role of youth in nation building.

### UNIT-III

**Environment issues**, conservation, enrichment and sustainability, climate change, waste management, natural resource management (rain water harvesting, energy conservation, waste land development, soil conservations and afforestation). **Health, hygiene & sanitation**, health education, food and nutrition, safe drinking water, sanitation, swachh bharat abhiyan.

Disaster management, role of youth in disaster management. Home nursing, first aid. civil/ self defense, civil defense services, taekwondo, Judo, karate etc.

### UNIT-IV

**Gender sensitization**, understanding gender – gender inequality – challenges – domestic violence, initiatives of government – schemes, law; initiatives of NGOs – awareness, movement.

### UNIT-V

**Physical education**, games and sports, biological basis of physical activity, benefits of exercise, physical, psychological, social, respiration, blood circulation. Yoga, protocol, postures, asanas, pranayama, kriyas, bandhas and mudras.

## 4. Books and Materials

### Text Book(s)

1. Mike Martin and Roland Scherzinger, *Ethics in Engineering*, New York, McGraw Hill, 1996.
2. A.S. Chauhan, *Society and Environment*, Jain Brothers Publications, 6<sup>th</sup> edition, 2006.

### Reference Book(s)

1. Govindarajan. M, Natarajan. S, Senthil Kumar. V.S, *Engineering Ethics*, Prentice Hall of India, 2004.
2. Charles D Fleddermann, *Engineering Ethics*, New Jersey Prentice Hall, 2004 (Indian Reprint).
3. John R Boatright, *Ethics and the Conduct of Business*, New Delhi, Pearson Education, 2003.



# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## PROGRAMME CURRICULUM STRUCTURE UNDER R19 REGULATIONS

### B. TECH – COMPUTER SCIENCE AND ENGINEERING

V SEMESTER(III YEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A2521	Cloud Computing	PC	3	1	0	4	30	70	100
A2522	Data Mining	PC	3	0	0	3	30	70	100
A2523	Artificial Intelligence	PC	3	0	0	3	30	70	100
	Professional Elective-I	PE	3	0	0	3	30	70	100
	Open Elective-I	OE	3	0	0	3	30	70	100
A2524	Cloud Computing Laboratory	PC	0	0	3	1.5	30	70	100
A2525	Data Mining Laboratory	PC	0	0	3	1.5	30	70	100
A2526	Artificial Intelligence Laboratory	PC	0	0	2	1	30	70	100
A2527	Socially Relevant Project-II	PW	0	0	2	1	100	0	100
A2034	Gender Sensitization	MC	2	0	0	0	100*	0	100*
TOTAL			17	01	10	21	340	560	900

VI SEMESTER (IIIIYEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A2528	Mobile Application& Development	PC	3	1	0	4	30	70	100
A2529	Machine Learning	PC	3	0	0	3	30	70	100
A2530	Compiler Design	PC	3	0	0	3	30	70	100
	Professional Elective-II	PE	3	0	0	3	30	70	100
	Open Elective-II	OE	3	0	0	3	30	70	100
A2531	Mobile Application& Development Laboratory	PC	0	0	3	1.5	30	70	100
A2532	Machine Learning Laboratory	PC	0	0	3	1.5	30	70	100
A2017	Professional English Communication Skills	PC	0	0	2	1	30	70	100
A2533	Comprehensive Assessment-II	PC	0	0	0	1	100	0	100
A2048	Indian constitution and Multiculturalism	MC	2	0	0	0	100*	0	100*
TOTAL			17	01	08	21	340	560	900

\*ThemarksforAuditCourses/MandatoryCoursesarenotconsideredforcalculatingSGPA

## G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

### Professional Electives

Professional Elective – 1	
Course Code	Title of the Course
A2551	Distributed Databases
A2552	Enterprise storage Systems
A2553	TCP/IP Protocol
A2554	Angular
Professional Elective – 2	
Course Code	Title of the Course
A2555	Big Data
A2556	Parallel Algorithms
A2557	Networking Architecture and Design
A2558	Design Patterns
Professional Elective – 3	
Course Code	Title of the Course
A2559	Data visualization techniques
A2560	Cloud Cryptography
A2561	Software Defined Networks
A2562	Virtual Reality
Professional Elective – 4	
Course Code	Title of the Course
A2563	Deep Learning
A2564	High Performance Computing
A2565	Block Chain Technology
A2566	DevOps

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## Open Electives

Course Code	Title of the Course	L-T-P	Credits	Offered by
A2181	Basic Civil Engineering	3-0-0	3	CE
A2182	Building Planning and Construction	3-0-0	3	CE
A2183	Disaster Management	3-0-0	3	CE
A2184	Water Resources Conservation	3-0-0	3	CE
A2281	Fundamentals of Electrical Engineering	3-0-0	3	EEE
A2282	Renewable Energy Sources	3-0-0	3	EEE
A2283	Electrical Measuring Instruments	3-0-0	3	EEE
A2381	Optimization Techniques	3-0-0	3	ME
A2382	Mechanical Technology	3-0-0	3	ME
A2383	Introduction to Automobile Systems	3-0-0	3	ME
A2481	Basic Electronics	3-0-0	3	ECE
A2482	Introduction to Communication Systems	3-0-0	3	ECE
A2483	Fundamentals of IoT	3-0-0	3	ECE
A2581	Basic Data Structures	3-0-0	3	CSE
A2582	Fundamentals of DBMS	3-0-0	3	CSE
A2583	Basics of Software Engineering	3-0-0	3	CSE
A2584	Python for Everyone	3-0-0	3	CSE
A2585	Computer Organization and Operating Systems	3-0-0	3	CSE
A2586	Fundamentals of Artificial Intelligence and Machine Learning	3-0-0	3	CSE
A2081	Research Methodology	3-0-0	3	H&S
A2082	Intellectual Property Rights	3-0-0	3	H&S
A2083	National Service Scheme	3-0-0	3	H&S
A2084	Yoga	3-0-0	3	H&S
A2085	Design Thinking	3-0-0	3	H&S

## Mandatory Courses

Course Code	Title of the Course
A2031	Environmental Science
A2032	Human Values and Ethics
A2033	Indian Constitution and Multiculturalism
A2034	Gender Sensitization

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**COURSE STRUCTURE**

**V –SEMESTER**

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# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## PROGRAMME CURRICULUM STRUCTURE UNDER R19 REGULATIONS

### B. TECH – COMPUTER SCIENCE AND ENGINEERING

V SEMESTER(III YEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A2521	Cloud Computing	PC	3	1	0	4	30	70	100
A2522	Data Mining	PC	3	0	0	3	30	70	100
A2523	Artificial Intelligence	PC	3	0	0	3	30	70	100
	Professional Elective-I	PE	3	0	0	3	30	70	100
	Open Elective-I	OE	3	0	0	3	30	70	100
A2524	Cloud Computing Laboratory	PC	0	0	3	1.5	30	70	100
A2525	Data Mining Laboratory	PC	0	0	3	1.5	30	70	100
A2526	Artificial Intelligence Laboratory	PC	0	0	2	1	30	70	100
A2527	Socially Relevant Project-II	PW	0	0	2	1	100	0	100
A2034	Gender Sensitization	MC	2	0	0	0	100*	0	100*
TOTAL			17	01	10	21	340	560	900

\*The marks for Audit Courses/Mandatory Courses are not considered for calculating SGPA

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## COURSE STRUCTURE

### A2521 - CLOUD COMPUTING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	1	0	42	14	0	4	30	70	100

## 1. Course Description

### Course Overview

The aim of the course is to provide insight of cloud computing architecture and its services. It includes various cloud service models including Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS). This course helps the learner to best utilize the cloud services in their domain and helps in choosing cloud computing as their profession.

### Course Pre/corequisites

A2514- Operating systems

A2515-Computer Networks

## 2. Course Outcomes (COs)

**After completion of the course, the learner will be able to:**

- A2521.1 Analyze cloud delivery models for better architecture.
- A2521.2 Implement infrastructure as a service model for industrial applications.
- A2521.3 Organize the cloud platform model for optimization services.
- A2521.4 Develop various application software with software as service.
- A2521.5 Design cloud computing reference architecture for delivery models.

## 3. Course Syllabus

### UNIT-I

**Introduction Of Delivery Models In Cloud Computing:** introduction to cloud delivery models, list various cloud delivery models, advantages of delivery models in cloud, trade-off in cost to install versus flexibility, cloud service model architecture.

### UNIT-II

**Infrastructure as a Service (IaaS):** Introduction to Infrastructure as a Service delivery model, characteristics of IaaS, architecture, examples of IaaS, applicability of IaaS in the industry.

### UNIT-III

**Platform as a Service (PaaS):** Introduction to Platform as a Service delivery model, characteristics of PaaS, patterns, architecture and examples of PaaS, applicability of PaaS in the industry.

### UNIT-IV

**Software as a Service (SaaS):** Introduction to Software as a Service delivery model, characteristics of SaaS, architecture, examples of SaaS, applicability of SaaS in the industry.

### UNIT-V

**Cloud Computing Reference Architecture (CCRA):** Introduction to cloud computing reference architecture (CCRA), benefits of CCRA, architecture overview, versions and application of CCRA for developing clouds.

## 4. Books and Materials

### Text Book(s):

1. RajkumarBuyya, James Broberg, and Andrzej Goscinski, *Cloud Computing: Principles and Paradigms* by Wiley Press, New York, USA, 2017.

### Reference Book(s):

1. Judith Hurwitz, Robin Bloor, Marcia Kaufman, Fern Halper, *Cloud computing for Dummies* (November 2016).
2. Michael J. Kavis, *Architecting the Cloud: Design Decisions for Cloud Computing Service Models* by, Wiley Press, 2016.

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3. Michael J. Kavis, Gautam Shroff, *Enterprise Cloud Computing Technology Architecture Applications*, Cambridge University Press, 2013.

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## COURSE STRUCTURE

### A2522 – DATA MINING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

## 1. Course Description

### Course Overview

This course is introduced to drive the students to reach the depth of data science with warehousing and mining concepts. It covers data pre processing, mining frequent patterns, associations and correlations, classification and prediction, and cluster analysis. In addition to this it paves way for machine learning algorithms. This helps the student to choose the career path in data science and architect the data for better decision making.

### Course Pre/corequisites

A2503-Data Structures

A2506-Database Management Systems

## 2. Course Outcomes (COs)

### After completion of the course, the learner will be able to:

A2522.1 Apply the principles of business intelligence in the commercial segment

A2522.2 Make use of pre-processing techniques for data organization

A2522.3 Implement association, clustering and rule based mining for Market based analysis

A2522.4 Analyze the data mining classification technique for data differentiation

A2522.5 Design the unsupervised clustering algorithms for data analysis

## 3. Course Syllabus

### UNIT-I

**Data Mining:** Fundamentals of data mining, data mining functionalities, classification of data mining systems, data mining task primitives.

### UNIT-II

**Data Pre Processing:** Descriptive data summarization, data cleaning, data integration and transformation, data reduction, data discretization and concept hierarchy generation.

### UNIT-III

**Mining Frequent Patterns, Associations and Correlations:** Efficient and scalable frequent item set mining methods, association rules, and correlation analysis

### UNIT-IV

**Classification and Prediction:** Decision tree induction, various classification methods, accuracy and error measures, ensemble methods.

### UNIT-V

**Cluster Analysis:** Types of data in cluster analysis, categorization and partitioning, hierarchical, density-based, grid-based, model-based clustering methods, outlier analysis.

## 4. Books and Materials

### Text Book(s)

1. Jiawei Han, Michel Kamber, *Data Mining Concepts and Techniques*, 3/e, Elsevier, 2019.

### Reference Book(s)

1. Alex Berson, Stephen Smith, *Data Warehousing Data Mining & OLAP*, TMH.
2. K.P.Soman, S.Diwakar, V.Ajay, *Insight into Data Mining*, PHI, 2008.



# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE

### A2523 – ARTIFICIAL INTELLIGENCE

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

#### 1. Course Description

##### Course Overview

The aim of this course is to create computer programs that can solve problems and achieve goals like humans would. This course covers problem solving, logical reasoning, planning, knowledge representation and machine learning concepts. In this course, the students are acquainted with the fundamental knowledge for understanding AI and also the basics of designing intelligent agents that can solve general purpose problems. This course helps the students to choose their career path in trending Artificial Intelligence related technologies.

##### Course Pre/corequisites

A2011-Probability and Statistics

A2014-Formal Languages and Automata Theory

#### 2. Course Outcomes (COs)

**After completion of the course, the learner will be able to:**

A2523.1 Apply suitable search strategies in finding better solutions for a given problem

A2523.2 Analyze performance of an algorithm as per given parameters

A2523.3 Analyze the efficient problem state space search for a problem

A2523.4 Implement the appropriate AI techniques to solve uncertainty problems

A2523.5 Apply AI techniques to solve real time problems

#### 3. Course Syllabus

##### UNIT-I

**Problem Solving:** Introduction, agents, problem formulation, uninformed search strategies, heuristics, informed search strategies, constraint satisfaction.

##### UNIT-II

**Logical Reasoning:** Logical agents, propositional logic, inferences, first-order logic, inferences in first order logic, forward chaining, backward chaining, unification, resolution.

##### UNIT-III

**Planning:** Planning with state-space search, partial-order planning, planning graphs, planning and acting in the real world.

##### UNIT-IV

**Uncertain Knowledge and Reasoning:** Uncertainty, review of probability, probabilistic reasoning, Bayesian networks, and inferences in Bayesian networks, temporal models, Hidden Markov models.

##### UNIT-V

**Learning:** Learning from observation, inductive learning, decision trees, and explanation based learning, statistical learning methods, reinforcement learning.

#### 4. Books and Materials

##### Text Book(s)

1. S. Russel and P. Norvig, *Artificial Intelligence – A Modern Approach*, Fourth Edition, Pearson Education, 2020.

##### Reference Book(s)

1. David Poole, Alan Mackworth, Randy Goebel, *Computational Intelligence: a logical approach*, Oxford University Press, 2012.
2. G. Luger, *Artificial Intelligence: Structures and Strategies for Complex Problem Solving*, Sixth Edition, Pearson Education, 2008.

## **G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL**

3. J. Nilsson, *Artificial Intelligence: A New Synthesis*, First Edition, Elsevier Publishers, 2003.

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE

### A2524 – CLOUD COMPUTING LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	30	70	100

#### 1. Course Description

##### Course Overview

The aim of the laboratory is to provide insight of cloud computing architecture and its services. Students gain hands-on practice on various cloud service models including Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS) using Amazon Web Services (AWS), Microsoft Azure and Google Cloud Platform. This course helps the learner to best utilize the cloud services in their domain and even helps in choosing cloud computing as their profession.

##### Course Pre/corequisites

A2014-Operating systems

A2015-Computer Networks

A2521-Cloud Computing

#### 2. Course Outcomes (COs)

**After completion of the course, the learner will be able to:**

A2524.1 Develop and deploy applications for better cloud utility

A2524.2 Design web services for modern commercial applications

A2524.3 Analyze the performance, scalability, and availability of the underlying cloud technologies for business requirements

A2524.4 Implement software installation for utility of its applications

A2524.5 Compare various cloud computing platforms for better cloud services

#### 3. Course Syllabus

##### List of cloud computing programs

1: Creating a Warehouse Application in Salesforce.com.

2: Creating an Application in Salesforce.com using Apex Programming Language.

3: Implementation of SOAP Web services in C#/JAVA Applications.

4: Para-Virtualization using VM Ware's Workstation/Oracle's Virtual Box and Guest O.S.

5: Installation and Configuration of Hadoop

6: Create an application (Ex: Word Count) using Hadoop Map/Reduce.

7: Case Study: PAAS (Facebook, Google App Engine).

8: Case Study: Amazon Web Services

#### 4. Laboratory Equipment/Software/Tools Required

1. Amazon Web Services (AWS)

2. Microsoft Azure

3. Google Cloud Platform

#### 5. Books and Materials

##### Text Book(s)

1. Rajkumar Buyya, James Broberg, and Andrzej Goscinski, *Cloud Computing: Principles and Paradigms* by Wiley Press, New York, USA, 2017.

##### Reference Book(s):

1. Judith Hurwitz, Robin Bloor, Marcia Kaufman, Fern Halper, *Cloud computing for Dummies* (November 2016).

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2. Michael J. Kavis, *Architecting the Cloud: Design Decisions for Cloud Computing Service Models* by, Wiley Press, 2016.

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE A2525 – DATA MINING LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	30	70	100

### 1. Course Description

#### Course Overview

This laboratory drives the learners to reach the depth of data warehousing and mining concepts. It gives hands-on practice in implementing data pre-processing, mining frequent patterns, associations and correlations, classification and prediction, and cluster analysis. This helps the learner to choose the career path in data science and architect the data for better decision making.

#### Course Pre/corequisites

A2510-Database Management Systems Laboratory

A2522-Data Mining

### 2. Course Outcomes (COs)

**After completion of the course, the learner will be able to:**

- A2525.1 Execute data mining algorithms for extraction of appropriate datasets
- A2525.2 Apply data pre-processing techniques on raw input data for data cleansing
- A2525.3 Appraise the classification techniques on large datasets for differentiation
- A2525.4 Apply the data mining algorithms to perform association rule mining and clustering tasks
- A2525.5 Differentiate the outlier data from cluster data for statistical analysis

### 3. Course Syllabus

#### List of Experiments

1. Introduction to WEKA and create .arff dataset.
2. Explore the available datasets in WEKA.
3. Load a dataset (ex. Iris dataset)
4. Create a weather table with the help of data mining tool WEKA.
5. Demonstration of pre-processing techniques to the training data set of weather table.
6. Write a procedure to normalize weather table data using knowledge flow.
7. Demonstrate construction of decision tree for weather data and classify it.
8. Write a procedure for visualization of weather Table.
9. Write a procedure in finding association Rules for buying data.
10. Demonstration of association rule process on dataset test .arff using apriori algorithm.
11. Write a procedure for clustering customer data using simple K-Means algorithm.
12. Write a procedure for employee data using make density based cluster algorithm

### 4. Laboratory Equipment/Software/Tools Required

WEKA TOOL

**5. Books and Materials**

**Text Book(s)**

1. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, *Introduction to Data Mining*, Pearson Education (Addison Wesley), 2017.

**Reference Link**

1. <http://www.cs.waikato.ac.nz/ml/weka/>

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE

### A2526 – ARTIFICIAL INTELLIGENCE LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	30	70	100

#### 1. Course Description

##### Course Overview

The aim of this Laboratory is to create computer programs that can solve problems by learning experiences. This course covers banalization, normalization data pre-processing technique to apply on sample data. From this course, the student acquires fundamental knowledge on AI techniques to solve general purpose problems. This course helps the students to choose their career path in trending Artificial Intelligence related technologies.

##### Course Pre/corequisites

1. A2014- Formal Languages and Automata Theory
2. A2523 - Artificial Intelligence

#### 2. Course Outcomes (COs)

**After completion of the course, the learner will be able to:**

- A2526.1 Execute statistical problems to produce appropriate solutions
- A2526.2 Categorize the problem for selection of an appropriate algorithm
- A2526.3 Compare computational complexity of AI problems for better efficiency
- A2526.4 Demonstrate various AI algorithms based on empirical and theoretical proofs for performance statistics

#### 3. Course Syllabus

1. Apply Binarization data pre-processing technique on sample data.
2. Apply Mean Removal data pre-processing technique on sample data.
3. Apply Min and Max scaling on sample data.
4. Apply normalization data pre-processing technique on real estate data.
5. How to encode the labels and show the performance of encoded labels.
6. Using Pandas perform the following
  - a. Handling.
  - b. Slicing.
  - c. Extracting statistics from Time Series Data.
7. Use the sklearn.svm package and implement classification.
8. Using python program build a Linear Regressor.

#### 4. Laboratory Equipment/Software/Tools Required

1. Open source scripting language- Python

#### 5. Books and Materials

**Text Book(s)**

## **G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL**

1. S. Russel and P. Norvig, *Artificial Intelligence – A Modern Approach*, 4<sup>th</sup> edition, Pearson Education, 2020.

