

# **ACADEMIC REGULATIONS COURSE STRUCTURE AND DETAILED SYLLABUS**

## **INFORMATION TECHNOLOGY**

### **B.Tech - Four Year Degree Course**

(Applicable for the Batches Admitted from 2020-21)

**R-20**

(Choice Based Credit System)



Kotappakonda Road, Yellamanda (P),  
Narasaraopet - 522 601, Guntur Dist.,  
Andhra Pradesh, INDIA.



# Course Structure and Syllabus

(R20 Regulations)



# NARASARAOPETA ENGINEERING COLLEGE

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(AUTONOMOUS)

Kotappakonda Road, Yellamanda (Post), Narasaraopet – 522601, Guntur District, AP  
Approved by AICTE, New Delhi & Permanently affiliated to JNTUK, Kakinada, Code: 47,  
Accredited by NBA & NAAC, RTA Approved Pollution test Centre, ISO 9001: 2008 Certified Institution  
Phone: 08647-239905 Website: [www.nrtec.in](http://www.nrtec.in)

**CURRICULAR FRAMEWORK FOR REGULAR AND HONORS B.TECH  
PROGRAMMES OF ALL BRANCHES**

**PREAMBLE**

The rapid transformation in every sphere of life is augmenting the need to prepare the present fast-paced generation to adapt to the changing knowledge & skill requirement on a life-long basis, in the fields of science, engineering, technology and humanities to influence society positively. The future looks up to multi-disciplinary, competent leaders who are Information and Communication Technology ready and driven by strong ethical values.

NEC envisions to nurture knowledge, skills, and attitude and values of the aspiring youth to enable them to become global citizens and towards that process, the institution has evolved a flexible integrated academic curriculum.

NEC introduced Outcome Based Education (OBE) and Choice Based Credit System (CBCS), which emphasized on honing the skills and knowledge of the graduates.

The Engineering curriculum is revised with an objective to fill the gaps in the existing curriculum with reference to skill development. The revised curriculum underwent a reorganization making the engineering education enshrined with skill development ecosystem to suit the industry's needs and to ensure the graduates employability.

The curriculum mandates students to take up five skill courses which are relevant to the industry from second year onwards, two basic level skill courses, one on soft skills and other two on advanced level skill courses. The students are also given the option of choosing between skill courses offered by the college and a certificate course offered by industry, a professional body, APSSDC or any other accredited body.

Another major change brought in the curriculum is the introduction of B.Tech with Honors or a B.Tech. with a Minor. This is to give an opportunity for the fast learners to earn additional credits either in the same domain or in a related domain, making them more proficient in their chosen field of discipline or be a graduate with multidisciplinary knowledge and job ready skills.

**1. PROGRAMS OFFERED BY THE COLLEGE**

Narasaraopeta Engineering College (NEC) offers a 4-year (8 semesters) **Bachelor of Technology** (B.Tech.) degree programme, under Choice Based Credit System (CBCS) for the following branches of Engineering.

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S. No.	Name of the Program	Program Code
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
6.	Information Technology	12
7.	CSE (Artificial Intelligence)	43

### 2. ELIGIBILITY FOR ADMISSION

The total seats available as per the approved intake are grouped into two categories viz. category A and Category B with a ratio of 70:30 as per the state government guidelines vide G.O No.52.

The admissions for category A and B seats shall be as per the guidelines of Andhra Pradesh State Council for Higher Education (APSCHE) in consonance with government reservation policy.

- Under Category A: 70% of the seats are filled through EAMCET counselling.
- Under Category B: 30% seats are filled based on 10+2 merits in compliance with guidelines of APSCHE

#### Eligibility for Admission - Under Lateral Entry Scheme (LES)

Students with diploma qualification have an option of direct admission into 2nd year B. Tech. (Lateral Entry Scheme). Under this scheme 10% seats of sanctioned intake will be available in each course as supernumerary seats. Admissions to this three-year B Tech later entry Programme will be through ECET. The maximum period to complete B. Tech. under lateral entry scheme is six consecutive academic years from the date of joining.

### 3. AWARD OF THE DEGREE:

#### For Regular and LES students

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

- Pursues a course of study in not less than four and not more than eight academic years for regular students. For LES students, pursue a course of study for not less than three academic years and not more than six academic years counted from the academic year of admission.
- He/she shall forfeit their seat in B. Tech course and their admission stands cancelled after eight academic years for regular students and six academic years for LES students starting from the academic year of admission.

- (c) Registers for 160 credits and must secure all the 160 credits for Regular students. Registers for 121 credits and must secure all the 121 credits for LES students
- (d) A student shall be eligible for the award of B.Tech degree with Honors or Minor if he/she earns 20 credits in addition to the 160/121 credits. A student shall be permitted to register either for Honors or for Minor and not for both simultaneously.

### **Academic Calendar**

For all the eight/six semesters a common academic calendar shall be followed in each semester by having sixteen weeks of instruction, one week for the conduct of practical exams and with two weeks for theory examinations. Dates for registration, sessional and end semester examinations shall be notified in the academic calendar of every semester. The schedule for the conduct of all the curricular and co-curricular activities shall be notified in the planner.

### **4. Assigning of Credits:**

- 1 Hr. Lecture (L) per week - 1 credit
- 1 Hr. Tutorial (T) per week - 1 credit
- 1 Hr. Practical (P) per week - 0.5 credits
- 2 Hours Practical (Lab)/week - 1 credit

5. There shall be mandatory student induction program for freshers, with a three-week duration before the commencement of first semester. Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations etc., shall be included in the guidelines issued by AICTE

6. All undergraduate students shall register for NCC/NSS activities. A student will be required to participate in an activity for two hours in a week during second and third semesters. Grade shall be awarded as Satisfactory or Unsatisfactory in the mark sheet on the basis of participation, attendance, performance and behaviour. If a student gets an unsatisfactory Grade, he/she shall repeat the above activity in the subsequent years, in order to complete the degree requirements.

7. Courses like Environmental Sciences, Universal Human Values, Ethics, Indian Constitution, Essence of Indian Traditional Knowledge etc., shall be included in the curriculum as non-credit mandatory courses. Environmental Sciences is to be offered compulsorily as mandatory course for all branches. A student has to secure 40% of the marks allotted in the internal evaluation for passing the course. No marks or letter grade shall be allotted for all mandatory non-credit courses.

8. There shall be 05 Professional Elective courses and 04 Open Elective courses. All the Professional & Open Elective courses shall be offered for 03 credits, wherever lab component is involved it shall be (2-0-2) and without lab component it shall be (3-0-0) or (2-1-0) and for all minors /honors, it shall be (4-0-0). If a course comes with a lab component, that component has to be cleared separately. The concerned BOS shall explore the possibility of introducing virtual labs for such courses with lab component.
9. All Open Electives are offered to students of all branches in general. However, a student shall choose an open Elective from the list in such a manner that he/she has not studied the same course in any form during the Programme.
10. A student shall be permitted to pursue up to a maximum of two elective courses under MOOCs during the Programme. Attendance will not be monitored for MOOC courses. Student has to pursue and acquire a certificate for a MOOC course only from the organizations/agencies approved by the BoS in order to earn the 3 credits. The Head of the department shall notify the list of such courses at the beginning of the semester.
11. The college shall invite registration forms from the students at the beginning of the semester for offering professional and open elective courses. There shall be a limit on the minimum and maximum number of registrations based on class/section strength.
12. Students shall undergo mandatory summer internships for a minimum of six weeks duration at the end of second and third year of the Programme. There shall also be mandatory full internship in the final semester of the Programme along with the project work.
13. There shall be 05 skill-oriented courses offered during III to VII semesters. Among the five skill courses, four courses shall focus on the basic and advanced skills related to the domain courses and the remaining one shall be a soft skills course.
14. Under graduate Degree with Honors/Minor shall be issued by the Institute to the students who fulfil all the academic eligibility requirements for the B. Tech program and Honors/Minor program. The objective is to provide additional learning opportunities to academically motivated students.
- 15. Assessment:** The performance of a student in each semester shall be evaluated subject wise with a maximum of 100 marks for theory, 50 marks for practical subject. The distribution shall be 30%



marks for Internal Evaluation and 70% marks for the End Semester Examinations. A student has to secure not less than 35% of marks in the end semester examination and minimum 40% of marks in the sum total of internal and end semester examination marks to earn the credits allotted to each course.

### **DISTRIBUTION AND WEIGHTAGE OF MARKS**

The performance of a student in each semester shall be evaluated subject – wise with a maximum of 100 marks for Theory, 50 marks for Practical Subject / Mini Project and 50 marks for Practical Training / Internship. The Project Work shall be evaluated for 200 marks.

### **THEORY**

For all theory subjects consisting of 5 units in each subject, the assessment shall be for 30 marks through internal evaluation and 70 marks through external end semester examination of 3 hours duration.

### **INTERNAL EVALUATION**

Internal evaluation is based on two **Cycle** examinations. Each **Cycle** consists of three components.

1) **Assignment Test – 1 (A1):**

A1 will be conducted after the completion of 1<sup>st</sup> unit of syllabus. 5 or 6 questions will be given to students before 1 week of the commencement of the test. On the day of test each student will be given two questions at random. A1 will be evaluated for 05 marks.

2) **Quiz - 1(Q1):**

After the first two and half Units of syllabus is over along with the descriptive test, online quiz test will be conducted for 20 marks and scaled down to 10 marks.

3) **Descriptive Test – 1(D1):**

Along with the Q1, a descriptive test will be conducted for 25 marks and scaled down to 15 marks. One 10 marks question from unit 1, one 10 marks question from unit 2, and one 5 marks question from first half of 3<sup>rd</sup> unit will be given.

**Cycle–I** final marks = A1 (05 marks) + Q1 (10 marks) + D1 (15 marks) = 30 marks

**In the similar manner, Cycle–II Examination will be conducted as follows:**

A2 test will be conducted after 3.5 units of syllabus (covering syllabus from 2.5 to 3.5 units)

Q2 and D2 will be conducted after 5<sup>th</sup> unit is over. For D2, one 5 marks question will be given from second half of third unit, two 10 marks questions will be given each from units 4 and 5.

**Cycle-II** final marks = A2 + Q2 + D2 = 30 Marks.

**Final internal marks** will be computed as **80 % of best cycle marks + 20% of least cycle marks.**

### EXTERNAL EVALUATION

External theory examination Question Paper will have the following format

PART-A (5 X 4 Marks = 20 Marks)

Answer ALL questions

Five 4-Marks Questions from each 5 Units

PART-B (5 X 10 marks = 50 marks)

Two questions will be given from each unit of syllabus with internal choice of one question.

### PRACTICALS

#### INTERNAL EVALUATION

There shall be continuous evaluation during the semester for 15 internal marks.

The internal marks shall be awarded as follows:

- i) Day to day performance: Record (2M) +Experiment (2M)+ Viva (1M) - 05 Marks
  - ii) Internal Lab Test : 10 Marks
- Total =i +ii =05+10 = 15 Marks.

#### EXTERNAL EVALUATION

For practical subjects there shall be an external examination at the end of the semester for 35 marks in the presence of external examiner. The examination duration is 3 hours.

#### DRAWING SUBJECTS

For the subject having design and / or drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing etc.,) and estimation, the distribution shall be 30 marks for Internal Evaluation and 70 marks for End Examination.

The 30 internal marks will be evaluated as follows:

Internal Tests : 15 marks. (1½ hour duration)  
Day – to – day work: 15 marks (evaluation of charts)



In the internal test, 3 questions will be given to the student and he has to answer all the three questions (3x05 M = 15M)

There shall be two internal tests in a semester. The sum of 80% of the best and 20% of the least of two internal tests shall be considered for the award of internal marks.

The syllabus for the subject “**Machine drawing using Auto CAD**” consists of two major portions:

1. Unit I to III –Conventional drawing pattern.
2. Unit IV to VI-Computer lab pattern using any drafting packages

The distribution of internal and external marks is 30 and 70 marks respectively.

### **Internal Evaluation: Max Marks: 30**

The total internal evaluation marks are distributed in the following two components:

1. Day-to-day work : 15 Marks (Evaluation of Charts)
2. Descriptive Test : 15 Marks

### **Cycle–I Examination – Conventional drawing pattern**

In Cycle-I examination the 30 marks will be awarded as follows:

- |                       |            |
|-----------------------|------------|
| Day-to-day evaluation | - 15 Marks |
| Descriptive Test      | - 15 Marks |

In the Descriptive Test of duration 2 hours, 3 questions will be given to the student and he has to answer all the three questions (3x05M = 15M).

### **Cycle–II Examination – Computer lab pattern using any drafting packages**

for duration of 2 hours.

