AR-20

ACADEMIC REGULATIONS

COURSE STRUCTURE

AND

DETAILED SYLLABUS OF

ELECTRICAL AND ELECTRONICS ENGINEERING

For

B.TECH. FOUR YEAR DEGREE COURSE
(Applicable for the batches admitted from 2020-2021)

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT (AUTONOMOUS)

Approved by AICTE, Accredited by NBA & NAAC,
Recognised under 2(f)12(b) of UGC
Permanently Affiliated to JNTUK, Kakinada
K.Kotturu, Tekkali, Srikakulam-532 201, Andhra Pradesh.

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)
Approved by AICTE, Accredited by NBA & NAAC, Recognized under 2(f) and 12(b) of UGC
Permanently Affiliated to JNTUK, Kakinada
K. Kotturu, Tekkali, Srikakulam-532201, Andhra Pradesh, India

Academic Regulations 2020 (AR20) for B. Tech
(Effective for the students admitted into I year from the Academic Year 2020-21 onwards)

1. Award of B.Tech. Degree:

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

Registered for **160** credits and he/she must secure total **160** credits.

Students, who fail to complete their four-year course of study within **8** years or fail to acquire the **160** Credits for the award of the degree within **8** academic years from the year of their admission, shall forfeit their seat in B. Tech course and their admission shall stand cancelled.

2. Courses of study:

The following courses of study are offered at present with specialization in the B.Tech Course.

S. No.	Branch Code-Abbreviation	Branch
01	01-CE	Civil Engineering
02	02-EEE	Electrical and Electronics Engineering
03	03-ME	Mechanical Engineering
04	04-ECE	Electronics and Communication Engineering
05	05-CSE	Computer Science and Engineering
06	12-IT	Information Technology
07	42-CSE (AI&ML)	CSE (Artificial Intelligence and Machine Learning)

And any other course as approved by the authorities of the University from time to time.

3. Credits (Semester system from I year onwards):

S. No	Course	Credits
1	Mandatory Course	0
2	Theory Course	3
3	Laboratory Course	1.5
4	Integrated Course	4.5
5	Interdisciplinary/Open Elective Course	3
6	Skill-Oriented/Skill-Advanced/Soft Skills Course	2
7	Internship	1.5/03
8	Project work	12

4. Interdisciplinary/Open Electives:

There is one interdisciplinary elective in III year II semester and one open elective in IV year I semester. The student can choose any one interdisciplinary elective/open elective courses offered in the respective semester. The pattern of Midterm examinations and End examinations of these courses is similar to regular theory courses and the valuation is purely internal.

5. MOOCs:

Explore all possibilities to run at least one subject in every semester from II year I semester onwards as a MOOCs.

6. NCC/NSS activities:

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 II year I semester or II year II semester. Grade shall be awarded as Satisfactory or Unsatisfactory in the mark sheet on the basis of participation, attendance, performance and behavior. 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. Evaluation Methodology:

The performance of a student in each semester shall be evaluated with a maximum of **100** marks for theory course, laboratory and other courses. The project work shall be evaluated for **200** marks.

Mandatory Courses:

Mandatory course is one among the compulsory courses and does not carry any Credits. The list of mandatory courses is shown below:

- Induction Program
- Constitution of India
- Environmental Science
- Human Values

No marks or letter grade shall be allotted for all mandatory non-credit courses.

Theory course (100 marks):

For theory course, the distribution shall be **40** marks for internal midterm evaluation and **60** marks for the External End Examinations. Out of **40** internal midterm marks, **25** marks are allotted for descriptive exam, **10** marks for two assignments (**5** marks for each assignment) or one case study (group-wise), and **5** marks for objective test.

Pattern for Internal Midterm Examinations (25 marks):

For theory courses of each semester, there shall be **2** Midterm exams. Each descriptive exam is to be held for **30** marks and will be scaled down to **25** marks, with the duration of **90** minutes.

For final calculation of internal marks, weightage of **70%** will be given to the student who performed well either in first Midterm or second Midterm and **30%** weightage will be given to other Midterm examination.

Midterm paper contains three descriptive type questions with internal choice. Each question carries **10** marks (3×10=30M). The first Midterm examination will be conducted usually after 8 weeks of instruction or after completion of 50% syllabus (i.e. first 3 Units), and the second Midterm examination will be conducted usually at the end of instruction after completion of remaining 50% syllabus (i.e. remaining 3 Units).

Objective test (5 marks):

For theory courses of each semester, there shall be **2** Objective tests to be conducted along with Midterm exam. Each Objective test is to be held for **10** marks with the duration of **10** minutes and will be scaled down to **5** marks.

For final calculation of objective test marks, weightage of **70%** will be given to the student who performed well either in first objective test or second objective test and **30%** weightage will be given to other objective test.

Pattern for External End Examinations (60 marks):

The question paper shall have descriptive type questions for **60** marks. There shall be one question from each unit with internal choice. Each question carries **10** marks. Each course shall consist of six units of syllabus. The student should answer total **6** questions. (6X10M=60M)

Laboratory Course (100 marks):

For laboratory course, there shall be continuous evaluation during the semester for **40** internal marks and **60** semester end examination marks. Out of the **40** marks for internal, **25** marks for day–to–day evaluation, **5** marks for record and **10** marks to be awarded for internal laboratory written test. The end examination shall be conducted by the teacher concerned and external examiner from outside the college.

For the course Engineering Graphics and Design, the distribution shall be **40** marks for internal evaluation (**20** marks for day–to–day evaluation, and **20** marks for internal tests) and **60** marks for end examination.

For the award of marks for internal tests, weightage of **70%** will be given to the student who performed well either in first test or second test and **30%** weightage will be given to other test.

Integrated Course (100 marks):

Integrated courses are exclusively designed to provide a unique learning experience of layered learning where students have a chance to practice while learning. These courses are designed by blending both theory and laboratory components one over the other.

Assessment for **100** marks as given below:

Category	Marks	Assessment
Internal	20	Internal assessment of Laboratory carried out for 40 marks will be scaled down to 20 marks.
	20	Internal assessment of Theory carried out for 40 marks will be scaled down to 20 marks.
End examination	40	End examination of Laboratory carried out for 60 marks will be scaled down to 40 marks.
	20	End examination of Theory carried out for 60 marks will be scaled down to 20 marks.

For Integrated courses, the evaluation of Theory and Laboratory are carried out separately as per evaluation method given in 7.2 and 7.3.

A candidate shall be declared to have passed in integrated course if he/she secures a minimum of **40%** aggregate marks i.e. **40** out of **100** (Internal & Semester-end examination marks put together), subject to a minimum of **35%** marks i.e. **21** marks out of **60** in semester-end examination; in addition to that he/she has to secure minimum of **14** marks (out of **40**) in Laboratory end examination and minimum of **7** marks (out of **20**) in Theory end examination.

Skill Oriented/Skill Advanced Course (100 marks):

Out of a total of **100** marks for the Skill-Oriented/Skill-Advanced Course, **40** marks shall be for the internal evaluation and **60** marks for semester-end examination.

The internal evaluation shall be made on the basis of seminar given by each student on the topic of his/her Skill-Oriented/Skill-Advanced Course, which was evaluated by internal committee constituted by HOD.

The semester-end examination (Viva-Voce) shall be conducted by the committee, consists of an External examiner, Head of the department and Internal supervisor of the Skill-Oriented/Skill-Advanced Course.

Soft Skills (100 marks):

Soft skills shall be evaluated for **100** marks: **40** marks for day-to-day evaluation and **60** marks on the basis of end examination and the valuation is purely internal.

Internship (100 marks):

All the students shall undergo internship for a period minimum of **6** weeks after II year II Semester and III year II Semester. Students have an option of choosing their own industry related to their respective branches.

Self study report for the internship of II year II Semester shall be submitted and evaluated during the III year I Semester and Self study report for the internship of III year II Semester shall be submitted and evaluated during the IV year I Semester.

The Self study report will be evaluated for a total of **100** marks consisting of **40** marks for internal assessment and **60** marks for semester-end examination.

Internal assessment for **40** marks shall be done by the internship supervisor in the industry.

The semester-end examination (Viva-Voce) shall be conducted by the committee, consisting of an External examiner, Head of the department and Internal supervisor of the Internship.

Project (200 marks):

Out of a total of 200 marks for the Project, **80** marks shall be for Project Internal Evaluation and **120** marks for the semester-end Examination.

The Internal Evaluation shall be made on the basis of two seminars given by each student on the topic of his project which was evaluated by an internal committee. Out of **80** internal marks: **20** marks allotted for literature survey, **30** marks for results and analysis, **15** marks for first seminar (usually after 8 weeks) and **15** marks for second seminar (at the end of the semester).

The semester-end examination (Viva – Voce) shall be conducted by the committee, consisting of an External examiner, Head of the Department and Supervisor of the Project. The evaluation of project shall be made at the end of IV year.

Honors/Minor Programme:

Students of a Department/Discipline are eligible to opt for Honors Programme offered by the same Department/Discipline.

Students who are desirous of pursing their special interest areas other than the chosen discipline of Engineering may opt for additional courses in Minor specialization groups offered by a department other than their parent department. Student can also opt for Industry-relevant tracks of any branch to obtain the Minor.

A Student shall be permitted to register for Honors/Minor program at the beginning of II year II semester provided that the student must have acquired a minimum of 8.0 CGPA upto the end of II year I semester without any backlogs. In case of the declaration of the semester results after the commencement of the II year II semester and if a student fails to score the required minimum of 8.0 CGPA, his/her registration for Honors/Minor program stands cancelled and he/she shall continue with the regular programme.

A CGPA of 8.0 has to be maintained in the subsequent semesters without any backlog in order to keep the Honors/Minors registration active.

In addition to fulfilling all the requisites of a regular B.Tech Programme, a student shall earn 20 additional credits to be eligible for the award for B.Tech (Honors/Minor) program.

20 additional credits acquired are excluded from CGPA requirement for the award of B.Tech degree and CGPA requirement for the degree with Honors/Minor.

Of the 20 additional credits to be acquired, 16 credits shall be earned by undergoing specified courses listed as pool, with four courses, and each carrying 4 credits. The remaining 4 credits must be acquired through two MOOC courses, which shall be domain specific, each with a minimum duration of 8 weeks as recommended by the Board of Studies. If no grade is given to any MOOCS course by the evaluator, then grade will be decided by the Department committee and ratified by Board of Studies and Academic Council.