### **Reference Book(s)**

1. Elain Rich and Kevin Knight, *Intelligence*, 3rd edition, TMH, 2017.
2. David Poole, Alan Mackworth, Randy Goebel, *Computational Intelligence: a logical approach*, Oxford University Press, 2012.



# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE

### A2034 – GENDER SENSITIZATION

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
2	0	0	28	0	0	0	100	0	100

## 1. Course Description

### Course Overview

The main objective of this course is to develop students' sensibility with regard to issues of gender in contemporary India and to provide a critical perspective on the socialization of men and women. It also introduces students to information about some key biological aspects of genders to expose the students to debates on the politics and economics of work. This course helps the students to reflect critically on gender violence.

### Course Pre/corequisites

This course has no pre requisites

## 2. Course Outcomes (COs)

**After completion of the course, the learner will be able to:**

- A2034.1 Develop a better understanding of important issues related to gender in contemporary India
- A2034.2 Sensitize to basic dimensions of the biological, sociological, psychological and legal aspects of gender
- A2034.3 Acquire insight into the gendered division of labour and its relation to politics and economics
- A2034.4 Equip to work and live together as equals
- A2034.5 Develop a sense of appreciation of women in all walks of life

## 3. Course Syllabus

### UNIT I

**UNDERSTANDING GENDER:** Gender: Why should we study it Socialization: Making Women, Making Men Introduction, preparing for Woman hood, growing up Male, First lessons in Caste, Different Masculinities

### UNIT II

**GENDER AND BIOLOGY:** Missing Women: Sex Selection and its consequences Declining Sex Ratio, Demographic Consequences Gender Spectrum: Beyond the Binary Two or Many? Struggles with Discrimination, Additional Reading: Our Bodies, Our Health.

### UNIT III

**GENDER AND LABOUR:** Housework: The Invisible Labour "My Mother Doesn't Work". "Share the Load", Women's Work: Its Politics and Economics Fact and Fiction, Unrecognized and Unaccounted work

### UNIT IV

**ISSUES OF VIOLENCE:** Sexual Harassment: Say No! Sexual Harassment, not Eve-Teasing-Coping with Everyday Harassment 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....."

### UNIT V

**GENDER STUDIES:** Knowledge: Through the Lens of Gender Point of View, Gender and the Structure of Knowledge. Who's History? Questions for Historians and Others Reclaiming a Past, Writing other Histories.

## 4. Books and Materials

### Text Book(s)

1. A. Suneeta, UmaBhrugubanda, *Towards a world of equals: A Bilingual Textbook on gender*

### Reference Book(s)

1. Sen, Amartya. "More than one Million Women are Missing." *New York Review of Books* 37,20(20 December 1990). print
2. Tripi Lahiri, *By the Numbers: Where Indian Women Work*, *Women's Studies Journal* (14 November 2012) <<http://blogs.wsj.com/Indiarealtime/2012/11/14/by-the-numberswhere-Indian-Women-work/>>

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**COURSE STRUCTURE**  
**VI –SEMESTER**

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## G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

VISEMESTER (IIIIYEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A2528	Mobile Application & Development	PC	3	1	0	4	30	70	100
A2529	Machine Learning	PC	3	0	0	3	30	70	100
A2530	Compiler Design	PC	3	0	0	3	30	70	100
	Professional Elective-II	PE	3	0	0	3	30	70	100
	Open Elective-II	OE	3	0	0	3	30	70	100
A2531	Mobile Application & Development Laboratory	PC	0	0	3	1.5	30	70	100
A2532	Machine Learning Laboratory	PC	0	0	3	1.5	30	70	100
A2017	Professional English Communication Skills	PC	0	0	2	1	30	70	100
A2533	Comprehensive Assessment-II	PC	0	0	0	1	100	0	100
A2048	Indian constitution and Multiculturalism	MC	2	0	0	0	100*	0	100*
TOTAL			17	01	08	21	340	560	900

\*The marks for Audit Courses/Mandatory Courses are not considered for calculating SGPA

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE A2528-MOBILE APPLICATION DEVELOPMENT

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

### 1. Course Description

This course provides fundamentals of smart phone programming and android software development , construct and apply knowledge on how to develop User Interface for a mobile application Design, develop and substitute basic things on data persistence, content provider, messaging, and location based services for a mobile application.

#### Course Pre/corequisites

Computer Networks

### 2. Course Outcomes (COs)

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

- A2528.1 Able to recognize the importance of knowledge on Android programming basics
- A2528.2 Able to construct the various aspects of user interfaces.
- A2528.3 Able to apply knowledge on displaying pictures, menus and data services.
- A2528.4 Able to develop application on content provider and messaging services.
- A1528.5 Able to substitute on the fundamentals of location based services, and creating your own services.

### 3. Course Syllabus

#### UNIT-I

**Getting started with android programming:**What is android, obtaining the required tools, creating first android application, Using Android Studio for Android Development. Activities, fragments & Intents: Understanding activities, linking activities using intents, fragments, displaying notifications.

#### UNIT-II

**Getting to know the android user interface:** Understanding the components of a screen, adapting to display orientation, managing changes to screen orientation, utilizing the action bar, creating the user interface programmatically, and listening for UI notifications. Designing User Interface with Views: Using basic views, using picker views, using list views to display long lists.

#### UNIT-III

**Displaying pictures and Menus with Views “:** Using image views to display Pictures-Gallery and Image View views, using menus with views, analog and digital clock views.Data Persistence: Saving and loading user preferences, persisting data to files, creating and using databases.

#### UNIT-IV

**Content Providers** Sharing data in android, using a content provider, creating own content providers. Messaging: SMS messaging, sending E-mail.

#### UNIT-V

Location based services,Displaying maps, getting a location data, monitoring a location, building a location tracker. Developing android services: Creating your own services.

### 4. Books and Materials .

Text Book(s) :

1. Beginning Android programming with android studio 4th edition, J. F. DiMarzio, Published by John Wiley & Sons, Inc.

#### References(s):

1. Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox), 2012

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE

### A2529–MACHINE LEARNING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

## 1. Course Description

### Course Overview

The goal of this course is to give foundation in machine learning and basic concepts used in the design of classification, prediction models. It includes different machine learning algorithms and methods. In addition, it helps to apply the appropriate machine learning technique for classification, pattern recognition and optimization and decision problems.

### Course Pre/corequisites

A2011-Probability and Statistics

## 2. Course Outcomes (COs)

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

A2529.1 Distinguish between, supervised, unsupervised and semi-supervised learning

A2529.2 Apply the opt machine learning strategy for any given problem

A2529.3 Suggest supervised, unsupervised or semi-supervised learning algorithms for any given problem

A2529.4 Design a system that uses the appropriate graph models of machine learning

A2529.5 Modify existing machine learning algorithms to improve classification efficiency

## 3. Course Syllabus

### UNIT-I

**Introduction:** Learning – Types of Machine Learning – Supervised Learning – The Brain and the Neuron – Design a Learning System – Perspectives and Issues in Machine Learning – Concept Learning Task – Concept Learning as Search – Finding a Maximally Specific Hypothesis – Version Spaces and the Candidate Elimination Algorithm – Linear Discriminants – Perceptron – Linear Separability – Linear Regression.

### UNIT-II

**LINEAR MODELS:** Multi-layer Perceptron – Going Forwards – Going Backwards: Back Propagation Error – Multi-layer Perceptron in Practice – Examples of using the MLP – Overview – Deriving Back-Propagation – Radial Basis Functions and Splines – Concepts – RBF Network – Curse of Dimensionality – Interpolations and Basis Functions – Support Vector Machines

### UNIT-III

**TREE AND PROBABILISTIC MODELS:** Learning with Trees – Decision Trees – Constructing Decision Trees – Classification and Regression Trees – Ensemble Learning – Boosting – Bagging – Different ways to Combine Classifiers – Probability and Learning – Data into Probabilities – Basic Statistics – Gaussian Mixture Models – Nearest Neighbor Methods – Unsupervised Learning – K means Algorithms – Vector Quantization – Self Organizing Feature Map

### UNIT-IV

**DIMENSIONALITY REDUCTION AND EVOLUTIONARY MODELS:** Dimensionality Reduction – Linear Discriminant Analysis – Principal Component Analysis – Factor Analysis – Independent Component Analysis – Locally Linear Embedding – Isomap – Least Squares Optimization – Evolutionary Learning – Genetic algorithms – Genetic Offspring: - Genetic Operators – Using Genetic Algorithms – Reinforcement Learning –

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

Overview – Getting Lost Example – Markov Decision Process

## UNIT-V

**GRAPHICAL MODELS:** Markov Chain Monte Carlo Methods – Sampling – Proposal Distribution – Markov Chain Monte Carlo – Graphical Models – Bayesian Networks – Markov Random Fields – Hidden Markov Models – Tracking Methods

### 4. Books and Materials

#### Text Book(s)

1. Stephen Marsland, —Machine Learning – An Algorithmic Perspective||, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.
2. Tom M Mitchell, —Machine Learning||, First Edition, McGraw Hill Education, 2013

#### Reference Book(s)

1. Peter Flach, —Machine Learning: The Art and Science of Algorithms that Make Sense of Data||, First Edition, Cambridge University Press, 2012.
2. Jason Bell, —Machine learning – Hands on for Developers and Technical Professionals||, First Edition, Wiley, 2014
3. EthemAlpaydin, —Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series)||, Third Edition, MIT Press, 2014

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE A2530 – COMPILER DESIGN

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

### 1. Course Description

#### Course Overview

The main objective of this course is to make students understand the working principles of a compiler. It covers bottom-up parsing, syntax-directed translation, intermediate code generation, type checking, code optimization and code generation. This course enables students to design their own compilers for specific needs.

#### Course Pre/corequisites

A2014-Formal Languages and Automata Theory

### 2. Course Outcomes (COs)

#### After completion of the course, the learner will be able to:

- A2530.1 Identify tokens in the source program using lexical analyzer technique
- A2530.2 Develop top-down and bottom-up parsers for the given grammar
- A2530.3 Construct type checking semantic rules using synthesized and inherited attributes
- A2530.4 Develop optimized intermediate code using code optimization techniques
- A2530.5 Generate target code using flow graph and DAG

### 3. Course Syllabus

#### UNIT-I

**Introduction to Compilers:** Definition of compiler, interpreter and its differences, the phases of a compiler, role of lexical analyzer, design of simple lexical analyzer LEX-lexical analyzer generator.

#### UNIT-II

**Parsing:** Elimination of left recursion, left factoring, top-down parsing-backtracking, recursive-descent parsing, predictive parsers, LL(1) grammars.

**Bottom-up Parsing:** Stack implementation of shift-reduce parsing, conflicts during shift-reduce parsing, LR grammars, LR parsers-simple LR, canonical LR and look ahead LR parsers, handling of ambiguous grammar, YACC automatic parser generator.

#### UNIT-III

**Syntax-directed Translation:** Syntax directed definition, construction of syntax trees, S-attributed and L-attributed definitions, and translation schemes.

#### UNIT-IV

**Intermediate Code Generation:** Intermediate forms of source programs– abstract syntax tree, polish notation and three address code, types of three address statements and its implementation.

**Type Checking:** Static and dynamic checking of types, specification of a simple type checker, equivalence of type expressions.

#### UNIT-V

**Code Optimization:** Organization of code optimizer, basic blocks and flow graphs, the principal sources of optimization, the dag representation of basic blocks.

**Code Generator:** Design issues, object code forms, the target machine, a simple code Generator, peephole optimization.

### 4. Books and Materials

#### Text Book(s)

1. Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman, *Compilers–Principles, Techniques and Tools*, 2<sup>nd</sup> edition Low price edition, Pearson Education, 2011.

## **G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL**

### **Reference Book(s)**

1. Kenneth C. Loudon, Thomson, *Compiler Construction-Principles and Practice*, 1<sup>st</sup> edition, PWS Publishing.
2. Andrew W. Appel, *Modern Compiler Implementation C*, Cambridge University Press, 2004.



# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE A2531 - MOBILE APPLICATION DEVELOPMENT LAB

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	30	70	100

### 1. Course Description

#### Course Overview

This Laboratory presents to learn how to develop Applications in android environment to develop user interface applications , data persistence, messaging and location based services.

CoursePre/corequisites:

A2515- Computer Network

### 2. Course Outcomes(COs)

After successful completion of smart phone programming lab students will be:

- A2531 .1 Able to acquire practical knowledge on Android programming.
- A2531 .2 Able to understand the implementation aspects of user interfaces.
- A2531 .3 Able to understand the implementation of image view and persistent data services.
- A2531 .4 Able to acquire practical knowledge on messaging services.
- A2531 .5 Able to understand the practical exposure on implementation of location based services.

### 3. Syllabus

The student is expected to be able to do the following problems, though not limited.

1. a) Create an Android application that shows Hello + name of the user and run it on an emulator.  
b) Create an application that takes the name from a text box and shows hello Message along with the name entered in text box, when the user clicks the OK button.
2. Create an application that has a button, when the user clicks the button it should display second activity which has edit text and an OK button. When user writes something on the edit text and clicks the OK button it should go back to first activity and display content of edit text in the form of toast.
3. Create a screen that has input boxes for User Name, Password, and Address, Gender (radio buttons for male and female), Age (numeric), Date of Birth (Date Picker), State (Spinner) and a submit button. On clicking the submit button, print all the data below the Submit Button. Use (a) Linear Layout (b) Relative Layout and (c) Grid Layout or Table Layout.
4. Develop an application that shows names as a list and on selecting a name it should show the details of the candidate on the next screen with a "Back" button. If the screen is rotated to landscape mode (width greater than height), then the screen should show list on left fragment and details on right fragment instead of second screen with back button. Use Fragment transactions and Rotation event listener.
5. Develop an application that uses a menu with 3 options for dialing a number, opening a website and to send an SMS. On selecting an option, the appropriate action should be invoked using intents.
6. Develop an application that inserts some notifications into Notification area and whenever a notification is inserted, it should show a toast with details of the notification.
7. a) Create an application to display images in gallery and Image Views.  
b) Create an application to display analog and digital clock.

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8. a) Create a user registration application that stores the user details in a database table.  
b) Create a database and a user table where the details of login names and passwords are stored. Insert some names and passwords initially. Now the login details entered by the user should be verified with the database and an appropriate dialog should be shown to the user.
9. a) Create an admin application for the user table, which shows all records as a list and the admin can select any record for edit or modify. The results should be reflected in the table.  
b) Create an application that shows all contacts of the phone along with details like name, mobile number etc.
10. Create an application that saves user information like name, age, gender etc. in shared preference and retrieves them when the program restarts.
11. Create an alarm that rings every Sunday at 8:00 AM. Modify it to use a time picker to set alarm time.
12. Develop an application that shows the current location's latitude and longitude continuously as the device is moving (tracking).
13. Create an application that shows the current location on Google maps.
14. Create an application that illustrates sending E-mail.
15. Create an application that illustrates SMS messaging.

### **4. Laboratory Equipment/Software/Tools Required**

1. Amazon Web Services (AWS)
2. Microsoft Azure
3. Google Cloud Platform

### **5. Books and Materials**

Beginning Android programming with android studio 4th edition, J. F. DiMarzio, Published by John Wiley & Sons, Inc.

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE

### A2532–MACHINE LEARNING LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

#### 1. Course Description

##### Course Overview

The goal of this course is to give foundation in machine learning and basic concepts used in the design of classification, prediction models. It includes different machine learning algorithms and methods. In addition, it helps to apply the appropriate machine learning technique for classification, pattern recognition and optimization and decision problems.

##### Course Pre/Co requisites

A2011 Probability and Statistics

#### 2. Course Outcomes (COs)

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

Distinguish between, supervised, unsupervised and semi-supervised learning

Apply the opt machine learning strategy for any given problem

Suggest supervised, unsupervised or semi-supervised learning algorithms for any given problem

Design a system that uses the appropriate graph models of machine learning

Modify existing machine learning algorithms to improve classification efficiency

#### 3. Lab Programs

1. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.
2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.
3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
4. Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets.
5. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
6. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.
7. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.
8. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.
9. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.
10. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.

**4. Books and Materials**

**Text Book(s)**

1. Stephen Marsland, —Machine Learning – An Algorithmic Perspective||, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.
2. Tom M Mitchell, —Machine Learning||, First Edition, McGraw Hill Education, 2013

**Reference Book(s)**

1. Peter Flach, —Machine Learning: The Art and Science of Algorithms that Make Sense of Data||, 2. First Edition, Cambridge University Press, 2012.
3. Jason Bell, —Machine learning – Hands on for Developers and Technical Professionals||, First Edition, Wiley, 2014

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE

### A2048 – INDIAN CONSTITUTION AND MULTICULTURALISM

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
2	0	0	28	0	0	0	100	0	100

#### 1. Course Description

##### Course Overview

This course is designed in such a way that it gives an overview of Indian Constitution. This course provides the knowledge on importance of constitution, structure of executive, legislature and judiciary, central and state relation financial and administration.

##### Course Pre/corequisites

There are no prerequisites and corequisites for this course.

#### 2. Course Outcomes (COs)

##### After completion of the course, the learner will be able to:

- A2033.1 Understand historical background of the constitution making and its importance for building a democratic India.
- A2033.2 Explain the role of President and Prime Minister.
- A2033.3 Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
- A2033.4 Understand the value of the fundamental rights and duties for becoming good citizen of India
- A2033.5 Analyze the decentralization of power between central, state and local self-government.
- A2033.6 Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.

#### 3. Course Syllabus

##### UNIT - I

**Introduction to Indian Constitution:** Indian Constitution - Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

##### UNIT - II

**Union Government and its Administration Structure of the Indian Union:** Federalism, Centre- State relationship, President: Role, power and position, Prime Minister and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions.

##### UNIT - III

**State Government and its Administration:** Governor - Role and Position – Chief Minister and Council of ministers, State Secretariat: Organization, Structure and Functions.

##### UNIT - IV

**Local Administration:** District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation Pachayati Raj: Functions PRI: Zila Panchayat, Elected officials and their roles, CEO Zila Panchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy.

##### UNIT - V

**Election Commission:** Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission: Functions of Commissions for the welfare of SC/ST/OBC and women.

#### 4. Books and Materials

##### Text Book(s)

1. Durga Das Basu, *Introduction to the Constitution of India*, Prentice Hall of India Pvt. Ltd. New Delhi.
2. Subash Kashyap, *Indian Constitution*, National Book Trust.

##### Reference Book(s)

1. A. Siwach, *Dynamics of Indian Government & Politics*.
2. D.C. Gupta, *Indian Government and Politics*.
3. H.M. Sreevai, *Constitutional Law of India*, 4<sup>th</sup> edition in 3 volumes (Universal Law Publication)

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**PROFESSIONAL ELECTIVES**

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# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## Professional Electives

Professional Elective– 1	
Course Code	Title of the Course
A2551	Distributed Databases
A2552	Enterprise storage Systems
A2553	TCP/IP Protocol
A2554	Angular
Professional Elective– 2	
Course Code	Title of the Course
A2555	Big Data
A2556	Parallel Algorithms
A2557	Networking Architecture and Design
A2558	Design Patterns
Professional Elective– 3	
Course Code	Title of the Course
A2559	Data visualization techniques
A2560	Adhoc and sensor Networks
A2561	Software Defined Networks
A2562	Virtual Reality & Augmented Reality
Professional Elective– 4	
Course Code	Title of the Course
A2563	Image processing
A2564	Block Chain Technology
A2565	Devops
A2566	Neural Networks and deep learning

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE A2551 – DISTRIBUTED DATABASES

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

### 1. Course Description

#### Course Overview

The aim of the course is to organize and access the data in a distributed database secured environment with enhanced performance. This course covers distributed database architectures, distributed database design, distributed and parallel query processing with optimization. In addition, it focuses on concurrency control in distributed parallel database systems. It paves way to choose a career path in administering and architecting databases.