In Cycle-II examination the 30 marks will be awarded as follows:

- |            |            |
|------------|------------|
| Record     | - 10 Marks |
| Execution  | - 10 Marks |
| Paper Work | - 10 Marks |

Of two cycle examinations conducted during the semester, sum of 80% of the best and 20% of the least of two cycle examinations shall be considered for the award of internal marks.

### **End semester Examination** (Total Duration: 4 hours, Max, marks: 70)

Conventional drawing pattern (Duration: 2 Hours, Marks: 35)

Computer lab pattern using any drafting packages (Duration: 2 Hours, Max:35)

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(Note: Both Conventional drawing pattern and Computer lab pattern using any drafting packages are compulsory and are to be conducted in separate sessions)

### PASS MARK CRITERIA

A student shall be deemed to have satisfied the pass mark, if he secures not less than 35% of marks in the end examinations and a minimum of 40% of marks in the sum total of the internal evaluation and end examination taken together as detailed below.

On passing a course of a program, the student shall earn the credits as assigned to that course.

S.No	Category of Subject	Max. Marks	Internal Marks	External Marks	External pass %	External pass mark	Over all pass %	Over all pass mark
1	Theory/ Drawing	100	30	70	35	25	40	40
2	Practical	50	15	35	35	12	40	20

#### 16. Attendance Requirements:

- i. A student shall be eligible to appear for end semester examinations if he/she acquires a minimum of 75% of attendance in aggregate of all the subjects in a semester.
- ii. Shortage of Attendance below 65% in aggregate shall in NO case be condoned.
- iii. Condonation for 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.
- v. Students whose shortage of attendance is not condoned in any semester are not eligible to take their end semester examination of that class and their registration shall stand cancelled.
- vi. A student will not be promoted to the next semester unless he satisfies the attendance requirements of the present semester, as applicable. They may seek readmission for that semester when offered next.
- vii. A stipulated fee shall be payable towards condonation of shortage of attendance to the college. (a) A student is eligible to write the end semester examinations if he acquires a minimum of 50% in each subject and 75% of attendance in aggregate of all the subjects.

#### 18. Promotion Rules:

- a) A student shall be promoted from first year to second year if he fulfils the minimum attendance requirements.

b) A student will be promoted from II year to III year if he fulfils the academic requirement of 40% of credits up to II year II-Semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in II year II semester.

c) A student shall be promoted from III year to IV year if he fulfils the academic requirements of 40% of the credits up to III year II semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in III year II semester.

## 19. 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.

Marks Range	Level	Letter Grade	Grade Point
$\geq 90$	Outstanding	A+	10
80-89	Excellent	A	9
70-79	Very Good	B	8
60-69	Good	C	7
50-59	Fair	D	6
40-49	Satisfactory	E	5
$< 40$	Fail	F	0
-	Absent	AB	0
-	Malpractice	MP	-

## Calculation of 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.

$$SGPA = \sum (C_i \times G_i) / \sum C_i$$

Where,  $C_i$  is the number of credits of the  $i^{th}$  subject and  $G_i$  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.

$$CGPA = \sum (C_i \times S_i) / \sum C_i$$

Where 'S<sub>i</sub>' is the SGPA of the  $i^{th}$  semester and  $C_i$  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. SGPA & CGPA will be calculated for those candidates who have passed all the subjects in that or up to that semester respectively.
- 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 A+, A, B, C, D, E and F.
- vii. As per AICTE regulations, conversion of CGPA into equivalent percentage as follows:  
$$\text{Equivalent Percentage} = (\text{CGPA} - 0.75) \times 10$$

### 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/she shall be placed in one of the following:

Class Awarded	CGPA Secured
First Class with Distinction	$\geq 7.75$ (With No subject failures)
First Class	$\geq 6.75$ (With subject failures)
Second Class	$\geq 5.75$
Pass Class	$\geq 4.75$ & $< 5.75$
FAIL	$< 4.75$

### 20. 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 I year/II year/III year to pursue entrepreneurship full time. This period shall be counted for the maximum time for graduation. An evaluation committee at institute level shall be constituted to evaluate the proposal submitted by the student and the committee shall decide on permitting the student for availing the Gap Year.

### REVALUATION

- 1. Student can submit the application for revaluation evaluation, along with the prescribed fee for revaluation evaluation of his answer script(s) of theory subject(s) as per the notification issued by the Controller of Examinations.
- 2. The Controller of Examinations shall arrange for revaluation of such answer script(s).
- 3. An evaluator, other than the first evaluator shall reevaluate the answer script(s).

### **MINIMUM INSTRUCTION DAYS**

The minimum instruction days for each semester shall be 90 working days.

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

### **WITHHOLDING OF RESULTS**

If the student has not paid the dues, if any, to the college or if any case of indiscipline is pending against him, the result of such student will be kept withheld. His degree will be withheld in such cases.

### **TRANSITORY REGULATIONS**

Discontinued or detained candidates are eligible for readmission as and when next offered. A candidate, who is detained or discontinued in a semester, on readmission shall be required to do all the subjects in the curriculum prescribed for the batch of students in which the student joins subsequently. However, exemption will be given to those candidates who have already passed such subjects in the earlier semester(s) he was originally admitted into and substitute subjects are offered in place of them as decided by the Board of Studies. However, the decision of the Board of Studies will be final.

A student who is following JNTUK curriculum and detained due to shortage of attendance at the end of the first semester of first year shall join the autonomous batch of first year first semester. Such students shall study all the subjects prescribed for the batch in which the student joins and considered on par with regular candidates of Autonomous stream and will be governed by the autonomous regulations.

A student who is following JNTUK curriculum, detained due to lack of credits or shortage of attendance at the end of the second semester of first year or at the subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the subjects in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the subjects of the semester(s) of the batch which he had passed earlier and substitute subjects will be offered in place of them as decided by the Board of Studies. The student has to clear all his backlog subjects up to previous semester by appearing for the supplementary examinations conducted by JNTUK for the award of degree will be sum of the credits up to previous semester under JNTUK regulations and the credits prescribed for the semester in which a candidate seeks readmission and subsequent semesters under the autonomous stream. The class will be awarded based on the academic performance of a student in the autonomous pattern.

### **Transfer candidates (from non-autonomous college affiliated to JNTUK)**

A student who is following JNTUK curriculum, transferred from other college to this college in second year first semester or subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the subjects in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the subjects of the semester(s) of the batch which he had passed earlier and substitute subjects are offered in their place as decided by the Board of Studies. The student has to clear all his backlog subjects up to previous semester by appearing for the supplementary examinations conducted by JNTUK for the award of degree. The total number of credits to be secured for the award of the degree will be the sum of the credits up to previous semester under JNTUK regulations and the credits prescribed for the semester in which a candidate joined after transfer and subsequent semesters under the autonomous stream. The class will be awarded based on the academic performance of a student in the autonomous pattern.

### **Transfer candidates (from an autonomous college affiliated to JNTUK)**

A student who has secured the required credits up to previous semester as per the regulations of other autonomous institutions shall also be permitted to be transferred to this college.

A student who is transferred from the other autonomous colleges to this college in second year first semester or subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the subjects in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree.

However, exemption will be given in the subjects of the semester(s) of the batch which he had passed earlier and substitute subjects are offered in their place as decided by the Board of studies.

The total number of credits to be secured for the award of the degree will be the sum of the credits up to previous semester as per the regulations of the college from which he has transferred and the credits prescribed for the semester in which a candidate joined after transfer and subsequent semesters under the autonomous stream. The class will be awarded based on the academic performance of a student in the autonomous pattern.



## Scope

1. The academic regulations should be read as a whole, for the purpose of any interpretation.
2. In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Academic Council is final.
3. The college may change or amend the academic regulations, course structure or syllabi at any time, and the changes or amendments made shall be applicable to all students with effect from the date notified by the College Authorities.

## MALPRACTICES RULES

### DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

- The Principal shall refer the cases of Malpractices in Internal Assessment Test and Semester end examinations to a malpractice prevention committee constituted by him for the purpose. Such committee shall follow the approved levels of punishment. The Principal shall take necessary action against the students based on the recommendations of the committee.
- Any action by the candidate trying to get undue advantage in the performance or trying to help another, or derive the same through unfair means is punishable according to the provisions contained hereunder:

	<b>Nature of Malpractices/ Improper conduct</b>	<b>Punishment</b>
	<i>If the candidate:</i>	
1(a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination).	Expulsion from the examination hall and cancellation of the performance in that subject only.
1(b)	Gives assistance or guidance or receives it from any other candidate	Expulsion from the examination hall and cancellation of the performance in that subject only of all the

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	orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the college.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and to be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all college examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all college examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6.	Refuses to obey the orders of the Chief Superintendent/Assistant –	In case of students of the college, they shall be expelled from examination halls and cancellation of

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	<p>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.</p>	<p>their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.</p>
7.	<p>Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.</p>	<p>Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all college examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.</p>
8.	<p>Possess any lethal weapon or firearm in the examination hall.</p>	<p>Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.</p>
9.	<p>If student of the college, who is not a candidate for the particular</p>	<p>Student of the college expulsion from the examination hall and cancellation of the performance in that</p>

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	examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/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 will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the college for further action to award suitable punishment.	

### OTHER MATTERS:

1. Physically challenged candidates who have availed additional examination time and a scribe during their intermediate / EAMCET examinations will be given similar concessions on production of relevant proof / documents.
2. The Principal shall deal in an appropriate manner with any academic problem which is not covered under these rules and regulations, in consultation with the Heads of the departments and subsequently such actions shall be placed before the Academic Council for ratification. Any emergency modification of regulation, approved in the meetings of the Heads of the departments shall be reported to the Academic Council for ratification.

### GENERAL:

1. The academic council may, from time to time, revise, amend or change the regulations, schemes of examinations and / or syllabi.
2. Where ever the words "he" "him" "his", occur in the regulations, they include "she", "her", "hers".
3. The academic regulation should be read as a whole for the purpose of any interpretation.
4. In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Principal is final.

**R20 COURSE STRUCTURE**

**I B.TECH - I SEMESTER**

S.No	Subject Code	SUBJECT	Cat. Code	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	L	T	P	CREDITS
1	R20CC1102	Matrix Algebra and Calculus	BS	30	70	100	2	1	0	3
2	R20EC1205	Applied Physics	BS	30	70	100	3	0	0	3
3	R20CC1101	Technical and Communicative English -I	HS	30	70	100	3	0	0	3
4	R20CC1105	Problem Solving Using C	ES	30	70	100	3	0	0	3
5	R20CC1210	IT Workshop	ES	30	70	100	0	0	6	3
6	R20CC11L1	Soft Skills and Communication Skills Lab	HS	15	35	50	0	0	3	1.5
7	R20CC12L10	Applied Physics Lab	BS	15	35	50	0	0	3	1.5
8	R20CC11L1	C Programming Lab	ES	15	35	50	0	0	3	1.5
<b>TOTAL</b>										<b>19.5</b>

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

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**I B.TECH – II SEMESTER**

S.No.	Subject Code	SUBJECT	Cat. Code	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	L	T	P	CREDITS
1	R20CC1202	Numerical Methods and Statistics	BS	30	70	100	2	1	0	3
2	R20CC1204	Engineering Chemistry	BS	30	70	100	3	0	0	3
3	R20CC1106	Python Programming	ES	30	70	100	3	0	0	3
4	R20CC1208	Electronic Devices and Logic Design	ES	30	70	100	3	0	0	3
5	R20CC1108	LINUX Programming Lab	BS	30	70	100	0	1	3	2.5
6	R20CC11L3	Problem Solving Using Python Lab	ES	15	35	50	0	0	3	1.5
7	R20CC11L5	Engineering Chemistry Lab	BS	15	35	50	0	0	3	1.5
8	R20CC12L3	R Programming Lab	ES	15	35	50	0	1	2	2.0
9	R20CCMC1	Environmental Studies	MC	-	-	-	2	0	0	0
<b>TOTAL</b>										<b>19.5</b>



## DEPARTMENT OF INFORMATION TECHNOLOGY

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	2	1	-	30	70	100	3
SUBCODE: R20CC1102	<b>MATRIX ALGEBRA AND CALCULUS</b> (Common to All Branches)						

### COURSE OBJECTIVES:

- Understanding basic concepts of linear algebra (systems of linear equations, matrix calculus).
- To become proficiency in solving computational problems of linear algebra.
- To acquire knowledge on mean value theorems in calculus.
- Familiarization about the techniques in calculus and multivariate analysis.

