NARASARAOPETA ENGINEERING COLLEGE (AUTONOMOUS)

Course Structure and Syllabus

(R20 Regulations)

Civil Engineering

B.Tech – I Year

(Applicable for the Batches admitted from 2020-21

NARASARAOPETA ENGINEERING COLLEGE (AUTONOMOUS)

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

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.

a. Under Category A: 70% of the seats are filled through EAMCET counselling.
b. 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:

(a) 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.

(b) 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 1st 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 3rd 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 5th 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)

(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
≥ 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.

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

Where, Ci is the number of credits of the i^{th} subject and Gi 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.

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

Where 'Si' 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:

Equivalent Percentage = (CGPA – 0.75) x 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	≥ 7.75 (With No subject failures)
First Class	≥ 6.75 (With subject failures)
Second Class	≥ 5.75
Pass Class	≥ 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 revaluate 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 INEXAMINATIONS

➢ 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:

	Nature of Malpractices/ Improper conduct	**Punishment**
	If the candidate:	
1(a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which 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 orally or by any other body language methods or communicates through cell	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is

	phones with any candidate or persons in or outside the exam hall in respect of any matter.	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 – Superintendent /any officer on duty or	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other

	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.	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.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that 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.
8.	Possess any lethal weapon or firearm in 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. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular	Student of the college expulsion from the examination hall and cancellation of the performance

	examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6to 8.	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. 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.

NARASARAOPETA ENGINEERING COLLEGE:: NARASARAOPET

(AUTONOMOUS)

DEPARTMENT OF CIVIL ENGINEERING

R20 COURSE STRUCTURE

B.TECH I YEAR – I SEMESTER

S.No	CODE	SUBJECT NAME	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	L	T	P	C
1	R20CC1103	Engineering Chemistry	30	70	100	3	0	0	3
2	R20CC1102	Matrix Algebra and Calculus	30	70	100	2	1	0	3
3	R20CC1101	Technical and Communicative English-I	30	70	100	3	0	0	3
4	R20CC1107	Engineering Mechanics	30	70	100	2	1	0	3
5	R20CC1105	Problem Solving Using C	30	70	100	3	0	0	3
6	R20CC11L1	Soft skills and Communication Skills Lab-1	15	35	50	0	0	3	1.5
7	R20CC11L5	Engineering Chemistry Lab	15	35	50	0	0	3	1.5
8	R20CC11L2	Problem Solving Using C Lab	15	35	50	0	0	3	1.5
		Total							**19.5**

I BTECH II SEMESTER

S.No	CODE	SUBJECT NAME	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	L	T	P	C
1	R20CC1201	Differential Equations and Vector Calculus	30	70	100	2	1	0	3
2	R20CC1203	Engineering Physics	30	70	100	3	0	0	3
3	R20CC1207	Engineering Drawing	30	70	100	1	0	4	3
4	R20CE1212	Elements of Mechanical and Ele. and Engg.	30	70	100	3	0	0	3
5	R20CE1216	Elements of Building Science	30	70	100	3	0	0	3
6	R20CC12L6	Elements of Mechanical and Ele. and Engg Lab	15	35	50	0	0	3	1.5
7	R20CC12L5	Engineering Physics Lab	15	35	50	0	0	3	1.5
8	R20CC12L4	Engineering Workshop	15	35	50	0	0	3	1.5
9	R20CCMC2	Constitution of India(MC)	15	35	50	2	0	0	0
		Total							**19.5**

B.Tech I Year – I Semester

S.No	CODE	SUBJECT NAME	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	L	T	P	C
1	R20CC1103	Engineering Chemistry	30	70	100	3	0	0	3
2	R20CC1102	Matrix Algebra and Calculus	30	70	100	2	1	0	3
3	R20CC1101	Technical and Communicative English-I	30	70	100	3	0	0	3
4	R20CC1107	Engineering Mechanics	30	70	100	2	1	0	3
5	R20CC1105	Problem Solving Using C	30	70	100	3	0	0	3
6	R20CC11L1	Soft skills and Communication Skills Lab	15	35	50	0	0	3	1.5
7	R20CC11L5	Engineering Chemistry Lab	15	35	50	0	0	3	1.5
8	R20CC11L2	Problem Solving Using C Lab	15	35	50	0	0	3	1.5
		Total							**19.5**

I B.TECH I and II SEMESTERS	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	30	70	100	3
Code: R20CC1103	ENGINEERING CHEMISTRY (COMMON TO ALL BRANCHES)						

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. -**Analyzing**

CO 2: Compare different types of polymers, fuels and their importance-**Analyzing**

CO 3: Utilize the advanced materials as engineering materials and apply them in domestic and industrial life-**Applying**

CO 4: Distinguish electrical energy sources and importance of corrosion science-**Analyzing**

CO 5: Identify different types of engineering materials and applications in engineering. -**Applying**

UNIT-I: WATER CHEMISTRY

Characteristics of water: Sources, Impurities–Hardness and 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 and 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 and 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 and 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, 2nd 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, Cenage Learning India Pvt. Ltd, (2016).