#### Course Pre/corequisites

1. A2509- Database Management Systems

### 2. Course Outcomes (COs)

#### After completion of the course, the learner will be able to:

A2551.1 Analyze distributed database design to address architectural issues

A2551.2 Apply partitioning techniques to enhance data storage and security

A2551.3 Design various query processing strategies for query optimization

A2551.4 Develop a concurrent system for transaction management

A2551.5 Design parallel architecture to counter the failures of parallel databases

### 3. Course Syllabus

#### UNIT-I

**Introduction:** What is a DDBS, history of distributed DBMS, data delivery alternatives, promises of distributed DBMSs, design issues, and distributed DBMS architectures.

#### UNIT-II

**Distributed and Parallel Database Design:** Data fragmentation, data allocation, distributed data control, distributed query processing: overview, data localization.

#### UNIT-III

**Distributed Query Optimization:** Distributed query optimization algorithms, adaptive query processing, distributed transaction processing.

#### UNIT-IV

**Data Replication:** Consistency of replicated databases, update management strategies, replication protocols, replication and failures.

#### UNIT-V

**Parallel Database Systems:** Parallel architectures, parallel query processing, load balancing, database clusters, and database integration-multi database systems.

### 4. Books and Materials

#### Text Book(s)

1. M. Tamer Ozsu, Patrick Valduriez, *Principles of Distributed Database Systems*, 4<sup>th</sup> edition :( c) Springer Nature Switzerland AG 2020, Springer, Cham.

#### Reference Book(s)

1. Silberschatz, orth and Sudershan, *Database System Concept*, McGraw Hill, 6<sup>th</sup> edition, 2016.
2. Tannenbaum, *Distributed Systems: Principles and Paradigms*, 2<sup>nd</sup> edition, pearson, 2017.



# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE

### A2552 – ENTERPRISE STORAGE SYSTEM

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

## 1. Course Description

### Course Overview

This course provides a comprehensive overview of storage technologies for complex information technology environments. It covers the storage networking technologies, backup, recovery and infrastructure virtualization. In addition, it includes policy based information management functionality. The learners of this course are benefited to choose their career in data centers or cloud infra with strong knowledge in data maintenance.

### Course Pre/corequisites

1. A2509- Database Management System
2. A5514- Operating Systems

## 2. Course Outcomes (COs)

### After completion of the course, the learner will be able to:

- A2552.1 Analyze the architecture of an intelligent storage system for rapid data accessing
- A2552.2 Justify the implementation of storage solutions to enable business continuity
- A2552.3 Apply Storage Area Network for virtualization
- A2552.4 Design a storage solution based on organizations requirements
- A2552.5 Provide StorageInfrastructure Virtualization for better storage management

## 3. Course Syllabus

### UNIT-I

**Storage Systems:** Data classification, storage evolution and data centre infrastructure. RAID level performance and availability considerations.

### UNIT-II

**Storage Networking Technologies:** Direct-Attached Storage (DAS) architecture, Storage Area Network (SAN) attributes. Networked Attached Storage (NAS) components IP Storage Area Network (IP SAN) ISCSI, FCIP and FCoE architecture.

### UNIT-III

**Storage Backup & Recovery:** architecture, topologies, and technologies in SAN and NAS environments. Data archival.

### UNIT-IV

**Storage Security and Management:** security and regulations. Designing secure solutions security implementation in SAN, NAS, and IP-SAN networking. Monitoring and storage management activities and challenges.

### UNIT-V

**Storage Infrastructure Virtualization:** Storage network virtualization VLAN, VSAN. Cloud optimized storage: global storage management locations, scalability, and operational efficiency. Policy based information management; metadata attitudes.

## 4. Books and Materials

### Text Book(s)

1. John Wiley & Sons, *Information Storage and Management*, Wiley publisher, 2<sup>nd</sup> ed., 2014.

### Reference Book(s)

1. Richard Barker, Paul Massiglia, *Storage Area Network Essentials: A Complete Guide to Understanding and Implementing Sans*, Wiley, 2014.
2. W. Curtis Preston, *Using SANs and NAS*, O'Reilly & Associates Sebastopol, Calif., 2013.

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE A2553 – TCP/IP Protocol

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

### 1. Course Description

#### Course Overview

The intention of this course is to provide fundamentals of data communication and computer networks. It covers network models, congestion and quality of service, queue management, stream control transmission protocol. In addition to this it deals with random drop, passive buffer and queue management schemes. The course benefits the students to choose their professional career as network engineers with deep roots in designing communication protocols.

#### Course Pre/corequisites

A5515- Computer Networks

### 2. Course Outcomes (COs)

**After completion of the course, the learner will be able to:**

- A1253.1 Analyze the layers of the OSI and TCP/IP for efficient data transmission.
- A2553.2 Distinguish between reliable and unreliable protocols for interconnections in application level and network level
- A2553.3 Design routing mechanisms for congestion avoidance
- A2553.4 Apply buffer management techniques to enhance performance
- A2553.5 Apply flow, error and congestion control mechanisms for efficient data transmission

### 3. Course Syllabus

#### UNIT-I

**Network Models:** TCP/IP Protocol suite, addressing. Routers, gateway.

#### UNIT-II

**Internetworking Concepts:** Principles of internetworking interconnection through IP Routers TCP, UDP & IP: TCP Services, IP Addressing.

#### UNIT-III

**Congestion and Quality of Service:** Data Traffic, congestion, congestion control, congestion control in TCP, quality of service, techniques to improve QOS: scheduling, admission control, resource reservation.

#### UNIT-IV

**Queue Management:** Concepts of buffer management, drop tail, drop front, random drop, passive buffer management schemes, active queue management

#### UNIT-V

**Stream Control Transmission Protocol:** SCTP services, SCTP features, packet format, flow control, error control, congestion control.

### 4. Books and Materials

#### Text Book(s)

1. Behrouz A Forouzan, *TCP/IP Protocol Suite*, McGraw-Hill Publishing Company, 2014.

#### Reference Book(s)

1. Douglas. E.Comer, *Internetworking with TCP/IP*, Volume I, PHI-2011.

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE A2554 – ANGULAR

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

### 1. Course Description

#### Course Overview

This course deals with generating dynamic web frameworks. It includes data architecture with support of typescript, directives, forms and routing. It also includes chat threads, components to develop chatting applications. The learners of this course can choose web development as their career.

#### Course Pre/corequisites

1. A2505- Object Oriented Programming through Java
2. A2516- Web Programming Laboratory

### 2. Course Outcomes (COs)

**After completion of the course, the learner will be able to:**

A2554.1: Apply single-page application designs in developing web applications

A2554.2: Implement the type scripts layers for web applications

A2554.3: Build Angular forms for client interaction

A2554.4: Implement efficient Angular routings to protect components from unauthorized access

A2554.5: Design view components for chatting applications

### 3. Course Syllabus

#### UNIT-I

**Overview:** Introduction, adding data to the component. Working with arrays, using the user item component, bootstrapping crash course, expanding our application, dering multiple rows, finishing touches, deployment.

#### UNIT-II

**Typescript:** Angular is built in typescript, built-in types, the price-display-component component.

#### UNIT-III

**Directives and Forms:** Built-in directives, forms in angular, form controls and form groups, reactive forms with form builder, dependency injection.

#### UNIT-IV

**HTTP:** Introduction, a basic request, writing a YouTubeSearchComponent

**Routing:** Components of angular routing, components of angular routing, application component, configuring the routesting strategies, route parameters, router hooks.

#### UNIT-V

**Data Architecture in Angular:** Data architecture, chat app overview, implementing the models, data architecture with observable, building our views using threads.

### 4. Books and Materials

#### Text Book(s)

1. Nate. Murray, Felipe Coury, Ari Lerner, Carlos Taborda Ng-book: *The Complete Guide to Angular*, Create Space Independent Publishing Platform, 2018.

#### Reference Book(s)

1. Dhananjay Kumar, *Angular Essentials*, BPB Publications, 2019.
2. SohailSalehi, *Angular Services*, Packet Publishing, 2017.

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE A2555 – BIG DATA

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

### 1. Course Description

#### Course Overview

This course enlightens the core concepts of big data, its applications and systems. It covers distributed programming, distributed file systems leading to Hadoop file systems and map-reduce programming concepts. In addition, it provides an introduction to Hadoop-Map reduce frameworks. The learners of this course can choose their domain in Data Engineering and can opt their career in Data Science and intern to increase the potential for data utility to transform the world.

#### Course Pre/corequisites

A2519- Data Mining

### 2. Course Outcomes (COs)

**After completion of the course, the learner will be able to:**

A2555.1 Analyze distributed programs for formation of large scale clusters

A2555.2 Apply enabling techniques of Hadoop and Map Reduce for distributed processing

A2555.3 Assemble the components of Hadoop and its Eco-System for efficient data storage and processing

A2555.4 Develop Map-Reduce programs in Java for performing large scale data analysis

A2555.5 Apply K-means clustering and Mahout Techniques for efficient data analysis

### 3. Course Syllabus

#### UNIT-I

**Distributed Programming Using Java:** Quick recap and advanced java programming-generics, threads, sockets, simple client server programming using JAVA, difficulties in developing distributed programs for large scale clusters and introduction to cloud computing.

#### UNIT-II

**Distributed File Systems leading to Hadoop File System:** Introduction, using HDFS, Hadoop architecture, internals of Hadoop file systems.

#### UNIT-III

**Map-reduce Programming:** Developing distributed programs and issues, why Map- reduce and conceptual understanding of Map-reduce programming, developing Map-reduce programs in java, setting up the cluster with HDFS and understanding how Map- reduce works on HDFS, Running simple word count Map-reduce program on the cluster, additional examples of M-R programming.

#### UNIT-IV

**Anatomy of Map-reduce Jobs:** Understanding how Map- Reduce program works, tuning Map-Reduce jobs, understanding different logs produced by Map-Reduce jobs and debugging the Map- Reduce jobs.

#### UNIT-V

**Case studies of Big Data analytics:** Case studies of Big Data analytics using Map-Reduce programming, K-Means clustering, using Big Data analytics libraries using Mahout.

### 4. Books and Materials

#### Text Book(s)

1. Tom White, *Hadoop: The Definitive Guide*, 4<sup>th</sup> edition, O'reilly, 2015.

#### Reference Book(s)

1. Chuck Lam, *Hadoop in Action*, 2<sup>nd</sup> edition, Manning Publications, 2014.
2. David Flanagan, *Java in a Nutshell*, 6<sup>th</sup> edition, O'Reilly & Associates, 2014.

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE A2556 – PARALLEL ALGORITHMS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

### 1. Course Description

#### Course Overview

The aim of this course is to enrich the concepts on design, analysis and implementation of sequential as well as parallel algorithms. In particular, it focuses on pram algorithms, SIMD algorithms being supported by MIMD algorithms. The hardware industry requires students with the knowledge to develop algorithms with micro instructions while designing multiprocessors and controllers.

#### Course Pre/corequisites

A2513- Design and Analysis of Algorithms

### 2. Course Outcomes (COs)

**After completion of the course, the learner will be able to:**

- A2556.1 Design parallel random access machines algorithms for standard problems and applications
- A2556.2 Analyze efficiency of different parallel algorithms
- A2556.3 Choose the mapping on multi computers for efficient data processing. (Assess multiprocessors and multicomputer for efficient data processing).
- A2556.4 Design the matrix algorithms to reduce complexity.
- A2556.5 Apply the graph algorithms to solve complex numeric problems

### 3. Course Syllabus

#### UNIT-I

**Introduction:** Parallel processing terminology, the sieve of Eratosthenes. PRAM algorithms - PRAM model of parallel computation, PRAM algorithms, reducing the number of processors.

Processor arrays, multiprocessors, and multicomputer: processor organizations, processor arrays, multiprocessor, Flynn's taxonomy.

#### UNIT-II

**Mapping and Scheduling:** Mapping data to processors on processor and multi computers, dynamic load balancing on multi computers, static scheduling on UMA (Uniform Memory Access) multi computers, deadlock.

#### UNIT-III

**Elementary Parallel Algorithms:** Classifying MIMD algorithms, reduction, prefix sums.

#### UNIT-IV

**Matrix Multiplication:** Sequential matrix multiplication, algorithms for processor arrays, algorithms for multiprocessor, algorithms for multi computers.

#### UNIT-V

**Graph Algorithms:** Searching a graph, connected components, all-pairs shortest path, single source shortest path, minimum-cost spanning tree.

### 4. Books and Materials

#### Text Book(s)

1. Michael J. Quinn, *Parallel Computing: Theory & Practice*, Tata McGraw Hill Edition, 2<sup>nd</sup> edition, 2017.

#### Reference Book(s)

1. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, *Fundamentals of Computer Algorithms*, University press, Second edition, 2011.
2. V Rajaraman, C Siva Ram Murthy, *Parallel computers- Architecture and Programming*, PHI learning, 2016.

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE

### A2557 – NETWORKING ARCHITECTURE AND DESIGN

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

## 1. Course Description

### Course Overview

The goal of this course is to give foundation in computer networks mechanisms and advanced concepts used in the design of protocols and network architectures. It includes the basic principles of transmission and switching, wireless communications, shared medium transmission, mechanisms and algorithms for routing, network architecture and networking, resource management and network services. The learners of the course can choose their career as network engineers.

### Course Pre/corequisites

A1218- Computer Networks

A2516- Computer Networks Laboratory

## 2. Course Outcomes (COs)

**After completion of the course, the learner will be able to:**

A2557.1 Apply computer design and instruction set principles as per system requirements

A2557.2 Analyze system requirements to remove redundancy

A2557.3 Propose sub-netting and routing strategies in addressing architectural issues

A2557.4 Apply network management mechanisms for data security and privacy

A5557.5 Develop hybrid mechanisms for effective interconnection

## 3. Course Syllabus

### UNIT-I

**Introduction:** Architecture and design processes requirements analysis. The requirements specification and map.

### UNIT-II

**Requirements Analysis:** Gathering and listing requirements. Requirements mapping developing the requirements specification – flow analysis. Example application of flow analysis.

### UNIT-III

**Network Architecture:** Component architecture- systems and network architectures. Addressing and routing architecture. Routing strategies – architectural considerations.

### UNIT-IV

**Network Management Architecture:** Network management mechanisms – architectural considerations performance mechanisms – architectural considerations. Security and privacy architecture: developing a security and privacy plan.

### UNIT-V

**Network Design:** Selecting technologies for network design. Guidelines and constraints on technology evaluations. Routing applying interconnection mechanisms to the design.

## 4. Books and Materials

### Text Book(s)

1. James D. McCabe, *Network Analysis, Architecture and Design*, 3<sup>rd</sup> edition, Elsevier, 2014.

### Reference Book(s)

1. Andrew S. Tanenbaum, *Computer Networks*, Fifth Edition, Prentice Hall, Upper Saddle River, New Jersey, 2013.

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE A2558-DESIGN PATTERNS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

### 1. Course Description

#### Course Overview

This course extends object-oriented programming by incorporating design patterns to create interactive applications. It includes patterns like creational, structural and behavioral. In addition it helps to recognize a design and enables to minimize the amount of refactoring by using primitive techniques such as objects, inheritance, and polymorphism. The learners will have a foundation to build more complex software applications.

#### Course Pre/corequisites

A2505- Object-oriented programming through JAVA

### 2. Course Outcomes (COs)

**After completion of the course, the learner will be able to:**

A2558.1 Apply the model-view-controller architecture for a given application

A2558.2 Propose the most suitable design pattern to solve a design problem

A2558.3 Inspect existing code to perform software refactoring

A2558.4 Apply the basic design principles for quality software

### 3. Course Syllabus

#### UNIT-I

**Introduction to Design Patterns:** Design pattern definition, design patterns in SmallTalk MVC, describing design patterns, catalog of design patterns, organizing the catalog, solving of design problems using design patterns, selection of a design pattern, use of design patterns.

#### UNIT-II

**Creational Patterns:** Abstract factory, builder, factory method, prototype, singleton, discussion of creational patterns.

#### UNIT-III

**Structural Patterns:** Adapter, bridge, composite. **Structural Patterns-2:** Decorator, façade, flyweight, proxy, discuss of structural patterns.

#### UNIT-IV

**Behavioral Patterns Part-1:** Chain of responsibility, command, interpreter, iterator, mediator, memento, observer.

#### UNIT-V

**Behavioral Patterns Part -2:** State, strategy, template method, visitor, and discussion of behavioral patterns. What to expect from design patterns, a brief history, the pattern community invitation, a parting thought.

### 4. Books and Materials

#### Text Book(s):

1. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides, *Design Patterns Elements of reusable object-oriented software*, Pearson Education, 2015.

#### Reference Book(s):

1. Mark Grand, *Patterns in JAVA Vol-I, II & III*, Wiley DreamTech, 2016.
2. Eric Freeman, Head *First Design Patterns*, second edition, O'reilly-sp2014.

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**COURSE STRUCTURE**

**VII –SEMESTER**

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## G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

VII SEMESTER (IVYEAR)									
Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A2534	Natural Language Processing	PC	3	0	0	3	30	70	100
A2535	Software Testing	PC	3	0	0	3	30	70	100
A2536	Cryptography and Network Security	PC	3	0	0	3	30	70	100
A2537	Software Testing Laboratory	PC	0	0	2	1	30	70	100
	Professional Elective - III	PE	3	0	0	3	30	70	100
	Open Elective - III	OE	3	0	0	3	30	70	100
A2538	Mini Project/Internship	PW	0	0	4	2	100	0	100
A2540	Project Work Phase - I	PW	0	0	4	2	100	0	100
TOTAL			15	00	10	20	380	420	800

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE

### A2534 NATURAL LANGUAGE PROCESSING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

#### 1. Course Description

##### Course Overview

The main objective of this course is to learn the fundamentals of natural language processing and use of CFG and PCFG in NLP. This course also provides role of semantics of sentences and pragmatics. This provides how to use NLP techniques to IR applications

##### Course Pre/co requisites

A2512 Formal Language and Automata theory

#### 2. Course Outcomes (COs)

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

- A2534.1 Understand various phases in natural language processing.
- A2534.2 Understand different linguistic resources software tools.
- A2534.3 Understand parts of speech tagging with HMM, TBL.
- A2534.4 Illustrate natural language grammar and context free grammar.
- A2534.5 Understand applications of NLP and machine translation.

#### 3. Course Syllabus

##### UNIT - I

**Introduction:** Human languages, models, ambiguity, processing paradigms; Phases in natural language processing, applications, Text representation in computers, encoding schemes.

##### UNIT - II

**Linguistics resources:** Introduction to corpus, elements in balanced corpus, TreeBank, PrpBank, WordNet, VerbNet etc. Resource management with XML,, Management of linguistic data with the help of GATE, NLTK. Regular expressions, Finite State Automata, word recognition, lexicon, Morphology, acquisition models, Finite State Transducers, N,grams, smoothing, entropy, HMM, ME, SVM,CRF.

##### UNIT - III

**Part of Speech tagging:** Stochastic POS tagging, HMM, Transformation based tagging (TBL), Handling of unknown words, named entities, multi word expressions.

**A survey on natural language grammars,** lexeme, phonemes, phrases and idioms, word order, agreement, tense, aspect and mood and agreement, Context Free Grammar, spoken language syntax, Parsing, Unification, probabilistic parsing, TreeBank.

##### UNIT - IV

**Semantics meaning representation:** semantic analysis, lexical semantics, Word-Net, Word Sense Disambiguation, Selection restriction, machine learning approaches, and dictionary based approaches. Discourse Reference resolution, constraints on co-reference, algorithm for pronoun resolution, text coherence and discourse structure. Applications of NLP Spellchecking, Summarization.

##### UNIT - V

##### Information retrieval:

Vector space model, term weighting, homonymy, polysemy, synonymy, improving user queries, Machine Translation, Overview.

#### 4. Books and Materials

##### Text Book(s):

1. Daniel Jurafsky, James H. Martin—Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech, Pearson Publication, 2014.

## **G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL**

2. Steven Bird, Ewan Klein and Edward Loper —Natural Language Processing with Python, First Edition, ORreilly Media, 2009.