### COURSE OUTCOMES:

Upon successful completion of the course, the students should be able to

**CO 1:** Solve the system of linear equations.[K3]

**CO 2:** Analyze the applications of matrices in various fields and obtain Eigen values and Eigenvectors.[K4]

**CO 3:** Apply the mean value theorems in calculus to Engineering problems.[K3]

**CO 4:** Apply the functions of several variables to evaluate the rates of change with respect to Time and space variables in engineering. [K3]

**CO 5:** Determine the area and volume by interlinking them to appropriate double and triple integrals. [K5]

### SYLLABUS

#### UNIT-I:

##### LINEAR SYSTEMS OF EQUATIONS:

(10 hours)

Rank of a matrix - Echelon form, Normal form, Solution of linear systems, Direct Methods, Gauss elimination, Gauss Jordan and Gauss Seidal Methods. Solutions of linear simultaneous equations: LU decomposition.

**Application:** Finding the current in a electrical circuit, Traffic flow

#### UNIT – II:

##### EIGENVALUES AND EIGENVECTORS

(12 hours)

Eigenvalues, Eigenvectors, Properties, Cayley - Hamilton Theorem(without proof), Quadratic forms, Reduction of quadratic form to canonical form, Rank, Positive definite, negative definite, semi definite, index, signature.

**Application:** Finding powers and inverse of a square matrix using Cayley Hamilton's Theorem.

#### UNIT – III:

##### MEAN VALUE THEOREMS

(8 hours)

Review on limits and continuity, Mean Value theorems (without proofs): Rolle's theorem, Lagrange's theorem, Cauchy's theorem, Taylor's (Generalized mean value) theorem, increasing and decreasing functions, Maxima and minima of function of single variable.

#### UNIT- IV:

##### PARTIAL DIFFERENTIATION:

(8 hours)

Function of two or more variables, Partial derivatives, Total derivatives, change of variables, Jacobian - functional dependence, Taylor's theorem for Two variables. Maxima and Minima of functions of two variables, Lagrange's method of undetermined multipliers.

### UNIT-V:

#### MULTIPLE INTEGRALS:

(10 hours)

Double and triple integrals, Change of Variables, Change of order of Integration, volume.

Application: Momenta of Inertia.

#### TEXT BOOK :

1. Dr. B.S. Grewal, “*Higher Engineering Mathematics*”, 43<sup>rd</sup> Edition, Khanna Publishers, 2012.
2. B.V. Ramana, “*Higher Engineering Mathematics*”, 32<sup>nd</sup> Edition, McGraw Hill Education, 2018.

#### REFERENCES:

1. N.P. Bali, Bhavanari Satyanarayana, Indrani Promod Kelkar, “*Engineering Mathematics*”, University Science Press, (An Imprint of Lakshmi Publications Pvt., Ltd) New Delhi, 2012.
2. Kreyszig E, “*Advanced Engineering Mathematics*”, 8<sup>th</sup> Edition, John Wiley, Singapore, 2001.
3. Greenberg M D, “*Advanced Engineering Mathematics*”, 2<sup>nd</sup> Edition, Pearson Education, Singapore, Indian Print, 2003.
4. Peter V. O’Neil, “*Advanced Engineering Mathematics*”, 7<sup>th</sup> Edition, Cengage Learning, 2011.
5. Bhavanari Satyanarayana, Pradeep Kumar T.V. & Srinivasulu D, “*Linear Algebra and Vector Calculus*”, Studera Press, New Delhi, 2017.

#### WEB SOURCE REFERENCES:

1. <https://nptel.ac.in/courses/122107036/32>
2. <https://nptel.ac.in/courses/122107036/27>
3. <https://nptel.ac.in/courses/122101003/downloads/Lecture-4.pdf>
4. <https://nptel.ac.in/courses/122101003/downloads/Lecture-6.pdf>
5. <https://nptel.ac.in/courses/122104017/28>

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	30	70	100	3
SUBCODE: R20EC1205	<b>APPLIED PHYSICS</b> <b>(Common to ECE,EEE,CSE,IT&amp;CAI)</b>						

## COURSE OBJECTIVES:

- To impart knowledge in basic concepts of wave optics, fiber optics, properties of solid crystal materials and magnetic materials, acoustics, superconductors.
- To familiarize the applications of materials relevant to engineering field.

## COURSE OUTCOMES:

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

**CO 1:** Interpret the experimental evidence of wave nature of light and interference in thin films, Diffraction grating and Polarization in various fields. [K2]

**CO 2:** Analyze and understand various types of lasers & optical fibers.[ K4]

**CO 3:** Identify the crystal structures and XRD techniques. [ K3].

**CO 4:** Apply the magnetic materials in engineering field. [K3]

**CO 5:** Identify the various applications of semiconductors in engineering field. [K3]

## SYLLABUS

### UNIT– I

**Interference & Diffraction:** Introduction -Interference in thin films by reflection – Newton’s rings, introduction to diffraction – difference between Fresnel’s and Fraunhofer diffraction - Fraunhofer diffraction at single slit (qualitative) - Diffraction grating.

**Polarization:** Introduction – Types of Polarization – Double refraction – Nicol’s prism-Quarter wave plate and Half Wave plate – Applications.

### UNIT–II

**Lasers:** Introduction – Characteristics of lasers – Spontaneous and Stimulated emission of radiation – Population inversion – Ruby laser – Helium Neon laser-Applications.

**Fiber Optics:** Introduction- Basic Structure and Principle of optical fiber - Acceptance angle – Acceptance cone - Numerical Aperture-Applications.

### UNIT–III

**Crystallography :** Introduction – Space lattice – Basis – Unit Cell – Lattice parameters – Bravais lattices – Crystal systems – Structures and packing fractions of SC,BCC and FCC.

**X-Ray Diffraction:** Directions and planes in crystals – Miller indices – Separation between successive (h k l) planes – Bragg’s law.

### UNIT-IV

**Electromagnetic Fields:** Gauss divergence theorem - Stokes theorem (Quantitative) – Fundamental laws of electromagnetism – Maxwell’s Electromagnetic Equations.

**Magnetic materials:** Magnetic Susceptibility- Magnetic permeability –Classification of Magnetic materials – Dia, Para, and Ferro – Hysteresis Loop- Soft and Hard magnetic materials – Applications- Superconductivity- Properties, Meissner effect - Type-I and Type-II super conductors.

### UNIT-V

**Quantum Mechanics:** Introduction –de-Broglie’s concept of Matter waves – Physical significance of wave function - Schrodinger Time Independent wave equations – Particle in a one dimensional potential box.

**Semiconductor Physics:** Origin of energy band formation in solids- classification of materials into conductors, semiconductors and insulators, Intrinsic and Extrinsic semiconductor- Hall Effect.

### REFERENCE BOOKS:

1. Charles Kittel, “Introduction to solid state physics” ISBN: 9788126578436, Willey India Pvt.Ltd, 5<sup>TH</sup> edition, 2012.
2. M.Arumugam, “Applied Physics”, ISBN: 81-89638-01-7, Anuradha Agencies, 4<sup>th</sup> edition, 2013.
3. D.K.Bhattacharya, “Engineering Physics”, ISBN: 0198065426, 9780198065425, Oxford University press, 2<sup>nd</sup> edition, 2010.
4. Sanjay D Jain and Girish G Sahasrabudhe “Engineering Physics”, University Press ISBN: 8173716781, 1<sup>st</sup> edition, 2010.
1. B.K.Pandey & S. Chaturvedi “Engineering Physics” ISBN: 8131517616, Cengage Learning, 1<sup>st</sup> edition, 2012.

### WEB REFERENCES:

1. <http://link.springer.com/physics>
2. <http://www.thphys.physics.ox.ac.uk>
3. <http://www.sciencedirect.com/science>
4. <http://www.e-booksdirectory.com>

### E-BOOKS:

1. <http://www.peaceone.net/basic/Feynman>
2. <http://physicsdatabase.com/free-physics-books>
3. <http://www.damtp.cam.ac.uk/user/tong/statphys/sp.pdf>
4. <http://www.freebookcentre.net/Physics/Solid-State-Physics-Books.html>

## DEPARTMENT OF INFORMATION TECHNOLOGY

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	30	70	100	3
SUBCODE: R20CC1101	<b>TECHNICAL AND COMMUNICATIVE ENGLISH - I</b> (Common to All Branches)						

### COURSE OBJECTIVES:

- To enable the engineering students develop their basic communication skills in English for academic and social purposes.
- To equip the students with appropriate oral and written communication skills.
- To inculcate the skills of listening, reading and critical thinking.
- To integrate English Language learning with employability skills and training.
- To enhance the students' proficiency in reading skills enabling them meet the academic demands of their course.

### COURSE OUTCOMES:

Learners are able to

**CO1:** Interpret explicit and implicit meaning of a text, recognize key passages; raise questions and summarize it. [K3].

**CO2:** Compose paragraphs, essays, emails, letters, reports, resume and transfer information into tables, Pie and bar diagrams. [K6].

**CO3:** Build grammatically correct sentences using a variety of sentence structures. [K3]

**CO4:** Enhance word power and usage of lexicons [K3].

### Teaching Methodology:

The methodology of teaching will be chalk and talk, PPT, audio-visual, flipped class and activity based teaching.

### UNIT-I

**Hours of Instruction per unit: 8**

#### 1. A Drawer full of Happiness

- a. **Listening** : Dialogues, Task based listening activities.
- b. **Speaking** : Asking and answering general questions.
- c. **Reading** : Skimming, Scanning.
- d. **Writing** : Punctuations, Paragraphs.
- e. **Grammar & Vocabulary** : Nouns, Adjuncts, GRE Vocabulary, Technical Vocabulary.

### UNIT-II

**Hours of Instruction per unit: 8**

#### 2. Nehru's Letter to daughter Indira on her Birthday

- a. **Listening** : Individual and pair based listening to the audio track.
- b. **Speaking** : Discussion in pairs / small groups on specific topics.
- c. **Reading** : Identifying sequence of ideas; recognising verbal techniques.
- d. **Writing** : Summarising, Paraphrasing.
- e. **Grammar & Vocabulary** : Articles, Adjectives, Prepositions

Verbal Competence,  
Synonyms & Antonyms,  
Analogy,  
GRE Vocabulary,  
Technical Vocabulary.

### UNIT-III

Hours of Instruction per unit: 8

#### 3. Stephen Hawking- Positivity ‘Benchmark’

- a. **Listening** : Listening for global comprehension and summarising.
- b. **Speaking** : Discussing specific topics in pairs (or) small groups and reporting the discussion, Complaining, Apologising.
- c. **Reading** : Reading between the lines, Critical reading for evaluation.
- d. **Writing** : Official Letter writing, E-Mail etiquette, General Netiquette, Covering Letter & Resume writing.
- e. **Grammar & Vocabulary** : Phrasal verbs, Verbs, Tenses (Present, Past & Future), Concord: Subject-Verb Agreement, Verbal reason, Using equivalents, Word associations, GRE Vocabulary, Technical Vocabulary.

### UNIT-IV

Hours of Instruction per unit: 8

#### 4. Like a Tree, Unbowed: Wangari Maathai- Biography

- a. **Listening** : Making predictions while listening to conversations (or) transactional dialogues.
- b. **Speaking** : Role plays for practice of conversational English in academic contexts (formal and informal) .
- c. **Reading** : Information transfer (Tables, Bar Diagrams, Line Graphs, Pie Diagrams)
- d. **Writing** : Interpreting visual information, Statement of Purpose (SOP)
- e. **Grammar & Vocabulary** : Gender inclusive language (Gendered Noun, Gender-neutral Noun), Quantifying expressions, Adjectives, Adverbs, Degrees of comparison, GRE Vocabulary, Technical Vocabulary.

### UNIT-V

Hours of Instruction per unit: 8

#### 5. “Stay Hungry, Stay Foolish”- Rushmi Bansal

- a. **Listening** : Identifying key terms, understanding concepts, interpreting the concepts.
- b. **Speaking** : Formal oral presentations on topics from academic contexts.



- c. **Reading** : Reading comprehension, The RAP strategy for in-depth reading, Intensive reading and extensive reading.
- d. **Writing** : Academic proposals, Poster presentation.
- e. **Grammar & Vocabulary** : Reported Speech, Reporting verbs for academic purposes, Corrections of sentences, GRE Vocabulary, Technical Vocabulary.