The Committee constituted by the Principal will decide on the minimum enrolments for offering Honors/Minor program. If the minimum enrolment criterion is not met, then the students will be permitted to register for the equivalent MOOC courses as approved by the concerned Board of Studies.

A student shall be permitted to choose only courses as a part of Honors/Minor degree program that he/she has not studied in any form during the regular B.Tech program.

If a student drops or is terminated from the Honors/Minor program, the additional credits so far earned cannot be converted into free or core electives; they will remain extra. These additional courses will find mention in the transcript (but not in the degree certificate.).

In case a student fails to meet the CGPA requirement for Degree with Honors/Minor at any point of registration, he/she will be dropped from the list of students eligible for Degree with Honors/Minor and they will receive regular B.Tech degree only. However, such students will receive a separate grade sheet with a mention of the additional courses completed by them.

Honors/Minor must be completed simultaneously with a major degree program. A student cannot earn Honors/Minor after he/she has already earned bachelor's degree.

8. Attendance Requirements:

A student shall be eligible to appear for the semester-end examinations, if he/she acquires a minimum of **75%** of attendance in aggregate of all the subjects.

Condonation of shortage of attendance in aggregate up to **10%** (**65%** and above and below **75%**) in each semester with genuine reasons shall be approved by a committee duly appointed by the college. The condonation approved otherwise can be reviewed by the College Academic Committee.

A Student will not be promoted to the next semester unless he satisfies the attendance requirement of the present semester. He/she may seek re-admission for that semester when offered next.

Shortage of Attendance below **65%** in aggregate shall in NO case be condoned. Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examination of that class and their registration shall stand cancelled. A fee stipulated by the college shall be payable towards condonation of shortage of attendance.

9. Minimum Academic Requirements:

Conditions for pass and award of credits for a course:

A candidate shall be declared to have passed in individual course if he/she secures a minimum of **40%** aggregate marks i.e. **40** out of **100** (internal & semester-end examination marks put together), subject to a minimum of **35%** marks i.e. **21** marks out of **60** in semester-end examination.

On passing a course of a programme, the student shall earn assigned credits in that Course.

Method of Awarding Letter Grades and Grade Points for a Course:

A letter grade and grade points will be awarded to a student in each course based on his/her performance as per the grading system given below.

Table: Grading System for B.Tech. Programme

Percentage	Level	Letter Grade	Grade Points
>= 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

Calculation of Semester Grade Points Average (SGPA) for semester:

The performance of each student at the end of the each semester is indicated in terms of SGPA.

The SGPA is calculated as below:

$$SGPA = \frac{\Sigma(CR \times GP)}{\Sigma CR} \quad \text{(for all courses passed in a semester)}$$

Where CR = Credits of a Course
GP = Grade points awarded for a course

Calculation of Cumulative Grade Points Average (CGPA) and Award of Divisionfor entire programme:

The CGPA is calculated as below:

$$CGPA = \frac{\Sigma(CR \times GP)}{\Sigma CR} \quad \text{(for the entire programme)}$$

Where CR = Credits of a course
GP = Grade points awarded for a course

- Both SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.
- As per the AICTE regulations, conversion of CGPA into equivalent percentage as follows:
  Equivalent Percentage = (CGPA – 0.50) x 10

Award of Divisions:

Class Awarded	CGPA Secured
First Class with distinction	≥ 7.5
First Class	≥ 6.5 and < 7.5
Second Class	≥ 5.5 and <6.5
Pass Class	≥ 5.0 and <5.5

Supplementary Examinations:

Supplementary examinations will be conducted in every semester.

Conditions for Promotion:

(i) A student will be promoted to second year if he/she satisfies the minimum attendance requirement.

(ii) A student shall be promoted from II to III year only if he fulfills the academic requirement of total **50%** credits (if the number of credits is in fraction, it will be rounded off to a lower digit) from regular and supplementary examinations of I year and II year examinations, irrespective of whether the candidate takes the examination or not.

(iii) A student shall be promoted from III year to IV year only if he fulfills the academic requirements of total **50%** credits (if number of credits is in fraction, it will be rounded off to lower digit) from regular and supplementary examinations of I Year, II Year and III Year examinations, irrespective of whether the candidate takes the examinations or not.

10. Course pattern:

(i) The entire course of study is of four academic years and each year will have TWO Semesters (Total EIGHT Semesters).

(ii) A student is eligible to appear for the end examination in a subject, but when absent for it or failed in the end examinations he/she may appear for that subject's supplementary examinations, when offered.

(iii) When a student is detained due to lack of credits / shortage of attendance, he may be re-admitted when the semester is offered after fulfillment of academic regulations. Whereas the academic regulations hold well with the regulations he/she first admitted.

11. Minimum Instruction Days:

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

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

13. General:

(i) Wherever the words "he," "him," "his," occur in the regulations, they include "she," "her," "hers" as well.

(ii) The academic regulation should be read as a whole for the purpose of any interpretation.

(iii) In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the principal is final.

(iv) The college may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the college.

****

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)
Approved by AICTE, Accredited by NBA & NAAC, Recognized under 2(f) and 12(b) of UGC
Permanently Affiliated to JNTUK, Kakinada
K. Kotturu, Tekkali, Srikakulam-532201, Andhra Pradesh, India

Academic Regulations 2020 (AR20) for B. Tech (Lateral Entry Scheme)
(Effective for the students admitted into II year from the Academic Year 2021-22 onwards)

1. Award of B. Tech. Degree:

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

Registered for **121** credits and he/she must secure total **121** credits.

Students, who fail to complete their three-year course of study within **6** years or fail to acquire **121** Credits for the award of the degree within **6** academic years from the year of their admission shall forfeit their seat in B. Tech course and their admission shall stand cancelled.

2. Promotion Rule:

A lateral entry student will be promoted from II year to III year if he satisfies the minimum required attendance in II year.

A student shall be promoted from III year to IV year only if he fulfills the academic requirements of total **50%** of credits (if the number of credits is in fraction, it will be rounded off to lower digit) from the II Year and III Year examinations, irrespective of whether the candidate takes the examinations or not.

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

****

DISCIPLINARY ACTION FOR MALPRACTICES / IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices/Improper conduct	Punishment
1	If the student 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 student 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.
	If the student gives assistance or guidance or receives it from any other student orally or by any other body language methods or communicates through cell phone with any student or students in or outside the exam hall with respect to any matter	Expulsion from the examination hall and cancellation of the performance in that subject only. In case of an outsider, he will be handed over to the police and a case is registered against him.
2	If the student 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 student is appearing	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student 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.
3	If the student impersonates any other student in connection with the examination	The student who has impersonated shall be expelled from examination hall. The student is also debarred and forfeits the seat. The performance of the original student, who has been impersonated, shall be cancelled in all the subjects of the examination (including practical's and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The student is also debarred for two consecutive semesters from class work and all semester-end examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of the seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4	If the student smuggles the answer book or additional sheet or takes out or arranges to send out the question paper 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 student 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 student is also debarred for two consecutive semesters from class work and all semester-end examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of the seat.
5	If the student uses objectionable, abusive or offensive language in the answer script 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	If the student refuses to obey the orders of the Chief Superintendent/Assistant -Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walkout or instigates others to walk out or threatens the officer-in charge or any person on duty in or outside the examination hall or causes any injury to any of his relatives either by words 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 relatives, or indulges in any other act of misconduct or mischief which results in damage or destruction of property in the examination hall or any part of the	In case of students of the college, they shall be expelled from examination hall and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The students 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.

	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	
7	If the student leaves the exam hall taking away answer script or intentionally tears off 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 student 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 student is also debarred for two consecutive semesters from class work and all university examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of the seat.
8	If the student possesses 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 student 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 student is also debarred and forfeits the seat.
9	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clauses 6, 7, 8	In case of student of the college, expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student 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	If the student 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 student 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 student has already appeared including practical examinations and project work of that semester/year examinations.

Aditya Institute of Technology and Management, Tekkali
R20 – COURSE STRUCTURE (1ST B.Tech.)
(Proposed for EEE)

Year/Sem.	Category	Code	Theory/Lab	L	T	P	C
I B. Tech. (1st Sem)	MC	20MCT101	Induction Program	3 weeks			0
	BSC	20BST101	Linear Algebra and Calculus	2	1	0	3
	BSC	20BST105	Applied Physics	3	0	0	3
	PC	20EET101	Electronic Devices and Circuits	3	0	0	3
	ESC	20EST101	Basic Electrical Engineering	3	0	0	3
	ESC	20ESL102	Workshop and Manufacturing practice	1	0	4	3
	BSC	20BSL101	Physics Lab	0	0	3	1.5
	ESC	20ESL101	Basic Electrical Engineering Lab	0	0	3	1.5
	PC	20EEL101	Electronic Devices and Circuits Lab	0	0	3	1.5
Total				**12**	**1**	**13**	**19.5**

Year/Sem.	Category	Code	Theory/Lab	L	T	P	C
I B. Tech. (2nd Sem)	MC	20MCT102	Environmental Science	2	0	0	0
	HSSC	20HST101	English	3	0	0	3
	BSC	20BST102	Differential Equations	2	1	0	3
	BSC	20BST107	Chemistry	3	0	0	3
	ESC	**20ESI102**	Programming for Problem Solving	3	0	3	4.5
	ESC	20ESL103	Engineering Graphics & Design	1	0	4	3
	HSSC	20HSL101	Language Proficiency Lab	0	0	3	1.5
	BSC	20BSL102	Chemistry Lab	0	0	3	1.5
Total				**14**	**1**	**13**	**19.5**

Category	Subjects (T/L)	Credits
Mandatory Courses	2/0	0
Humanities and Social Science Courses	1/1	4.5
Basic Science Courses	4/2	15
Engineering Science Courses	2/4	15
Professional Core Course	1/1	4.5
Total	**10/8**	**39**

I: Integrated theory

Aditya Institute of Technology and Management, Tekkali

R20 – COURSE STRUCTURE (2nd B.Tech.)