REFERENCE BOOKS:

1. P.C. Jain and M. Jain "**Engineering Chemistry**", ISBN 8187433175, 15/e, Dhanpat Rai and 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=H1Y1oxQ5eUAandt=627s
3. URL: https://www.youtube.com/watch?v=1xWBPZnEJk8
4. URL: https://www.youtube.com/watch?v=p9yPXdT0k48andt=225s
5. URL: https://www.youtube.com/watch?v=xb_xndPe4n0andt=390s

E-Books:

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

I B.TECH-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	2	1	0	30	70	100	3
Code: R20CC1102	**MATRIX ALGEBRA and CALCULUS (Common to All Branches)**						

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

1. Solve the system of linear equations. [**Apply - K3**]
2. Analyze the applications of matrices in various fields and obtain Eigen values and Eigenvectors. [**Analyzing-K4**]
3. Relate the results of mean value theorems in calculus to Engineering problems. [**Understanding-K2**]
4. Apply the functions of several variables to evaluate the rates of change with respect to time and space variables in engineering. [**Apply - K3**]
5. Identify the area and volume by interlinking them to appropriate double and triple integrals. [**Apply - K3**]

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 Jordon 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 DIFFERENTION: (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 BOOKS:

1. Dr. B.S. Grewal, "*Higher Engineering Mathematics*", 43rd Edition, Khanna Publishers, 2012.
2. B.V. Ramana, "Higher Engineering Mathematics", 32nd 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*", 8th Edition, John Wiley, Singapore, 2001.
3. Greenberg M D, "*Advanced Engineering Mathematics*", 2nd Edition, Pearson Education, Singapore, Indian Print, 2003.
4. Peter V. O'Neil, *"Advanced Engineering Mathematics"*, 7th Edition, Cengage Learning, 2011.
5. Bhavanari Satyanarayana, Pradeep Kumar T.V. and Srinivasulu D, "Linear Algebra and Vector Calculus", Studera Press, New Delhi, 2017.

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	30	70	100	3
Code: R20CC1102	TECHNICAL AND COMMUNICATIVE ENGLISH - I (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**: Infer explicit and implicit meaning of a text, recognize key passages; raise questions and summarize it **(Apply-3).**
- **CO2**:Compose paragraphs, essays, emails, letters, reports, resume and transfer information into tables, Pie and bar diagrams. **(Creating-5).**
- **CO3**:Build grammatically correct sentences using a variety of sentence structures **(Apply3).**
- **CO4**:Enhance word power and usage of lexicons **(Apply3).**

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 and 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 and Vocabulary** : Articles, Adjectives, Prepositions
Verbal Competence,
Synonyms and 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 and Resume writing.

e. **Grammar and Vocabulary** : Phrasal verbs, Verbs, Tenses (Present, Past and 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 and 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 and 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
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
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
11. 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
	2	1	0	30	70	100	3
Code: R20CC1107	**ENGINEERING MECHANICS (COMMON TO ME, CE BRANCHES)**						

COURSE OBJECTIVES:

- Learn and understanding the basic principles of mechanics of rigid bodies, various types of force systems and to analyze problems in a simple and logical manner.
- Study and calculate the concepts of wedge friction, and to analyze simple trusses using method of joints and method of sections.
- Study and determine centroids and center of gravity of various standard geometrical shapes as well as composite areas and bodies.
- Learn the concept of moment of inertia and the mathematical calculations involved in finding moments of inertia of two dimensional areas.
- The students are to be exposed to concepts of work, energy and particle motion.

COURSE OUTCOMES:

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

CO 1: **Apply** the principles of mechanics to determine the resultant of several concurrent forces acting on a particle.

CO 2: **Analyz**e the trusses using method of joints and method of sections; apply the basic concepts of dry friction and wedges.

CO 3: **Illustrate** the centroid and center of gravity bodies and composite sections.

CO 4: **Determine** the Area Moment of Inertia and Mass Moment of Inertia of areas bodies and Composite sections.

CO 5: **Apply** the work-energy principle to particles and connected systems for engineering Applications

PREREQUISITES: Vectors, Differential equations and integrations**.**

UNIT–I

INTRODUCTION TO ENGINEERING MECHANICS: Basic Concepts, Characteristics of a Force, Force system, classification, Resultant of Force Systems, parallelogram law of forces, Triangle law of forces.

SYSTEMS OF FORCES: Resolution of forces, Coplanar Concurrent forces, Moment of Force and its Application–Couples, Varignon's theorem.

EQUILIBRIUM OF SYSTEMS OF FORCES: Equations of Equilibrium of Coplanar concurrent forces, Lami's Theorem, support reactions, free body diagrams.

UNIT–II

ANALYSIS OF PLANE TRUSSES: Definition, Assumptions made in the analysis of plane trusses-methods of joints and method of sections.