### TEXTBOOKS:

1. INFOTECH ENGLISH , Maruthi Publications, Guntur- 522001.

### REFERENCES:

1. Raymond Murphy, *Murphy's English Grammar*, Cambridge University Press 2004
2. Meenakshi Raman, Sangeeta Sharma, *Technical Communication: English Skills for Engineers*, Oxford University Press, 2009
3. Michael Swan, *Practical English Usage*, Oxford University Press, 1996

### ONLINE SOURCES:

1. [www.enchantedlearning.com](http://www.enchantedlearning.com)
2. <https://www.englisch-hilfen.de/en/>
3. <https://www.bbc.co.uk/learningenglish/>
4. <https://in.usembassy.gov/education-culture/american-spaces/american-space-new-delhi/collection/>
5. [https://www.talkenglish.com/speaking/basics/speaking\\_basics\\_ii.aspx](https://www.talkenglish.com/speaking/basics/speaking_basics_ii.aspx)
6. <https://www.englishclub.com/speaking/>
7. <https://agendaweb.org/listening-exercises.html>
8. <https://www.esolcourses.com/content/topicsmenu/listening.html>
9. <https://www.esl-lab.com/>
10. [https://www.eagetutor.com/eage-fluent-english-speaking-search-p.htm?gclid=EAIaIQobChMIpr-F5OzH7QIVChsrCh1kBAkzEAMYASAAEgINpfD\\_BwE](https://www.eagetutor.com/eage-fluent-english-speaking-search-p.htm?gclid=EAIaIQobChMIpr-F5OzH7QIVChsrCh1kBAkzEAMYASAAEgINpfD_BwE)
11. [https://www.myenglishpages.com/site\\_php\\_files/reading.php](https://www.myenglishpages.com/site_php_files/reading.php)
12. <https://www.cambridgeenglish.org/learning-english/free-resources/write-and-improve/>

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	30	70	100	3
SUBCODE: R20CC1105	<b>PROBLEM SOLVING USING C</b> (Common to All Branches)						

### COURSE OBJECTIVE:

- To know the basic problem solving process using Flow Charts and algorithms.
- To understand the basic concepts of control structures in C.
- To learn concepts of arrays, functions, pointers and Dynamic memory allocation in C.
- To use the concepts of structures, unions, files and command line arguments in C.

### COURSE OUTCOMES:

After completion of this course, the students would be able to:

**CO1:** Develop algorithms and flow charts for simple problems. [K3]

**CO2:** Utilize suitable control structures for developing code in C. [K3]

**CO3:** Make use of functions and arrays in developing modular programs. [K3]

**CO4:** Make use of structures and pointers to write well-structured programs. [K3]

**CO5:** Make use of file Operations in C programming for a given application. [K3]

## SYLLABUS

### UNIT I

**Introduction to Algorithms and Programming Languages:** Algorithm – Key features of Algorithms – Some more Algorithms – Flow Charts – Pseudo code – Programming Languages – Generation of Programming Languages – Structured Programming Language.

**Introduction to C:** Structure of C Program – Writing the first C Program -Compiling and Executing C Programs - Using Comments – Keywords – Identifiers – Basic Data Types in C – Variables – Constants – I/O Statements in C - Operators in C -Programming Examples – Type Conversion and Type Casting.

### UNIT II

**Decision Control and Looping Statements:** Introduction to Decision Control Statements – Conditional Branching Statements – Iterative Statements – Nested Loops – Break and Continue Statement – Goto Statement.

**Functions:** Introduction – using functions – Function declaration/ prototype – Function Definition – function call – return statement – Passing parameters – Scope of variables –Storage Classes – Recursive functions – Recursion vs Iteration.

### UNIT III

**Arrays:** Introduction – Declaration of Arrays – Accessing elements of the Array – Storing Values in Array – Calculating the length of the Array – Operations on Array — Two Dimensional Arrays – Operations on Two Dimensional Arrays.

**Strings:** Introduction – Reading Strings – Writing Strings – String Manipulation functions -Array of Strings.

### UNIT IV

**Pointers:** Introduction to Pointers – declaring Pointer Variables – Pointer Expressions and Pointer Arithmetic – Null Pointers – Passing Arguments to Functions using Pointer, Dynamic Memory Allocation.

**Structure, Union, and Enumerated Data Types:** Introduction – Nested Structures –Arrays of Structures – Structures and Functions – Self-referential Structures – Union –Enumerated Data Types.

### UNIT V

**Files:** Introduction to Files – Using Files in C – Reading Data from Files – Writing Data To Files – Detecting the End-of-file – Error Handling during File Operations – Accepting Command Line Arguments – Functions for Selecting a Record Randomly - Remove –Renaming a File – Creating a Temporary File

### TEXT BOOKS:

1. Reema Thareja, “Programming in C”, First **edition**, OXFORD University Press 2018.

### REFERENCE BOOKS

1. REEMA THAREJA, “Introduction to C programming” OXFORD UNIVERSITY PRESS
2. Rachhpal Singh, “Programming in C”, kalyani publishers.
3. E Balagurusamy, “computing fundamentals & c programming”, isbn 978-0-07- 066909-3, Tata McGraw-Hill, Second Reprint, 2008.
1. Ashok N Kamthane, “Programming with ANSI and Turbo C”, Pearson Edition Publications, 2002.
5. Dennis Richie and Brian Kernighan, “The C programming Language”, 2<sup>nd</sup> edition.

### WEB REFERENCES:

1. <http://cprogramminglanguage.net/>
2. <http://lectures-c.blogspot.com/>
3. [http://www.coronadoenterprises.com/tutorials/c/c\\_intro.htm](http://www.coronadoenterprises.com/tutorials/c/c_intro.htm)
4. [http://vfu.bg/en/e-Learning/Computer-Basics--computer\\_basics2.pdf](http://vfu.bg/en/e-Learning/Computer-Basics--computer_basics2.pdf)
5. <https://www.edx.org/learn/c-programming>
6. <https://www.programiz.com/c-programming>

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	6	30	70	100	3
SUBCODE: R20CC1210	<b>IT WORKSHOP</b>						

### COURSE OBJECTIVES:

- Enabling the student to understand basic hardware and software tools through practical exposure.

### COURSE OUTCOME:

After completion of this course, the student should be able to

**CO1:** Demonstrate the need of PC hardware components, applications and softwares.[K2]

**CO2:** Explain the knowledge of networks, internet and World Wide Web, Search engines, Netiquette. [K2]

**CO3:** Install and use different software like Windows XP, Linux.

**CO4:** Identify and fix the defective PC and software related issues.[K3]

**CO5:** Formalise with parts of windows word, Excel and Power point.

### PC Hardware

**Task 1: Identification of the peripherals of a computer.** To prepare a report containing the block diagram of the CPU along with the configuration of each peripheral and its functions. Description of various I/O Devices.

**Task 2: (Optional):** A Practice on disassembling the components of a PC and assembling them to back to working condition.

**Task 3:** Examples of Operating Systems- DOS, MS Windows, Installation of MS windows on a PC

**Task 4:** Introduction to Memory and Storage Devices, I/O Port, Device Drivers, Assemblers, Compilers, Interpreters, Linkers, Loaders.

**Task 5: Hardware Troubleshooting (Demonstration):** Identification of a problem and fixing a defective PC (improper assembly or defective peripherals).

**Software Troubleshooting (Demonstration):** Identification of problem and fixing the PC for any software issues.

### Internet & Networking Infrastructure

**Task 6:** Demonstrating Importance of Networking, Transmission Media, Networking Devices- Gateway, Routers, Hub, Bridge, NIC, Bluetooth technology, Wireless Technology, Modem, DSL, and Dialup Connection.

**Orientation & Connectivity Boot Camp and Web Browsing:** Students are trained to configure the network settings to connect to the Internet. They are trained to demonstrate the same through web browsing (including all tool bar options) and email access.

### Task 7: Search Engines & Netiquette:

Students are enabled to use search engines for simple search, academic search and any other context based search (Bing, Google etc). Students are acquainted to the principles of micro-blogging, wiki, collaboration using social networks, participating in online technology forums.

**Task 8: Cyber Hygiene (Demonstration) :** Awareness of various threats on the internet. Importance of Security patch updates and Anti-Virus solution Ethical Hacking, Firewalls, Multi-factors authentication techniques including Smart card Biometrics and also practiced.

### Word

**Task 9: MS Word Orientation:** Accessing, overview of toolbars, saving files, Using help and resources, rulers, formatting, Drop Cap, Applying Text effects, Using Character Spacing, OLE in Word, using templates, Borders and Colors, Inserting Header and Footer, Using Date and Time option, security features in word, converting documents while saving.

**Task 10 : Creating Project :** Abstract Features to be covered:-Formatting Styles, Inserting Table, Bullets and Numbering, Changing Text Direction, Cell alignment, footnote, Hyperlink, Symbols, Spell Check, Track Changes, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs.

### Excel

**Task 11:** Using spread sheet features of EXCEL including the macros, formulae, pivot tables, graphical representations.

**Creating Scheduler** - Features to be covered:-Gridlines, Format Cells, Summation, auto fill, Formatting Text.

**Task 12: Performance Analysis:** Features to be covered:-Split cells, freeze panes, group and outline, Sorting, Boolean and Logical operators, Conditional Formatting.

### Power Point

**Task 13:** Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this week includes:- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows, Hyperlinks, Inserting –Images, Clip Art, Tables and Charts in PowerPoint.

**Task 14:** Focusing on the power and potential of Microsoft power point Helps them learn best practices in designing and preparing power point presentation. Topic covered during this week includes:- Master Layouts (slide, template and notes), Types of views (basic, presentation, slide slotter, notes etc), Inserting – Background , textures, Design Templates, Hidden slides, OLE in PPT.

### TEXT BOOKS:

**Faculty to consolidate the workshop manuals using the following references.**

1. Anita Goel , Computer Fundamentals, Pearson
2. Scott. Mueller QUE , Scott Mueller's Upgrading and Repairing PCs, 18/e, Pearson, 2008

### REFERENCE BOOKS:

1. Essential Computer and IT Fundamentals for Engineering and Science Students, Dr.N.B.Venkateswarlu.
2. G Praveen Babu, M V Narayana, "Information Technology Workshop", BS Publications, 3e
3. Vikas Gupta, "Comdex Information Technology", Dreamtech.

### WEB REFERENCES:

1. <https://www.microsoft.com/en-us/garage/profiles/script-lab/>
2. <https://algonquincollege.libguides.com/slc/library-lab>
3. <https://technology.ku.edu/services/training-workshops>
4. <https://appssource.microsoft.com/en-us/product/office/wa104380862?tab=overview>

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	15	35	50	1.5
SUBCODE: R20CC11L1	<b>SOFT SKILLS &amp; COMMUNICATION SKILLS LAB</b> (Common to All Branches)						

### COURSE OBJECTIVES:

- To build confidence in the students to communicate effectively in English.
- To strengthen the oral communication skills to enable them to interact with the people in various social situations.
- To enable the learners improve pronunciation with the knowledge of phonetics.
- To provide exposure to students to soft skills like Goal Setting, Time Management, Interpersonal Skills, and Intra Personal Skills.

### COURSE OUTCOMES:

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

- CO1:** Communicate effectively with good pronunciation, overcoming mother tongue influence in academic and professional environment.[K3]  
**CO 2:** Listen and comprehend several accents of English Language.[K4]  
**CO 3:** Take part in various conversations/discourses using formal and informal expressions.[K4]  
**CO 4:** Adapt soft skills successfully in personal and professional life.[K5]

### UNIT– I

- Introduction to Phonetics.
- Listening - TEDx Talks ( [https://www.ted.com/talks/ashweetha\\_shetty\\_how-education-helped-me-rewrite-my-life?language-en#t-623369](https://www.ted.com/talks/ashweetha_shetty_how-education-helped-me-rewrite-my-life?language-en#t-623369))
- Self-Introduction

### UNIT–II

- Pronunciation Rules & Common Errors in Pronunciation.
- Listening -TEDx Talks([https://www.youtube.com/watch?v=Dk20-E0yx\\_s](https://www.youtube.com/watch?v=Dk20-E0yx_s))
- Role Play

### UNIT–III

- Situational Dialogues (Inviting, Accepting and Declining Invitations)
- Listening - TEDx Talks (<https://www.youtube.com/watch?v=IgAnj6r1O48>)
- JAM

### UNIT-IV

- Situational Dialogues (Commands, Instructions and Requests)
- Listening -TEDx Talks(<https://youtu.be/SKvMxZ284AA>)
- Telephonic Etiquette.

### UNIT-V

- Time Management.



- b. Goal Setting.
- c. Interpersonal Skills & Intra personal skills.

### TEXT BOOKS:

“Strengthen Your Communication Skills”, Maruthi Publications, 2013.