### **Reference Book(s)**

1. Breck Baldwin, —Language processing with Java and LingPipe Cookbook, Atlantic Publisher, 2015.

2. Richard M Reese, —Natural Language Processing with Java, OReilly Media, 2015.

3. Nitin Indurkha and Fred J. Damerau, —Handbook of Natural Language Processing, Second Edition, Chapman and Hall/CRC Press, 2010.

4. Tanveer Siddiqui, U.S. Tiwary, —Natural Language Processing and Information Retrieval, Oxford University Press, 2008.

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE A2535 SOFTWARE TESTING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

### 1. Course Description

#### Course Overview

This course presents a comprehensive study of software testing and quality control concepts. It covers the testing principles, methodologies, management strategies and techniques. In addition it emphasizes on understanding the software testing process. This course is helpful in producing quality software and enables the student to choose the career path as software testing engineer.

#### Course Pre/co requisites

1. A2501 - Computer Programming
2. A2510- Software Engineering

### 2. Course Outcomes (COs)

**After completion of the course, the learner will be able to:**

- A2535.1 Derive test cases for any given problem
- A2535.2 Compare the different testing techniques to produce quality software
- A2535.3 Identify the problem to its suitable testing model for error detection
- A2535.4 Apply the appropriate technique for the design of data flow and integration of software
- A2535.5 Create appropriate document for the software artifact

### 3. Course Syllabus

#### UNIT - I

**A Perspective on Testing:** Test cases, identifying test cases, levels of testing.

**Boundary Value Testing:** Normal boundary value testing, robust boundary value testing, random testing.

#### UNIT - II

**Equivalence Class Testing:** Traditional equivalence class testing, Improved equivalence class testing, equivalence class test cases for the triangle problem, equivalence class test cases for the next date function, equivalence class test cases for the commission problem, edge testing.

#### UNIT - III

**Decision Table, based Testing:** Decision table techniques, test cases for the triangle problem, next date function, commission problem.

**Path Testing:** DD, paths, test coverage metrics, basis path testing.

#### UNIT - IV

**Data Flow Testing:** Define/Use testing, slice, based testing.

**Integration Testing:** Decomposition, based integration, call graph, based integration, path based Integration and example: integration Next Date.

#### UNIT - V

**Object oriented Testing:** Issues in testing object, oriented software, and example: Next Date, object,

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oriented unit testing, object oriented integration testing.

**Software Complexity:** Unit level complexity, integration level complexity, software complexity example, object oriented complexity.

### 4. Books and Materials

#### Text Book(s)

1. Paul C. Jorgensen, *Software Testing, A Craftsman's Approach*, 4<sup>th</sup> edition, Auerbach Publications, 2013.

#### Reference Book(s)

1. Gopalaswamy Ramesh, Srinivasan Desikan, *Software Testing Principles and Practices*, 2<sup>nd</sup> edition, Pearson, 2007.
2. Mauro Pezze, Michal Young, *Software Testing and Analysis, Process, Principles and Techniques*, Wiley India, 2009.
3. Aditya P Mathur: *Foundations of Software Testing*, Pearson Education, 2008.

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE A2536 CRYPTOGRAPHY AND NETWORK SECURITY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

### 1. Course Description

#### Course Overview

This Course focuses towards the introduction of network security using various cryptographic algorithms and underlying network security applications. It also focuses on the practical applications that have been implemented and are in use to provide email and web security.

#### Course Pre/co requisites

A2516 Computer Networks

### 2. Course Outcomes (COs)

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

A2536.1. Understand cryptography and network security concepts and application

A2536.2. Apply security principles to system design

A2536.3. Identify and investigate network security threat

A2536.4. Analyze and design network security protocols

A2536.5. Conduct research in network security

### 3. Course Syllabus

#### UNIT - I

**Introduction:** Security Trends, Security attacks, Security services, Security Mechanisms, A Model for Network Security Model, Classical Encryption Techniques, Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Steganography.

#### UNIT - II

**Symmetric Encryption Principles:** symmetric encryption algorithms, cipher block modes of operation, Approaches of Message Authentication, Secure Hash Functions and MAC, Public key cryptography principles, public key cryptography algorithms, digital signatures.

#### UNIT - III

**Kerberos:** version4, Key distribution using asymmetric encryption, X.509, certificates, Authentication procedure, Email Security, Pretty Good Privacy ,Notation, operational description, keys and key rings, S/MIME, S/MIME functionality and messages.

#### UNIT - IV

**IP Security Overview,** IP Security Policy Encapsulating Security Payload, Key Management, Oakley Key determination Protocol. Web Security considerations, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction , SET overview, key features of SET,SET participants, Dual Signature.

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## **UNIT - V**

**System Security:** Secure Socket Layer and Transport Layer Security, Secure Electronic Transaction, Intruders, Intrusion Detection, Password Management, Malicious Software, Firewalls, Trusted Systems.

### **4. Books and Materials**

#### **Text Book(s) :**

1. Network Security Essentials (Applications and Standards) by William Stallings, Pearson, Fourth Edition.
2. Hack Proofing your network, Russell, Dreamtech, Second edition.

#### **References(s):**

1. C K Shyamala, N Harini and Dr. T R Padmanabhan: Cryptography and Network Security, Wiley India Pvt. Ltd.
2. BehrouzA. Foruzan, Cryptography and Network Security, Tata McGraw Hill 2007.
3. Charlie Kaufman, Radia Perlman, and Mike Speciner, Network Security: PRIVATE Communication in a PUBLIC World, Prentice Hall, ISBN 0,13,046019,2.

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE A2537 Software Testing Laboratory

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	2	0	0	42	2	30	70	100

### 1. Course Description

#### Course Overview

This Laboratory presents a practical knowledge on software testing and quality control concepts. It covers the testing like decision table, based testing, data flow testing, class value testing. In addition, it is used to implement different searching and sorting algorithms. This course is helpful in producing quality software and chooses the career path as software testing engineer.

#### Course Pre/co requisites

A2501 Computer Programming

A2505 Object Oriented Programming

A2524 Software Testing Techniques

### 2. Course Outcomes (COs)

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

A2537.1 Identify the customer requirements for the given problem

A2537.2 Apply decision table testing for select problems

A2537.3 Derive different test cases for any given problem

A2537.4 Apply the appropriate testing technique for the design of flow graphs

A2537.5 Create software testing document for the software artifact

### 3. Course Syllabus

#### List of Experiments

- Design and develop a program in a language of your choice to solve the triangle problem defined as follows: Accept three integers which are supposed to be the three sides of a triangle and determine if the three values represent an equilateral triangle, isosceles triangle, scalene triangle, or they do not form a triangle at all. Assume that the upper limit for the size of any side is 10. Derive test cases for your program based on boundary, value analysis, execute the test cases and discuss the results.
- Design, develop, code and run the program in any suitable language to solve the commission problem. Analyze it from the perspective of boundary value testing, derive different test cases, execute these test cases and discuss the test results.
- Design, develop, code and run the program in any suitable language to implement the Next, Date function. Analyze it from the perspective of deriving different test cases, executing these test cases and discussing the test results.
- Design and develop a program in a language of your choice to solve the triangle problem defined as follows: Accept three integers which are supposed to be the three sides of a triangle and determine if the three values represent an equilateral triangle, isosceles triangle, scalene triangle, or they do not form a triangle at all. Assume that the upper limit for the size of any side is 10. Derive test cases for your program based on equivalence class partitioning, execute the test cases and discuss the results.
- Design, develop, code and run the program in any suitable language to solve the commission



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problem. Analyze it from the perspective of equivalence class testing, derive different test cases, execute these test cases and discuss the test results.

6. Design, develop, code and run the program in any suitable language to implement the Next Date function. Analyze it from the perspective of equivalence class value testing, derive different test cases, execute these test cases and discuss the test results.
7. Design and develop a program in a language of your choice to solve the triangle problem defined as follows: Accept three integers which are supposed to be the three sides of a triangle and determine if the three values represent an equilateral triangle, isosceles triangle, scalene triangle, or they do not form a triangle at all. Derive test cases for your program based on a decision, table approach, execute the test cases and discuss the results.
8. Design, develop, code and run the program in any suitable language to solve the commission problem. Analyze it from the perspective of decision table, based testing, derive different test cases, execute these test cases and discuss the test results.
9. Design, develop, code and run the program in any suitable language to solve the commission problem. Analyze it from the perspective of data flow testing, derive different test cases, execute these test cases and discuss the test results.
10. Design, develop, code and run the program in any suitable language to implement the binary search algorithm. Determine the basis paths and use them to derive different test cases, execute these test cases and discuss the test results.
11. Design, develop, code and run the program in any suitable language to implement the quick sort algorithm. Determine the basis paths and use them to derive different test cases, execute these test cases and discuss the test results.
12. Design, develop, code and run the program in any suitable language to implement an absolute letter grading procedure, making suitable assumptions. Determine the basis paths and use them to derive different test cases, execute these test cases and discuss the test results.

#### **4. Laboratory Equipment/Software/Tools Required**

Ubuntu OS/ Windows OS, C Compiler/JAVA Compiler

#### **5. Books and Materials**

##### **Text Book(s)**

1. Paul C. Jorgensen, Software Testing, A Craftsman's Approach, 4th edition, Auerbach Publications, 2013.

#### **6. Reference Book(s)**

1. Gopala swamy Ramesh, Srinivasan Desikan, Software testing Principles and Practices, 2<sup>nd</sup> edition, Pearson, 2007.
2. Software Testing , Ron Patton, 2nd edition, Pearson Education, 2004.

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## **Professional Elective - III**

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# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE

### A2559–DATAVISUALIZATION TECHNIQUES

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

#### 1. Course Description

##### Course Overview

This course teaches how to design a data presentation that really makes an impact beyond spread-sheets and tables. In addition, this course provides the knowledge of Tableau's fundamental concepts and features: how to connect to data sources and present data using easy-to-understand visualizations. In this course, students are acquainted with principles of communicating data and in-depth tour of common visualization methods.

##### Course Pre/corequisites

Familiarity with data types, spread sheets and statistics is necessary.

##### 1. Course Outcomes(COs)

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

A1563.1 Make use of Tableau for effective communication of data.

A1563.2 Create advanced visualizations, formatting and calculations using Tableau

A1563.3 Analyze changes in data visualization over time.

A1563.4 Create different types of dashboards.

A1563.5 Analyze and recommend effective business decisions/solutions using a systematic, evaluative, and information-based approach.

##### 2. Course Syllabus

###### UNIT-I

**Communicating Data** : A Step in the Process, A Model of Communication, Three Types of Communication Problems, Six Principles of Communicating Data.

###### UNIT-II

**Introduction to Tableau** : Using Tableau, Tableau Story, Tableau Products, Connecting to Data, The Tableau User Interface.

###### UNIT-III

**MultipleQuantities**: Scatterplots, WholsWho?, Making it Exploratory, Adding Background Images, StackedBars, Regression and TrendLines, The Quadrant Chart.

###### UNIT-IV

**Changes in data visualization Over Time** : The Origin of Time Charts, The Line Chart, The Dual-AxisLine Chart, The Connected Scatter plot, The Date Field Type and Seasonality, The Timeline, TheSlope graph.

###### UNIT-V

**Dashboards**: Dashboards inTableau,Types of Dashboards,ContextIsKing,BuildingDashboards:Buildingan Exploratory Dashboard.

##### Books and Materials

##### TextBook(s):

1. BenJones, *Communicating Data withTableau:Designing,Developing,andDeliveringDataVis-ualizations*, O'ReillyMedia,2014.

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### **ReferenceBook(s)**

1. JoshuaN.Milligan,*LearningTableau2019-ThirdEdition*,PacktPublishing,2019.
2. AlexanderLoth,*VisualAnalyticswithTableau*,JohnWiley& Sons,2019.
3. JenniferJaneStirrup,*TableauDashboardCookbook*,PacktPubishing,2016

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE

### A2560 ADHOC AND SENSOR NETWORKS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

## 1. Course Description

### Course Overview

This course introduces about adhoc and sensor networking, an emerging paradigm in computer networking that allows a logically centralized software program to control the behavior of an entire network.

### Course Pre/co requisites

A2516 Computer Networks

### Course Objectives:

This course is designed to:

A2560. 1 Introduce the concepts of Adhoc and Sensor Networks.

A2560. 2 Explain Routing algorithms suitable for Adhoc Networks.

A2560. 3 Understand the transport protocols for Adhoc networks

A2560. 4 Familiarize with the security issues of adhoc and sensor networks

**Unit I:** IEEE 802 Networking Standard , Fundamentals of WLANs, IEEE 802.11 standard. What is Wireless Internet?, Mobile IP, Cellular and Adhoc Wireless Networks, Applications of Adhoc Networks, Issues in Ad Hoc Wireless Networks, Ad Hoc Wireless Internet.

**Unit II:** Issues in Designing a MAC Protocol for Ad Hoc Wireless Networks, Design Goals of a MAC Protocol for Ad Hoc Wireless Networks, Classification of MAC Protocols, ContentionBased Protocols, Contention-Based Protocols with Reservation Mechanisms, Contention-Based MAC Protocols with Scheduling Mechanisms, MAC Protocols that used Directional Antennas, Other MAC Protocols.

**Unit III:** Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classification of Routing Protocols, Table-Driven Routing Protocols, On-Demand Routing Protocols, Hybrid Routing Protocols, Hierarchical Routing Protocols, Power-Aware Routing Protocols.

**Unit – IV:** Multicast Routing in Ad hoc Wireless Networks- Issues in Designing a Multicast Routing Protocol, Operation of Multicast Routing Protocols, An architecture reference model for multicast routing protocols, Classifications of Multicast Routing Protocols, Tree-Based Multicast Routing Protocols, Mesh-Based Multicast Routing Protocols, Summary of Tree and Mesh-Based Protocols. Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks, Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer Solutions. TCP over Ad Hoc Wireless Networks, Other Transport Layer Protocols for Ad Hoc Wireless Networks.

**Unit V:** Security in Ad Hoc Wireless Networks, Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Key Management, Secure Routing in Ad Hoc Wireless Networks.

Wireless Sensor Networks- Introduction, Sensor Network Architecture, Data Dissemination, Data Gathering, MAC Protocols for Sensor Networks, Location Discovery, Quality of a Sensor Network, Evolving Standards, Other issues.

**4. Books and Materials**

**Text Book(s)**

1. William Stallings, "Foundations of Modern Networking", Pearson Ltd., 2016.
2. Software Defined Networks: A Comprehensive Approach by Paul Goransson and Chuck Black, Morgan Kaufmann Publications, 2014
3. SDN , Software Defined Networks by Thomas D. Nadeau & Ken Gray, O'Reilly, 2013

**Reference Book(s)**

1. Feamster, Nick, Jennifer Rexford, and Ellen Zegura. "The road to SDN: an intellectual history of programmable networks." ACM SIGCOMM Computer Communication Review 44.2(2014): 87,98.
2. Kreutz, Diego, et al. "Software,defined networking: A comprehensive survey." Proceedings

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE A2561 Software Defined Networks

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

### 1. Course Description

#### Course Overview

This course introduces about software defined networking, an emerging paradigm in computer networking that allows a logically centralized software program to control the behavior of entire network.

#### Course Pre/co requisites

A2516 Computer Networks

### 2. Course Outcomes (COs)

**After completion of the course, the learner will be able to:**

A2561.1 Explain the key benefits of SDN by the separation of data and control planes.

A2561.2 Interpret the SDN data plane devices and Open flow Protocols.

A2561.3 Implement the operation of SDN control plane with different controllers.

A2561.4 Apply techniques that enable applications to control the underlying net,work using SDN.

A2561.5 Describe Network Functions Virtualization components and their roles inSDN

### 3. Course Syllabus

#### UNIT - I

**SDN Background and Motivation:** Evolving network requirements, The SDN Approach:

Requirements, SDN Architecture, Characteristics of Software, Defined Networking, SDN and NFV, RelatedStandards: Standards, Developing Organizations, Industry Consortia, and Open Development Initiatives.

#### UNIT - II

**SDN Data plane and Open Flow:** SDN data plane: Data plane Functions, Data plane protocols, Open flow logical network Device: Flow table Structure, Flow Table Pipeline, The Use of Multiple Tables, Group

Table Open Flow Protocol.

#### UNIT - III

**SDN Control Plane:** SDN Control Plane Architecture: Control Plane Functions, Southbound Inter, face, Northbound Interface, Routing, ITU,T Model, Open Day light,REST, Cooperation and Coordination among Controllers.

#### UNIT - IV

**SDN Application Plane:** SDN Application Plane Architecture: Northbound Interface, Network Applications, User Interface, Network Services Abstraction Layer: Abstractions in SDN, Frenetic, Traffic engineering, Measurement and Monitoring, Security, Data Center Networking, Mobility and Wireless.

#### UNIT - V

Network Functions Virtualization: Background and Motivation for NFV, Virtual Machines, NFV Concepts: Simple Example of the Use of NFV, NFV Principles, High, Level NFV Framework, NFV Benefits and Requirements, NFV Reference Architecture: NFV Management and Orchestration.

**4. Books and Materials**

**Text Book(s)**

4. William Stallings, "Foundations of Modern Networking", Pearson Ltd., 2016.
5. Software Defined Networks: A Comprehensive Approach by Paul Goransson and ChuckBlack, Morgan Kaufmann Publications, 2014
6. SDN , Software Defined Networks by Thomas D. Nadeau & Ken Gray, O'Reilly, 2013

**Reference Book(s)**

3. Feamster, Nick, Jennifer Rexford, and Ellen Zegura. "The road to SDN: an intellectual history of programmable networks." ACM SIGCOMM Computer Communication Review 44.2 (2014): 87,98.
4. Kreutz, Diego, et al. "Software,defined networking: A comprehensive survey." Proceedings



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## Open Elective - III

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# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE A2081 Research Methodology

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

### 1. Course Description

#### Course objective

The objective of this course is

- To understand the basic concepts of research and research problem
- To make the students learn about various types of data collection and sampling design
- To enable them to know the method of statistical evaluation
- To make the students understand various testing tools in research
- To make the student learn how to write a research report
- To create awareness on ethical issues in research

### 2. Course Outcomes (COs)

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

- Understand basic concepts and its methodologies
- Demonstrate the knowledge of research processes
- Read, comprehend and explain research articles in their academic discipline
- Analyze various types of testing tools used in research
- Design a research paper without any ethical issues

### 3. Course Syllabus

#### UNIT- I

Meaning of Research, Objectives of Research, Types of Research, Research Approaches, and Guidelines for Selecting and Defining Research Problem, Research Design, Concepts related to Research design, Basic Principles of Experimental Design.

#### UNIT -II

Sampling Design, steps in Sampling Design, Characteristics of a Good Sample Design, Random Sampling Design. Measurement and Scaling Techniques Errors in Measurement, Tests of Sound Measurement, Scaling and Scale Construction Techniques, Time Series Analysis, Interpolation and Extrapolation. Data Collection Methods, Primary Data, Secondary data, Questionnaire Survey and Interviews.

#### UNIT- III

Correlation and Regression Analysis, Method of Least Squares, Regression vs Correlation, Correlation vs Determination, Types of Correlations and their Applications.

#### UNIT -IV

Statistical Inference: Tests of Hypothesis, Parametric vs Non-parametric Tests, Hypothesis Testing Procedure, Sampling Theory, Sampling Distribution, Chi-square Test, Analysis of variance and Co variance, Multivariate Analysis

#### UNIT -V

Report Writing and Professional Ethics: Interpretation of Data, Report Writing, Layout of a Research Paper, Techniques of Interpretation- Making Scientific Presentations in Conferences and Seminars, Professional Ethics in Research.