FRICTION: Introduction, Classification of friction, Laws of Friction, Coefficient of Friction, Angle of Friction, Angle of Repose, Motion of a body on an Inclined Plane, Ladder friction, Wedge friction.

UNIT–III

CENTROID: Centroids of simple figures (from basic principles)-Centroids of composite figures.

CENTRE OF GRAVITY: Centre of Gravity of simple body (from basic principles), Centre of gravity of composite bodies, pappu's theorem.

UNIT-IV

AREA MOMENTS OF INERTIA: Definition, Radius of gyration, Parallel axis theorem, perpendicular axis theorem, Moments of Inertia of composite figures, polar moment of Inertia.

MASS MOMENT OF INERTIA: Moment of Inertia of Rigid body-Moment of Inertia from basic principles-Slender bar, Rectangular Plate, Circular Plate, Moment of Inertia of 3D Bodies-Cone, Solid Cylinder.

UNIT-V

KINETICS: Analysis as a particle, Newton's laws of motion, D'Alembert's principle –simple applications-analysis as a rigid body in translation-fixed axis rotation-Simple applications.

WORK-ENERGY METHOD: Equations for Translation, work-Energy applications to particle motion, connected system-Impulse momentum method-simple applications

TEXT BOOKS:

1. Engineering Mechanics by S.Timoshenko and D.H.Young., 4th Edn - ,Mc Graw Hill publications.
2. Engineering Mechanics by S.S. Bhavikatti-New age publications
3. Engineering Mechanics Statics and Dynamics A.K.TAYAL Umesh publications.

REFERENCE BOOKS:

1. Engineering Mechanics by Fedinand . L. Singer , Harper –Collins.
2. Mechanicsof Materials (In Si Units) by Beer and Johnson, Tata McGraw-Hil.
3. Strengthof Materials (Mechanics of Materials) by James M.Gere and Barry J.Goodno, PWS-KENT Publishing Company, 1990
4. Strengthof Materials (Mechanics of Solids) by R.K. Rajput , S.Chand Publications.

Web References:

https://nptel.ac.in/courses/112103109/142.

https://nptel.ac.in/courses/112103109/113.

https://nptel.ac.in/courses/122104014/4

E-Books:

https://easyengineering.net/engineeringmechanicsbooks/

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	2	1	-	30	70	100	3
Code: R20CC1105	**PROBLEM SOLVING USING C (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]

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 and c programming", isbn 978-0-07- 066909-3, Tata McGraw-Hill, Second Reprint, 2008.

4. Ashok N Kamthane, "Programming with ANSI and Turbo C", Pearson Edition Publications, 2002.

5. Dennis Richie and Brian Kernighan, "The C programming Language", 2nd edition.

WEB REFERENCES:

1. http://cprogramminglanguage.net/

2. http://lectures-c.blogspot.com/

3. http://www.coronadoenterprises.com/tutorials/c/c_intro.htm

4. http://vfu.bg/en/e-Learning/Computer-Basics--computer_basics2.pdf

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	3	15	35	50	1.5
Code: R20CC11L1	**SOFT SKILLS and COMMUNICATION SKILLS LAB (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.

CO 2: Listen and comprehend several accents of English Language

CO 3: Take part in various conversations/discourses using formal and informal expressions.

CO 4: Adapt soft skills successfully in personal and professional life.

UNIT– I

a. Introduction to Phonetics.
b. Listening - TEDx Talks (https://www.ted.com/talks/ashweetha_shetty_how-education-helped-me-rewrite-my-life?language-en#t-623369)
c. Self-Introduction

UNIT–II

a. Pronunciation Rules and Common Errors in Pronunciation.
b. Listening -TEDx Talks(https://www.youtube.com/watch?v=Dk20-E0yx_s)
c. Role Play

UNIT–III

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

UNIT-IV

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

UNIT-V

a. Time Management.

b. Goal Setting.
c. Interpersonal Skills and 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 Havits of Highly Effective People,* Free Press, 1989

I B.TECH I and II SEMESTERS	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	20	30	50	1.5
Code: R20CC11L5	ENGINEERING CHEMISTRY LAB (COMMON TO ALL BRANCHES)						

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)-**Creating**

CO 2: Explain the functioning of different analytical instruments-**Applying**

CO 3: Compare viscosity and surface tension of different oils-**Analyzing**

CO 4: Measure molecular/system properties such as strength of solutions, conductance of solutions and acid number of lubricating oils, etc-**Evaluating**

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 Fe^{+2} by using $KMnO_4$

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 Stalagnometer

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 I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	15	35	50	1.5
Code: R20CC11L2	PROBLEM SOLVING USING C LAB (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:

CO1: Study, analyze and understand logical structure of computer programming and different constructs to develop programs in C Language. [K4]

CO2: Compare and contrast various data types and operator precedence. [K2]

CO3: Analyze the use of conditional and looping statements to solve problems associated with conditions and repetitions. [K4]

CO4: 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:

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

EXERCISE 2

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

EXERCISE 3

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

EXERCISE 4

a) Write a C program to find the sum of individual digits of a positive integer and find the reverse of the given number.
b) 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

a) 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.
b) 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 x 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)+...+(1+2+...+n).
   ii. 1+(2+2)+(3+3+3)+(4+4+4+4)+…+(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:

i. To insert a sub-string in to given main string from a given position.
ii. To delete n Characters from a given position in a given string.
iii. To replace a character of string either from beginning or ending or at a specified location

EXERCISE 13

a) Write a C Program to Implement Taylor series method
b) Write a C Program to Implement Euler's method
c) Write a C Program to Implement Runge Kutta method

EXERCISE 14

a) Write C Program to reverse a string using pointers
b) Write a C Program to compare two arrays using pointers
c) Write a C program to swap two numbers using pointers

EXERCISE 15

a) Write the following C Programs using Dynamic memory management functions.
   i. 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.
   ii. 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

a) Write a C program which copies one file to another.
b) Write a C program to count the number of characters and number of lines in a file.
c) 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.**

TEXT BOOKS:

1. Reema Thareja, " Programming in C", OXFORD.
2. The C programming Language by Dennis Richie and Brian Kernighan 2nd ed.

REFERENCE BOOKS:

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

B.TECH I YEAR – II SEMESTER

S.No	CODE	SUBJECT NAME	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	L	T	P	C
1	R20CC1201	Differential Equations and Vector Calculus	30	70	100	2	1	0	3
2	R20CC1203	Engineering Physics	30	70	100	3	0	0	3
3	R20CC1207	Engineering Drawing	30	70	100	1	0	4	3
4	R20CE1212	Elements of Mechanical and Ele. and Engg.	30	70	100	3	0	0	3
5	R20CE1216	Elements of Building Science	30	70	100	3	0	0	3
6	R20CC12L6	Elements of Mechanical and Ele. and Engg Lab	15	35	50	0	0	3	1.5
7	R20CC12L5	Engineering Physics Lab	15	35	50	0	0	3	1.5
8	R20CC12L4	Engineering Workshop	15	35	50	0	0	3	1.5
9	R20CCMC2	Constitution of India(MC)	15	35	50	2	0	0	0
		Total							**19.5**

I B.TECH-II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	2	1	0	30	70	100	3
Code: R20CC1201	DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS (Common to Civil, EEE, ME and ECE)						

COURSE OBJECTIVES:

1. To formulate and solve first order ordinary differential equations.
2. To solve second order differential equations of various kinds.
3. To find the solution of first order linear and non-linear partial differential equations.
4. The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.

COURSE OUTCOMES:

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

1. Apply first order ordinary differential equations to real life situations. [**Apply - K3**]
2. Identify and apply suitable methods in solving the higher order differential equations. [**Apply - K3**]
3. Solve the partial differentiation equations. [**Apply - K3**]
4. Interpret the physical meaning of different operators as gradient, curl and divergence. [**Understanding - K3**]
5. Estimate the work done against a field, circulation and flux using vector calculus. [**Evaluating – K5**]

UNIT I: DIFFERENTIAL EQUATIONS OF FIRST ORDER AND FIRST DEGREE: (10 hours)

Linear-Bernoulli's-Exact equations and equations reducible to exact form.

Applications: Newton's Law of cooling, Law of natural growth and decay, Orthogonal trajectories, Electrical circuits.

UNIT-II: LINEAR DIFFERENTIAL EQUATIONS OF HIGHER ORDER: (10 hours)

Finding the complementary functions, Inverse operator, Rules for finding the particular integrals, Method of variation of parameters. Cauchy's and Legendre's linear equations, simultaneous linear equations with constant coefficients.

Application: L-C-R Circuit problems.

UNIT – III: FIRST ORDER PARTIAL DIFFERENTIAL EQUATIONS: (10 hours)

Formation of partial differential equation by elimination of arbitrary constants and arbitrary functions, solutions of first order linear (Lagrange's) equations.

UNIT- IV: VECTOR DIFFERENTIATION: (8 hours)

Scalar and vector point functions, vector operator del, del applies to scalar point functions-Gradient, del applied to vector point functions-Divergence and Curl, vector identities.

UNIT- V: VECTOR INTEGRATION: (10 hours)

Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof).

TEXT BOOK :

1. Dr. B.S. Grewal, "*Higher Engineering Mathematics*", 43rd Edition, Khanna Publishers, 2012.
2. B.V.Ramana, "Higher Engineering Mathematics", 32nd Edition, McGraw Hill Education, 2018.
3. Bhavanari Satyanarayana, Pradeep Kumar T.V. and Srinivasulu D, "Linear Algebra and Vector Calculus", Studera Press, New Delhi, 2017.