### REFERENCE BOOKS:

1. Meenakshi Raman, Sangeeta Sharma, Technical Communication: Principles and Practice, Oxford University Press, 2015
2. J.D.O Conner, Better English Pronunciation, Cambridge University Press 1980.
3. T.Balasubramanian, “A Text Book of English Phonetics for Indian Students”, Macmillan, 1981
4. Penny ur Grammar Practice Activities, Cambridge University Press, 2010.
5. Mark Hancock, Pronunciation in Use, Oxford University Press 2007.
6. K. R Lakshmi Narayanan, T. Murugavan, Managing Soft Skills, Scitech Publications, 2010.
7. K V S G Murali Krishna, K V K K Prasad, Placement and Personality Development, Second Edition, Reem Publications Pvt. Limited, 2012
8. Shiv Khera, You can Win, Bloomsbury Publication, 2014
9. Stephen R. Covey, The 7 Habits of Highly Effective People, Free Press, 1989

### ONLINE SOURCES:

1. [www.enchantedlearning.com](http://www.enchantedlearning.com)
2. <https://www.englisch-hilfen.de/en/>
3. <https://www.bbc.co.uk/learningenglish/>
4. <https://in.usembassy.gov/education-culture/american-spaces/american-space-new-delhi/collection/>
5. [https://www.talkenglish.com/speaking/basics/speaking\\_basics\\_ii.aspx](https://www.talkenglish.com/speaking/basics/speaking_basics_ii.aspx)
6. <https://www.englishclub.com/speaking/>
7. <https://agendaweb.org/listening-exercises.html>
8. <https://www.esolcourses.com/content/topicsmenu/listening.html>
9. <https://www.esl-lab.com/>
10. [https://www.eagetutor.com/eage-fluent-english-speaking-search-p.htm?gclid=EAIaIQobChMIpr-F5OzH7QIVChsrCh1kBAkzEAMYASAAEgINpfD\\_BwE](https://www.eagetutor.com/eage-fluent-english-speaking-search-p.htm?gclid=EAIaIQobChMIpr-F5OzH7QIVChsrCh1kBAkzEAMYASAAEgINpfD_BwE)
11. [https://www.myenglishpages.com/site\\_php\\_files/reading.php](https://www.myenglishpages.com/site_php_files/reading.php)
12. <https://www.cambridgeenglish.org/learning-english/free-resources/write-and-improve/>

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	3	15	35	50	1.5
SUBCODE: R20CC12L10	<b>APPLIED PHYSICS LAB</b> <b>(Common to CSE, ECE, IT, CSE(AI), EEE)</b>						

### COURSE OBJECTIVES:

To impart physical measurement skills and make the students understand coherence between theoretical and practical knowledge.

### COURSE OUTCOMES:

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

**CO1:** Apply the principle of physics in engineering field **(K3)**

**CO2:** Utilize the modern engineering physics techniques and tools in real time applications. **(K3)**

**CO3:** Analyse characteristics, usage and the behaviour of materials. **(K4)**

### LIST OF EXPERIMENTS:

1. Rigidity modulus of material by wire-dynamic method (torsional pendulum)
2. Determination of wavelength of a source-Diffraction Grating-Normal incidence
3. Newton's rings –Radius of Curvature of Plano Convex Lens.
4. Determination of thickness of thin wire- Air wedge method
5. Determination of wavelength of Laser Source-single slit diffraction.
6. Determine the Numerical aperture of an optical fiber.
7. Melde's experiment – Transverse and Longitudinal modes.
8. Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus.
9. Verification of laws of stretched string by using Sonometer.
10. Calculate the energy loss in a given ferromagnetic material by plotting B-H Curve.
11. Energy Band gap of a Semiconductor p - n junction.
12. Characteristics of Thermistor – temperature coefficient

### TEXT BOOKS:

1. Engineering Physics Lab Manual by Dr.Y. Aparna & Dr.K.Venkateswarao (V.G.S.Book links).
2. Physics Practical Manual, Lorven Publications
3. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017.

### WEB REFERENCES:

1. <https://www.youtube.com/watch?v=NDsSPtL9dyQ>
2. <https://www.youtube.com/watch?v=9agoJRCnu4w>
3. <https://www.youtube.com/watch?v=bv-lLJreyCU>
4. <http://vlab.amrita.edu/index.php>

## DEPARTMENT OF INFORMATION TECHNOLOGY

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	15	35	50	1.5
SUBCODE: R20CC11L1	<b>C PROGRAMMING LAB</b> (Common to All Branches)						

### COURSE OBJECTIVE:

- The purpose of this course is to introduce to students to the field of language. The students will be able to enhance their analyzing and problem solving skills and use the same for writing programs in C.

### COURSE OUTCOMES:

After completion of this C Programming Lab, students would be able to:

**CO 1:** Study, analyze and understand logical structure of computer programming and different constructs to develop programs in C Language. [K4]

**CO 2:** Compare and contrast various data types and operator precedence. [K2]

**CO 3:** Analyze the use of conditional and looping statements to solve problems associated with conditions and repetitions. [K4]

**CO 4:** Analyze simple data structures, use of pointers and dynamic memory allocation techniques. [K4]

**CO5:** Make use of functions and file I/O operations in developing C Programs. [K3]

### EXERCISE 1

Construct Flowcharts for the following through Raptor:

- Develop a calculator to convert time, distance, area, volume and temperature from one unit to another.
- Calculate simple and compound interest for various parameters specified by the user.
- Calculate the average of n numbers.

### EXERCISE 2

- Write a C Program to calculate the area of triangle using the formula  
$$\text{Area} = \sqrt{s * (s - a) * (s - b) * (s - c)}$$
 where  $s = (a+b+c)/2$ .
- Write a C Program to find the largest of three numbers using ternary operator.
- Write a C Program to swap two numbers without using a temporary variable.

### EXERCISE 3

- Write a C program to find the roots of a quadratic equation.
- Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. Consider the operators +, -, \*, /, % and use Switch Statement.

### EXERCISE 4

- Write a C program to find the sum of individual digits of a positive integer and find the reverse of the given number.
- Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

### EXERCISE 5

- Write a C Program to print the multiplication table of a given number n up to a given value, where n is entered by the user.
- Write a C Program to enter a decimal number, and calculate and display the binary

equivalent of that number.

- c) Write a C Program to check whether the given number is Armstrong number or not.

### EXERCISE 6

- a) Write a C program to interchange the largest and smallest numbers in the array.  
b) Write a C program to input two  $m \times n$  matrices, check the compatibility and perform addition and multiplication of them.

### EXERCISE 7

- a) Write a C Program to find sum of following series for a given  $n$  value.

- i.  $1+(1+2)+(1+2+3)+(1+2+3+4)+(1+2+3+4+5)+\dots+(1+2+\dots+n)$ .  
ii.  $1+(2+2)+(3+3+3)+(4+4+4+4)+\dots+(n+n+n+n..+n)$ .

- b) Write a C Program to display following patterns for a given  $n$  value

i.

```
      1
    2  2
  3  3  3          if n =3
```

i.

```
      1
    2  2
  3  3  3
    2  2
      1          if n=3.
```

### EXERCISE 8

Draw a flow chart using Raptor and write C programs that use both recursive and non-recursive Functions for the following

- i) To find the factorial of a given integer.  
ii) To find the GCD greatest common divisor of two given integers.

### EXERCISE 9

- a) Write a C Program to find Fibonacci sequence.  
b) Write C programs illustrating call by value and call by reference concepts.

### EXERCISE 10

Write C Programs for the following string operations without using the built in functions - to concatenate two strings

- a) To append a string to another string  
b) To compare two strings

### EXERCISE 11

Write C Programs for the following string operations without using the built in functions

- a) To find whether a given string is palindrome or not  
b) Write a C Program to count number of occurrences of each character in a given string. Example:  
if input 'APPLE' then output is 'A count 1, P count 2, L count 1, E count 1'

### EXERCISE 12

Write a C program that uses functions to perform the following operations:

- a) To insert a sub-string in to given main string from a given position.  
b) To delete  $n$  Characters from a given position in a given string.  
c) To replace a character of string either from beginning or ending or at a specified location

### EXERCISE 13

- Write a C Program to Implement Taylor series method
- Write a C Program to Implement Euler's method
- Write a C Program to Implement Runge Kutta method

### EXERCISE 14

- Write C Program to reverse a string using pointers
- Write a C Program to compare two arrays using pointers
- Write a C program to swap two numbers using pointers

### EXERCISE 15

- Write the following C Programs using Dynamic memory management functions.
  - Accept size of array from user then read n elements into two arrays and store sum of those two arrays in third array, display three arrays using pointers.
  - User will specify data type and data to store, use generic pointer to store that data and display given input.

### EXERCISE 16

Examples which explores the use of structures, union and other user defined variables

### EXERCISE 17

- Write a C program which copies one file to another.
- Write a C program to count the number of characters and number of lines in a file.
- Write a C Program to merge two files into a third file. The names of the files must be entered using command line arguments.

### EXERCISE 18

Virtual Lab: <http://cse02-iiith.vlabs.ac.in/>

Any three programs must be submitted with result from the above link.

**\* At the end of the semester the student has to submit a Mini-Project on Computer Programming. The list of Mini-Projects is available in the department.**

**Virtual Lab :** <http://ps-iiith.vlabs.ac.in/>

### TEXT BOOKS:

- Reema Thareja, "Programming in C", OXFORD.
- The C programming Language by Dennis Richie and Brian Kernighan 2<sup>nd</sup> ed.

### REFERENCE BOOKS:

- Dr.E.Balaguruswamy, "Programming in ANSI C", Tata McGraw-Hill Education.
- Hanly, "Problem Solving and Program Design in C", Koffman, 7<sup>th</sup> ed, PEARSON.
- Forouzan, Gilberg, Prasad, "C Programming, A Problem Solving Approach", CENGAGE.
- Programming in C, Second Edition by Ashok N.Kamthane, Pearson.

### WEB REFERENCES:

- <https://www.topcoder.com/community/competitive-programming/>
- <https://cboard.cprogramming.com/c-programming/158586-project-euler-problem-2-solution.html>
- <https://www.hackerrank.com/domains/c>
- <https://leetcode.com/discuss/general-discussion/144138/C-programming-solutions/>

**I B.TECH. – II SEMESTER**

S.No.	Subject Code	SUBJECT	Cat. Code	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	L	T	P	CREDITS
1	R20CC1202	Numerical Methods and Statistics	BS	30	70	100	2	1	0	3
2	R20CC1204	Engineering Chemistry	BS	30	70	100	3	0	0	3
3	R20CC1106	Python Programming	ES	30	70	100	3	0	0	3
4	R20CC1208	Electronic Devices and Logic Design	ES	30	70	100	3	0	0	3
5	R20CC1108	LINUX Programming Lab	BS	30	70	100	0	1	3	2.5
6	R20CC11L3	Problem Solving Using Python Lab	ES	15	35	50	0	0	3	1.5
7	R20CC11L5	Engineering Chemistry Lab	BS	15	35	50	0	0	3	1.5
8	R20CC12L3	R Programming Lab	ES	15	35	50	0	1	2	2.0
9	R20CCMC1	Environmental Studies	MC	-	-	-	2	0	0	0
<b>TOTAL</b>										<b>19.5</b>

I B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	2	1	0	30	70	100	3
SUBCODE: R20CC1202	<b>NUMERICAL METHODS AND STATISTICS</b> <b>(CSE, IT &amp; AI)</b>						

### COURSE OBJECTIVES:

- To elucidate the different numerical methods to solve nonlinear algebraic equations.
- To propagate the use of different numerical techniques for carrying out numerical integration.

### COURSE OUTCOMES:

Upon successful completion of the course, the students should be able to

CO1: Evaluate approximating roots of polynomials and transcendental equations by different algorithms. [K5]

CO2: Apply Newton's forward backward and Lagrange's interpolation for equal and unequal intervals. [K3]

CO3: Apply different algorithms for approximating solutions of ordinary differential equation to its analytical computations.[K3]

CO4: Decide whether to accept or reject a statement about parameter in decision making problems. [K5]

### SYLLABUS

#### UNIT –I: ITERATION METHODS:

(8 hours)

Solution of Algebraic and Transcendental Equations: Introduction- Bisection method, Method of false position, Iteration method, Newton-Raphson method (One variable and simultaneous Equations).

#### UNIT –II: INTERPOLATION:

(10 hours)

Interpolation: Introduction- Errors in polynomial interpolation – Finite differences- Forward differences- Backward differences –Central differences – Symbolic relations and separation of symbols - Differences of a polynomial-Newton's formulae for interpolation – Interpolation with unequal intervals – Newton's Divided difference formula, Lagrange's interpolation formula.

#### UNIT –III: NUMERICAL DIFFERENTIATION AND INTEGRATION: (10 hours)

Numerical Differentiation, Ordinary differential equations-Taylor's series, Euler and modified Euler's methods. Runge-Kutta method of fourth order for solving first and second order equations. Numerical integration- trapezoidal rule, Simpson's 1/3rd and 3/8<sup>th</sup> rules.