(Proposed for EEE)

Year/Sem.	Category	Code	Theory/Lab	L	T	P	C
II B. Tech. (1st Sem)	MC	20MCT203	Constitution of India	2	0	0	0
	BSC	20BST203	Complex Variables and Statistical Methods	3	0	0	3
	PC	20EET202	D.C Machines & Transformers	2	1	0	3
	PC	20EET203	Electric Circuit Theory	3	0	0	3
	PC	20EET204	Electrical Measurements	3	0	0	3
	PC	20EET205	Electrical Power Generation & Distribution	3	0	0	3
	PC	20EEL202	D.C Machines Lab	0	0	3	1.5
	PC	20EEL203	Electrical Circuits Lab	0	0	3	1.5
	PC	20EEL204	Electrical Measurements Lab	0	0	3	1.5
	SC	20EES201	Skill Oriented Course – I	1	0	2	2
Total				**17**	**1**	**11**	**21.5**

Year/Sem.	Category	Code	Theory/Lab	L	T	P	C
II B. Tech. (2nd Sem)	MC	20MCS204	NCC/NSS	2	0	0	0
	ESC	**20ESI204**	Python Programming	3	0	3	4.5
	ESC	20EST203	Engineering Mechanics	3	0	0	3
	PC	20EET206	A.C Machines	2	1	0	3
	PC	20EET207	Control Systems	3	0	0	3
	OE	20IET21X	Interdisplinary Elective – I	3	0	0	3
	PC	20EEL205	A.C Machines Lab	0	0	3	1.5
	PC	20EEL206	Control Systems Lab	0	0	3	1.5
	SC	20EES202	Skill Oriented Course – II	1	0	2	2
Total				**15**	**1**	**11**	**21.5**
Honors/Minor Course: Electric Vehicles							
	HM	20EVT201	Introduction to Electrical Vehicle Technology	3	1	0	4
Internship (6 weeks) (Mandatory) during summer vacation							

Category	Subjects (T/L)	Credits
Mandatory Courses	1/0	0
Basic Science Courses	1/0	3
Engineering Science Courses	2/1	7.5
Professional Core Course	6/5	25.5
Interdisplinary Elective	1/0	3
Skill Course	2/0	4
Total	**13/6**	**43**

I: Integrated theory

Aditya Institute of Technology and Management, Tekkali
R20 – COURSE STRUCTURE (3rdB.Tech.)
(Proposed for EEE)

Year/Sem.	Category	Code	Theory/Lab	L	T	P	C
III B. Tech. (1st Sem)	MC	20MCT304	Human Values	2	0	0	0
	PC	20XXT309	Professional Core – 8 (Electro Magnetic Field Theory)	3	0	0	3
	PC	20XXT310	Professional Core – 9 (Power Systems –II)	3	0	0	3
	PC	20XXT311	Professional Core – 10 (Power Electronics)	3	0	0	3
	PE	20XXE31X	Professional Elective– I	3	0	0	3
	OE	20IET31X	Interdisplinary Elective – II (Renewable energy sources)	3	0	0	3
	HSSC	20HSL302	Professional Communication Skills Lab	0	0	3	1.5
	PC	20XXL307	Professional Core Lab – 7 (Power Electronics Lab)	0	0	3	1.5
	SC	20SCP33X	Skill Advanced Course – I	1	0	2	2
	I/P	20XXP301	Internship – I	0	0	0	1.5
Total				**18**	**0**	**8**	**21.5**
Honors/Minor Courses (The hours distribution may be 3-0-2 or 3-1-0 also)				**4**	**0**	**0**	**4**

Year/Sem.	Category	Code	Theory/Lab	L	T	P	C
III B. Tech. (2ndSem)	PC	**20XXI312**	Professional Core – 11 (Micro Processor and Micro Controllers)	3	0	3	4.5
	PC	20XXT313	Professional Core – 12 (Switchgear and Protection)	3	0	0	3
	PE	20XXE32X	Professional Elective– II	3	0	0	3
	PE	20XXE33X	Professional Elective– III	3	0	0	3
	PC	20XXT314	Professional Core – 13 (Power System Analysis)	3	0	0	3
	PC	20XXL308	Professional Core Lab – 8 (Electrical Simulation Lab)	0	0	3	1.5
	PC	20XXL309	Professional Core Lab – 9 (Java Programming Lab)	0	0	3	1.5
	SC	20SCP34X	Skill Advanced Course – II	1	0	2	2
Total				**16**	**0**	**11**	**21.5**
Industrial/Research Internship 2 Months (Mandatory) during summer vacation							
Honors/Minor Courses (The hours distribution may be 3-0-2 or 3-1-0 also)				**4**	**0**	**0**	**4**

Category	Subjects (T/L)	Credits
Humanities and Social Science Courses	0/1	1.5
Basic Science Courses	0/0	0
Professional Core Course	5/4	21
Professional Core Elective	3/0	9
Interdisplinary Elective	2/0	6
Skill Course	2/0	4
Internship/Project	1/0	1.5
Total	**13/5**	**43**

I: Integrated theory

Aditya Institute of Technology and Management, Tekkali
R20 – COURSE STRUCTURE (4th B.Tech.)
(Proposed for EEE)

Year/Sem.	Category	Code	Theory/Lab	L	T	P	C
IV B. Tech. (1st Sem)	PC	20XXT415	Professional Core – 14 (Utilization of Electrical Energy)	3	0	0	3
	HSSC	20HST403	MEMS	3	0	0	3
	PE	20XXE44X	Professional Elective – IV	3	0	0	3
	PE	20XXE45X	Professional Elective – V	3	0	0	3
	OE	20OET41X	Open Elective	3	0	0	3
	SC	20SCP451	Soft Skills	1	0	2	2
	PC	20XXL408	Professional Core Lab – 10 (Power Systems Lab)	0	0	3	1.5
	PC	20XXL409	Professional Core Lab – 11 (Industrial Automation Lab)	0	0	3	1.5
	I/P	20XXP402	Internship – II	0	0	0	3
Total				**16**	**0**	**8**	**23**
Honors/Minor Courses (The hours distribution may be 3-0-2 or 3-1-0 also)				**4**	**0**	**0**	**4**

Year/Sem.	Category	Code	Theory/Lab	L	T	P	C
IV B. Tech. (2nd Sem)	I/P	20XXP403	Project work, Seminar and Internship (6 months) in industry	0	0	0	12
Total							**12**

Category	Subjects (T/L)	Credits
Humanities and Social Science Courses	1/0	3
Professional Core Course	1/2	6
Professional Core Elective	2/0	6
Open Elective	1/0	3
Skill Course	1/0	2
Internship/Project	2/0	15
Total	**8/2**	**35**

I: Integrated theory

Aditya Institute of Technology and Management, Tekkali
R20 – COURSE STRUCTURE
(Proposed for EEE)

Category	Subjects (T/L)		Credits
Mandatory Courses	4/0		0
Humanities and Social Science Courses	2/2		9
Basic Science Courses	5/2		18
Engineering Science Courses	6/3		22.5
Professional Core Course	14/12		60
Professional Core Elective	5/0		15
Interdisplinary Elective/Open Elective	3/0		9
Skill Course	5/0		10
Internship/Project	3/0		16.5
Total	**47/19**		**160**

Professional Elective - I

Code	Subject
20XXE31X	Principles of Signals &Systems
20XXE31X	Principles of Pulse and Digital Circuits
20XXE31X	Switching Theory and Logic Design

Professional Elective - II

Code	Subject
20XXE32X	Linear digital Integrated Circuits
20XXE32X	Special electrical machines
20XXE32X	Instrumentation

Professional Elective - III

Code	Subject
20XXE33X	Electric Drives
20XXE33X	High Voltage DC Transmission
20XXE33X	Flexible AC Transmission Systems

Professional Elective - IV

Code	Subject
20XXE44X	Power System Operation and Control
20XXE44X	High Voltage Engineering
20XXE44X	Power Quality Management Systems

Professional Elective - V

Code	Subject
20XXE45X	Artificial intelligence & machine learning
20XXE45X	Smart grid
20XXE45X	Non-Conventional Energy Sources

II-II

Subject Code	Offered by Dept.	Interdisciplinary Elective – I	Offered for Dept.
20IET211	BS&H	Transform Theory	MECH/CIVIL
20IET212	BS&H	Numerical Methods	ECE/EEE
20IET213	BS&H	Introduction to Number Theory	CSE/IT
20IET214	CIVIL	Elements of building planning	MECH
20IET215	CIVIL	Remote Sensing	ECE/EEE/CSE/IT
20IET216	EEE	Mathematical Modeling and Simulation	ECE/MECH/CIVIL/CSE/IT
20IET217	MECH	Fundamentals of Material Science	ECE/EEE/CIVIL/CSE/IT
20IET218	ECE	Introduction to Electronic Measurements	EEE/MECH/CIVIL/CSE/IT
20IET219	CSE	UNIX Utilities	ECE/EEE/MECH/CIVIL
20IET21A	IT	Fundamentals of Data Structures	ECE/EEE/MECH/CIVIL
20IET21B	TPC	Advanced Coding – I	CSE/IT
20IET21C	TPC	Competitive Programming – I	ECE/EEE/MECH/CIVIL

III-I

Subject Code	Offered by Dept.	Interdisciplinary Elective – II	Offered for Dept.
	BS&H	Fundamentals of Fuzzy Logic	All
	CIVIL	Geographical Information System	ECE/EEE/MECH/ CSE/IT
	EEE	Renewable energy sources	ECE/MECH/CIVIL/CSE/IT
	MECH	Fundamentals of ROBOTICS	ECE/EEE/CIVIL/CSE/IT
	ECE	Principles of communications	EEE/MECH/CIVIL/CSE/IT
	CSE	JAVA Programming	ECE/EEE/MECH/CIVIL
	IT	Introduction to DBMS	ECE/EEE/MECH/CIVIL
	TPC	Advanced Coding – II	CSE/IT
	TPC	Competitive Programming – II	ECE/EEE/MECH/CIVIL

IV-I

Subject Code	Offered by Dept.	Open Elective	Offered for Dept.
	MBA	HRD & Organizational behavior	All
	MBA	Project Management	All
	MBA	Entrepreneurial Development	All
	MBA	Digital Marketing	All
	CIVIL	Environmental impact assessment	All
	EEE	Energy Audit Conservation and Management	All
	MECH	Optimization Techniques	All
	CSE	Blockchain Technologies	All
	IT	IT systems Management	All

LINEAR ALGEBRA AND CALCULUS
(Common to all Branches)

Subject Code:20BST101

L	T	P	C
2	1	0	3

Course Objectives:

- Understand the process of calculation of rank, solution of System of Linear Homogeneous and Non Homogeneous equations by Gauss Elimination method.
- Learn the process of calculating the Eigen values, Eigenvectors and Quadratic Forms.
- Understand the concepts of multiple integrals and their usage.
- Learn the properties of Gamma and Beta Functions, their relation and evaluation of improper integrals.
- Understand the concepts of gradient, divergence, curl of scalar and vector point functions.
- Understand and calculate Line Integral, Surface Integral, Volume Integral, concepts of Green's, Stokes and Gauss Divergence theorems in converting one integral form to another

Course Outcomes:

The student will be able to:

1. Calculate the rank and solve linear homogeneous and non homogeneous equations by Gauss Elimination method.
2. Calculate eigen values, eigen vectors and estimate the nature of the matrix..
3. Evaluate multiple integral in both Cartesian and polar coordinates.
4. Apply Beta and Gamma functions to solve improper integrals.
5. Calculate gradient, divergence, curl of a scalar and vector point functions and derive vector identities.
6. Solve a Line Integral, Surface Integral, Volume Integral, apply Green's, Stokes and Gauss Divergence theorems in converting one integral form to another.