REFERENCES:

1. Kreyszig E, "*Advanced Engineering Mathematics*", 8th Edition, John Wiley, Singapore, 2001.
2. Greenberg M D, "*Advanced Engineering Mathematics*", 2nd Edition, Pearson Education, Singapore, Indian Print, 2003.
3. Peter V. O'Neil, *"Advanced Engineering Mathematics"*, 7th Edition, Cengage Learning, 2011.
4. N.P. Bali, Bhavanari Satyanarayana, Indrani Promod Kelkar, "*Engineering Mathematics*", University Science Press, (An Imprint of Lakshmi Publications Pvt., Ltd) New Delhi, 2012.

I B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	30	70	100	3
Code: R20CC1203	Engineering Physics (Common to CEandME)						

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: Recognize the experimental evidence of wave nature of light and interference in thin films, Diffraction grating and Polaraisation in various fields. **(Remember) K1**
CO 2: Analyse and understand various types of lasers and optical fibers. **(Analyse) K4**
CO 3: Identifies the crystal structures and XRD techniques. **(Remember) K1**.
CO 4: Knowing the applications of magnetic and superconducting materials in engineering field. **(Remember) K1**
CO 5: Identifies the use of Acoustics and Ultrasonics in engineering field. **(Analyse) K4**

UNIT– I

Interference and 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

Magnetic materials: Magnetic dipole moment- Magnetization- Magnetic Susceptibility- Magnetic permeability –Classification of Magnetic materials – Dia, Para, and Ferro – Hysteresis Loop- Soft and Hard magnetic materials – Applications of Magnetic materials

Superconductivity: Introduction- Properties, Meissner effect - Type-I and Type-II super conductors- BCS theory (Qualitative) – AC and DC Josephson effects - Applications of Superconductors

UNIT-V

Acoustics: Introduction – requirements of acoustically good hall– Reverberation – Reverberation time – Sabine's formula - Absorption coefficient and its determination – Factors affecting acoustics of buildings and their remedial measures.

Ultrasonics: Introduction - Properties - Production by Magnetostriction and Piezoelectric methods – Non Destructive Testing (Qualitative) – Applications.

TEXT BOOKS:

1. A.J. Dekker, "Solid state Physics", ISBN 10: 0333918339 / ISBN 13: 9780333918333, Mc Millan India Ltd, First edition, 2000.
2. M.N. Avadhanulu and P.G. Kshirasagar, "A text book of Engineering Physics", ISBN 81-219-0817-5, S. Chand publications, First Edition, 2011.
3. P. K. Palanisamy, "Engineering Physics", ISBN: 9788183714464, Scitech Publishers, 4th Edition, 2014
4. M.R. Srinivasan, "Engineering Physics", ISBN978-81-224-3636-5, New Age international publishers, 2nd Edition,2014

REFERENCE BOOKS:

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

I B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	1	0	4	30	70	100	3
Code: R20CC1207	ENGINEERING DRAWING (Common to CE and ME)						

COURCE OBJECTIVES:

- The students to use drawing instruments and to draw polygons, engineering Curves and engineering scales.
- The students use to make orthographic projections, projections of points, simple lines and projections of the lines inclined to both the lines.
- The students use to draw the projections of the planes inclined to both the plane.
- The students use to draw the projections of solids and development of surfaces.
- The students use to draw conversion of isometric views to orthographic views vice versa and to learn basic drawing commands in auto cad.

COURSE OUTCOMES:

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

CO1: Construct the geometrical shapes of regular polygons, Engineering Curves, and scales.

CO2: Illustrate the orthographic projections, projections of points, and lines inclined to both the planes.

CO3: Construct the projection of planes inclined to both the planes.

CO4: Analyse the projection of solids and the development of surfaces for regular solids.

CO5: Analyse the conversion of isometric views to orthographic views vice versa.

UNIT– I

The basic concepts in engineering drawing: Introduction to engineering drawing instruments, lettering and dimensioning practice. Geometrical constructions- Constructing regular polygons by general methods.

Curves used in engineering practice: Introduction to conic sections, construction of ellipse parabola, hyperbola by eccentricity method. Construction of ellipse by - Arcs of circles Method, Concentric Circles Method and Oblong Method, and parallelogram methods.

Engineering Scales: Introduction, scales on drawings Representation fraction: Construction of plain, diagonal and vernier scale.

UNIT–II

Orthographic projections- introduction to type of projections, first angle and third angle projections.

Projection of points: Principles of orthographic projection – Convention.

Projections of straight lines:

Projections of straight lines parallel to both the planes, parallel to one plane and inclined to the other plane. Lines inclined to both the planes, determination of true lengths, angle of inclination and traces.

UNIT–III

Projections of planes: regular planes perpendicular / parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.

UNIT-IV

Projections of Solids: introduction to projections of solids, types of solids: prisms, pyramids, cones and cylinders –simple positions and the axis inclined to one of the planes.

Development of surfaces- Development of surfaces of right regular solids- Prisms, Cylinder, Pyramids, Cone and their sectional parts.

UNIT-V

Introduction of isometric views: Isometric projections and orthographic projections. Conversion of isometric views to orthographic views and orthographic views to isometric views.