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## **Books and Materials**

### **Text books:**

1. C.R.Kothari, "Research Methodology: Methods and Techniques", 2<sup>nd</sup> edition, New Age International Publishers.
2. A Step by Step Guide for Beginners, "Research Methodology": Ranjit Kumar, Sage Publications

### **Reference Book(s)**

1. P.Narayana Reddy and G.V.R.K.Acharyulu, "Research Methodology and Statistical Tools", 1<sup>st</sup> Edition, Excel Books, New Delhi.
2. Donald R. "Business Research Methods", Cooper & Pamela S Schindler, 9<sup>th</sup> edition.
3. S C Gupta, "Fundamentals of Statistics", 7<sup>th</sup> edition Himalaya Publications.

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VIII SEMESTER(IVYEAR)									
Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
	Professional Elective - IV	PE	3	0	0	3	30	70	100
	Open Elective - IV	OE	3	0	0	3	30	70	100
A2542	Project Work Phase - II	PW	0	0	16	8	60	140	200
TOTAL			06	00	16	14	120	280	400

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE

### A2563– Image processing

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

## 1. Course Description

### Course Overview

In this course students will learn digital image processing techniques including representation, sampling and quantization, image acquisition, imaging geometry, image transforms, image enhancement, image smoothing and sharpening, and image restoration.

### Course Pre/corequisites

- Basic programming skills.
- Basic Probability and Statistics

## 2. Course Outcomes (COs)

**After completion of the course, the learner will be able to:**

A2564.1 Interpret fundamental concepts of digital and colour image processing.

A2564.2 Exemplify image enhancement.

A2564.3 Analyze the various terminologies involved in image segmentation like edge, boundary detection etc. Assess image compression techniques for digital images.

A2564.4 Summarize segmentation techniques for digital images.

### UNIT-I:

#### INTRODUCTION TO DIGITAL IMAGE PROCESSING

Introduction: Digital image representation, Fundamental steps in image processing, Elements of digital image processing, Elements of visual perception, Simple image model, Sampling and Quantization, Basic relationships between pixels, Image transformations.

Applications: Medical imaging, Robot vision, Character recognition, Remote sensing.

### UNIT-II:

#### IMAGE ENHANCEMENT

Need for image enhancement, Point processing, Histogram processing, Spatial filtering-Smoothing and

Sharpening.

### UNIT-III:

#### COLOR IMAGE PROCESSING

Colour fundamentals, Colour models, Color transformations, Pseudo colour image processing, Full colour image processing.

### UNIT-IV:

#### IMAGE COMPRESSION

Redundancies, Fidelity criteria, Image compression model, Lossless compression: Huff man coding,

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Arithmetic coding. Lossy compression: Lossy Predictive Coding, JPEG Compression Standard.

### **UNIT-V:**

#### **IMAGE SEGMENTATION**

Detection of discontinuities: point, line and edge detection, Edge linking and Boundary.

Detections: Local Processing, Global processing via Hough transform, Thresholding, Region oriented segmentation: Region growing, Region splitting and merging.

#### **4.Books and Materials**

##### **Text Book(s)**

1. Rafael C. Gonzalez and Richard E. Woods, "Digital Image Processing", 3rd Edition, Pearson Education, 2011.

##### **Reference Book(s)**

1. S Jayaraman, S Esakkirajan and T Veerakumar, "Digital Image Processing", TMH, 2011.
2. S. Sridhar, "Digital Image Processing", 2nd Edition, Oxford Publishers, 2016.

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## COURSE STRUCTURE

### A2564– Block Chain Technology

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

## 1. Course Description

### Course Overview

This course is intended to study the foundations of Block chain technology. In this course, the student will explore various aspects of Block chain technology. By implementing, the student will have an idea about private and public blockchain, and intelligent contract. The student should have an idea to design and deploying the smart contracts.

### Course Pre/co requisites

A1531 Cryptography and Network Security

## 2. Course Outcomes(COs)

**After completion of the course, the learner will be able to:**

- A1568.1 Understand and explore the process of Block chain technology in payment and funding processing.
- A1568.2 Analyze the working of Smart Contracts
- A1568.3 Perform basic operations in hyper ledges and block chain networks.
- A1568.4 Describe and deploy the smart contracts.
- A1568.5 Identify the risks involved in building Block chain applications.

## 3. Course Syllabus

### UNIT I

**Introduction,** Scenarios, Challenges Articulated, Blockchain, Blockchain Characteristics, Opportunities Using Blockchain, History of Blockchain. Evolution of Blockchain: Evolution of Computer Appli cations, Centralized Applications, Decentralized Applications, Stages in Blockchain Evolution, Consortia, Forks, Public Blockchain Environments, Type of Players in Blockchain Ecosystem, Players in Market.

### UNIT II

**Blockchain Concepts:** Introduction, Changing of Blocks, Hashing, Merkle-Tree, Consensus, Mining and Finalizing Blocks, Currency aka tokens, security on blockchain, data storage on blockchain, wallets, coding on blockchain: smart contracts, peer-to-peer network, types of blockchain nodes, risk associated with blockchain solutions, life cycle of blockchain transaction.

### UNIT III

**Architecting Blockchain solutions:** Introduction, Obstacles for Use of Blockchain, Blockchain Relevance Evaluation Framework, Blockchain Solutions Reference Architecture, Types of Blockchain Applications. Cryptographic Tokens, Typical Solution Architecture for Enterprise Use Cases, Types of

Blockchain Solutions, Architecture Considerations, Architecture with Blockchain Platforms, Approach for Designing Blockchain Applications.

### UNIT IV

## **G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL**

**Ethereum Blockchain Implementation:** Introduction, Tuna Fish Tracking Use Case, Ethereum Eco-system, Ethereum Development, Ethereum Tool Stack, Ethereum Virtual Machine, Smart Contract Programming, Integrated Development Environment, Truffle Framework, Ganache, Unit Testing, Ethereum Accounts, MyEtherWallet, Ethereum Networks/Environments, Infura, Etherscan, Ethereum Clients, Decentralized Application, Metamask, Tuna Fish Use Case Implementation, Open Zeppelin Contracts

### **UNIT V**

**Hyperledger Blockchain Implementation:** Introduction, Use Case Car-Ownership Tracking, Hyperledger Fabric, Hyperledger Fabric Transaction Flow, and FabCar Use Case Implementation, Invoking Chaincode Functions Using Client Application.

### **3. Books and Materials**

#### **TextBook(s)**

1. Ambadas, Arshad Sarfaz Ariff, Sham "Block chain for Enterprise Application Developers", Wiley publications.
2. Andreas M. Antonopoulos, "Mastering Bitcoin: Programming the Open Blockchain", O'Reilly 2nd edition 2017

#### **Reference Book(s)**

- 1) Blockchain: A Practical Guide to Developing Business, Law, and Technology Solutions, Joseph Bambara, Paul R. Allen, Mc Graw Hill.



# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE

### A2565 DevOps

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

## 1. Course Description

### Course Overview

This course enlightens the agile relationship between development and IT operations and provides the knowledge about various DevOps tools. It focuses on professional principles that help business units Collaborate inside the enterprise and break down traditional silos. The learner can lead his/her professional career in service and commercial enterprises.

### Course Pre/co requisites

A1510 Software Engineering

## 2. Course Outcomes (COs)

**After completion of the course, the learner will be able to:**

A2562.1 Analyze DevOps methodologies in collaboration with the Development and Operations team

A2562.2 Apply configuration management strategies for better integrations and deployment

A2562.3 Make use of various DevOps tools to ease of collaboration and development

A2562.4 Determine the speed of productivity for in time delivery

A2562.5 Application deployment and configuration for uninterrupted usage

## 3. Course Syllabus

### UNIT - I

**SDLC:** Introduction to SDLC, agile model.

**Introduction to Devops:** Introduction, Devops features, work management, source code management, build automation, delivery automation, understanding code quality, automation of CI/CD.

### UNIT - II

**Source Code Management:** What is version control and GIT, standard branching workflows, Branching Workflow, GitHub flow.

### UNIT - III

**Build Automation , CI:** Build( CI ) Orchestration using Jenkins automation server, build tools , Apache Maven, Gradle, Ant, NPM/Node.js, pipeline Basics, Jenkins master, node, agent, and executor, freestyle projects & pipelines.

### UNIT - IV

**Artifact Management:** Nexus, JFrogArtifactory, JFrogArtifactory as Kubernetes registry, Helm chart for Microsoft azure pipeline.

**Continuous Delivery:** Software components can be released in short cycles, every change is automatically deployed to the Dev environment.

### UNIT - V

**Continuous Deployment:** Extends continuous delivery, every change is automatically deployed to

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Production, CD Flow, containerization with Docker, Introduction to Docker, images & containers, Docker File, working with containers and publish to Docker Hub, Configuration management Ansible, Introduction to Ansible, Ansible tasks, Roles, Jinja templates, vaults, deployments using Ansible.

### 4. Books and Materials

#### TextBook(s)

1. Gene Kim, Jez Humble, Patrick Debois, John Willis, *The DevOps Handbook: How to Create World-Class Agility, Reliability, 2016.*

#### Reference Book(s)

1. Michael Huttermann, *DevOps for Developers*, 2012.
2. Joakim Verona, *Practical DevOps*, packet open source publications, 2016.

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE A2566 Neural Networks and deep learning

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

### 1. Course Description

#### Course Objectives

- To introduce the foundations of Artificial Neural Networks
- To acquire the knowledge on Deep Learning Concepts
- To learn various types of Artificial Neural Networks
- To gain knowledge to apply optimization strategies

### 2. Course Outcomes (COs)

**After completion of the course, the learner will be able to:**

**A2566 .1** understand the concepts of Neural Networks

**A2566 .2** select the Learning Networks in modeling real world systems

**A2566 .3** use an efficient algorithm for Deep Models

**A2566 .4** Apply optimization strategies for large scale applications

### 3. Course Syllabus

#### UNIT-I

Artificial Neural Networks Introduction, Basic models of ANN, important terminologies, Supervised Learning Networks, Perceptron Networks, Adaptive Linear Neuron, Back-propagation Network. Associative Memory Networks. Training Algorithms for pattern association, BAM and Hopfield Networks.

#### UNIT-II

Unsupervised Learning Network- Introduction, Fixed Weight Competitive Nets, Maxnet, Hamming Network, Kohonen Self-Organizing Feature Maps, Learning Vector Quantization, Counter Propagation Networks, Adaptive Resonance Theory Networks. Special Networks-Introduction to various networks.

#### UNIT – III

Introduction to Deep Learning, Historical Trends in Deep learning, Deep Feed - forward networks, Gradient-Based learning, Hidden Units, Architecture Design, Back-Propagation and Other Differentiation Algorithms

#### UNIT - IV

Regularization for Deep Learning: Parameter norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised learning, Multi-task learning, Early Stopping, Parameter Typing and Parameter Sharing, Sparse Representations, Bagging and other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, tangent Prop and Manifold, Tangent Classifier

#### UNIT - V

Optimization for Train Deep Models: Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate SecondOrder Methods, Optimization Strategies and Meta-Algorithms Applications: Large-Scale Deep Learning,

# **G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL**

Computer Vision, Speech Recognition, Natural Language Processing

## **4. Books and Materials**

### **TEXT BOOKS:**

1. Deep Learning: An MIT Press Book By Ian Good fellow and Yoshua Bengio and Aaron Courville
2. Neural Networks and Learning Mach

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**OPEN ELECTIVES**

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### Open Electives

Course Code	Title of the Course	L-T-P	Credits	Offered by
A2181	Basic Civil Engineering	3-0-0	3	CE
A2182	Building Planning and Construction	3-0-0	3	CE
A2183	Disaster Management	3-0-0	3	CE
A2184	Water Resources Conservation	3-0-0	3	CE
A2281	Fundamentals of Electrical Engineering	3-0-0	3	EEE
A2282	Renewable Energy Sources	3-0-0	3	EEE
A2283	Electrical Measuring Instruments	3-0-0	3	EEE
A2381	Optimization Techniques	3-0-0	3	ME
A2382	Mechanical Technology	3-0-0	3	ME
A2383	Introduction to Automobile Systems	3-0-0	3	ME
A2481	Basic Electronics	3-0-0	3	ECE
A2482	Introduction to Communication Systems	3-0-0	3	ECE
A2483	Fundamentals of IoT	3-0-0	3	ECE
A2581	Basic Data Structures	3-0-0	3	CSE
A2582	Fundamentals of DBMS	3-0-0	3	CSE
A2583	Basics of Software Engineering	3-0-0	3	CSE
A2584	Python for Everyone	3-0-0	3	CSE
A2585	Computer Organization and Operating Systems	3-0-0	3	CSE
A2586	Fundamentals of Artificial Intelligence and Machine Learning	3-0-0	3	CSE
A2081	Management Science	3-0-0	3	H&S
A2082	Research Methodology	3-0-0	3	H&S
A2083	Intellectual Property Rights	3-0-0	3	H&S
A2084	National Service Scheme	3-0-0	3	H&S
A2085	Yoga	3-0-0	3	H&S
A2086	Design Thinking	3-0-0	3	H&S

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE

### A2181 – BASIC CIVIL ENGINEERING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

## 1. Course Description

### Course Overview

This course is designed to impart the basic knowledge about civil engineering to the students of other branches of engineering. The course includes materials for construction, basic surveying and other basic concepts of irrigation, water supply and geotechnical engineering. It provides the significance of the civil engineering profession satisfying societal needs.

### Course Pre/corequisites

The course has no specific prerequisite and co requisite

## 2. Course Outcomes (COs)

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

- A2181.1 Classify various materials and components used in building construction
- A2181.2 List out different domains like Structural, Transportation and Geotechnical Engineering in Civil engineering stream
- A2181.3 Identify types of soils and foundations for various structures
- A2181.4 Measure the linear and angular parameters using concepts of surveying
- A2181.5 Develop water supply system for domestic and irrigational needs

## 3. Course Syllabus

### UNIT I

**Introduction to civil engineering & construction materials:** Importance and scope of civil engineering, characteristics, types and their uses of stones, bricks, timber and cement

### UNIT II

**Survey and highway engineering:** Definition and classification of surveying, linear and angular measurements, leveling- modern instruments

### UNIT III

**Modes of transportation:** classification of highways - classification of pavements, curves, super elevation

### UNIT IV

**Geotechnical engineering:** Origin of soil, types of soil, bearing capacity of soil, types of foundation, shallow and deep

### UNIT V

**Irrigation and water supply:** Definition and classification of irrigation, irrigation structures, dams, weirs, cross drainage works, canal drops and quality of water-treatment methods

## 4. Books and Materials

### Text Book(s)

1. B C Punmia, Ashok K Jain, Arun K Jain. *Basic Civil Engineering*, Laxmi Publications (P) Ltd, 1<sup>st</sup> edition, 2003.
2. G K Hiraskar. *Basic Civil Engineering*, Dhanpat Rai Publication, 1<sup>st</sup> edition, 2004.

### Reference Book(s)

1. K.R. Arora. *Soil Mechanics and Foundation Engineering*, Standard Publishers and Distributors, Delhi, 7<sup>th</sup> edition 2014.
2. B C Punmia Lal, *Irrigation and Water Power Engineering*, Laxmi Publications Pvt. Ltd., New Delhi, 16<sup>th</sup> edition, 2005.

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE

### A2182 – BUILDING PLANNING & CONSTRUCTION

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

## 1. Course Description

### Course Overview

The objective of the course is to learn about building by-laws laid by planning authorities, apply the principles and methods to be followed in constructing various components of a building & understand about masonry types in brick and stone construction. This course provides sequential approach towards constructional activities like flooring, carpentry, plumbing and electrical works etc.

### Course Pre/corequisites

The course has no specific prerequisite and corequisite

## 2. Course Outcomes (COs)

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

- A2182.1 Plan buildings by adhering to laws laid by regulatory bodies
- A2182.2 Classify different masonry types of brick and stones used in construction
- A2182.3 Select appropriate floors and roofs for a proposed building
- A2182.4 Identify building materials which can be employed in construction
- A2182.5 Make use of damp proofing techniques to prevent ingress of water in buildings

## 3. Course Syllabus

### UNIT-I

**Residential Buildings: introduction,** Different types of residential buildings- detached house, semi- detached house, row house or chawls, block of flats or terrace house, duplex type houses, selection of site for residential building, factors effecting the selection of site, components of building, by-laws and regulations, orientation of buildings-factors effecting orientation, C.B.R.I suggestions for obtaining optimum orientation..

### UNIT-II

**Masonry:** stone masonry-Definitions of terms used in masonry, materials for stone masonry, classifications of stone masonry, dressing of stones. Brick Masonry- introduction, types of bricks, bonds in brick work, comparison of brick masonry and stone masonry. Composite masonry-introduction, stone composite masonry, brick-stone masonry, concrete masonry, hollow clay blocks masonry, reinforced brick masonry.

### UNIT-III

**Floors and Roofs:** ground floor-Components of a floor, materials used for floor construction, different types of flooring, upper floors- introduction, steel joist and stone or precast concrete slab floor, jack arch floors, reinforced cement concrete floors, ribbed or hollow tiled flooring, precast concrete floors, timber floors. Types of roofs- pitched roofs, single roofs, double or purlin roofs, trussed roofs.

### UNIT-IV

**Doors and Windows:** Introduction, Location of doors and windows, definition of technical terms, size of doors and windows, types of doors and windows, ventilators, fixtures and fastenings.

### UNIT-V

**Damp proofing:** Introduction, Causes and effects of dampness on buildings, materials and methods used for damp proofing, DPC treatment in building problems, fire hazards, fire resisting properties of common building materials.

## 4. Books and Materials

### Text Book(s)

1. Kumara Swamy N & Kameswara Rao A, *Building planning and Drawing*, Charotar Publishers, 6th Edition, 1998
2. Dr.B.C. Punmia, Ashok Kr. Jain, Arun Kr. Jain, *Building Construction*, Laxmi Publications, 10th Edition, 2008

### Reference Book(s)

1. S.K. Duggal, *Building Materials*, New Age International Publishers, 4th Edition, 2010
2. D.N. Ghose, *Materials of construction*, Tata-McGraw-Hill Publishing Company Limited, 1<sup>st</sup> Edition, 1989



## **G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL**

3. Sushil Kumar Sushil Kumar, (2003), *Engineering Materials*, Metropolitan Book Co., Private Ltd., New Delhi.

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE A2183 – DISASTER MANAGEMENT

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

### 1. Course Description

#### Course Overview

This course provides knowledge on environmental hazards and disasters. The syllabus includes the basics of endogenous and exogenous hazards and gives a suitable picture on the different types of hazard and disasters. This course will enable the student to apply different management techniques to the hazards and disasters.

#### Course Pre/corequisites

The course has no specific prerequisite and corequisite.

### 2. Course Outcomes (COs)

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

- A2183.1 Classify different kind of hazards/disasters and their effects on environment
- A2183.2 Analyze the causes of hazards/disasters which effects human life
- A2183.3 Apply disaster management through engineering applications
- A2183.4 Apply suitable mitigation measures to minimize the effects of hazards and disasters

### 3. Course Syllabus

#### UNIT I

**Environmental Hazards & Disasters:** Environmental Hazards & Disasters: Meaning of Environmental hazards, Environmental, Disasters and Environmental stress. Concept of Environmental Hazards, Environmental, stress & Environmental Disasters. Different approaches & relation with human Ecology, Landscape Approach - Ecosystem Approach - Perception approach - Human ecology & its application in geographical researches.

#### UNIT II

**Types of Environmental hazards & Disasters:** Types of Environmental hazards & Disasters: Natural hazards and Disasters, Man induced hazards & Disasters, Natural Hazards- Planetary Hazards/ Disasters, Extra Planetary Hazards/ disasters, Planetary Hazards- Endogenous Hazards – Exogenous Hazards.

#### UNIT III

**Endogenous Hazards:** Endogenous Hazards, Volcanic Eruption, Earthquakes, Landslides, Volcanic Hazards/ Disasters - Causes and distribution of Volcanoes, Hazardous effects of volcanic eruptions, Environmental impacts of volcanic eruptions, Earthquake Hazards/ disasters, Causes of Earthquakes, Distribution of earthquakes, Hazardous effects of earthquakes, Earthquake Hazards in India, Human adjustment, perception & mitigation of earthquake.