Unit – I

Linear System of Equations: Matrices – Rank- echelon form – Normal form – System of Linear Homogeneous and Non Homogeneous equations – Gauss Elimination method- Applications- Matrix representation for a Graph-Current in an electrical circuit. (8 hrs)

Unit – II

Eigen Values, Eigen Vectors, Quadratic Forms: Eigen values – Eigenvectors – Properties (an over view)-Diagonalization- Quadratic Forms- Reduction of Quadratic Forms to Canonical Form- Rank-Nature-Index-Signature. (8 hrs)

Unit – III

Multiple Integrals: Double integral (Cartesian and polar form) -Change of order of integration -Change of variables (Cartesian to polar)- Triple integrals – Change of variables (Cartesian to spherical/cylindrical). (8 hrs)

Unit – IV

Special functions: Gamma and Beta Functions – Properties - Relation between Beta and Gamma functions- Evaluation of improper integrals. (8 hrs)

Unit – V

Vector Differential Calculus: Scalar and Vector point functions- Vector differentiation - Directional derivatives – Gradient, Curl and Divergence- Vector identities. (8 hrs)

Unit – VI

Vector Integral Calculus: Vector Integration –Line Integral, Surface Integral, and Volume Integral – Green Theorem, Stokes Theorem and Gauss Divergence theorem (without proofs with simple illustrations only). (8 hrs)

Text Books

1. B.V. Ramana, Higher Engineering Mathematics, 44th Edition, Tata McGraw Hill New Delhi, 2014.
2. Dr.B.S.Grewal, Higher Engineering Mathematics, 43nd Edition, Khanna Publishers, 2015.

Reference Books

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. **G.B. Thomas and R.L. Finney**, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
3. **Veerarajan T**., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
4. **D. Poole**, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
5. **N.P. Bali and Manish Goyal**, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.

APPLIED PHYSICS
(Common to all Branches)

Subject Code:20BST105

L	T	P	C
3	0	0	3

Course Description

This course encompass Fundamental Concepts of Physics that include

- Wave Optics
- Lasers
- Fiber Optics
- Modern Physics
- Electro Magnetic Theory
- Semiconductor Physics

that are inevitable for any Engineering student so that these prerequisites aid the student to readily understand Day to Day Engineering Problems with Pragmatic Approach.

Course Objectives

- To realize the principles of optics in designing optical devices
- To comprehend the Principles of Lasers
- To Infer the Principles of Fiber Optics
- To Recognize the shortcoming of classical physics and describe the need for modifications to classical theory
- To Identify the interaction of electromagnetic fields
- To summarize the characteristics of semiconductor materials.

Course Outcome

Students will be able to

1. Apply the principles of optics in designing optical devices
2. Illustrate the Principles of Lasers
3. Outline the Principles of Fiber Optics
4. Resolve the discrepancies in classical estimates through quantum principles
5. Analyze the interaction of electromagnetic fields.
6. Interpret the characteristics of semiconductor materials.

Unit – I

Wave Optics

Interference - Introduction, Principle of Superposition of Waves, Interference in Plane Parallel Film due to Reflected Light, Newton's Rings under Reflected Light - Determination of Wavelength of Monochromatic Source of Light.

Diffraction - Introduction, Differences between Interference and Diffraction, Fraunhofer Diffraction due to Single Slit – Intensity Distribution.

Unit – II

Lasers - Introduction, Characteristics of Lasers- Coherence, Directionality, Monochromacity and High Intensity, Principle of Laser – Absorption, Spontaneous and Stimulated Emission, Einstein Coefficients (Qualitative), Population Inversion, Optical Resonator and Lasing Action, Ruby Laser [Three Level System], Helium-Neon Laser [Four Level System], Applications of Lasers in Industry, Scientific and Medical Fields.

Unit – III

Fiber Optics - Introduction, Optical Fiber Construction, Principle of Optical Fiber – Total Internal Reflection, Conditions for Light to Propagate - Numerical Aperture and Acceptance Angle, Differences between Step Index Fibers and Graded Index Fibers, Differences between Single Mode Fibers and Multimode Fibers, Applications of Optical Fibers in Communication

Unit – IV

Modern Physics Quantum Mechanics - Wave Particle Duality, de-Broglie's Hypothesis of Matter Waves, Heisenberg's Uncertainty Principle, Physical Significance of Wave Function. Time independent wave equation and Particle in One Dimensional Potential Box

Unit – V

Electromagnetic Theory Concept of Electric Field, Point Charge in Electric Field, Gauss Law and it's Applications, Magnetic Field - Magnetic Force on Current Carrying Coil. Ampere's Law, Biot-Savart Law, Faraday's Law of Induction, Lenz's Law, Maxwell's Equations and Applications

Unit – VI

Semiconductors Physics: Introduction- Intrinsic and Extrinsic Semiconductors, Dependence of Fermi Level on Carrier Concentration and Temperature, Diffusion and Drift Currents. Hall Effect –Mobility, Sign of Charge Carriers, Conductivity, Resistivity.

Text Books

1. A Textbook of Engineering Physics, M N Avadhanulu & P G Kshirsagar, S.Chand Publishers
2. Fundamentals of Physics by Resnick, Halliday and Walker
3. Modern Physics by Arthur Beiser

Reference books

1. University Physics by Young and Freedman
2. Solid State Physics by S. O. Pillai, New Age International Pubishers
3. Engineering Physics, Volume-I&II, P.K.PalaniSwamy, Scitech Publications Hyderabad
4. Engineering Physics Volume I&II Dr.K.Vijaykumar, S.Chand Publishing Company, New Delhi
5. Engineering Physics Dr. S. Mani Naidu, Pearson Publications Chennai

ELECTRONIC DEVICES AND CIRCUITS

Subject Code: 20EET101

L	T	P	C
3	0	0	3

Course objectives:

- To understand the working, characteristics of PN Junction diode, Zener diode andLED.
- To describe the working, parameters of rectifiers andfilters.
- To explain the working, characteristics of transistor (BJT) in different configurations, JFET andMOSFET.
- To understand the need for biasing and to explore the transistor biasingmethods.
- To explain how transistor acts as a switch and amplifier and also understands types of feedbackamplifiers and characteristics of negative feedback amplifier.
- To understand the condition for oscillations and analyze RC Phase shift oscillator, Wien bridge oscillator, Hartley and Colpitt's oscillator usingBJT.

Course Outcomes:

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

- CO1: Describe the working principle of PN Junction diode, Zener diode andLED.
- CO2: Explain the operation and analyze the parameters of rectifiers andfilters.
- CO3: Describe the working and behavior of transistor (BJT) in different configurations, JFET and MOSFET.
- CO4: Describe the need for biasing and transistor biasingmethods.
- CO5: Explain how transistor acts as a switch and amplifier and also understand types of feedback amplifiers and characteristics of negative feedback amplifier.
- CO6: Understand the condition for oscillations and analyze RC Phase shift oscillator, Wienbridge oscillator, Hartley and Colpitt's oscillator usingBJT.

UNIT I:

Diode Characteristics: Formation of PN junction diode, V-I Characteristics of Diode, Diode as a switch, Zener Diode Characteristics, Zener Diode as Voltage Regulator, LED.

UNIT II:

Rectifiers and Filters: Half wave rectifier, Full wave rectifier, Ripple factor, Efficiency, TUF, Comparison between full wave rectifier and Half Wave rectifier, Rectifiers with C- Filter, L- filter.

UNIT III:

Transistor Characteristics:

Bipolar Junction Transistors (BJT) - input & output Characteristics of transistor in CB, CE, CC configurations, Relationship between α, β and γ.

Field effect transistors (FET) -Characteristics of JFET, MOSFET (Enhancement and depletion)

UNIT IV:

Transistor Biasing and Stabilization: Need for biasing, DC & AC load line, Criteria for fixing the operating point, Types of biasing and its stability, thermal run away, Thermal stability.

UNIT V:

Applications of Transistor: Transistor as a switch, Transistor as an Amplifier (CE),

Feedback amplifiers: Concept of feedback, classification of feedback amplifiers, general characteristics of negative feedback amplifiers

UNIT VI:

Oscillators: Condition for oscillations, RC Phase shift oscillator, Wien bridge oscillator, Hartley and Colpitt's oscillator using BJT.

Text Books:

1. Integrated Electronics – Jacob Millman, Chritos C. Halkies, Tata Mc-Graw Hill,2009.
2. Electronic Devices - FLOYD 5th Edition, Pearson Education.

Reference Books:

1 Electronic Devices and Circuits – J. Millman, C.C. Halkias, Tata Mc-GrawHill.
2 Electronic Devices and Circuits – R.L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall, 9thEdition, 2006.

http://www.vidyarthiplus.in/2011/11/electronic-device-and-circuits-edc.html

BASIC ELECTRICAL ENGINEERING

Subject Code:20EST101

L	T	P	C
3	0	0	3

Course objectives:

- To introduce the basic knowledge of electric circuits
- To illustrate knowledge with network reduction techniques.
- To analyze AC circuits.
- To provide knowledge on Magnetic circuits.
- To become familiar with DC Generator.
- To understand the concept of DC Motor.