Introduction to auto cad- Practice on Draw, Edit and Modify commands using auto CAD.

TEXT BOOKS:

1. Engineering Drawing by N.D. Butt, Chariot Publications.
2. Engineering Drawing by K.L.Narayana and P. Kannaiah, Scitech Publishers.

REFERENCE BOOKS:

1. Engineering Graphics for Degree by K.C. John, PHI Publishers.
2. Engineering Drawing by Basant Agarwal and CM. Agarwal, Tata McGraw Hill Publishers.

Web References:

1.URL: https://www.youtube.com/watch?v=ohhdNRtDpCY,

E-Books:

https://www3.nd.edu/~cpoellab/teaching/cse40814/Lecture1-Handouts.pdf

I B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	30	70	100	3
Code: R20CC1212	ELEMENTS OF MECHANICAL AND ELECTRICAL ENGINEERING (For Civil)						

COURSE OBJECTIVES:

- To provide required knowledge on joining, forming, welding and power transmissions.
- To provide required knowledge on power plants and gas turbines.
- To familiarize with the basic DC network.
- To explain the concepts of electrical machines and their characteristics

COURSE OUTCOMES:

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

- Illustrate the types of power plants and applications
- Demonstrate various methods of joining and material processing
- **Analyze** the behaviour of an electrical circuit.
- **Measure** the performance quantities such as losses, efficiency of DC machines

UNIT-I:

Heat Power Generation: Introduction, Steam power generation- Basic cycle, applications. Internal combustion Engines-Classification, applications, Gas turbine-Basic cycle, components of a gas turbine, Types of fuels, Refrigeration cycles-Basics, VCR system.

UNIT-II:

Power Transmission: Different types of power transmission-belt drives, rope drives, chain drives. Gears:-Classification of gears, applications.

UNIT-III:

Joining and Forming Processes: Types of joining-Arc welding, Resistance welding, Gas welding, Brazing and Soldering, Metal forming-Forging, Rolling, Extrusion operations.

Basic laws and Circuits

Active and passive elements-voltage-current-power-power factor-energy-Ohms law-Kirchhoff's Laws-series and parallel circuits-source transformations-delta-wye conversion.

Unit IV: DC Machines

Principle Operation-Constructional features-induced EMF-Types of DC generators-Working of DC motor-Torque expression-3point starter-Speed controls-Losses and Efficiency by direct loading.

Unit V: Transformers

Constructional details-working principle-EMF equation-voltage regulation-losses and efficiency-open/short circuit tests.

Induction Motors:3-Phase Induction motor Construction-working principle-Types-slip-Performance characteristics-1-phase Induction motor working principle-applications

TEXT BOOKS:

1. Mechanical Engineering Science K R Gopala Krishna, Subhas publications.
2. Elements of Mechanical Engineering, M.L. Mathur, F.S.Metha and R.P.Tiwari; Jain Brothers Publications, 2009.
3. D.P.Kothari, I.J.Nagrath, Basic Electrical and Electronics Engineering, 1stedition, McGraw Hill Education (India) Private Limited, 2017.
4. B.L. Theraja, Fundamentals of Electrical Engineering and Electronics, 1stedition, S. Chand Publishing, New Delhi, 2006.

REFERENCES:

1. Production Technology by P.N.Rao by I and II McGraw-Hill publications.
2. Gas turbines, V Ganeshan.
3. S.K.Bhattacharya, Basic Electrical and Electronics Engineering, Pearson Education, 2011.
4. R.K.Rajput, Basic Electrical and Electronics Engineering, University Science Press, New Delhi, 2012.

WEB REFERENCES:

1. https://www.wileyindia.com/power-plant-engineering-as-per-aicte-theory-and-practice.html
2. https://www.classcentral.com/course/swayam-power-plant-engineering-17735
3. https://www3.nd.edu/~cpoellab/teaching/eee40814/Lecture1-Handouts.pdf

I B.TECH II SEMESTERS	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	30	70	100	3
Code: R20CC1216	ELEMENTS OF BUILDING SCIENCES						

COURSE OBJECTIVES:

- Develop knowledge of material science and behavior of various building materials used in construction.
- Identify the construction materials required for the assigned work.
- Provide basic knowledge of all the components of the structure.
- To understand the principle and science in the construction of any structure.

COURSE OUTCOMES:

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

CO1: Classify and understand the applications of basic building materials.
CO2: Understand the applications of advanced building materials.
CO3: Explain the principles and methods of construction of building components.
CO4: Understand the building services and principles of planning.
CO5: Understand the bye-laws in planning of residential buildings.

UNIT – I

Building materials- I

Introduction: Importance – Objectives of study of building materials – Classification of construction materials – Properties of materials.

Stones: Properties of building stones– Relation to their structural requirements – Classification of stones– Dressing of stones –Testing of stones.

Bricks: Composition of good brick earth – Methods of manufacturing of bricks – Qualities of a good brick –Testing of bricks.

Lime: Technical terms – Constituents of lime stone – Classification of lime – Manufacturing of lime.