#### UNIT IV

**Exogenous hazards/ disasters:** Exogenous hazards/ disasters, Infrequent events, Cumulative atmospheric hazards/disasters Infrequent events: Cyclones, Lightning, Hailstorms Cyclones: Tropical cyclones & Local storms, Destruction by tropical cyclones & local storms (causes, distribution human adjustment, perception & mitigation) Cumulative atmospheric hazards/ disasters: - Floods- Droughts- Cold waves- Heat waves. Floods: - Causes of floods- Flood hazards India- Flood control measures (Human adjustment, perception & mitigation). Droughts: - Impacts of droughts- Drought hazards in India, Drought control measures, Extra Planetary Hazards/ Disasters, Man induced Hazards /Disasters, Physical hazards/ Disasters-Soil Erosion

#### UNIT V

**Soil Erosion:** Mechanics & forms of Soil Erosion, Factors & causes of Soil Erosion, Conservation measures of Soil Erosion. Chemical hazards/ disasters, Release of toxic chemicals, nuclear explosion- Sedimentation processes. Sedimentation processes: - Global Sedimentation problems- Regional Sedimentation problems- Sedimentation & Environmental problems- Corrective measures of Erosion & Sedimentation. Biological hazards/ disasters: - Population Explosion.

### 4. Books and Materials

#### Text Book(s)

1. Rajib Shah, *Disaster Management*, Universities Press, India, 2<sup>nd</sup> Edition, 2003
2. Tushar Bhattacharya, *Disaster Science and Management*, TMH Publications, 1<sup>st</sup> Edition, 2012

#### Reference Book(s)

## **G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL**

1. Donald Hyndman & David Hyndman, *Natural Hazards & Disasters*, Cengage Learning, 4<sup>th</sup> Edition, 2013
2. R.B. Singh (Ed), *Disaster Management*, Rawat Publication, New Delhi, 1<sup>st</sup> Edition, 2006
3. Kates, B.I & White, *The Environment as Hazards*, G.F, Oxford Publishers, New York, 1978.

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE

### A2184 – WATER RESOURCES CONSERVATION

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

#### 1. Course Description

##### Course Overview

This course introduces the great need to conserve and plan the water resources in more efficient way because of urbanization and depletion of water resources. The course content enables the students to learn water hydrology, importance of water conservation and methods to conserve water resources.

##### Course Pre/corequisites

The Course has no specific prerequisite and corequisite

#### 2. Course Outcomes (COs)

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

- A2184.1 Interpret ground and surface water utilization for conservation of water resources
- A2184.2 Apply the concepts of artificial ground water recharge to increase ground water level
- A2184.3 Make use of the concepts of harvesting for preservation of water
- A2184.4 Utilizenew technologies like ion exchange and UV radiation techniques to recycle and reuse waste water
- A2184.5 Plan efficient use of water resources with minimum energy

#### 3. Course Syllabus

##### UNIT I

**Ground and surface water utilization-** Hydrologic cycle, water budget, ground water level fluctuations and environmental influence.

##### UNIT II

**Artificial ground water recharge-** Concept and methods of artificial ground water recharge mounds & induced recharge, wastewater recharge for reuse, water spreading, farm ponds and percolation tanks.

##### UNIT III

**Water harvesting-** Rainwater harvesting, catchment harvesting, harvesting structures, soil moisture conservation, and check dams

##### UNIT IV

**Reuse & recycle of waste water-**Types of reuse, application of treated waste water, purity of reclaimed water, guidelines and regulations, new technologies used in recycling of waste water.

##### UNIT V

**Watershed management-** Concept of watershed management, policies and decision making

#### 4. Books and Materials

##### Text Book(s)

1. Ramakrishnan S. *Ground water*, Sci -Tech Publications, 2<sup>nd</sup> edition, 2010.

##### Reference Book(s)

1. S.N. Chatterjee. *Water Resources, Conservation and management*, Atlantic Publishers, 1<sup>st</sup> edition, 2018.
2. Murthy J.V.S, *Watershed Management*, New Age International Publishers, 2<sup>nd</sup> edition, 2017.
3. Murthy V.V.N, *Land and Water Management*, Kalyani Publications, 1<sup>st</sup> edition, 2018.

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE

### A2281 – FUNDAMENTALS OF ELECTRICAL ENGINEERING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

## 1. Course Description

### Course Overview

This course is to familiarize the students about the basics of electrical engineering, circuit theory and electrical machines.

This course introduces the fundamental concepts, basic knowledge of electrical quantities, network theorems for the analysis of basic DC and AC circuits. It also deals with the working principle, construction and operation of DC machines and AC machines. These machines are used in domestic and industrial applications.

### Course Pre/corequisites

The course has no specific prerequisite and corequisite.

## 2. Course Outcomes (COs)

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

- A2281.1 Apply network reduction techniques and knowledge of alternating quantities to calculate current, voltage and power for complex circuits.
- A2281.2 Analyze the electrical circuits using nodal analysis, mesh analysis and network theorems.
- A2281.3 Demonstrate the working principle and operation of DC machines, AC machines and single-phase transformers.
- A2281.4 Test the Performance of DC machines, AC machines and single-phase transformers.

## 3. Course Syllabus

### UNIT I

**DC Circuits:** Circuit Concept, Types of Network Elements, ohm's Law, types of Sources Voltage - Current Relationship for Passive element (R,L&C), Kirchhoff's Laws, Network Reduction Techniques: Series, Parallel, combination of Series and Parallel, Delta - Star Transformation, loop and Nodal Analysis.

### UNIT II

**AC Circuits:** Representation of alternating quantities, peak, average, RMS, form factor and peak factor for sinusoidal wave form. J-notation, Analysis of single-phase AC circuits consisting of Pure R, L & C circuits, Combination of RL, RC, and RLC (only series) circuits.

### UNIT III

**Network Theorems:** Thevenin's, Norton's, Superposition and Maximum Power Transfer Theorems (DC Excitation only).

### UNIT IV

**D.C Generators:** Constructional details of D.C. generator, Principle of Operation of D.C. generators, Types of D.C Generators, E.M.F Equation.

### UNIT V

**D.C Motors:** Principle of Operation of DC Motors, Back emf, Torque Equation, Swinburne's test, speed control of DC motors by armature and field control methods.

**1-phase Transformers:** Principle of Operation, Constructional Details, E.M.F. equation, Losses and efficiency, OC& SC Tests.

**3-Phase Induction Motors:** Principle of Operation, Types of induction motors, Slip, Torque equation, Torque-Slip characteristics.

**3-phase Alternators:** Principle of Operation-Constructional Details-EMF Equation.

## 4. Books and Materials

### Text Book(s)

- V.K. Mehta and Rohith Mehta, "Basic electrical engineering", S. Chand publishers, 14<sup>th</sup> edition.
- M.S. Naidu and S. Kamakshaiah, "Introduction to Electrical Engineering", Tata McGraw Hill Publishers, 1<sup>st</sup> edition, 2004.

## **G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL**

### **Reference Book(s)**

1. A Sudhakar, Shyammohan S Palli, "*Circuits and Networks*", Tata McGraw-Hill, 4<sup>th</sup> edition.
2. D. C. Kulshreshtha," *Basic Electrical Engineering*", McGraw Hill, 2009.
3. L. S. Bobrow, "*Fundamentals of Electrical Engineering*", Oxford University Press, 2011.

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE A2282 – RENEWABLE ENERGY SOURCES

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

### 1. Course Description

#### Course Overview

The purpose of this course is to enable the student to acquire knowledge on various Power Generation Systems. The primary objective of this course is to introduce solar energy, its radiation, collection, storage and application. It also deals with production of quality of energy, types of generation plants and their principles of operation, methods of energy storage and economics of generation.

#### Course Pre/corequisites

The course has no specific prerequisite and corequisite

### 2. Course Outcomes (COs)

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

- A2282.1 Apply the principles of Renewable energy sources for the construction of Powergenerating station.
- A2282.2 Analyze the various energy conversion systems and their limitations.
- A2282.3 Analyze Renewable energy sources for various environmental conditions
- A2282.4 Analyze the generation principles and operation of variety of sources of energy

### 3. Course Syllabus

#### UNIT I

**Principles of Solar Radiation:** Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extra-terrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

#### UNIT II

**Solar Energy Collection, Storage & Applications:** Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors. Storage & Applications: Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

#### UNIT III

**Wind Energy & Bio Mass:** Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria. Bio-Mass: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C. Engine operation and economic aspects.

#### UNIT IV

**Other Sources of Energy:** Resources, types of wells, methods of harnessing the energy, potential in India. Ocean Energy: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles.

**Tidal and wave energy:** Potential and conversion techniques, mini-hydel power plants, and their economics.

#### UNIT V

**Energy Storage and Economy:** Energy Storage - Energy in Transportation - Magneto hydrodynamic Power Generation- Hydrogen Economy

### 4. Books and Materials

#### Text Book(s)

- G.D. Rai, *Non-Conventional Energy Sources*, Khanna Publishers, 4<sup>th</sup> edition 2008.
- JhonTwidell and tony Weir, *Renewable Energy Resources*, 2<sup>nd</sup> edition, Taylor and Francis Group, 2006.

#### Reference Book(s)

## **G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL**

1. Twidell&Weir, *Renewable Energy Sources*, Tata McGraw Hill Education Private Limited, New Delhi, 4<sup>th</sup> edition 2009.
2. S. N. Bhadra, D. Kastha& S. Banerjee, *Wind Electrical Systems* – Oxford University Press,2013.



# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE A2283 – ELECTRICAL MEASURING INSTRUMENTS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

### 1. Course Description

#### Course Overview

The purpose of this course is to familiarize the students about the different electrical measuring instruments used to measure electrical quantities. The minimization of different errors and their effects in measuring instruments are discussed. Here the concepts of single phase and three phase circuits are discussed to determine the voltage, current, power and energy. Also, the concepts of bridges are discussed, which are used for the measurement of unknown resistance, inductance and capacitance. These electrical measuring instruments are used in domestic and industrial applications.

#### Course Pre/corequisites

The course has no specific prerequisite and corequisite

### 2. Course Outcomes (COs)

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

A2283.1 Categorise various electrical instruments used for measuring electrical parameters.

A2283.2 Design appropriate arrangement for extension of range in measuring instruments.

A2283.3 Analyze the errors and compensations in various electrical measuring instruments

A2283.4 Measure current, voltage, power and energy in 1-phase and 3-phase circuits

A1283.5 Estimate the unknown quantities of resistance, inductance and capacitance using bridges

### 3. Course Syllabus

#### UNIT I

**Measuring Instruments:** Classification, deflecting, control and damping torques, Ammeters and Voltmeters, PMMC, moving iron and dynamometer type instruments, expression for the deflecting torque and control torque, Errors and compensations, extension of range using shunts and Series resistance.

#### UNIT II

**Instrument transformers:** Current Transformer and Potential Transformer, ratio and phase angle error, error compensation problems.

#### UNIT III

**Potentiometers:** Principle and operation of D.C. Crompton's potentiometer, standardization, Measurement of unknown resistance, current, voltage.

#### UNIT IV

**Measurement of Power:** Single phase dynamometer wattmeter, LPF and UPF, Double element and three element dynamometer Wattmeter's', expression for deflecting and control torques, Extension of range of wattmeter using instrument transformers, Measurement of active and reactive powers in balanced and unbalanced systems.

**Measurement of Energy:** Single phase induction type energy meter, driving and braking torques errors and compensations, testing by phantom loading. Three phase energy meters.

#### UNIT V

**DC Bridges:** Method of measuring low, medium and high resistance, Whetstone's bridge, Kelvin's double bridge for measuring low resistance, measurement of high resistance, loss of charge method, megger method.

**AC Bridges:** Measurement of Inductance, Maxwell's Bridge, Anderson's Bridge. Measurement of Capacitance, Desauty's Bridge, Schering Bridge.

### 4. Books and Materials

#### Text Book(s)

1. A.K. Sawhney, A course on Electrical and Electronics Measurements & Instrumentation, Dhanpat Rai and Co. Publishers, 19<sup>th</sup> edition, 2015.

## **G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL**

2. J.B. Gupta, A course on Electrical and Electronics Measurements & Instrumentation, S.K. Kataria publishers, 14<sup>th</sup> edition, 2014.

### **Reference Book(s)**

1. U.A. Bakshi, A. V. Bakshi, Electrical measurements and Instrumentation, Technical publications, 1<sup>st</sup> edition, 2009.
2. E. W. Golding & F.C. Widdis, Electrical Measurements and Measuring Instruments, Wheeler publishers, 5<sup>th</sup> edition, 1997.
3. H S Kalsi, Electronic Instrumentation, Tata McGraw-Hill, 3<sup>rd</sup> edition, 2010.

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE A2381 – OPTIMIZATION TECHNIQUES

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

### 1. Course Description

#### Course Overview

This course deals with modelling and optimization of the problems with limited resources. It provides the tools and techniques to solve the real-world problems by finding the optimal solutions to the models subject to constraints of time, labour, money, material and other resources. This course helps students in better decision making regarding optimum usage of available resources.

#### Course Pre/corequisites

The course has no specific prerequisite and Corequisite

### 2. Course Outcomes (COs)

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

- A2381.1 Apply various Operations Research models and methods to real world problems.
- A2381.2 Solve Linear Programming, assignment, sequencing, game theory, queuing, transportation and project management problems for optimum solution.
- A2381.3 Evaluate various alternatives available to find optimal solution for real world problems.
- A2381.4 Choose the best strategies to maximize the profit or minimize loss in the presence of a competitor.
- A1381.5 Decide the best operating policy for the efficient use of resources.

### 3. Course Syllabus

#### UNIT I

**Operations Research:** Scope, O.R models, Linear Programming - Formulation, graphical method, simplex method, big - M method and special cases.

#### UNIT II

**Assignment Model:** Formulation, optimal solution by Hungarian method, maximization problem, balanced and unbalanced problems, restriction models.

**Sequencing Models:** Introduction, Johnson's Rule, processing n jobs through two machines, processing n jobs through three machines and processing n jobs through m machines

#### UNIT III

**Transportation Problem:** Introduction, finding initial basic feasible solutions, optimality test, alternate solutions and unbalanced transportation problem.

#### UNIT IV

**Game Theory:** Introduction, minimax (maximin) method of optimal strategies, saddle point, value of the game, rectangular games without saddle point, dominance principle, graphical method.

**Queuing Theory:** Introduction, terminology, single channel models with finite queue length and non-finite queue length

#### UNIT V

**Introduction to Project Management:** Terminology, methods of finding critical path -critical path method (CPM), project evaluation and review technique (PERT) - probability of completing the project within scheduled time and crashing.

### 4. Books and Materials

#### Text Book(s)

1. S.D. Sharma, *Operations Research*, New Delhi: Kedarnath Publications, 2017
2. S.R. Yadav and A.K. Malik, *Operations Research*, New Delhi: Oxford University Press, 2014.

#### Reference Book(s)

## **G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL**

1. Hamdy Abdelaziz Taha, *Operations Research: an Introduction*, 9<sup>th</sup> edition, Pearson, Boston, 2015.
2. Prem Kumar Gupta & D S Hira, *Operations Research*, Revised edition, New Delhi: S. Chand Publishing, 2015.

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE

### A2382 – MECHANICAL TECHNOLOGY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

#### 1. Course Description

##### Course Overview

This course provides knowledge to select the required material for different engineering applications. It also deals with basic concepts of internal combustion engines, compressors, power transmission systems and welding processes. The student will be able to apply the knowledge of engines, materials and welding processes which can be used in domestic and industrial applications.

##### Course Pre/corequisites

The course has no specific prerequisite and corequisite

#### 2. Course Outcomes (COs)

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

- A2382.1 Identify the types of engines and their cycles.
- A2382.2 Classify the reciprocating air compressors and their working principles.
- A2382.3 Discuss the constructional features of domestic refrigeration and air conditioning systems.
- A2382.4 Inspect the mechanism of power transmission elements of various engineering systems.
- A2382.5 Select suitable engineering materials and welding methods for real time applications.

#### 3. Course Syllabus

##### UNIT I

**I.C. Engines:** working principle, 4 stroke and 2 stroke engines, comparison.

##### UNIT II

**Reciprocating Air compressors:** Description and working of single stage and multistage reciprocating air compressors – inter cooling.

##### UNIT III

**Refrigeration systems:** Study of household refrigerator, window air conditioner, split air conditioner ratings and selection criteria of above devices

##### UNIT IV

**Transmission of power:** Belt, Rope, Chain and gear drive.

##### UNIT V

**Engineering materials and welding processes:** Engineering materials, properties of materials, gas welding, arc welding, soldering and brazing.

#### 4. Books and Materials

##### Text Book(s)

1. R.S Khurmi & JS Gupta, *Thermal Engineering*, New Delhi S Chand, 2012.
2. P.L. Ballaney, *Refrigeration and Air Conditioning*, 2<sup>nd</sup> edition, 2012.

##### Reference Book(s)

1. R.K. Jain and S.C. Gupta, *Production Technology*, New Delhi, Khanna Publishers, 2012.
2. S.N. Lal, *Elements of Mechanical Engineering*, Cengage Learning, 2013.

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE

### A2383 – INTRODUCTION TO AUTOMOBILE SYSTEMS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

#### 1. Course Description

##### Course Overview

This course provides a broad knowledge about the automobile mechanisms like transmission, final drive, braking system, front axle, steering, frame and chassis. It also covers emission and electrical systems used in automobiles. This knowledge will be helpful to the student in co-relating various systems with each other and understanding the individual systems in a better manner while using them in daily life.

##### Course Pre/corequisites

The course has no specific prerequisite and corequisite

#### 2. Course Outcomes (COs)

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

- A2383.1 Identify the different parts of the automobile systems used in daily life.
- A2383.2 Analyze brakes, steering, axles, suspension and frames of an engine for better performance.
- A2383.3 Inspect the mechanism of power transmission elements, and applications of various engineering systems.
- A2383.4 Compare the significance of various engines in terms of their performance.
- A2383.5 Classify various electrical systems that are used for efficient functioning of automobiles.

#### 3. Course Syllabus

##### UNIT I

**Introduction**- History, Industrial revolution, Development in automobile industry, leading manufacturers.

##### UNIT II

**Classification of vehicles:** On the basis of load, wheels, final drive, fuel used, position of engine and steering transmission, body and load, layout of an automobile chassis function of major components of a vehicle such as frame, transmission (clutch and gearbox), braking system, types of suspension, principle and its components.

##### UNIT III

**Introduction to thermodynamics:** First and second laws of thermodynamics, Otto cycle, diesel cycle. Types of automotive fuels, properties of fuels, air requirement for complete combustion of fuel.

**Introduction to IC engines:** Concept of two stroke and four stroke petrol and diesel engines and their applications to automobiles, various terms, specification of automobile engines.

##### UNIT IV

**Emissions from automobiles** – Pollution standards national and international, pollution control techniques, multipoint fuel injection for SI engines- common rail diesel injection, emissions from alternative energy sources– hydrogen, biomass, alcohols, LPG, CNG.

##### UNIT V

**Electrical system**- Charging circuit, generator, current and voltage regulator, starting system, bendix drive, mechanism of solenoid switch, lighting systems, horn, wiper, fuel gauge, oil pressure gauge, engine temperature indicator.

#### 4. Books and Materials

##### Text Book(s)

1. Kirpal Singh, *Automotive Mechanics – Vol. 1 & Vol. 2*, Standard Publishers Distributors, 13<sup>th</sup> edition, 2013
2. R.S Khurmi & JS Gupta, *Thermal Engineering*, New Delhi S. Chand, 2012.

##### Reference Book(s)

1. PL Ballaney, *Thermal Engineering*, New Delhi, Khanna Publishers, 2013.
2. M.L. Mathur, F.S. Mehta and R.P. Tiwari, *Elements of Mechanical Engineering*, New Delhi, Jain Brothers, 2013

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE A2481 – BASIC ELECTRONICS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

### 1. Course Description

#### Course Overview

This course provides fundamentals of electronics and an understanding of a range of discrete semiconductor devices, including design, construction and testing of experimental electronic devices. This course makes the students get expertise in analyzing principle of operation of p-n junction diode, special diodes, rectifiers, BJT and FET.