Course outcomes:
CO1: Able to summarize different electrical circuits.
CO2: Able to construct network reduction techniques
CO3: Able to outline the basics of AC circuits.
CO4: Able to state magnetic circuits.
CO5: Able to examine DC Generator.
CO6: Able to explain DC Motor.

UNIT –I Introduction to Electric Circuits
Basic definitions, Electrical circuit elements (R, L and C), Voltage and current sourcesIndependent and dependent sources, Ohm's Law, Series & Parallel circuits, Source transformation, Kirchhoff's Laws, , simple problems.

UNIT-II Network Reduction Techniques
Star-Delta transformation, Nodal Analysis, Super node, Mesh analysis, super mesh-Problems.

UNIT-III AC Circuits
Representation of sinusoidal waveforms, peak and rms values, phasor representation, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series only), real power, reactive power, apparent power, power factor, simple problems.

UNIT-IVMagnetic circuits
Basic definitions of magnetic flux, flux density, Reluctance, Magneto motive force (m.m.f), magneticfield intensity, magnetic permeability and susceptibility. Comparison between magnetic and electrical circuits, inductively coupled circuits, coefficient of coupling, dot convention,simple problems on magnetic circuits.

UNIT-VDC Generator

Generator-Principle of Operation, Construction, EMF equation, Classification, O.C.C, internal and external characteristics of shunt generator, Applications.

UNIT-VI DC Motor

Motor-principle of operation, Torque equation, Classification Speed Control Methods, Operation of 3 point starter,Applications.

TEXT BOOKS

1. Principles of Electrical and Electronics Engineering by V.K.Mehta, S.Chand& Co.
2. Introduction to Electrical Engineering – M.S Naidu and S. Kamakshaiah, TMH Publ.

REFERENCE BOOKS .

1. Basic Electrical Engineering Dr.K.B.MadhuSahuscitech publications (india) pvt.ltd.
2. D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009.
3. D. P. Kothari and I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill,2010.

WORKSHOP AND MANUFACTURING PRACTICE

Subject Code: 20ESL102

L	T	P	C
1	0	4	3

Course objectives:

- The Engineering Workshop Practice for engineers is a training lab course spread over entire semester. The modules include training on different trades like Fitting, Carpentry, Black smithy etc… which makes the students to learn how various joints are made using wood and other metal pieces.

Course outcomes:

On completion of this course, students should be able to:

CO 1. Make half-lap, mortise &tenon, corner dovetail or bridle wooden joints.
CO 2. Develop sheet metal into objects like square tray, taper side tray, conical funnel or elbow pipe.
CO 3. Forge MS rod from round to square cross-section, or into L- or S- bend.
CO 4. Fabricate MS pieces into either a straight, square, dovetail or V-fit.
CO 5. Connect a staircase or a tube light house-wiring electrical circuit.

I. Wood Working Technology - Familiarity with different types of wood and tools used in wood Working technology.

Tasks to be performed:

1) Half – Lap joint 2) Mortise and Tenon joint
3) Corner Dovetail joint 4) Briddle joint.

II. Sheet Metal Working – Familiarity with different types of tools used in sheet metal working, developments of sheet metal jobs from GI sheets, knowledge of basic concepts of soldering.

Tasks to be performed:

1) Square Tray 2) Taper side Tray
3) Conical Funnel 4) Elbow Pipe.

III. Forging Technology – Familiarity with different types of tools used in forging technology. Knowledge of different types of furnaces like coal fired, electrical furnaces etc...

Tasks to be performed:

1) round M.S rod to square bar 2) L bend in given M.S. Rod.
3) S bend in given M.S. Rod. 4) heat treatment tests like annealing, normalizing etc...

IV. Fitting Technology – Familiarity with different types of tools used in fitting technology.

Tasks to be performed:

1) "V" – fitting 2) square fitting
3) Dovetail fitting 4) Straight fitting

V.HOUSE WIRING

1) Tube light connection
2) Staircase connection

Note: Any two jobs from each trade must be performed by the student.

PHYSICS LAB
(Common to all Branches)

Subject Code:20BSL101

L	T	P	C
0	0	3	1.5

Course Description

This Laboratory course is intended to apply the scientific method to expedite experiments that include

- Error analysis
- Waves Fundamentals
- Mechanics
- Physical Optics
- Lasers and Fiber Optics
- Semiconductor devices

So that student can verify theoretical ideas and concepts covered in lecture through host of analytical techniques, statistical analysis and graphical analysis.

Course Objectives

- To Operate Sensitive Instruments for precision measurements
- To Identify Error for targeted accuracy
- To Interpret the results of mechanical parameters such as modulus of elasticity and acceleration due to gravity through simple oscillatory experiments using torsional pendulum or physical pendulum
- To Determine relevant parameters associated with Interference and Diffraction phenomena using Travelling Microscope and Spectrometer.
- To Exhibit Techniques and Skills associated with Modern Engineering Tools such as Lasers and Fiber Optics
- To Characterize semiconducting material devices.

Course Outcomes: Will be able to

1. Demonstrate the ability for precision measurements to design instrumentation
2. Estimate the Error for targeted accuracy
3. Infer the results of mechanical parameters such as modulus of elasticity and acceleration due to gravity through simple oscillatory experiments using torsional pendulum or physical pendulum
4. Apply the knowledge of Optics to calculate geometrical parameters of thickness of thin object and radius of curvature of a lens
5. Illustrate techniques and skills associated with Modern Engineering Tools such as Lasers and Fiber Optics
6. Evaluate characteristics of semiconducting material devices

List of Experiments

1. Precision Measurements and Instruments
2. Error Analysis and Graph Drawing
3. Determination of Rigidity Modulus of the Material of Wire using Tensional Pendulum
4. Determination of Acceleration due to Gravity (g) using Compound Pendulum
5. Newton's Rings – Determination of the Radius of Curvature of a given Plano Convex Lens
6. Determination of Thickness of Thin Object using Wedge Method
7. Verify the characteristic curve of NTC Thermistor.
8. Determination of width of a single slit using LASER
9. Determination of Numerical Aperture and Bending Loss of an Optical Fiber
10. Determination of Energy Band Gap using the given Semiconductor

Manual / Record Book

1. Manual cum Record for Engineering Physics Lab, by Prof. M. Rama Rao, Acme Learning.
2. Lab Manual of Engineering Physics by Dr.Y. Aparnaand Dr. K. VenkateswaraRao (VGS bookslinks, Vijayawada)

BASIC ELECTRICAL ENGINEERING LAB

Subject Code: 20ESL101

L	T	P	C
0	0	3	1.5

Course Objective:

To introduce the student to study different electrical components and to verify the basic laws related to electrical engineering, Speed control of D.C. motor, testing of transformer, electrical wiring system through study, practice, and experiments.

Course Outcomes:

Students will be able to

CO1: Label various types of electrical components.

CO2: Demonstrate various basic electrical laws.

CO3: Demonstrate speed control DC motor & Characteristics of generator.

CO4: Experiment with lamps.

CO5: Examine electrical wiring system

List of Experiments:

1. Study of electrical components.
2. To verify Ohm's law.
3. To verify (a) Kirchhoff's current law (b) Kirchhoff's voltage law.
4. To verify the total resistance of the series and parallel connected circuits.
5. Find armature resistance, field resistance and filament Lamp Resistance using V-I method.
6. Magnetization characteristics of DC shunt generator.
7. Speed control of D.C. Shunt motor by a) Armature Voltage control b) Field flux control method
8. Fluorescent tube connection.
9. (a) One way control of lamp
   (b) Two way control of lamp
10. Fan wiring.

Additional Experiments:

11. Soldering and bread board precautions.
12. To find voltage current relationship for series RL circuit and determine power factor.

ELECTRONIC DEVICES AND CIRCUITS LAB

Subject Code: 20EEL101

L	T	P	C
0	0	3	1.5

Course Objective:

- To measure the voltage, time period and phase usingCRO.
- To observe the characteristics of PN junction diode &Zener diodeexperimentally.
- To find ripple factor of half and full wave rectifiers with and withoutfilter.
- To observe the characteristics of BJT in CB and CE configurations and also analyze the frequency response of CE Amplifierexperimentally.
- To observe the characteristics of JFETexperimentally.
- To measure the frequency of oscillations of RC Phase ShiftOscillator.

Course Outcomes:

Students will be able to
CO1: Measure the voltage and time period using cathode ray oscilloscope (CRO).
CO2: Analyze the V-I characteristics of P-N diode, Zener diode and examineits cut-in voltages.
CO3: Analyze the half wave and full wave rectifiers with and withoutFilters
CO4: Differentiate the characteristics of Bipolar Junction Transistor (BJT) in CB and CEconfigurations and also analyze the frequency response of CEAmplifier.
CO5: Draw the characteristics of Field Effect Transistor (FET).
CO6: Determine the frequency of oscillations of RC Phase Shift Oscillator.

List of Experiments:

1. Measurement of voltage and time period using cathode ray oscilloscope(CRO)
2. PN Junction diode forward and reverse bias characteristics (cut-in voltage, static and dynamicresistance).
3. Zener diodecharacteristics.
4. Rectifier without filters (Full wave & halfwave).
5. Rectifier with filters (Full wave & halfwave).
6. Transistor CB characteristics (Input andOutput)
7. Transistor CE characteristics (Input andOutput)
8. Frequency response of CEAmplifier

9. FETcharacteristics
10. RC Phase ShiftOscillator

ENVIRONMENTAL SCIENCE

Course Code: 20MCT102

L	T	P	C
2	0	0	0

Course Objectives:

- Memorize the knowledge of environment andstatus of different resources on earth.
- Identify the significance, arrangement, causes of annihilation and conservation of ecosystems andbiodiversity..
- Identify the significance, types and conservation of biodiversity.
- Discriminate causes, effects of a variety of pollutions and suitable control methods.
- Identify the hurdles of sustainable development; evaluate the different environmental managementand legal issues.
- Describe the population growths, health problems andevaluate the environmental assets.

Course Outcomes: By Studying this Course Student will

1. Recognize and speaks well again on the general issues of environment and know how to conserve resources for better usage.
2. Explain and demonstrate the ecosystems setup, assess.
3.Recognize andconserving of diversity to upkeep.
4. Examine a range of pollution problems along with controland their eco-friendlydisposal methods.
5. Translate the sustainable development practice through clean development mechanisms.
6. Evaluate the changing trends of world population and compile the information in order to document theenvironmental assets.