UNIT – II

Building Materials- II

Wood: Structure – Seasoning of timber – Defects in timber.

Tiles: Characteristics of good tile – Types of tiles – Testing of tiles.

Other Materials: Properties and uses of iron, glass, ceramics, plastics, steel, aluminum, gypsum and fibre-reinforced plastics.

UNIT – III

Building Construction

Foundations: Shallow foundations – Spread, combined, strap and mat footings.

Masonry: Bonds in Stone and brick masonry - Partition walls.

Floors: Materials used – Different types of floors – concrete, tiled floors.

Roofs: Pitched, flat and curved roofs –RCC roofs.

Stairs: Terminology – Types of stairs.

Surface Finishes: Plastering – Pointing – White washing, distempering and Painting – Damp proofing.

UNIT – IV

Building Services and Principles of Building Planning

Ventilation: Necessity – Functional requirements – Natural and mechanical ventilation

Lighting: Day and artificial lighting – Types of lighting in working places.

Fire Protection: Causes – General fire safety requirements – Fire resistant construction.

Principles of Building Planning: Introduction – Selection of site – Principles of building planning.

UNIT – V

Building Regulations and Planning

Building Bye–laws and Regulations: Introduction – Objectives of building bye-laws – Principles underlying building bye-laws – Terminology – Floor area ratio (FAR), Floor space index (FSI) – Classification of buildings as per NBC– Open space requirements – Built up area limitations – Height of the buildings – Wall thickness.

Planning of Residential Buildings: Introduction – Minimum standards for various parts of the buildings – Requirements of different parts and their grouping.

Green Building : Concept of green building – Rating IGBC.

Text Books:

1. S.C.Rangwala, K.S. Rangwala and P.S. Rangwala [2012], *Engineering materials*, Charotar Publishers, Anand.
2. Dr. B.C. Punmia [2008], *Building construction*, Laxmi Publications (P) Ltd., New Delhi.
3. Dr. N. Kumara Swamy and A. KameswaraRao [2012], *Building Planning and Drawing*, Charotar Publishers, Anand.
4. Gurucharan Singh and Jagdish Singh [2009], *Building Planning Designing and scheduling*, Standard publishers Distributors.

Reference Books:

1. S.K. Duggal [2012], *Building materials*, New Age international (P) Ltd., New Delhi.
2. N.L. Arora and B.L. Gupta [2014], *Building construction*, Satyaprakshan publications.
3. S.V. Deodhar [2005], *Building science and planning*, Khanna Publishers, New Delhi.
4. Bureau of Indian Standards, *National Building Code of India – 2016*, New Delhi.
5. V.K. Jain [2009], *Automation Systems in smart and Green Buildings*, Khanna Publications.
6. S.C. Rangwala [2009], *Civil Engineering Drawing*, Charotar Publishing House.

I B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	3	15	35	50	1.5
Code: R20CC12L6	ELEMENTS OF IN MECHANICAL and ELECTRICAL ENGINEERING LAB (For CIVIL)						

Course Objective

To expose the students to the operation of DC motor, Transformer and rectifiers give them experimental skill

After completion of the lab. The students will be able to

CO1: To illustrate different heat engines and its applications

CO2: To join the metal sheets using welding method

CO3: Determine the efficiency and regulation of 1-phase transformer

CO4: **Compute** the performance characteristics of transformers and DC machines through suitable tests.

List of Experiments:

Mechanical

1. To study the Construction and Working of different types of boilers.
2. To study the working and function of mountings and accessories in boilers.
3. To study Two-Stroke and Four-Stroke Diesel Engines.
4. To Study Two-Stroke and Four-Stroke Petrol Engines.
5. To study the vapour compression Refrigeration System and determination of its C.O.P.
6. To determine the viscosity of given fuel/oil sample using viscometer
7. To determine the calorific value of given fuel sample using bomb calorimeter
8. To study the solar heating system
9. To weld a lap joint and butt joint using Arc welding
10. To weld sheet metal using Resistance Welding

Electrical

1. Verification of Kirchhoff's law.
2. Swinburne's test and Predetermination of efficiencies as Generator and Motor
3. Brake test on DC shunt motor. Determination of performance curves
4. Speed control of D.C shunt motor by a) Armature voltage control b) Field flux control method.
5. OC and SC tests on single phase transformer (predetermination of efficiency and regulation).
6. Load test on three-phase induction motor.

Virtual lab:

1. Verification of Kirchhoff's law.
2. Brake test on DC shunt motor. Determination of performance curves

I B.TECH I/II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	3	20	30	50	1.5
Code: R20CC12L5	Engineering Physics Lab (Common to CE and ME)						

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: Understand the principle of physics and interpret them in engineering field and compares the results with theoretical calculations.

CO2: Ability to use modern engineering physics techniques and tools in real time applications in engineering studies.

CO3: The student will be enabled to know about the characteristics and the behaviour of materials in a practical manner and gain knowledge and its usage.