#### Course Pre/corequisites

A2003 – Engineering Physics

### 2. Course Outcomes (COs)

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

- A2481.1 Analyze the operation and characteristics of diodes and transistors.
- A2481.2 Analyze various applications of diodes and transistors.
- A2481.3 Make use of Boolean algebra postulates to minimize boolean functions.
- A2481.4 Construct and analyze various combinational and sequential circuits used in digital systems.

### 3. Course Syllabus

#### UNIT I

**Diode:** Formation, forward and reverse bias, V-I characteristics, application as a switch, V-I characteristics of Zener diode, Zener diode as a regulator.

#### UNIT II

**Rectifiers:** Construction, operation of Half wave, Full wave and Bridge rectifier.

**Transistors:** formation, types, configurations, applications of BJT, FET, MOSFET.

**Amplifiers:** Basics, different types of amplifiers and their applications in public addressing systems.

#### UNIT III

**Number systems:** Review of number systems and their conversions, Representation of negative numbers, binary codes.

#### UNIT IV

**Boolean algebra:** Theorems and properties, canonical and standard forms of SOP/POS form, digital logic gates, universal gates.

#### UNIT V

**Combinational circuits:** basic logic gates, adders, subtractors, multiplexers and comparators.

**Sequential circuits:** SR, JK, T, and D latches and flip-flops.

### 4. Books and Materials

#### Text Book(s)

1. J. Millman, C. Halkias, *Electronic Devices and Circuits*, TMH, 4<sup>th</sup> edition, 2010.
2. M. Morris Mano, Michael D. Ciletti, *Digital Design*, 4th edition, Pearson Education/PHI, India, 2008.

#### Reference Book(s)

1. R.L. Boylestad and Louis Nashelsky, *Electronic Devices and Circuits*, Pearson Publications, 9<sup>th</sup> edition, 2006.
2. J.B. Gupta, *Electronic Devices and Circuits*, 3<sup>rd</sup> Edition, S.K. Kataria & Sons, 2008.

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE

### A2482 – INTRODUCTION TO COMMUNICATION SYSTEMS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

## 1. Course Description

### Course Overview

This course provides the basic concepts of communication systems such as signals, modulation, demodulation and multiplexing. This course also provides different modulation techniques used in analog and digital communication systems. In this course, students also learn about the operation of AM and FM receivers.

### Course Pre/corequisites

The course has no specific prerequisite and corequisite.

## 2. Course Outcomes (COs)

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

- A2482.1 Analyze the operation of basic communication system.
- A2482.2 Compute the Fourier transform, energy and power of communications signals.
- A2482.3 Compare the performance of different modulation schemes used in communication systems
- A2482.4 Differentiate time division and frequency division multiplexing techniques.
- A2482.5 Select an appropriate modulation technique while designing a communication system.

## 3. Course Syllabus

### UNIT I

**Operations on signals:** Fourier series, Fourier transform, Energy, Power, Bandwidth, Sampling.

**Communication Systems:** Components, Analog and digital messages, channel effect, signal to noise ratio and capacity.

### UNIT II

**Modulation and Detection:** Definition, transmission, multiplexing, demodulation.

**Amplitude Modulation:** Time domain representation, spectrum of AM, single tone AM, modulation and demodulation of DSB, DSBSC, SSB, VSB.

### UNIT III

**Angle Modulation:** Phase modulation, Frequency Modulation.

**Pulse Modulation:** Pulse Amplitude Modulation (PAM), Pulse Width Modulation (PWM) and Pulse Position Modulation (PPM).

### UNIT IV

**Digital Modulation schemes:** ASK, FSK, PSK, M-ary PSK, QPSK.

### UNIT V

**Receivers and Multiplexing:** AM receiver, FM receiver, Frequency-Division Multiplexing (FDM), Time-Division Multiplexing (TDM).

## 4. Books and Materials

### Text Book(s)

- Simon Haykin and Michael Moher. *Introduction to Analog and Digital Communications*, JOHN WILEY & SONS, INC., 2<sup>nd</sup> edition, 2007.
- B.P. Lathi and Zhi Ding. *Modern Digital and Analog Communication Systems*, Oxford University Press, 4<sup>th</sup> edition, 2010.

### Reference Book(s)

- Sham Shanmugam. *Digital and Analog Communication Systems*, Wiley-India edition, 2006.
- A. Bruce Carlson, and Paul B. Crilly. *Communication Systems, An Introduction to Signals and Noise in Electrical Communication*, McGraw-Hill International Edition, 5<sup>th</sup> edition, 2010.
- Herbert Taub and Donald L Schilling. *Principles of Communication Systems*, Tata McGraw- Hill, 3<sup>rd</sup> edition, 2009.



# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE A2483 – FUNDAMENTAL OF IOT

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

### 1. Course Description

#### Course Overview

This course covers the development of internet of things (IoT) products and services including devices for sensing, actuation, processing and communication. This course helps the students to describe the technology around the Internet of Things (IoT). In this course students' study, python concepts, how to interface I/O devices, sensors using Arduino uno and raspberry pi. This course has simple examples with integration of techniques turned into an application.

#### Course Pre/corequisites

The course has no specific prerequisite and corequisites.

### 2. Course Outcomes (COs)

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

- A2483.1 Analyze IoT Applications using IoT enablers and connectivity layers, components.
- A2483.2 Distinguish sensors and actuators in terms of their functions and applications.
- A2483.3 Interface I/O devices, Sensors using Arduino UNO.
- A2483.4 Develop Raspberry Pi Interfacing programs using python concepts.
- A2483.5 Apply Raspberry Pi and Arduino Uno programming for IoT based projects

### 3. Course Syllabus

#### UNIT I

**Introduction to IoT:** Characteristics of IoT, Applications of IoT, IoT categories, IoT enablers and connectivity layers, IoT components.

#### UNIT II

**Sensors and Actuators:** Sensors-definition, characteristics of sensor, classification of sensors, Actuators-definition, types of Actuators.

#### UNIT III

**Programming with Arduino:** Introduction to Arduino UNO, Arduino IDE, Basic commands, Serial commands. LED Interface, Switch Interface, Serial Interface, temperature Sensor Interface

#### UNIT IV

**Python:** Overview of Python, features, comments, variables, operators, data types, If statement, functions, for loop, while loop, strings, lists, tuples, dictionaries.

#### UNIT V

**Programming with Raspberry Pi:** Introduction to Raspberry Pi, Installation of raspbian OS, connecting to laptop, terminal commands, LED Interface, Button Interface, DHT sensor interface.

### 4. Books and Materials

#### Text Book(s)

1. Jeeva Jose. *Internet of Things*, 1st edition, Khanna Book Publishing, 2019
2. Rajesh Singh, Anita Gehlot, Lovi Raj Gupta, Bhupendra Singh, Mahendra Swain. *Internet of Things with Raspberry Pi and Arduino*, 1st edition, CRC Press, 2019

#### Reference Book(s)

1. Vijay Madiseti, Arshdeep Bahga. *Internet of Things — A hands on Approach*, 1st Edition, University Press, 2014
2. Adrian McEwen, Hakim Cassimally. *Designing the Internet of Things*, 1<sup>st</sup> edition, John Wiley and Sons, 2014.

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE A2581 –BASIC DATA STRUCTURES

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

### 1. Course Description

#### Course Overview

The aim of this course is to provide insight in organizing data types logically to access and configure the data. The concepts of linear and non-linear data structure algorithms are discussed. It improves the problem-solving ability of a learner to a great extent which can be applied in various fields of engineering.

#### Course Pre/Corequisites

The course has no specific prerequisite and co-requisites.

### 2. Course Outcomes (Cos)

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

- A2581.1 Analyze the time and space complexities of algorithms
- A2581.2 Apply various operations on linear data structures
- A2581.3 Design searching and sorting techniques for a given application
- A2581.4 Develop nonlinear programming for optimization techniques

### 3. Course Syllabus

#### UNIT I

**Introduction and Overview:** Definition, Concepts of Data Structures, Overview and Implementation of Data Structures.

#### UNIT II

**Linear Data Structures: Stacks-** Introduction, Definition, Representation of Stack, Operations on Stacks, Applications of Stacks, **Queues-** Introduction, Definition, Representations of Queues, Various Queue Structures, Applications of Queues.

#### UNIT III

**Linked lists:** Definition, Single linked list, Circular linked list, Double linked list, Circular Double linked list, Application of linked lists.

#### UNIT IV

**Sorting and Searching: Sorting-** Bubble Sort, Selection Sort, Insertion Sort, Merge Sort, Quick Sort, Time complexity.

**Search-** Sequential Search, Binary Search, time complexity.

#### UNIT V

**Trees and Graphs: Trees-** Examples, Vocabulary and Definitions, Binary Tree Applications, Tree Traversals, Binary Search Trees. **Graph-** Vocabulary and Definitions, Applications: BFS and DFS.

### 4. Books and Materials

#### Text Book(s)

1. Debasis Samanta. *Classic Data Structures*. Second Edition, PHI, 2014.

#### Reference Book(s)

1. G A Vijayalakshmi Pai. *Data Structures and Algorithms*. TMH, 2008.

## **G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL**

2. Horowitz, Sahni and Anderson Freed. *Fundamentals of Data Structures in C*. 2<sup>nd</sup> edition, Universities Press, 2012.

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE A2582 – FUNDAMENTAL OF DBMS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

### 1. Course Description

#### Course Overview

This course enlightens the learners with the fundamentals of database and its applications. It covers various data models, Entity Relationship diagrams, SQL queries and indexing techniques. The learners of this course can choose the domain of Data Engineering and can opt their carrier path in database administration or data analytics.

#### Course Pre/Corequisites

The course has no specific prerequisite and co-requisites.

### 2. Course Outcomes (COs)

- A2582.1 Apply suitable data models for given application
- A2582.2 Design database using integrity constraints and ACID properties
- A2582.3 Construct optimized SQL queries to solve real time problems
- A2582.4 Apply suitable normal form to eliminate data redundancy
- A2582.5 Choose appropriate index structure to improve performance

### 3. Course Syllabus

#### UNIT I

**Introduction:** Basics of Database System Applications, Principle of Database Systems, View of Data - Data Abstraction, Instances and Schemas, Data Models, Database Languages - DDL, DML, ER diagrams.

#### UNIT II

**Relational Model:** Fundamentals of Relational Model - Integrity Constraints over Relations, Enforcing Integrity constraints, Querying relational data, Logical data base Design, Views, ACID Properties.

#### UNIT III

**SQL:** Basic SQL Queries, Introduction to Sub queries, Correlated Sub queries, Set - Comparison Operators, Aggregate Operators, NULL values, logical operators, Joins.

#### UNIT IV

**Normalizations:** Redundancy Issues, Decompositions, Functional Dependencies, various Normal Forms.

#### UNIT V

**Data on External Storage:** File Organization and various indexing structures.

### 4. Books and Materials

#### Text Book(s)

1. Raghurama Krishnan, *Johannes Gehrke, Database Management Systems*, McGraw-Hill Education, 3<sup>rd</sup> edition, 2014.

#### Reference Book(s)

1. A. Silberschatz, H.F. Korth, S.Sudarshan, *Database System Concepts*, McGraw Hill, 6<sup>th</sup> edition, 2012.
2. RamezElmasri, Shamkat B. Navathe, *Database Systems*, Pearson Education, 6<sup>th</sup> edition 2009.

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE A2583 – BASICS OF SOFTWARE ENGINEERING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

### 1. Course Description

#### Course Overview

This course deals with engineering principles and programming languages applied in software development. These principles include analyzing user requirements, designing, building, and testing software. The knowledge acquired through this course is used to handle big projects efficiently with minimizing cost and reduced complexity.

#### Course Pre/Corequisites

The course has no specific prerequisite and corequisites.

### 2. Course Outcomes (COs)

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

- A2583.1 Apply the phases of software development life cycle in application development
- A2583.2 Identify software requirements for construction
- A2583.3 Design requirement engineering process for change management
- A2583.4 Apply the design concepts for design models
- A2583.5 Construct the various testing techniques for software systems

### 3. Course Syllabus

#### UNIT I

**Introduction:** Software engineering and process models: Introduction, changing nature of software, software myths.

#### UNIT II

**Process Models:** Waterfall model, incremental process models, evolutionary process models, The unified process, agile process models.

#### UNIT III

**Software Requirements:** Functional and non-functional requirements, user requirements, system requirements, The software requirements document.

#### UNIT IV

**Requirement Engineering Process:** Feasibility studies, requirements elicitation and analysis, requirement validation, requirement management.

#### UNIT V

**Design:** Design process and design quality, design concepts-abstraction, information hiding, functional independence, refactoring, modularity, refinement, design classes, design model.

**Testing:** Testing strategies-A Strategic approach to software testing, test strategies for conventional software, white box testing, black box testing, validation testing, system testing.

### 4. Books and Materials

#### Text Book(s)

1. Roger S. Pressman, *Software Engineering*, A Practitioner's Approach, McGraw Hill, International Edition, 8<sup>th</sup> edition, 2015.

## **G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL**

### **Reference Book(s)**

1. Sommerville, *Software Engineering*, Pearson education, 7<sup>th</sup> edition, 2008.

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE A2584 –PYTHONFOR EVERYONE

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

### 1. Course Description

#### Course Overview

The aim of this course is to provide the fundamentals of Python language. It covers data types, operators, control statements, data structures, functions, modules, exception handling and file handling concepts. This course helps the student in selecting a domain path leading to software engineering in the segment of Artificial intelligence, Data Science and IoT.

#### Course Pre/Corequisites

The course has no specific prerequisite and corequisite.

### 2. Course Outcomes (COs)

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

- A2584.1 Apply the basic constructs of Python to solve problems
- A2584.2 Organize lists, tuples and dictionaries appropriately to solve complex problems
- A2584.3 Build functions to increase code reusability
- A2584.4 Implement modular programming for organized software development
- A2584.5 Make use of exception handling for robust programming

### 3. Course Syllabus

#### UNIT I

**Introduction to python programming:** History of python, Basics, python character set, tokens, data types, input and output functions, formatting numbers and strings, Operators.

**Control statements:** Decision making statements, Loop control statements, nested loops, break and continue statements.

#### UNIT II

**Data Structures:** Sequence, Lists, Tuples, Sets, Dictionaries. Functional Programming: filter (), map (), reduce () , Python Strings.

#### UNIT III

**Functions-** Basics of functions, syntax, local and global scope of a variable, Recursions, lambda functions, parameters and arguments in functions.

#### UNIT IV

**Modules:** The from...import statement, Making your own Modules, dir() function, The Python Module, Modules and Namespaces, Packages, Standard Library modules.

#### UNIT V

**Exceptions:** Introduction, Handling Exceptions, Multiple Except Blocks, else Clause, Raising Exceptions, finally Block, Re-raising Exception.

**File Handling:** Introduction, need of file handling, text input and output files, seek function, binary files, Extracting data from a file.

### 4. Books and Materials

## **G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL**

### **Text Book(s)**

1. Ashok NamdevKamthane, Amit Ashok Kamthane. *Programming and problem solving with python*. McGraw-Hill Education, 2018.

### **Reference Book(s)**

1. Martin C.Brown. *The Complete Reference: Python*. McGraw-Hill, 2018.
2. ReemaThareja. *Python programming using problem solving approach*. Oxford, 2019.



# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE

### A2585 – COMPUTER ORGANIZATION AND OPERATING SYSTEMS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

## 1. Course Description

### Course Overview

This course is a combination of computer organization and operating system concepts. It provides the concepts of Computer Architecture and Organization which focuses on register transfers, micro-operations and computer arithmetic concepts. Operating Systems covers the basic operating system abstractions, mechanisms, and their implementations. The learner of this course can choose his/her carrier as system architect or as system programmer.

### Course Pre/Corequisites

The course has no specific prerequisite and corequisites.

## 2. Course Outcomes (COs)

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

- A2585.1 Analyze the fundamentals of computer organization in designing a system
- A2585.2 Apply the concepts of programming language to solve system problems
- A2585.3 Make use of the Operating Systems design structure and its services for system programming
- A2585.4 Develop Process Scheduling algorithms and Inter-Process Communication systems for resource management
- A2585.5 Classify memory management techniques and virtual memory mechanisms for apt implementations

## 3. Course Syllabus

### UNIT I

**Basic Computer Organization and Design:** Instruction codes, computer registers, computer instructions, timing and control, instruction cycle, memory reference instructions, input/output and interrupt, complete computer description, design of basic computer.

### UNIT II

**Programming the Basic Computer:** Introduction, machine language, assembly language, the assembler, programming arithmetic and logic operations

### UNIT III

**Introduction:** What operating systems do, operating system -structure, operations, services, user operating system interface, system calls, types of system calls.

### UNIT IV

**Process Management:** Process concept, process scheduling, scheduling criteria, scheduling algorithms, operations on processes, inter process communication, examples of ipc systems, process synchronization, critical section problem, semaphores, and monitors.

### UNIT V

**Memory Management:** Main memory-background, swapping, contiguous memory allocation, segmentation, paging, virtual memory-background, demand paging, page replacement, allocation of frames.

**Deadlocks:** System model, deadlock characterization, methods for handling deadlocks, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock.

## 4. Books and Materials

## **G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL**

### **Text Book(s)**

1. M. Morris Mano, *Computer system architecture*, Pearson Education, 5<sup>th</sup> edition, 2016.

### **Reference Book(s)**

1. Willam Stallings, *Computer Organization and Architecture Designing for Performance*, Pearson, PHI, 6<sup>th</sup> edition, 2010.
2. Silberschatz, Galvin and Gagne, *Operating System Concepts*, 9<sup>th</sup> edition, 2013, Wiley India edition.

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE

### A2586 – FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

## 1. Course Description

### Course Overview

This course provides the insight of basic Artificial Intelligence concepts along with fundamentals of machine learning, deep learning and neural networks. It covers math-heavy topics, such as regression and classification illustrated by Python examples. In addition, it also focuses on AI with search techniques and machine learning types. This course helps the students to choose their career path in trending Artificial Intelligence related technologies.

### Course Pre/Corequisites

The course has no specific prerequisite and co-requisites.

## 2. Course Outcomes (COs)

**After completion of the course, the learner will be able to:**

- A2586.1 Analyze different fields in which AI is applied
- A2586.2 Apply suitable search strategies in finding better solution for a given problem
- A2586.3 Identify linear regression with single and multiple variables
- A2586.4 Perform predictive analysis using decision trees and random forest classifier
- A2586.5 Implement deep learning neural network models with TensorFlow

## 3. Course Syllabus

### UNIT I

**Principles of Artificial Intelligence:** Introduction, Fields and Applications of Artificial Intelligence, AI Tools and Learning Models, The Role of Python in Artificial Intelligence

### UNIT II

**AI With Search Techniques:** Introduction, heuristics, Uniformed and informed search strategies, Pathfinding with the A\* Algorithm.

### UNIT III

**Regression: Introduction,** Linear Regression with One Variable, Linear Regression with Multiple Variables, Polynomial and Support Vector Regression.

### UNIT IV

**Classification:** Introduction, The Fundamentals of Classification, Classification with Support Vector Machines, Introduction to Decision Trees, Random Forest Classifier.

### UNIT V

**Machine Learning with Neural Networks:** Introduction, Machine Learning Types, TensorFlow for Python, Introduction to Neural Networks, Deep Learning.

## 4. Books and Materials

### Text Book(s)

1. Zsolt Nagy, *Artificial Intelligence and Machine Learning Fundamentals*, Packtpublishing, 2018.

### Reference Book(s)

1. Dr. Dheeraj Mehrotra, *Basics of Artificial Intelligence & Machine Learning*, Notion Press, 1<sup>st</sup> edition 2019.

## **G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL**

2. Neil Wilkins, *Artificial Intelligence: An Essential Beginner's Guide to AI, Machine Learning, Neural Networks, Deep Learning*, Bravex Publications, 2019.