Unit – I (*6lectures*)

Importance of Environmental Studies and Natural Resources: Definition of Environment – Importance - Need for Public Awareness

Forest Resources - Use and over exploitation - deforestation – consequences – case study

Water Resources - Use and over utilization - dams - benefits and problems on Tribes andEnvironment

Food Resources – Food security concept - changes caused by agriculture and overgrazing -effects of modern agriculture – fertilizer - pesticide problems - water logging - salinity – conceptof sustainable agricultural methods - case study

Energy Resources - Non-renewable energy resources – coal – crude oil - natural gas - use ofrenewable and alternate energy sources

Unit – II (*3lectures*)

Ecosystems: Definition – Structure of ecosystem: producers - consumers – decomposers.Functions of ecosystem: Food chains - food webs - ecological pyramids - Energy flow – Nutrientcycles (Carbon cycle and Nitrogen cycle). Ecological succession

Unit-III(*3lectures*)

Biodiversity and its conservation: Definition of Biodiversity - Values of biodiversity - Bio-geographical classification of India - Hot Spots of India - Endangered and endemic species of India –Threats to biodiversity - Conservation of biodiversity

Unit – IV (*6lectures*)

Environmental Pollution: Definition – causes - effects - control measures of Air pollution -Water pollution - Noise pollution – Marine Pollution - Nuclear hazards.

Solid waste Management: Causes - effects - disposal methods of urban waste – biomedicalwastes - case studies

Disaster management: floods – earthquakes – cyclones

Unit – V (*6 lectures*)

Social Issues and the Environment: Concept of Unsustainable and Sustainable development –Water conservation: Rain water harvesting- Watershed management – Globalenvironmental challenges: climate change - global warming – acid rains - ozone layer depletion -World summits on environment: Stockholm conference – Rio-earth summit – Kyoto protocol – Environment (Protection) Act - Air (Prevention and Control ofPollution) Act – Water (Prevention and control of Pollution) Act - Wildlife (Protection) Act -Forest (Conservation) Act

Unit – VI (*4lectures*)

Human Population and the Environment: Population growth patterns - variation amongnations - Population problems - control -Environment and human health - Role of informationTechnology in Environment and human health

Text Books:

1. ShashiChawla. 2015, *A Text book of Environmental Studies*, Revised edition, TMH, New Delhi

2. Bharucha, E. 2005, *Text book of Environmental Studies*, First edition, Universities Press (India) Pvt. Ltd., Hyderabad

3. Suresh K. Dhameja. 2006-07, *Environmental Studies*, Third revised edition, S.K. Kataria & Sons (P) Ltd., New Delhi

4. Benny Joseph. 2015, *Environmental Studies*, Revised edition, TMH, New Delhi

Reference Books:

1. Odum, E.P, *Fundamentals of Ecology*, Third edition, W.B. Saunders & Co (P) Ltd., Philadelphia.

2. P. D. Sharma, *Ecology and Environment*, Revised edition, Rastogi Publications (P) Ltd.

3. Cunningham, W.P., Cunningham, M.A., *Principles of Environmental Science*, TMH, New Delhi.

4. Peavy, Rowe and Tchobanoglous, *Environmental Engineering*, McGraw – Hill International edition.

5. Graedel, T.E., Allenby, B.R., *Industrial Ecology and Sustainable Engineering*, Pearson Publications.

ENGLISH
(Common to all Branches)

Subject Code: 20HST101

L	T	P	C
3	0	0	3

Course Objectives

- To enable students build vocabulary appropriate to their levels and to make students understand printed texts of different genres
- To enhance basic writing skills of the students in different forms of written communication
- To assist students implicitly synthesize the rules of grammar for the production of accurate sentences
- To help students learn rules of using punctuation marks and prepositions appropriately in writing
- To aid students acquire appropriate and adequate letter writing skills
- To get students develop reading skills and enhance their essay writing skills

Course Outcomes

1. Students will be able to comprehend printed texts of different genres more easily and they will be able to make appropriate word choice.
2. Students will be able to write short texts masterly.
3. Students will be able to construct grammatically correctsentences.
4. Students will be able to use punctuation marks and prepositions correctly in speech and writing.
5. Students will be able to communicate through letters and emails effectively.
6. Students will be able to comprehend unfamiliar passages, and will be able to write*essays.*

Unit–I*Father's Help* by RK Narayan
Synonyms and Antonyms — One-word substitutes

Unit–II*My Early Days* by APJ Abdul Kalam
Tense— Voice — *If* clauses

Unit – III*The Road Not Taken* by Robert Frost
Reported Speech—Degrees of Comparison —Simple, Compound, Complex Sentences

Unit – IV *Politics and the English Language* by George Orwell
Punctuation —Prepositions

Unit–V*Mother's Day* by J. B. Priestly
Letter Writing — E-mail Writing

Unit–VI *Chipko Movement*
ReadingComprehension—Essay Writing

Text Books

1. *On Writing Well*. William Zinsser. Harper Resource Book. 2001
2. *Practical English Usage*. Michael Swan. Oxford University Press. 1995.
3. *Study Writing*. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
4. *Hugging the Trees: The Story of the Chipko Movement*. Thomas Weber. Viking Publishers, New Delhi, 1988.

DIFFERENTIAL EQUATIONS
(Common to all Branches)

Subject Code:20BST102

L	T	P	C
2	1	0	3

Course Objectives:

- To solve the first order Ordinary Differential equations and apply to Orthogonal trajectories, Newton's Law of Cooling and Law of Growth (Decay).
- To solve second and higher order ordinary differential equations.
- Derive the Fourier series expansion of one variable functions.
- Understand Taylor's, Maclaurin's series expansion and rules of calculating extreme value of two or more variable functions.
- Learn the methods of solving first order quasi-linear (Lagrange) partial differential equations and first order non-linear partial differential equations.
- Understand the method of solving a linear Partial differential equation with constant coefficients by method of Separation of Variables, solve a one dimensional Wave and a one dimensional Heat equation.

Course Outcomes

The student will be able to:

1. Apply the mathematical tool for the solution of Ordinary Differential equations, Orthogonal trajectories, Newton's Law of Cooling and Law of Growth (Decay).
2. Evaluate higher order homogenous and non-homogenous linear differential equations with constant coefficients.
3. Estimate the Fourier series expansion of one variable functions.
4. Estimate the Taylor's, Maclaurin's series expansion of two variable functions and extreme values of two or more variable functions.
5. Evaluate a first order quasi-linear (Lagrange) partial differential equations and first order non-linear partial differential equations.
6. Evaluate a one dimensional Wave and Heat equation.

Unit – I

Ordinary differential equations of first order: Linear type - Bernoulli type–Exact type - Equations reducible to exact type- Orthogonal Trajectories-Newton's law of cooling - Law of Growth and Decay. (8 hrs)

Unit – II

Ordinary differential equations of higher order: Higher order homogenous and non-homogenous linear differential equations with constant coefficients- Complimentary Functions-Particular integrals for the functions of type sin(ax+b)/cos(ax+b), x^m, e^{ax} , $e^{ax}V(x)$ - Method of variation of parameters, Applications- LCR circuits. (8 hrs)

Unit – III

Fourier Series: Fourier Series -Even and odd functions– Fourier series of functions defined in the interval $(0, 2\pi)$, $(-\pi, \pi)$, $(0, 2c)$,$(-c,c)$ - Half range Fourier sine and cosine series**(8 hrs)**

Unit – IV

Partial Differentiation: Functions of two or more variables-Partial differentiation-Total Derivative- Taylor's and Maclaurin's Series (without proof) - Maxima, minima of functions without constraints and functions with constraints (Lagrange method of undetermined multipliers). (8 hrs)

Unit- V

Partial Differential Equations of first order: Partial differential Equations - Formation of partial differential equations– solutions of first order quasi-linear (Lagrange) partial differential equations and first order non-linear (standard type) partial differential equations. (8 hrs)

Unit – VI

Applications of Partial Differential Equations: Solution of linear Partial differential equations with constant coefficients – Method of Separation of Variables- One dimensional Wave and Heat equations. (8 hrs)

Text Books

1. B.V.Ramana, Higher Engineering Mathematics, 44th Edition, Tata McGraw Hill New Delhi,2014.
2. Dr.B.S.Grewal, Higher Engineering Mathematics, 43nd Edition, Khanna Publishers, 2015.

Reference Books

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.

CHEMISTRY
(Common to all Branches)

Subject Code:20BST107

L	T	P	C
3	0	0	3

Course Objectives:

The students will become familiar and understand about:

- Rationalise the importance of water for society and industrial needs.
- Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.
- To become familiar in moulding methods of preparation of different types of plastic materials
- Rationalise organic reactions such as addition, substitution, elimination, rearrangement reactions.
- Rationalise reference electrodes and science of corrosion.
- Distinguish Renewable & Non-Renewable energy resources and rationalise about green chemistry, batteries.

Course Outcomes:

The course will enable the student to:

1. Rationalise the importance of water for society and industrial needs.
2. Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques
3. Differentiate different moulding techniques of plastic materials
4. Rationalise organic reactions such as addition, substitution, elimination, rearrangement reactions.
5. Rationalise the science of corrosion.
6. Distinguish Renewable & Non-Renewable energy resources and rationalise about green chemistry, batteries.