#### UNIT IV: SAMPLING DISTRIBUTION:

(10 hours)

Estimation: Point Estimation, Interval Estimation, Bayesian Estimation.

#### UNIT V: TESTING OF HYPOTHESIS:

(10 hours)

Formulation of null hypothesis, critical regions, level of significance.

**Large sample tests:** test for single mean test for single proportion.

**Small Sample tests:** Student t-distribution (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.



**TEXT BOOK :**

1. Dr. B.S. Grewal, “*Higher Engineering Mathematics*”, 43<sup>rd</sup> Edition, Khanna Publishers, 2012.
2. **Miller and Freund’s**, Probability and Statistics for Engineers, 7/e, Pearson, 2008.

**REFERENCES:**

1. N.P. Bali, Bhavanari Satyanarayana, Indrani Promod Kelkar, “*Engineering Mathematics*”, University Science Press, (An Imprint of Lakshmi Publications Pvt., Ltd) New Delhi, 2012.
2. Kreyszig E, “*Advanced Engineering Mathematics*”, 8<sup>th</sup> Edition, John Wiley, Singapore, 2001.
3. Jaan Kiusalaas “*Numerical Methods in Engineering with Python*”, Cambridge University Press, 2005 Edition.
4. Curtis F. Gerald, Patrick O. Wheatley, “*Applied Numerical Analysis*”, 7<sup>th</sup> edition, Pearson.

**WEB SOURCE REFERENCES:**

1. <https://www.youtube.com/watch?v=QqhSmdkqgjQ>
2. <https://www.digimat.in/nptel/courses/video/111107105/L01.html>
3. <https://nptel.ac.in/courses/122/102/122102009/>
4. <http://www.nptelvideos.in/2012/11/numerical-methods-and-computation.html>
5. <https://nptel.ac.in/courses/111/105/111105041/>
6. <https://nptel.ac.in/courses/111/106/111106112/>
7. [https://nptel.ac.in/content/storage2/courses/103106120/LectureNotes/Lec1\\_2.pdf](https://nptel.ac.in/content/storage2/courses/103106120/LectureNotes/Lec1_2.pdf)

I B.TECH II SEMESTERS	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	30	70	100	3
SUBCODE: R20CC1204	<b>ENGINEERING CHEMISTRY (COMMON TO ALL BRANCHES)</b>						

### COURSE OBJECTIVES:

- To analyze water for its various parameters and its significance in industrial and domestic allocations.
- To acquire the knowledge on types of polymers, fuels and their applications.
- To provide information on exciting advanced materials available in engineering.
- To apply the electrochemical principles, understand the fundamentals of corrosion and development of different techniques in corrosion control.
- To learn the importance of engineering materials used in daily life and industry.

### COURSE OUTCOMES:

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

**CO 1:** Analyze the suitable method of water treatment depending on the quality treatment.  
[K4]

**CO 2:** Compare different types of polymers, fuels and their importance.[K4]

**CO 3:** Utilize the advanced materials as engineering materials and apply them in domestic and industrial life.[K3]

**CO 4:** Distinguish electrical energy sources and importance of corrosion science.[K4]

**CO 5:** Identify different types of engineering materials and applications in engineering.  
[K3]

## SYLLABUS

### UNIT-I: WATER CHEMISTRY

**Characteristics of water:** Sources, Impurities–Hardness & its units–Industrial water characteristics–Softening of water by external treatment methods (Lime soda process, Zeolite and Ion exchange process)–Numerical problems on lime soda process–Desalination of brackish water (Reverse osmosis and Electrodialysis).

**Water analysis techniques:** Alkalinity–hardness (Complexo-metric)–Break point chlorination–Free chlorine–DO–BOD and COD.

### UNIT-II: POLYMERS AND FUEL CHEMISTRY

**Polymers:** Introduction to polymers–Chain growth (free radical, ionic)–Step growth polymerization–Coordination polymerization–Copolymerization with specific examples–Thermoplastics and thermosets–Plastic moulding methods (Compression & Injection moulding)–Rubbers–Natural rubber–Processing–Vulcanization.

**Fuels**–Types of fuels–Calorific value–Numerical problems based on calorific value–Analysis of coal–Liquid fuels–Refining of petroleum–Cracking of heavy oil–Knocking and anti knocking agents–Octane and cetane values.

### UNIT-III: CHEMISTRY OF ADVANCED MATERIALS

**Nano materials:** Introduction–Sol-gel method & Chemical reduction method of preparation – Characterization by BET method and TEM methods–Carbon nano tubes and fullerenes: Types–Preparation–Properties and Applications.

**Liquid crystals:** Introduction–Types–Applications.

**Composite materials:** Introduction–Definition–Types–Applications–Cermets.

### UNIT-IV: ELECTROCHEMISTRY AND CORROSION

**Electrochemistry:** Galvanic cells–Single electrode potential–Reference electrodes–Electrochemical series–Batteries (primary, secondary and fuel cells)–Applications of secondary batteries in E-vehicles.

**Corrosion:** Causes and effects of corrosion–Theories of corrosion (chemical and electrochemical corrosion)–Factors effecting corrosion–Corrosion control methods–Cathode protection–Sacrificial anodic, Impressed current methods–Surface coatings–Methods of application on metals (Hot dipping, Galvanizing, Tinning, Cladding, Electroplating, Electroless plating)–Organic surface coatings–Paints–Constituents and their functions–Pigment Volume Concentration.

### UNIT-V: CHEMISTRY OF ENGINEERING MATERIALS

**Lubricants:** Introduction–Mechanism of lubrication–Classification of lubricants–Properties and testing of lubricating oils.

**Cement & Refractories:** Manufacture–Setting and hardening of cement–Failures of cement–Slag cement–Refractory: Introduction–Classification and properties of refractories.

### TEXT BOOKS:

1. Shikha Agarwal, “**Engineering Chemistry**”, ISBN 1107476410, 2<sup>nd</sup> Edition, Cambridge University Press, New Delhi, (2019).
2. O.G. Palana, “**Engineering Chemistry**”, ISBN 0070146101, Tata McGraw Hill Education Private Limited, New Delhi, (2009).
3. B. Rama Devi, Ch. Venkata Ramana Reddy, Prashantharath, “**Text Book of Engineering Chemistry**”, ISBN 9789353500511, Cengage Learning India Pvt. Ltd, (2016).

### REFERENCE BOOKS:

1. P.C. Jain and M. Jain “**Engineering Chemistry**”, ISBN 8187433175, 15/e, Dhanpat Rai & Sons, Delhi, (2015).
2. B.S Murthy and P. Shankar, “**A Text Book of NanoScience and NanoTechnology**”, University Press (2013).
3. K. Sesha Maheshwaramma and Mridula Chugh, “**Engineering Chemistry**”, Pearson India Edn services, (2016).
4. S.S. Dara, “**A Textbook of Engineering Chemistry**”, ISBN 8121932645, S.Chand Publisher, (2010)

### WEB REFERENCES:

1. URL: <https://www.youtube.com/watch?v=CWOJW4357Bg>
2. URL: <https://www.youtube.com/watch?v=H1Y1oxQ5eUA&t=627s>
3. URL: <https://www.youtube.com/watch?v=1xWBPZnEJk8>
4. URL: <https://www.youtube.com/watch?v=p9yPXdT0k48&t=225s>
5. URL: [https://www.youtube.com/watch?v=xb\\_xndPe4n0&t=390s](https://www.youtube.com/watch?v=xb_xndPe4n0&t=390s)

### E-BOOKS:

1. “**Engineering Chemistry**” (NPTEL Web-book), by B.L. Tembe, Kamaluddin and M.S. Krishnan.

I B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	30	70	100	3
SUBCODE: R20CC1106	<b>PYTHON PROGRAMMING</b> (Common to CSE & IT)						

### COURSE OBJECTIVE:

- To teach problem solving through flow charting tool-Raptor.
- To elucidate problem solving through python programming language.
- To introduce function oriented programming paradigm through python.
- To train in development of solutions using modular concepts.

### COURSE OUTCOMES:

After successful completion of this course, the students would be able to:

**CO 1:** Summarize the fundamental concepts of python programming. [K2]

**CO 2:** Interpret object oriented and event driven programming in python. [K2]

**CO 3:** Apply the suitable data structures to solve the real time problems. [K3]

**CO 4:** Apply regular expressions for many different situations. [K3]

### SYLLABUS:

#### UNIT-I

**Introduction to python:** Numbers, strings, variables, operators, expressions, Indentation, String operations and functions, math function calls, Input/output statements, conditional if, while and for loops,

#### UNIT-II

**Functions:** user defined functions, parameters to functions, recursive functions, and lambda function.

**Event driven programming:** Turtle graphics, Turtle bar chart, Widgets, key press events, mouse events, timer events.

#### UNIT-III

**Data structures:** List- list methods & functions, Tuple-tuple methods & functions, Dictionaries-dictionary methods & functions, traversing dictionaries. Sets-methods & functions, Files.

#### UNIT-IV

**OOP:** class, object, methods, constructors, inheritance, inheritance types, polymorphism, operator overloading, abstract classes, exception handling.

#### UNIT-V:

**Regular expressions:** Power of pattern matching and searching using regex in python, Meta characters and Sequences used in Patterns, Password, email, URL validation using regular expression, Pattern finding programs using regular expression.

### TEXT BOOKS:

1. Kenneth Lambert, "Fundamentals of Python: First Programs", ISBN-13: 978-1337560092, cengage learning publishers, first edition, 2012.
2. Allen B. Downey, "think python: how to think like a computer scientist", ISBN-13: 978-1491939369, O'reilly, 2<sup>nd</sup> edition, 2016.
3. Reema Thareja, "Python Programming using Problem Solving Approach", ISBN-13: 978-0-19-948017-3, Oxford University Press, 2017.

### REFERENCE BOOKS:

1. Vamsi kurama, "Python programming : A modern approach", ISBN-978-93-325-8752-6, pearson, 2018.
2. Mark Lutz, "Learning python", ISBN: 1-56592-464-9, Orielly, 4th edition, 1999.
3. W.Chun, "Core python programming", ISBN-13: 978-0132269933, pearson, 2nd edition, 2016.

### WEB RESOURCES:

1. <https://raptor.martincarlisle.com/>
2. <http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf>
3. [https://zhanxw.com/blog/wp-content/uploads/2013/03/BeautifulCode\\_2.pdf](https://zhanxw.com/blog/wp-content/uploads/2013/03/BeautifulCode_2.pdf)
4. <http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf>
5. <https://www.cse.msu.edu/~stockman/ITEC/Scratch/BGC2011Scratch-Rev1.pdf>
6. <https://nostarch.com/scratchplayground>
7. <http://fusecontent.education.vic.gov.au/9f79537a-66fc-4070-a5ce-e3aa315888a1/scratchreferenceguide14.pdf>

I B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	30	70	100	3
SUBCODE: R20CC1208	<b>ELECTRONIC DEVICES AND LOGIC DESIGN</b>						

### COURSE OBJECTIVES:

- To discuss the characteristics of semiconductor diodes.
- To illustrate the different types of Transistors and their applications.
- To demonstrate the basics of Boolean algebra and reduction techniques.
- To design of combinational circuits.
- To design sequential circuits like registers and counters.

### COURSE OUTCOMES:

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

**CO1:** Apply P-N diodes and Special diodes in electronic circuits.[K3]

**CO2:** Compare different types of transistors (BJT, FET and MOSFET) with their working principles.[K2]

**CO3:** Make use of Boolean algebra and K-map and to minimize combinational functions.[K3]

**CO4:** Develop combinational circuits and sequential circuits.[K3]

**CO5:** Construct different types of registers and counters.[K3]

### SYLLABUS:

#### UNIT I: Junction Diode Characteristics

Open circuited PN Junction, Forward and Reverse bias, V-I characteristics, Applications of Diode – Switch, Rectifiers (without and with filters), Zener Diode characteristics, Zener as voltage regulator, LED.

#### UNIT II: Transistors

BJT, Configuration of BJT, Input and Output Characteristics of CB, CE and CC Configuration, JFET, MOSFETs – Construction, Characteristics and Applications, Comparison between BJT and JFET, Comparison between JFET and MOSFET.

#### UNIT III: Number Systems, Logic Gates and Boolean algebra

Binary, Octal, Decimal and Hexadecimal Number Systems, Conversion of Numbers from one Radix to another Radix, 1's Complement and 2's Complement.

Basic Gates- AND, OR and NOT, Universal Gates- NAND and NOR, EX-OR and EX-NOR Gates, De-Morgan's Laws, Minimization of Logic Functions using Boolean Theorems and Karnaugh map method.