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE A2081 – MANAGEMENTSCIENCE

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

### 1. Course Description

#### Course Overview

The primary objective of this course is to provide the knowledge of Management in Success of Business. Further, students will be able to apply the Concepts, Theories, Principles of Management in various functional areas of an organization such as in Designing organization structures for managing the operations, Human Resource, Marketing and Production Departments. The student will able to evaluate cost and time of each business project by using PERT and CPM techniques and also formulate the new strategies that enhance competitive edge.

#### Course Pre/corequisites

The course has no specific prerequisite and corequisite

### 2. Course Outcomes (COs)

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

- A2081.1 Apply the concepts, theories, and principles of management in professional life.
- A2081.2 Design suitable organization structure for managing the operations in the organization.
- A2081.3 Apply principles of management to the various functional areas of an organization such as Human Resource, Marketing and Production.
- A2081.4 Evaluate cost and time of each business project by using PERT and CPM techniques.
- A2081.5 Formulate the new strategies that enhance competitive edge.

### 3. Course Syllabus

#### UNIT I

**Introduction to management:** Concept-Nature and Importance of Management, Functions-Evaluation of Scientific Management, Modern Management-Motivation Theories-Leadership Styles-Decision Making Process-Designing Organization Structure-Principles and Types of Organization.

#### UNIT II

**Operations Management:** Plant location and Layout, Methods of production, Work-Study-Statistical Quality Control through Control Charts, Objectives of Inventory Management, Need for Inventory Control -EOQ&ABC Analysis (Simple Problems)

**Marketing Management:** Meaning, Nature, Functions of Marketing, Marketing Mix, Channels of distribution - Advertisement and Sales Promotion - Marketing Strategies - Product Life Cycle.

#### UNIT III

**Human resource management:** Significant and Basic functions of HRM-Human Resource Planning (HRP), Job evaluation, Recruitment and Selection, Placement and Induction-Wage and Salary administration. Employee Training and development – Methods - Performance Appraisal - Employee Grievances - techniques of handling Grievances.

#### UNIT IV

**Strategic Management:** Vision, Mission, Goals and Strategy- Corporate Planning Process-Environmental Scanning-SWOT analysis-Different Steps in Strategic Formulation, Implementation and Evaluation.

**Project Management:** Network Analysis-PERT, CPM, Identifying Critical Path-Probability-Project Cost Analysis, Project Crashing (Simple Problems).

#### UNIT V

**Contemporary management issues practices:** Basic concepts of MIS-Materials Requirement Planning (MRP), Just-In-Time (JIT) System, Total Quality Management (TQM)-Six Sigma and Capability Maturity Models (CMM) evies, Supply Chain Management, Enterprise Resource Planning (ERP), Performance Management, Business Process Outsourcing (BPO), Business Process Re-Engineering, Bench Marking, and Balance Score Card.

## G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

### 4. Books and Materials

#### Text Book(s)

1. A.R Aryasri, *Management Science*, 4<sup>th</sup> edition, New Delhi: Tata Mcgraw Hill, 2013.

#### Reference Book(s)

1. Ashima B. Chhalill, P. Vijaya Kumar, N. AppaRaohalill, '*Introduction to Management Science*', 1<sup>st</sup> edition, New Delhi: Cengage, 2012.
2. Vijay Kumar & Apparao: *Introduction to Management Science*, New Delhi Cengage, 2011.

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE A2082 – RESEARCH METHODOLOGY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

### 1. Course Description

#### Course Overview

The primary objective of this course is to have a general understanding of statistics as applicable to business and its use in areas of engineering research. The Course addresses the methods of research with an emphasis on various stages that are necessary to obtain and process information to enable well informed decision-making. It allows the students to grasp and comprehend the methods and techniques used in research and provide with the knowledge and skill to undertake research.

#### Course Pre/corequisites

The course has no specific prerequisite and corequisite

### 2. Course Outcomes (COs)

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

- A2082.1 Interpret the importance of literature survey to identify the research problem.
- A2082.2 Develop suitable research methodologies to conduct engineering research.
- A2082.3 Apply the principles of research to gather the required data from various sources
- A2082.4 Evaluate the gathered data by using appropriate statistical techniques.
- A2082.5 Prepare and present the research report effectively with the help of visual aids.

### 3. Course Syllabus

#### UNIT I

**Research Methodology:** Objectives and Motivation of Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method, Importance of Research Methodology, Research Process, Criteria of Good Research, Problems Encountered by Researchers in India, Benefits to the society in general. Defining the Research Problem: Definition of Research Problem, Problem Formulation, Necessity of Defining the Problem, Technique involved in Defining a Problem.

#### UNIT II

**Literature Survey:** Importance of Literature Survey, Sources of Information, Assessment of Quality of Journals and Articles, Information through Internet. Literature Review: Need of Review, Guidelines for Review, Record of Research Review.

#### UNIT III

**Research Design:** Meaning of Research Design, Need of Research Design, Feature of a Good Design Important Concepts Related to Research Design, Different Research Designs, Basic Principles of Experimental Design, developing a Research Plan, Design of Experimental Set-up, Use of Standards and Codes.

#### UNIT IV

**Data Collection:** Collection of primary data, Secondary data, Data organization, Methods of data grouping, Diagrammatic representation of data, Graphic representation of data. Sample Design: need for sampling, some important sampling definitions, Estimation of population, Role of Statistics for Data Analysis, Parametric V/s Non Parametric methods, Descriptive Statistics, Measures of central tendency and Dispersion, Hypothesis testing, Use of Statistical software. Data Analysis: Deterministic and random data, Uncertainty analysis, Tests for significance: Chi-square, student's t-test, Regression modeling, Direct and Interaction effects, ANOVA, F-test, Time Series analysis, Autocorrelation and Autoregressive modeling.

#### UNIT V

**Research Report Writing:** Format of the Research report, Synopsis, Dissertation, Thesis its Differentiation, References/Bibliography/Webliography, Technical paper writing/Journal report writing, making presentation, Use of

## G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

visual aids. Research Proposal Preparation: Writing a Research Proposal and Research Report, Writing Research Grant Proposal.

### 4. Books and Materials

#### Text Book(s)

1. O.R Krishnaswami and M. Ranganatham, *"Methodology of Research in Social Sciences"*, Mumbai: Himalaya Publishing House, ISBN 81-8318-454-5, 2005.

#### Reference Book(s)

1. C.R Kothari, *Research Methodology, Methods & Technique*; Hyderabad: New Age International Publishers, 2004.
2. R. Ganesan, *Research Methodology for Engineers*, New Delhi: MJP Publishers, 2011.
3. RatanKhananabis and SuvasisSaha, *Research Methodology*, Universities Press, Hyderabad, 2015.
4. Y. P. Agarwal, *Statistical Methods: Concepts, Application and Computation*, Sterling Publications Pvt., Ltd., New Delhi, 2004.



# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE

### A2083- INTELLECTUAL PROPERTY RIGHTS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

## 1. Course Description

### Course Overview

The primary objective of the course is to have a general understanding of the basics of Intellectual Property Rights, Copy Right Laws, Trade Marks and Issues related to Patents. The Course addresses the means of innovations with an emphasis on trade secret that are necessary to obtain IPR through protect their innovations. It also encourages the students to take up innovations and establish start-ups.

### Course Pre/corequisites

The course has no specific prerequisite and corequisite

## 2. Course Outcomes (COs)

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

- A2083.1 Analyse ethical and professional issues which arise in the intellectual property law context.
- A2083.2 Apply intellectual property law principles (including copyright, patents, designs and trademarks) to real problems.
- A2083.3 Analyse the social impact of intellectual property law and policy.
- A2083.4 Make use of copyrighted material so that it does not obstruct the progress of human knowledge.
- A2083.5 Analyze IPR policies before filing patentable inventions and discoveries.

## 3. Course Syllabus

### UNIT I

**Introduction to Intellectual Property:** Introduction, Types of Intellectual Property, International Organizations, Agencies and Treaties, Importance of Intellectual Property Rights.

### UNIT II

**Trade Marks:** Purpose and Function of Trade Marks, Acquisition of Trade Mark Rights, Protectable Matter, Selecting and Evaluating Trade Mark, Trade Mark Registration Processes.

### UNIT III

**Law of Copy Rights:** Fundamental of Copy Right Law, Originality of Material, Rights of Reproduction, Rights to Perform the Work Publicly, Copy Right Ownership Issues, Copy Right Registration, Notice of Copy Right, International Copy Right Law. Law of Patents: Foundation of Patent Law, Patent Searching Process, Ownership Rights and Transfer.

### UNIT IV

**Trade Secrets:** Trade Secrete Law, Determination of Trade Secrete Status, Liability for Misappropriations of Trade Secrets, Protection for Submission, Trade Secrete Litigation. Unfair Competition: Misappropriation Right of Publicity, False Advertising.

### UNIT V

**New Developments of Intellectual Property:** New Developments in Trade Mark Law; Copy Right Law, Patent Law, Intellectual Property Audits. International overview on Intellectual Property, International – Trade Mark Law, Copy Right Law, International Patent Law, International Development in Trade Secrets Law.

## 4. Books and Materials

### Text Book(s)

1. K Bansl & P Bansal, *Fundamentals of Intellectual Property for Engineers*, BS Publications, ISBN: 9788178002774, 8178002779, Edition: 2013.

### Reference Book(s)

## G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

1. Deborah E. Bouchoux, *Intellectual Property: The Law Of Trademarks Copyrights Patents And Trade Secrets*, 4<sup>th</sup> Edition, New Delhi: Cengage India, 2015, ISBN:9788131528976.
2. PrabuddhaGanguli, *Intellectual Property Rights– Unleashing The Knowledge Economy*, McGraw Hill Education; 1<sup>st</sup> Edition, 1<sup>st</sup> July 2017.
3. Integrating Intellectual Property Rights and Development Policy: *Report of the Commission on Intellectual Property Rights*, London September 2002 (web source: [http://www.iprcommission.org/papers/pdfs/final\\_report/ciprfullfinal.pdf](http://www.iprcommission.org/papers/pdfs/final_report/ciprfullfinal.pdf)).

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE

### A2084 –NATIONAL SERVICE SCHEME

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

## 1. Course Description

### Course Overview

The main objectives of National Service Scheme (NSS) are : understand the community in which they work, understand themselves in relation to their community, identify the needs and problems of the community and involve them in problem-solving, develop among themselves a sense of social and civic responsibility, utilize their knowledge in finding practical solutions to individual and community problems, develop competence required for group-living and sharing of responsibilities, gain skills in mobilizing community participation, acquire leadership qualities and democratic attitudes, develop capacity to meet emergencies and natural disasters and, practice national integration and social harmony

### Course Pre/corequisites

This course has no specific prerequisite and corequisite

## 2.Course Outcomes (COs)

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

- A2084.1 Classify the organizational structure of NSS and its activities.
- A2084.2 Identify the methods of mobilization and importance of youth Leadership.
- A2084.3 Develop a sense of social and civic responsibility and provide solutions to individual and community problems
- A2084.4 Recognize the need for lifelong learning capabilities with the concepts of volunteerism and its functions.
- A2084.5 Develop capacity to meet emergencies and natural disasters

## 3.Course Syllabus

### Unit-I

**Introduction and Basic Concepts of NSS** - History, philosophy, aims & objectives of NSS, Emblem, flag, motto. Song, badge etc., Organizational structure, rules and responsibilities of various NSS functionaries.

### Unit-II

**NSS Programmes and Activities** - Concept of regular activities, special camping, Day Camps, Basis of adoption of village/slums. Methodology of conducting Survey, Financial pattern of the scheme, Other youth prog. /schemes of Goal, Coordination with different agencies, Maintenance of the Diary.

### Unit-III

**Understanding Youth** - Definition, profile of youth. categories of youth, Issues, challenges and opportunities for youth, Youth as an agent of social change.

**Importance and Role of Youth Leadership** -Meaning and types of leadership, Qualities of good leaders; traits of leadership, Importance and rule of youth leadership

### Unit-IV

**Community Mobilization**- Mapping of community stakeholders, Designing the message in the context of the problem and the culture of the Community, Identifying methods of mobilization.

### Unit-V

**Volunteerism and Shramdan**: Indian Tradition of volunteerism, Needs & Importance of volunteerism, Motivation and Constraints of Volunteerism, sharamadn as a part of Volunteerism.

## 4. Books and Materials

### Reference Book(s)

1. KhwajalaGhulamaSaiyidain, National Service Scheme: A Report, Published by Ministry of Education, Govt. of India, 1961.

## **G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL**

2. N. F. Kaikobad, Krishan K. Kapil, Training and consultancy needs in national service scheme, by. Published by the Tata Institute of Social Sciences (TISS), 1971.
3. National Service Scheme: guide-lines to project-masters, by Andhra University, Dept. of Sociology & Social Work. Published by Dept. of Sociology & Social Work, Andhra University, 1971.

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE

### A2085 – YOGA

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

#### 1. Course Description

##### Course Overview

Yoga is an invaluable gift of ancient Indian tradition. It embodies unity of mind and body; thought and action; restraint and fulfilment; harmony between man and nature and a holistic approach to health and well-being. Yoga is not about exercise but to discover the sense of oneness with ourselves, the world and Nature. By changing our lifestyle and creating consciousness, it can help us to deal with climate change. Stress and Depression have become silent killers. Yoga offers a solution to these ailments. Practicing Yoga helps fight stress and find peace. All you need is willingness to practice it.

##### Course Pre/corequisites

There is no specific prerequisite and corequisite

#### 2. Course Outcomes (COs)

##### After completion of the course, the learner will be able to do

- A2085.1 Improve physical conditioning related to flexibility through participation in yoga.
- A2085.2 Develop and maintain a personal yoga practice.
- A2085.3 Recognize and apply the value and benefits of an on-going yoga practice
- A2085.4 Select asanas appropriate for personal needs
- A2085.5 Identify and apply relaxation techniques for stress reduction

#### 3. Course Syllabus:

##### Unit-I

Introduction of human body and its systems, definition of anatomy and physiology and importance in Yogic practices, respiratory system, digestive system, endocrine system. Origin of Yoga & its brief development, Meaning of Yoga & its importance, Yoga as a Science of Art (Yoga Philosophy), Meaning of meditation and its types and principles

##### Unit-II

Classification of Yoga/Types of Yoga - Hatha Yoga, Raja Yoga, Laya Yoga, Bhakti Yoga, Gyan Yoga, Karma Yoga, Asthang Yoga

##### Unit-III

Classification of Asanas and its Mechanism, Cultural Asana (standing, sitting, supine, prone position & tippy-turvy), Meditative Asana and Relaxative Asana, Nervous System, Circulatory System

**Unit-IV** Introduction of Kriya, Bandha and Mudra, importance of KRIYA and its scientific approach, importance of BANDHA and its scientific approach, importance of MUDRA and its scientific approach

##### Unit-V

Effect of Asanas on various Systems, Difference between Asana and Exercise, Difference between Pranayama and deep breathing, Yogic Diet.

#### 4. Books and Materials

##### References:

- Georg Feuerstein (2002) The Yoga Tradition: Its History, Literature, Philosophy and Practice. New Delhi. Bhavana Books & Prints.
- Joshi, K.S. (1985) Yoga in daily life, Delhi: Orient paper backs
- Taimni I.K. (1961/1999) The Science of Yoga (The Yoga Sutras of Patanjali), The Theosophical Publishing House, Adyar.

# G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

## COURSE STRUCTURE A2086 - DESIGN THINKING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

### 3. Course Description

#### Course Overview

This course introduces design thinking and its application to developing new products, services, and the organization of businesses. Design thinking is a human-centric, interdisciplinary approach towards innovation. Design thinking as practiced in this course blends creative thinking and logical or rational thinking, and involves a process consisting of empathizing, ideating, and prototyping. Students will learn design principles, methodologies, and frameworks, and apply them through exercises and projects. The course is divided into four main aspects, all interconnected but which we also separately emphasize. They are: (1) design methodologies, (2) the “thing” to be designed (i.e., products, services, or the business itself, e.g. the business model), (3) human attitudes and behaviors (towards the designs), and (4) design contexts.

#### Course Pre/corequisites

This course has no specific prerequisite and corequisite

### 2. Course Outcomes (COs)

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

- A2086.1 Appreciate various design processes for creativity and innovation
- A2086.2 Develop design ideas through different techniques
- A2086.3 Identify the significance of reverse engineering about products
- A2086.4 Make use of design drawings to communicate ideas effectively
- A2086.5 Build organizations that support creative and innovative thinking

### 4. Course Syllabus

#### UNIT I

Introduction to Design Thinking, Definition, why is Design Thinking important, How is Design Thinking different, Process of design - Introduction – Product Life Cycle - Design Ethics, creativity, innovation and design, Design Process - Creativity and Innovation in Design Process - Design limitation, Preparing mind for Innovation-The physics of innovation.

#### UNIT II

Idea generation- The Idea, generation process, mind mapping tool. Experimentation-What works, learning launch tool, Strategic Opportunities, Creative people, creative organizations, Ideas, and tools to help both people and organizations work more creatively

#### UNIT III

Creative Thinking - Generating Design Ideas - Lateral Thinking –Analogies – Brainstorming - Mind mapping - National group Technique – Syntectic’s - Development of work - Analytical Thinking - Group Activities Recommended

#### UNIT IV

Reverse engineering - Introduction - Reverse Engineering Leads to New Understanding about Products -Reasons for Reverse Engineering - Reverse Engineering Process - Step by Step – Case Study

#### UNIT V

Basics of drawing to develop design Ideas- Introduction - Many Uses of Drawing - Communication through Drawing – Drawing Basis – Line - Shape/ Form – Value – Colour – Texture –Overview of drawing -Practice using Auto CAD recommended.

### 3. Books and Materials

#### Text Book(s)

- John.R.Karsnitz, Stephen O 'Brien and John P.Hutchinson, “*Engineering Design*”, Cengage learning (International edition) Second Edition,2013.
- Yousef Haikand Tamer M.Shahin, “*Engineering Design Process*”, Cengage Learning, Second Edition, 2011.

## G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

### Reference Online Resources

1. [https://courses.edx.org/register?course\\_id=coursev1%3AUQx%2BCORPINN1x%2B2T2020&enrollment\\_action=enroll&email\\_opt\\_in=false](https://courses.edx.org/register?course_id=coursev1%3AUQx%2BCORPINN1x%2B2T2020&enrollment_action=enroll&email_opt_in=false)
2. [https://www.coursera.org/programs/coursera-response-program-for-pcek-brht?collectionId=&productId=bfmQgUbbEeeMtBKozo\\_2UA&productType=cours&showMiniModal=true](https://www.coursera.org/programs/coursera-response-program-for-pcek-brht?collectionId=&productId=bfmQgUbbEeeMtBKozo_2UA&productType=cours&showMiniModal=true)
3. [www.tutor2u.net/business/presentations/.../productlife-cycle/default.html](http://www.tutor2u.net/business/presentations/.../productlife-cycle/default.html)  
or <https://www.mindtools.com/brainstorm.html>
4. <https://www.quicksprout.com/.../how-to-reverse-engineer-your-competitor>  
[www.vertabelo.com/blog/documentation/reverse-engineering](http://www.vertabelo.com/blog/documentation/reverse-engineering)  
<https://support.microsoft.com/en-us/kb/273814>
5. <https://support.google.com/docs/answer/179740?hl=en>  
<https://www.youtube.com/watch?v=2mjSDIBaUIM>  
[thevirtualinstructor.com/freshortening.html](http://thevirtualinstructor.com/freshortening.html)
6. [https://docs.oracle.com/cd/E11108\\_02/otn/pdf/.../E11087\\_01.pdf](https://docs.oracle.com/cd/E11108_02/otn/pdf/.../E11087_01.pdf)  
[www.bizfilings.com](http://www.bizfilings.com)  
Home>Marketing>Product Development
7. <https://canvas.uw.edu/courses/1023376/assignments/syllabus>