Unit – I

Water Technology Hardness of Water – Temporary and Permanent Hardness - Units of Hardness - Estimation of Hardness by EDTA Method - Problems on Temporary and Permanent Hardness - Disadvantages of Hard Water – Softening Methods of Hard Water- Zeolite or Permutit Process - Ion Exchange Process - Methods of Treatment of Water for Domestic Purposes – Sedimentation, Coagulation, Filtration, Disinfection - Sterilization, Chlorination, Break Point chlorination, Ozonisation. ***(9 lectures)***

Unit – II

Spectroscopy Spectroscopy - Electronic Spectroscopy - Types of Electronic Transitions - Definition of Chromophore – Definition of Auxochrome – Absorption and Intensity Shifts - Introduction to I.R. Spectroscopy – Fingerprint Region – Introduction to NMR – Principle - Equivalent and Non-Equivalent Protons - Chemical Shift- Splitting – Coupling Constant.***(8 lectures)***

Unit – III

Polymers and Plastics Definitions of Polymer, Polymerization – Functionality – Degree of polymerization - Types of Polymerization (Addition and Condensation Polymerizations) - Plastics – Definition, Thermoplastics, Thermosetting Plastics – Compounding of Plastics – Moulding of Plastics into Articles (Compression, Injection,

Transfer and Extrusion Moulding Methods) - Preparation, Properties and Engineering Uses of PVC and Bakelite.***(7 lectures)***

Unit – IV

Organic Reactions Types of Organic reactions: Addition - Electrophilic, Nucleophilic and Free radical - Substitution - Electrophilic, Nucleophilic (SN^1 and SN^2) and Free radical – Elimination (E_1 and E_2) – Rearrangement Reactions (Claisen, PinacolPinacolone Rearrangement).***(7 lectures)***

Unit – V

Corrosion and Its Control Definition of Corrosion – Theories of Corrosion (Chemical & Electrochemical) – Mechanism of Electrochemical Corrosion (Oxygen Absorption Type and Hydrogen Evolution Type) - Galvanic Series - Factors Influencing Corrosion – Corrosion Control Methods - Proper Designing, Modifying the Environment, Cathodic Protections – Sacrificial Anodic Protection and Impressed Current Cathodic Protection.Metallic (Anodic and Cathodic) Coatings – Methods of application on metals (Galvanizing and Tinning).***(9 lectures)***

Unit – VI

Green Chemistry & Energy Introduction to green chemistry – Definition and 12 principles of green chemistry.Types of energy sources – Renewable & Non-Renewable - Introduction to solar energy – harnessing of solar energy – photo voltaic cells – Concentrated Solar power plants.

Introduction of Energy storage devices: Principle& mechanism of Batteries &Supercapacitors, Types of Batteries (Alkaline & Lead-Acid) - Difference between Batteries and Supercapacitors.***(8 lectures)***

Text Books

1. University chemistry, by B. H. Mahan
2. Elementary organic spectroscopy: principles and applications, by Y. R. Sharma
3. Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane
4. "Engineering Chemistry", P. C. Jain and Monica Jain, DhanpatRai Publications, Co., New Delhi, 2004, 16th Edition

Reference books:

1. Fundamentals of Molecular Spectroscopy, by C. N. Banwell
2. Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan
3. Physical Chemistry, by P. W. Atkins
4. Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition.
5. Concise Inorganic Chemistry: Fifth Edition by J.D. Lee

PROGRAMMING FOR PROBLEM SOLVING
(Common to all Branches)

Subject Code:20ESI102

L	T	P	C
3	0	3	4.5

Course Objective

The course is designed to provide complete knowledge ofC language. Students will be able to develop logics which will help them to create programs, applications in C. Also by learning the basic programming constructs they can easily switch over to any other language in future.

Course Outcomes

Co1 Understand the fundamentals of C programming
Co2 Choose the loops and decision making statements to solve the problem
Co3 Make use of pointers toaccess arrays, strings and implements different operations on arrays, and work with textual information, characters and strings.
Co4 Apply programming to write modular programs, user defined functions to solvereal time problems and allocate memory using dynamic memorymanagement functions.
Co5 Create user defined data typesincluding structures and unions to solve problems.
Co6 Implement files operations in C programming for a given application and able to handle errors during program execution.

UNIT: 1

Introduction to Programming

Introduction to components of Computer system, Algorithm, Flow chart, Program development steps, C Tokens, Operator precedence, Structure of C program, Basic I/O statements.

Exercise Questions: 1

Ex 1: Write the C programs to calculate the following
a) Area of triangle when sides aregiven.
b) Program for Type Casting.
c) Interchanging values of twovariables.

Ex 2: Write the C programs to perform the following
a) Read lower case character and convert into uppercase.
b) Find maximum of 3 values using conditionaloperator.
c) Calculate area and perimeter ofcircle.

UNIT: 2

Control Structures

Decision statements: if, if-else, nested if and switch, **Iterative statements:** for, while, do while and nested loops **Branching:** Break, continue, goto.

Exercise Questions: 2

Ex 3: Write C programs for the following using decision making statements

a) Program to find roots of quadratic equation.
b) Find the Largest among 3values.
c) Calculate the grades of astudent.

Ex 4: Write C programs for the following using Iterative Statements

a) Arithmetical operations usingswitch-case.
b) Read a number and display inreverse.
c) Check for Armstrong number property

Ex 5:

a) Generate Fibonacciseries.
b) Generate Prime numbers between two numbers.
c) Write a program in C to display the pattern like right angle triangle using an asterisk

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

UNIT: 3

Arrays: Definition, Types: 1D, Multi Dimensional arrays, declaration, initialization, accessing elements, Matrix operations and String Handling.

Pointers: Definition, Declaration, Initialization, Pointer arithmetic, Pointer to pointer, arrays and pointers, Dynamic memory allocation

Exercise Questions: 3

Ex 6: Implement the following using arrays

a) Largest and smallest from a list ofelements.
b) Program for Linear Search.
c) Program for Bubble Sort.

Ex 7: Implement the following using arrays

a) Matrixaddition.
b) MatrixMultiplication.
c) Program using string handling functions

Ex 8: Implement the following using DMA Functions

a) Find the sum and average of list of elements using DMAFunctions
b) Implementation of call byreference and call by valve.

Ex 9:

a) Implement C Program using any numerical methods

UNIT: 4

Functions: Definitions, Declaration, Types of Functions, Parameter passing, Passing Arrays to functions, Recursion, library functions, functions and pointers, and Storage classes,

Exercise Questions: 4

Ex 10:

a) Factorial using recursion and nonrecursion.
b) GCD using recursion and nonrecursion.
c) To count the digits of a given number using recursion

UNIT: 5

Structures: Definition, Declaration, Accessing the structure elements, Array of structures, Arrays with in structures, pointer to structure, passing structure to function, nested structures, and unions.

Exercise Questions: 5

Ex: 11

a) Implementation of array of structure
b) Demonstration of Union

UNIT: 6

Files: Definition, Types of files, Opening modes, File IO Functions, Random access functions, Preprocessor directives.

Exercise Questions: 6

Ex 12:

a) Copy the contents of one file intoanother.
b) Count the number of characters, words and lines in afile.

Text Books

1. "The C – Programming Language", B. W Kernighan, Dennis M. Ritchie, 2nd Edition, PHI.

2. **"**A Structured Approach Using C" by Behrouz A. Forouzan,Richard F. Gilberg3rd Edition

3. "Problem solving Through 'C'- User Friendly Approach", Dr. G.S.N Murty, S Vishnu Murty, First Edition, MANTECH Publications Pvt.Ltd., 2020

References

1. "Let Us C", YashwantKantikar, 8th Ed., PBP Publications 2012.

2. "C Programming", E. Balagurusamy, Tata McGraw Hills,2011,New Delhi, India.

Web Links

1. https://www.tutorialspoint.com › Cprogramming › C – Home
2. https://www.programiz.com/c-programming

ENGINEERING GRAPHICS & DESIGN

Subject Code: 20ESL103

L	T	P	C
1	0	4	3

COURSE OBJECTIVES:

- Able to develop drawing skills.
- To draw orthographic views from the given isometric view and vice verse
- To understand the fundamentals of computer aided design and drafting

COURSE OUTCOMES:

CO 1. Draw projection of points and straight lines in first angle projection.
CO 2. Project plane surfaces and simple solids inclined to one reference plane.
CO 3. Convert orthographic views into isometric projections and vice-versa.
CO 4. Draw basic lines and profiles with commonly used operations in drafting software.
CO 5. Generate 2D drawings along with dimensioning in drafting software.

LIST OF EXERCISES:

PART-A: Conventional Engineering drawing

1 Projections of points
2 Projections of straight lines inclined to one reference plane only.
3 Projections of planes inclined to one reference plane only.
4 Projections of simple solids inclined to one reference plane only.
5 Conversion of isometric views into orthographic views
6 Conversion of orthographic views into isometric views.

PART-B: Basic Computer aided engineering drawing (2-D drawings)

1. Commands – Axes, Coordinate points, Creation of lines, Polylines, Square, Rectangle, Polygons, Spines, Circles, Ellipse, Text.
2. Move, Copy, Offset, Mirror, Rotate, Trim, Extend, Break, Chamfer, Fillet, Curves.

Note: Six Exercises are to be completed by using AutoCAD software

TEXT BOOKS:

1. Engineering Drawing, N. D. Bhatt, V. M. Panchal, Charotar Pub.
2. Engineering Drawing, K. L .Narayana, P.Kanniah, Scitech Pub.

REFERENCE BOOKS:

1. Engineering Drawing and Graphics, 2nd ed., K. Venugopal, New Age International Pub.
2. Fundamentals of Engineering Drawing, 11th ed., Luzadder, J. Warren, D.M. Jon, Prentice Hall India Pub.

LANGUAGE PROFICIENCY LAB
(Common to all Branches)

Subject Code:20HSL101

L	T	P	C
0	0	3	1.5

Course Objectives

- To enable students develop neutralized accent
- To assist students utter words intelligibly
- To enhance the ability of students to speak spontaneously
- To help students converse aptly as the context demands
- To get students acquire perceptive abilities in professional conversations
- To aid students grasp and interpret information provided in graphs and tables

Course Outcomes

1. Students will be able to recognize differences among various accents and speak with neutralized accent.
2. Students will be able to pronounce words accuratelywith the knowledge of speech sounds and use appropriate rhythm and intonation patterns in speech.
3. Students will be able to speak extemporaneously about anything in general.
4. Students will be able to generate dialogues for various situations.
5. Students will be able to present posters perceptively and concisely.
6. Students will be able to comprehend and interpret data provided in graphs and tables.

Course Syllabus

Unit – I: Listening Comprehension of Audio and Video clips of different accents
Unit – II: Pronunciation—Intonation—Stress—Rhythm
Unit – III:JAM— Narration of an Event
Unit – IV: Situational Dialogues
Unit – V: Poster Presentation
Unit – VI: Interpretation of Data in Graphs and Tables

Text Books

1. *Communication Skills*. Sanjay Kumar and PushpaLata. OUP. 2011.
2. *Practical English Usage.* Michael Swan. OUP. 1995.
3. *Speak Well*. K. Nirupa Rani. Orient Blackswan, Hyderabad. 2012.
4. *Strengthen Your Communication Skills*. M. Hari Prasad. Maruthi Publications, Hyd. 2014.
5. *Strengthen Your Steps*. M. Hari Prasad. Maruthi Publications, Hyderabad. 2012.
6. *Technical Communication*. Meenakshi and Sangeetha. OUP. New Delhi. 2013.