#### UNIT IV: Combinational and Sequential Logic Circuits

Combinational: Design of Half Adder, Full Adder, Half Subtractor, Full Subtractor, Design of Decoders, Encoders, Multiplexers, Demultiplexers. Sequential: Basic sequential logic circuits: Latch and Flip-Flop, Truth tables and excitation tables of RS, JK, T and D Flip-Flops.

### **UNIT V: Registers and Counters**

Buffer Register, Control Buffer Register, Bidirectional Shift Registers, Universal Shift Registers. Synchronous Counter, Ripple Counter, Ring Counter, Modulus Counter.

#### **TEXT BOOKS:**

1. Electronic Devices and Circuits – J. Millman, C.C. Halkias, TMGH, 2<sup>nd</sup> Edition 1998.
2. Digital Design – M. Morris Mano, Pearson, 3<sup>rd</sup> Edition, 2009.

#### **REFERENCES:**

1. Electronic Devices and Circuits Theory- Robert L. Boylestad and Louis Nashelsky, Pearson Education, 9<sup>th</sup> Edition, 2008.
2. Fundamentals of Logic Design- Charles H. Roth, Jr, Thomson Learning, 5<sup>th</sup> Edition, 2005.

#### **WEB REFERENCES:**

1. Student Resources provided in <https://www.electronics-tutorials.ws/> for basic electronic circuits
2. <http://nptel.ac.in/courses/117105080/> on Electronics and Communication Engineering
3. <http://www2.ece.ohio-state.edu/ee327/> Electronic Devices and Circuit laboratory
4. <https://searchworks.stanford.edu/view/11352963> for fundamentals of Electronics available in Digital Library
5. <https://archive.org/details/ElectronicDevicesCircuits>
6. <https://www.youtube.com/watch?v=CeD2L6KbtVM>
7. [http://onlinecourses.nptel.ac.in/noc20\\_ee70/preview](http://onlinecourses.nptel.ac.in/noc20_ee70/preview)



## DEPARTMENT OF INFORMATION TECHNOLOGY

I B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	1	3	30	70	100	2.5
SUBCODE: R20CC1108	<b>LINUX PROGRAMMING LAB</b>						

### COURSE OBJECTIVES:

- Facility with UNIX command syntax and semantics.
- Ability to read and understand specifications, scripts and programs.
- Individual capability in problem solving using the tools presented within the class.

### COURSE OUTCOMES:

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

**CO 1:** Apply the fundamental UNIX utilities. [K3]

**CO 2:** Utilize the Unix file system[K3]

**CO 3:** Experiment with shell and UNIX filters. [K3]

**CO 4:** Analyze the Shell Programming constructs to develop shell scripts. [K4]

### LIST OF EXPERIMENTS

#### WEEK1

1. Execution of various basic and file related commands in unix.  
basic and file related commands: man, echo, passwd, uname, who, date, stty, pwd, cd, mkdir, rmdir, ls, cp, mv, rm, cat, more, wc, ln.

#### WEEK2

2. Execution of various disk related commands.  
disk related commands: df, dfspace, du, ulimit
3. Execution of various process related commands.  
process related commands: ps, kill, nice, at, batch, crontab

#### WEEK3

4. Use the following file permission related commands.  
a) chmod, b) chown, c) chgrp d) umask
5. Execution of various basic filters in unix.  
Filters: head, tail, cut, paste, sort, uniq, cmp, diff, comm and tr

#### WEEK4

6. Use the following shell metacharacters.  
a) I/O Redirection (>, <, >>, <<, |)  
b) Filename substitution ( ?, \*, [...])  
c) Quoting metacharacters (\, "...", '...', `cmd`)  
d) Process execution (;, (), &, &&, ||)  
e) Positional parameters (\$1 to \$9)

#### WEEK5

7. a) Write a grep command that selects the lines from the file1 that have exactly three characters  
b) Write a grep command that selects the lines from the file1 that have at least three characters.

- c) Write a grep command that selects the lines from the file1 that have three or fewer characters
- d) Write a grep command that selects the lines from the file1 that have the string UNIX.
- e) Write a grep command that selects the lines from the file1 that have only the string UNIX.

### WEEK6

- 8. a) Write a sed command that deletes the first character in each line in a file
- b) Write a sed command that deletes the character before the last character in each line in a file.

### WEEK7

- 9. a) Write an awk command to print the lines and line number in the given input file
- b) Write an awk command to print first field and second field only if third field value is  $\geq 50$  in the given input file.

### WEEK8

- 10. a) Write A shell script that takes a command –line argument and reports on whether it is directory, a file, or something else
- b) Write a shell script that accepts one or more file name as a arguments and converts all of them to uppercase, provided they exists in the current directory
- c) Write a shell script that determines the period for which a specified user is working on the system

### WEEK9

- 11. a) Write a shell script that accepts a file name starting and ending line numbers as arguments and displays all the lines between the given line numbers
- b) Write a shell script that deletes all lines containing a specified word I one or more files supplied as arguments to it.

### WEEK10

- 12. a) Write a shell script that computes the gross salary of a employee according to the following
  - 1) if basic salary is  $< 1500$  then HRA 10% of the basic and DA =90% of the basic
  - 2) if basic salary is  $> 1500$  then HRA 500 and DA =98% of the basicThe basic salary is entered interactively through the key board
- b) Write a shell script that accepts two integers as its arguments and computes the value of first number raised to the power of the second number

### WEEK 11

- 13. a) Write an interactive file handling shell program. Let it offer the user the choice of copying, removing, renaming or linking files. Once the user has made a choice, have the program ask the user for necessary information, such as the file name ,new name and so on.
- b) Write a shell script that takes a login name as command –line argument and reports when that person logs in
- c) Write a shell script which receives two files names as arguments. It should check whether the two file contents are same or not. If they are same then second file should be deleted.

### WEEK 12

- 14. a) Write a shell script that displays a list of all files in the current directory to which the user has read write and execute permissions

- b) Develop an interactive script that asks for a word and file name and then tells how many times that word occurred in the file.
- c) Write a shell script to perform the following string operations.
  - 1) To extract a sub string from a given string
  - 2) To find the length of a given string

### WEEK 13

- 15. a) Write a shell script to display reverse numbers from given argument list
- b) Write a shell script to display factorial value from given argument list
- c) Write a shell script to search given number using binary search.
- d) Write a shell script to sort the elements in a array using bubble sort technique

### WEEK 14

- 16. a) Write a C program that simulate the following unix commands
  - 1. mv
  - 2. cp
- b) Write a C program that simulates ls command.

### TEXT BOOKS:

- 1. The Unix programming Environment by Brian W. Kernighan & Rob Pike, Pearson.
- 2. Introduction to Unix Shell Programming by M.G.Venkateshmurthy, Pearson.

### REFERENCE BOOKS:

- 1. Unix and shell programming by B.M. Harwani, OXFORD university press.
- 2. Unix Concepts and Applications by Sumitabha Das, 4thEdition., Tata McGraw Hill.

### WEB REFERENCES:

- 2. <https://www.learnshell.org>
- 3. <https://www.udemy.com/shellprogramming/> 3
- 4. <https://www.edureka.co/unix>
- 5. <https://www.goeduhub.com/8761/online-tutorial-training-certification-in-linux-unix>

## DEPARTMENT OF INFORMATION TECHNOLOGY

I B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	15	35	50	1.5
SUBCODE: R20CC11L3	<b>PROBLEM SOLVING USING PYTHON LAB</b> (Common to CSE & IT)						

### COURSE OBJECTIVE:

- To introduce programming through Visual programming tool - Scratch
- To teach problem solving through Flow charting tool - Raptor
- To elucidate problem solving through python programming language
- To introduce function-oriented programming paradigm through python
- To train in development of solutions using modular concepts
- To teach practical Python solution patterns

### COURSE OUTCOMES:

After successful completion of this course, the students would be able to:

**CO1:** Develop interactive visual programs using Scratch.[K3].

**CO2:** Develop Python programs for numerical and text based problems. [K3].

**CO3:** Develop graphics and event based programming using Python. [K3].

**CO4:** Develop Python programs on object oriented programming and regular expressions. [K3].

### LABORATORY EXPERIMENTS

#### WEEK-1:

1. Design a script in Scratch to make a sprite to draw geometrical shapes such as Circle, Triangle, Square, and Pentagon.
2. Design a script in Scratch to make a sprite to ask the user to enter two different numbers and an arithmetic operator and then calculate and display the result.

#### WEEK-2:

3. Design a Python script to convert a Binary number to Decimal number and verify if it is a Perfect number.
4. Design a Python script to determine if a given string is a Palindrome using recursion
- 5.

#### WEEK-3:

6. Design a Python script to sort numbers specified in a text file using lists.
7. Design a Python script to determine the difference in date for given two dates in YYYY:MM:DD format  $0 \leq YYYY \leq 9999$ ,  $1 \leq MM \leq 12$ ,  $1 \leq DD \leq 31$  following the leap year rules.

#### WEEK-4:

8. Design a Python Script to determine the Square Root of a given number without using inbuilt functions in Python.
9. Design a Python Script to determine the time difference between two given times in HH:MM:SS format.  $0 \leq HH \leq 23$ ,  $0 \leq MM \leq 59$ ,  $0 \leq SS \leq 59$ .
10. Write a Python program to convert a date of yyyy-mm-dd format to dd-mm-yyyy format.

#### WEEK-5:

11. Design a Python Script to convert a given number to words

12. Design a Python Script to convert a given number to roman number.

### WEEK-6:

13. Design a Python Script to generate the frequency count of words in a text file.
14. Design a Python Script to print a spiral pattern for a 2 dimensional matrix.

### WEEK-7:

15. Write a Python program to convert a given tuple of positive integers into an integer.
16. Write a Python program to create a dictionary grouping a sequence of key-value pairs into a dictionary of lists.  
Original list:  
[('yellow', 1), ('blue', 2), ('yellow', 3), ('blue', 4), ('red', 1)]  
Grouping a sequence of key-value pairs into a dictionary of lists:  
{'yellow': [1, 3], 'blue': [2, 4], 'red': [1]}

### WEEK-8:

17. Write a Python program to remove the intersection of a 2nd set from the 1st set.
18. Write a Python program to count the number of strings where the string length is 2 or more and the first and last character are same from a given list of strings.  
SampleList:['abc','xyz','aba','1221']  
Expected Result : 2

### WEEK-9:

19. Design a Python script to generate statistical reports Minimum, Maximum, Count, Average, Sum etc) on public datasets.
20. Design a Python script using the Turtle graphics library to construct a turtle bar chart representing the grades obtained by N students read from a file categorising them into distinction, first class, second class, third class and failed.

### WEEK-10:

21. Write a Python program to replace all occurrences of space, comma, or dot with a colon.
22. Write a Python program to match a string that contains only upper and lowercase letters, numbers, and underscores.

### WEEK-11:

23. Write a Python program to check that a string contains only a certain set of characters in this case a-z, A-Z and 0-9
24. Write a Python program to find the occurrence and position of the substrings within a string.

### WEEK-12:

25. Design a Python script on oop's concepts: Class variables and instance variable  
i. Robot ii) ATM Machine
26. Virtual Lab: <http://ps-iiith.vlabs.ac.in/> any three programs must be submitted with result from the above link.

### TEXT BOOKS:

1. Kenneth Lambert, "Fundamentals of Python: First Programs" , ISBN-13: 978-1337560092,cengage learning publishers, first edition,2012.

2. Allen B. Downey, “think python: how to think like a computer scientist”, ISBN-13: 978-1491939369, O’reilly, 2<sup>nd</sup> edition, 2016.
3. Reema Thareja, “Python Programming using Problem Solving Approach”, ISBN-13:978-0-19-948017-3, Oxford University Press, 2017.

**REFERENCE BOOKS:**

1. Vamsi kurama, “Python programming : A modern approach”, ISBN-978-93-325-8752-6,pearson,2018.
2. Mark Lutz , “Learning python”, ISBN: 1-56592-464-9,Orielly, 4<sup>th</sup> edition, 1999 .
3. W.Chun, “Core python programming”, ISBN-13: 978-0132269933, pearson, 2<sup>nd</sup> edition, 2016.