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 and 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

I B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	3	15	35	50	1.5
Code: R20CC12L4	ENGINEERING WORKSHOP (COMMON TO ME, CE BRANCHES)						

COURSE OBJECTIVES:

- To impart knowledge to students to develop their technical skill sets for creating entities from raw material.
- To give hands on training and practice to students for use of various tools, devices, machines.
- To develop ability of students to understand, plan and implement various processes and operations to be performed on the raw material to create object of desired shape and size.
- Enabling the student to understand basic hardware and software tools through practical exposure.

COURSE OUTCOMES:

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

CO 1: Make Use of the various carpentry tools, machines, devices used in engineering practice for preparing different carpentry joints.

CO 2: Make Use of the various fitting tools, machines, devices used in engineering practice for Preparing different Fits.

CO 3: Develop different components using Tin Smithy and black smithy tools.

CO 4: Demonstrate the various house wiring connections for different house wiring connections

CO5: Demonstrate the need of PC hardware components, applications and softwares.

CO6: Explain the knowledge of networks, internet and World Wide Web, Search engines, Netiquette.

CO7: Install and use different software like Windows XP, Linux

CO8: Identify and fix the defective PC and software related issues.

CO9: Formalise with parts of windows word, Excel and Power point.

LIST OF EXPERIMENTS:

TRADES FOR EXERCISE:

CARPENTRY

1. Cross-Lap joint
2. Dove tail joint

FITTING

1. V-fit
2. Square fit

TINSMITHY

1. Square box without lid
2. Tapper tray

HOUSE WIRING

1. Two lamps series connection and parallel connection
2. Fluorescent Tube Wiring and Stair Case Wiring

BLACK SMITHY

1. S-Hook
2. Round rod to square rod

Internet and Networking Infrastructure

Task 1: Demonstrating Importance of Networking, Transmission Media, Networking Devices-Gateway, Routers, Hub, Bridge, NIC, Bluetooth technology, Wireless Technology, Modem, DSL, and Dialup Connection.

Orientation and 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 2: Search Engines and 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 3: 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 4: 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 5 : 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 6: 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 7: Performance Analysis: Features to be covered:-Split cells, freeze panes, group and outline, Sorting, Boolean and Logical operators, Conditional Formatting.

Power Point

Task 8: 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 9: 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.

I B.TECH II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	2	0	0	-	-	-	-
R20CCMC2	CONSTITUTION OF INDIA (MC)						

COURSE OBJECTIVES

1. To train students in understanding the basic structure of Indian Constitution
2. To aware the students about the role of constitution in a democratic society
3. To prepare students to live better and happily with other fellow beings through the application of Fundamental Rights in their lives.
4. To know about the powers of Union Government and State Government

COURSE OUTCOMES

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

CO 1: Examine salient features of Indian Constitution and live accordingly in society and interpret the meaning of Fundamental Rights of State Policy

CO 2: Discover various aspects of Union Government legislation and live up to the Expectations of the rules.

CO 3: Critically examine State Government legislation and improve your living standards by following the rules strictly

CO 4: Examine powers and functions of local bodies such as Municipalities and Panchayats and, take advantage of available resources for better living

CO 5: Analyze the powers and functions of Election Commission and The Union Public Service Commission and decide upon it for safe and secured life.

UNIT-I: INTRODUCTION TO INDIAN CONSTITUTION and FUNDAMENTAL RIGHTS

Meaning of the term Indian Constitution –Preamble- Constituent Assembly- Salient Features of Indian Constitution. Fundamental Rights - Fundamental Duties -The Directive Principles of State Policy.

UNIT-II: UNION GOVERNMENT

Union Government -Union Legislature (Parliament) -Lok Sabha and Rajya Sabha (with Powers and Functions) -Union Executive -President of India (with Powers and Functions) -Prime Minister of India (with Powers and Functions) -Union Judiciary (Supreme Court) -Jurisdiction of the Supreme Court

UNIT-III: STATE GOVERNMENT

State Government -State Legislature (Legislative Assembly / Vidhan Sabha, Legislative Council / Vidhan Parishad) -Powers and Functions of the State Legislature -State Executive-Governor of the State (with Powers and Functions) -The Chief Minister of the State (with Powers and Functions) -State Judiciary (High Courts)

UNIT-IV: LOCAL SELF GOVERNANCE

Powers and functions of Municipalities, Panchyats, ZP's and Co – Operative Societies

UNIT-V: SOVEREIGN BODIES

Election Commission of India (with Powers and Functions) -The Union Public Service Commission (with Powers and Functions)

TEXT BOOKS

1. Introduction to constitution of India, Durga Das Basu, Lexis Nexis Publications
2. Constitution of India by PRFESSIONAL BOOK PUBLISHERS
3. The Constitution of India by Arun K Tiru vengadam, Blooms bury publishers.
4. The constitution of India by PM Bakshi, Universal law publishing co
5. The Constitution of India by S.R. Bhansali, Universal law publishing co