**WEB RESOURCES:**

1. <https://raptor.martincarlisle.com/>
2. <http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf>
3. [https://zhanxw.com/blog/wp-content/uploads/2013/03/BeautifulCode\\_2.pdf](https://zhanxw.com/blog/wp-content/uploads/2013/03/BeautifulCode_2.pdf)
4. <http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf>
5. <https://www.cse.msu.edu/~stockman/ITEC/Scratch/BGC2011Scratch-Rev1.pdf>
6. <https://nostarch.com/scratchplayground>
7. <http://fusecontent.education.vic.gov.au/9f79537a-66fc-4070-a5ce-e3aa315888a1/scratchreferenceguide14.pdf>

I B.TECH II SEMESTERS	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	15	35	50	1.5
SUBCODE: R20CC11L5	<b>ENGINEERING CHEMISTRY LAB (COMMON TO ALL BRANCHES)</b>						

### **COURSE OBJECTIVES:**

- To provide the students with a solid foundation in chemistry laboratory required to solve the engineering problems.
- To expose the students in practical aspects of the theoretical concepts.
- To train the students on how to handle the instruments.

### **COURSE OUTCOMES:**

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

**CO 1:** Develop and perform analytical chemistry techniques to address the water related problems (hardness, alkalinity, Chlorine, DO). [K6]

**CO 2:** Explain the functioning of different analytical instruments.[K5]

**CO 3:** Compare viscosity and surface tension of different oils.[K4]

**CO 4:** Measure molecular/system properties such as strength of solutions, conductance of solutions and acid number of lubricating oils, etc.[K5]

### **LIST OF EXPERIMENTS**

Introduction to chemistry laboratory–Molarity, Normality, Primary, Secondary standard solutions, Volumetric titrations, Quantitative analysis, Qualitative analysis etc.

1. Estimation of NaOH using standard HCl solution
2. Determination of hardness of water sample by EDTA method
3. Determination of alkalinity of water sample
4. Determination of Dissolved Oxygen content of water sample by Winkler's method
5. Determination of Dissolved Chlorine by Mohr's method
6. Estimation of  $\text{Fe}^{+2}$  by using  $\text{KMnO}_4$
7. Preparation of phenol formaldehyde resin/Urea formaldehyde
8. Conductometric titration between strong acid and strong base
9. Determination of viscosity of a liquid by Ostwald's viscometer
10. Determination of surface tension of a liquid by Stalagmeter
11. Determination of moisture content present in given coal sample
12. Determination of acid value of an oil

### **VIRTUAL LABS:**

1. Soil Analysis- Determination of pH of soil
2. Water analysis - Determination of Physical parameters



**TEXT BOOKS:**

1. N.K Bhasin and Sudha Rani “**Laboratory Manual on Engineering Chemistry**” 3/e, Dhanpat Rai Publishing Company (2007).
2. Mendham J, Denney RC, Barnes JD, Thosmas M and Sivasankar B “**Vogel’s Quantitative Chemical Analysis**” 6/e, Pearson publishers (2000).
3. Sudharani, “**Lab manual on Engineering Chemistry**” Dhanpat Rai Publications, Co., New Delhi. (2009).

**WEB REFERENCES:**

1. URL: <https://vlab.amrita.edu>

I B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	1	2	15	35	50	2
SUBCODE: R20CC12L3	<b>R PROGRAMMING LAB</b>						

### **COURSE OBJECTIVES:**

- To make the student to get a clear understanding of the core concepts of R like import data in various formats for statistical computing, data manipulation, business analytics etc.
- To implement various functions, data structures.

### **COURSE OUTCOMES:**

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

**CO 1:** Apply the all basic operators on various data types.[K3]

**CO 2:** Develop programs using Conditional Statements and various types of loops.[K3]

**CO 3:** Develop programs using Matrices, Lists and Frames.[K3]

**CO 4:** Develop programs using Functions, Math functions and Statistical functions in R.[K3]

**CO 5:** Analyze the real word datasets presented in different formats using R libraries to perform exploratory data analysis and visualization.[K3]

### **LIST OF EXPERIMENTS**

#### **EXERCISE 1:**

- Write a program to illustrate basic Arithmetic in R
- Write a program to illustrate Variable assignment in R
- Write a program to illustrate data types in R

#### **EXERCISE 2:**

- Write a program to illustrate if-else-else if in R
- Write a Program to illustrate While and For loops in R
- Write a program to illustrate Logical & and Logical | operators in R.

#### **EXERCISE 3:**

- Write a program to illustrate creating and naming a vector in R
- Write a program to illustrate create a matrix and naming matrix in R
- Write a program to illustrate Add column and Add a Row in Matrix in R
- Write a program to illustrate Selection of elements in Matrixes in R
- Write a program to illustrate Performing Arithmetic of Matrices

#### **EXERCISE 4:**

- How to Create a Matrix in R
- Print dimension of the matrix with dim()
- Construct a matrix with 5 rows that contain the numbers 1 up to 10 and byrow = FALSE
- Print dimension of the matrix with dim()
- Add a Column to a Matrix with the cbind()
- Slice a Matrix
- Write a program to illustrate Compare Matrices and Compare vectors

#### **EXERCISE 5:**

- Write a program to illustrate Factors in R
- Case study of why you need use a Factor in R

- c) Write a program to illustrate Ordered Factors in R

### EXERCISE 6:

- a) How to Create a Data Frame
- b) Slice Data Frame
- c) Append a Column to Data Frame
- d) Select a Column of a Data Frame
- e) Subset a Data Frame
- f) Write a program to illustrate Data Frame Selection of elements in a Data frame
- g) Write a program to illustrate Sorting a Data frame
- h) Merge Data Frames in R: Full and Partial Match

### EXERCISE 7:

- a) Write a program to illustrate List ? Why would you need a List
- b) Write a program to illustrate Adding more elements into a List

### EXERCISE 8:

- a) Write a program to illustrate Function inside function in R
- b) Write a program to illustrate some built in Mathematical Functions.
- c) Write a program to calculate mean, mode, SD, variance.

### EXERCISE 9:

Cleaning data in R:

- a) Characteristics of Clean Data and Messy Data
- b) Load Data into R with readxl
- c) View the Data with tidyr::glimpse()
- d) Looking to Data Types
- e) Comparing to read.csv()
- f) Combining Datasets
- g) Clean Up Column Names with magrittr Magic!
- h) The Pipe Operation

### EXERCISE 10:

Data visualization in R:

- a) Histogram
- b) Bar / Line Chart
- c) Box plot
- d) Scatter plot
- e) Heat Map
- f) Mosaic Map
- g) Map Visualization
- h) 3D Graphs
- i) Correlogram
- j) Write a program to illustrate Customizing and Saving to Graphs in R.

### TEXT BOOKS:

1. Robert I. Kabacoff, R in Action-Data analysis and graphics with R, 2e, Manning Publications
2. David Dietrich, Barry Heller, and Beibei Yang, Data Science & Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data, EMC Education Services, John Wiley & Sons, Inc.

**REFERENCE BOOKS:**

1. Garrett Grolmund, Hands-On Programming with R, Orielly.
2. Paul Teetor, R Cookbook, O'Reilly

**WEB REFERENCES:**

1. <https://rpubs.com/>
2. <https://b-ok.asia/ireader/2604048>
3. [https://d1b10bmlvqabco.cloudfront.net/attach/ighbo26t3ua52t/igp9099yy4v10/igz7vp4w5su9/OReilly\\_HandsOn\\_Programming\\_with\\_R\\_2014.pdf](https://d1b10bmlvqabco.cloudfront.net/attach/ighbo26t3ua52t/igp9099yy4v10/igz7vp4w5su9/OReilly_HandsOn_Programming_with_R_2014.pdf)
4. <https://www.guru99.com/r-matrix-tutorial.html>
5. <https://www.guru99.com/r-data-frames.html>
6. <https://www.guru99.com/r-sort-data-frame.html>
7. <https://www.guru99.com/r-dplyr-tutorial.html>
8. <https://www.guru99.com/r-merge-data-frames.html>
9. <https://www.guru99.com/r-functions-programming.html>
10. <https://www.dataquest.io/blog/load-clean-data-r-tidyverse/>
11. <https://www.analyticsvidhya.com/blog/2015/07/guide-data-visualization-r/>

I B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	2	-	-	-	-	-	0
SUBCODE: R20CCMC1	<b>ENVIRONMENTAL STUDIES</b> (COMMON TO ALL BRANCHES)						

### **COURSE OBJECTIVES:**

- To make the students aware about the environment and its inter-disciplinary, to familiarize the concept of ecosystem and their importance, basic understanding of the ecosystem and its diversity.
- Overall understanding of the natural resources.
- To bring the awareness among students about the importance of biodiversity and the need for its conservation.
- To make the students understand the adverse effects of environmental pollution, its causes and measures to control it.
- Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities. Awareness on the social issues, environmental legislation and global treaties understanding the environmental policies and regulations.

### **COURSE OUTCOMES:**

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

- CO 1:** Explain the concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food web.[K2]
- CO 2:** Analyze the natural resources and their importance for the sustenance of the life and recognize the need to conserve the natural resources.[K4]
- CO 3:** Explain the biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity.[K2]
- CO 4:** Distinguish various attributes of the pollution, their impacts and measures to reduce or control the pollution along with waste management practices.[K4]
- CO 5:** Interpret Environmental policy, legislation, environmental assessment and the stages involved in EIA Environmental audit.[K2]

### **UNIT – I**

Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance – Need for Public Awareness. Institutions and people in Environment.

#### **Ecosystems:**

Definitions and concepts – Characteristics of ecosystem – Structural and functional features – Producers, consumers and decomposers and food webs – Types of ecosystems – Forests, grassland, desert, crop land, pond, lake, river and marine ecosystems – Energy flow in the ecosystem – Ecological pyramids – Ecological successions.

## UNIT – II

Natural Resources: Water resources–Use and over utilization of surface and natural resourced ground water–Floods, drought, conflicts over water, dams–benefits and problems on tribal population & Environment. Forest resources: Use and over–exploitation, deforestation.

Mineral resources: Use and exploitation, tribal & environmental effects of extracting and using mineral resources.

Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer–pesticide problems, water logging, salinity–concept of sustainable agricultural methods.

Energy Resources: Renewable (wind energy, tidal energy) and non renewable energy resources (Fossil fuels, coal).

## UNIT – III

**Biodiversity:** Definition: genetic, species and ecosystem diversity- classification - Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as a mega-diversity nation - Hot-spots of biodiversity

Conservation of biodiversity: Threats to biodiversity: habitat loss, man wildlife conflicts - Endangered and endemic species of India – Conservation of biodiversity: In-Situ conservation and Ex- situ conservation.

## UNIT – IV

Environmental Pollution and Control Technologies: Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, and nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies, Good Agricultural Practices – Drip irrigation, soil erosion and desertification.

Solid Waste Management: Sources, Classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products, Biomedical, Hazardous and e – waste management. Covid-19- and environmental Health –Impact of the Coronavirus-Precautions and infection control.

## UNIT – V

Environmental Policy, Legislation and Environmental Management: Environmental ethics: Issues and possible solutions. Environmental Protection Act, Legal aspects -Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act - Wildlife Protection Act -Forest Conservation Act-Issues involved in enforcement of environmental legislation.

Impact Assessment and its significance - various stages of EIA, preparation of EMP and EIS, Environmental audit, Ecotourism.

Visit to some local Polluted Site: Study of an industrially Polluted area.

## TEXT BOOKS:

1. Anubha Kaushik & C. P. Kaushik, Environmental Studies, New Age International (P) Ltd., New Delhi. Fourth edition, 2014.
2. P. N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani, Environmental Studies, Pearson Education, Chennai. ISBN 978-93-325-2052-3, Second edition-2014.

### REFERENCE BOOKS:

1. Deekshita Dave & P. UdayaBhaskar, Text Book of Environmental Studies Cengage Learning.
2. Shaashi Chawla, a Textbook of Environmental Studies, TMH, New Delhi.
3. Benny Joseph Environmental Studies, Tata McGraw Hill Co, New Delhi.
4. Dr.K.V.S.G. Murali Krishna, Environmental Studies VGS Publishers, Vijayawada, First Edition 2016.
5. Bharucha, E. Text book of Environmental Studies, First edition, Universities Press (India) Pvt., Ltd., Hyderabad, 2005.

### WEB REFERENCES:

- 1.URL: [https://www.youtube.com/watch?v=7G3eXI\\_DPn8](https://www.youtube.com/watch?v=7G3eXI_DPn8)
- 2.URL: <https://www.eolss.net/sample-chapters/C09/E6-70-05-01.pdf>
- 3.URL: <https://www.youtube.com/watch?v=QuRL6NbyvEQ>
- 4.URL: [https://google/ Introduction to Environmental Studies5JM1G2](https://google/Introduction+to+Environmental+Studies5JM1G2)
- 5.URL: <http://www.teacherspayteachers.com/Product/Food-Chains-Trophic-Levels-and-Ecological-Pyramids-PowerPoint> Click the above