CHEMISTRY LAB
(Common to all Branches)

Subject Code:20BSL102

L	T	P	C
0	0	3	1.5

Course Objectives

The students will become familiar and understand about:

- Measure molecular/system properties such as kinematic viscosity, acid number of lubricating oil,etc
- Measure molecular/system properties such as surface tension and viscosity.
- Measure molecular/system properties such as pH, conductance of solutions, redox potentials, etc
- Measure molecular/system properties such as chloride content, hardness of water, dissolved oxygen, etc.
- Synthesize a small polymer molecule and analyze a salt sample.
- Estimate iron (by colurimeter), partition coefficient, and adsorption of acetic acid by Charcoaletc.

Course Outcomes:

The students will learn to:

1. Measure molecular/system properties such as kinematic viscosity, acid number of lubricating oil, etc.
2. Measure molecular/system properties such as surface tension and viscosity.
3. Measure molecular/system properties such as pH, conductance of solutions, redox potentials, etc
4. Measure molecular/system properties such as chloride content, hardness of water, dissolved oxygen, etc.
5. Synthesize a small polymer molecule and analyze a salt sample.
6. Estimate iron (by colurimeter), partition coefficient, and adsorption of acetic acid by charcoal, etc.

List of Experiments
(Choice of 10-12 experiments from the following)

1. Determination of surface tension and viscosity
2. Determination of Hardness of water sample by EDTA Method.
3. Conductometric estimation of Acid by Base.
4. Conductometric estimation of mixture of acids by base.
5. Potentiometric Titrations.
6. Synthesis of a polymer/drug.
7. Determination of acid value of an oil
8. Chemical analysis of a salt
9. Determination of Dissolved Oxygen present in the given water sample by Modern Winkler's Method
10. Colurimetric estimation of iron
11. pH metric titrations
12. Determination of the partition coefficient of a substance between two immiscible liquids
13. Adsorption of acetic acid by charcoal Use of the capillary viscosimeters to the demonstrate of the isoelectric point as the pH of minimum viscosity for gelatin sols and/or coagulation of the white part of egg

14. Potentiometric Titration of a Chloride-Iodide Mixture.
15. Determination of Chloride content present in given water sample.
16. Determination of kinematic viscosity of given lubricating oil.

Text Books

1. "Practical Engineering Chemistry" by K.Mukkanti, etal. B.S.Publications, Hyderabad (2011).
2. "Lab Manual on Engineering Chemistry" by Sudharani, DhanpatRai Publications, Co., New Delhi., (2009).

Reference Books

1. "Engineering Chemistry Lab Manual" by ShuchiTiwari (2010), SCITECH Publications.
2. "Vogel's Text Book of Quantitative Chemical Analysis", 6th Edition by G. J. Jeffery, J. Bassett, J. Mendham, R.C. Denney, Longman Scientific & Technical Publications, New York.
3. "A Text Book of Engineering Chemistry" by R. N. Goyal and H. Goel, Ane Books (P) Ltd.(2009).
4. "A Text Book on experiments and calculations Engineering" by S.S. Dara, S.Chand& Company Ltd. (2003).
5. "Instrumental methods of Chemical Analysis", Gurudeep R, Chatwal Sham, K. Anand, Latest Edition (2015), Himalaya Publications.

CONSTITUTION OF INDIA

L	T	P	C
2	0	0	0

Subject Code: 20MCT203

Objectives:
1. To help Students regulate their behavior in a social environment as Engineering Professionals.
2. To make students aware of the impact of taking social, legal and Administrative decisions about their profession.
3. To understand the political and constitutional parameters in work environment.
4. To understand the need and strengths of our nation and adopt their knowledge for future career.

Course Outcomes:
By the end of this course the student will be able to:
CO 1: Realize the rigidness of our Indian Politics and Administrative aspects.
CO 2: A Student can understand our nation federalism.
CO 3: Can assess different types of risk involved in misadministration.
CO 4: Can create competitive advantage.
CO 5: Summarizes the legal and Administrative establishments.
CO 6: A student can infer financial aspects for betterment of the National Building.

Unit – I
INTRODUCTION:
Historical perspective of the constitution of India - Salient features of The Indian Constitution - Amendment Procedure of The Indian Constitution.42nd amendment (Mini Constitution) - 44th amendment (1978 – Janatha Govt.)

Unit – II
IMPORTANT FEATURES OF CONSTITUTION:
Fundamental Rights(Article 12 to 35), Duties (51 A – 1976 emergency) and Directive principles (Article 36 to 51) of State Policy - Articles 14 to 18 - Articles 19 - Article 21

Unit – III
PARLIMENTARY FORM OF GOVT. IN INDIA:
President of India - Emergency provisions -National Emergency – Article 352President Rules – Article 356- Financial Emergency – Article 360Prime Minister and Cabinet - Supreme Court of India (Indian Judiciary)

Unit – IV
INDIAN FEDERALISM:
Union – State relations; - Legislative , Administrative and Financial relations.Local self Govt. – Constitutional Schemes in India (73 & 74 Constitutional amendments)

Unit – V
PARLIMENTARY COMMITTEES:
Public Accounts Committee - Estimates Committee - Committee on Public. Undertakings. - Election commission of India (Article -324) - Comptrollar andAuditor General (CAG) of India (Article – 148 to 150)

Unit – VI

FINANCE COMMISSION:

Finance Commission(Article – 280) - Neethi Aayog (Planning Commission) and - Political Parties.

Text Books:

1) Introduction to Indian Constitution by D.D Basu,Lexis Nexis Butterworth wadhwa Nagapur, 2008.
2) Poicits in India by Rajini Kothari, Orient LongMan, 2005.
3) The Indian Constitution by Madhav Khosla by Oxford University Press India, 2012.

COMPLEX VARIABLES AND STATISTICAL METHODS

Subject Code: 20BST203

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

- Test if a function is analytic, harmonic and then construct a harmonic conjugate function.
- Evaluate integrals using the Cauchy Integral theorem.
- Identify singular points of a function then calculate residues using Residue Theorem.
- Understand the concepts of discrete and continuous distributions.
- Understand the concept of sampling theory.
- Analyze the testing of hypothesis by t-test, z-test, Chi-square test.

COURSE OUTCOMES:

On completion of this course, students will be able to

- Construct a harmonic and conjugate harmonic function.
- Evaluate integrals using the Cauchy Integral formulae.
- Identify singular points of a function then calculate residues using Residue Theorem.
- Obtain probability of random variable.
- Execute Central limit theorem for Sampling Distributions.
- Perform the large and small sample tests.

.

UNIT-I Complex Functions

Functions of a complex variable- analyticity and its properties -Cauchy-Riemann equations in Cartesian and polar coordinates (without proof). Harmonic and conjugate harmonic functions-Milne-Thompson method.

UNIT-II Complex Integral

Cauchy's integral theorem (without proof)-Cauchy's integral formula (without proof)-Generalized Cauchy's integral formula (without proof).

UNIT-III Residues

Singular point –types of singularities- isolated, essential, removable –Pole of order m. Residue –Evaluation of residues – Residue theorem (without proof) and its applications.

UNIT-IV Random Variables and Distributions

Discrete and Continuous Random Variables –Properties. Distributions- Binomial – Possion's -Normal distribution.

UNIT-V Sampling Theory

Introduction to Sampling Theory -Population and Samples –Sampling distribution of means (σ known and σ unknown)- Central limit theorem- point estimation –Maximum error estimation-Interval estimation.

UNIT-VI Tests of Hypothesis

Hypothesis-null and alternative hypothesis – type-I and type-II error –level of significance – one tail and two tail test, z-test, Student's-t-test, F-test, Chi-square test.

Text Books:

1. Complex Analysis And Statistical Methods, Dr.B.Krishna Gandhi, Dr.T.K.V.Iyengar and S.Ranganatham and Dr.M.V.S.S.N.Prasad, S.Chand & Company.
2. Probability and Statistics for Engineers, Miller and Freund's, Prentice Hall of India.
3. Higher Engineering Mathematics, B.S.Grewal, Khanna Publishers.

Reference Books:

1. Advanced Engineering Mathematics, Irvin Kreyszig, Wiley India Pvt. Ltd.
2. Probability and Statistics, Athanasios Papoulis, Pearson education.

D.C MACHINES & TRANSFORMERS

Subject Code: 20EET202

L	T	P	C
2	1	0	3

Course objective

1. To analyze the performance of different types of DC machines & Transformers.
2. To appreciate the applications of DC machines & Transformers

Course outcomes

CO1: Identify and Define different types of dc generators.
CO2: Interpret the performance of DC generators under different load conditions.
CO3: Describe the construction and performance of various types of DC motors.
CO4: Determine the performance of DC machines by conducting different tests.
CO5: Distinguish between different types of transformers and compute their equivalent circuit parameters.
CO6: Determine the performance of transformer by conducting different tests.

UNIT I:

D.C generators: Constructional details, Principle of operation, Armature winding, Lap & Wave, Emf equation, Methods of excitation.

UNIT II:

Armature Reaction & Characteristics of D.C. generators: Armature Reaction, Commutation ,O.C.C, internal-external characteristics, losses-power flow, efficiency calculation, Applications of D.C Generators.

UNIT III:

DC Motors: Principle of operation of DC motors, Back EMF, Torque equation, Types of DC motors, Speed-Torque characteristics of DC motors, Applications.

UNIT IV:

Speed Control & Testing of DC Machines: Starting of DC motors: 3 point starter, 4 point starter, Losses and efficiency, Condition for maximum efficiency, Speed control methods, Brake test, Swinburne's test, Retardation test, Hopkinson's test, fields test.

UNIT V:

Transformers –I: Constructional features, Principle of operation, EMF equation, Transformer on No load and Load Phasor diagram, equivalent circuit, Regulation, losses and efficiency, All day efficiency, Applications.

UNIT VI:

Transformers –II: Open circuit and short circuit test, Sumpner's test, parallel operation, separation of core losses test, auto transformers, 3-Ø transformer connections, Scott connection.

TEXT BOOKS:

1. I.J. Nagrath&D.P.Kothari, " Electrical Machines", Tata McGrawHill, 5th edition.
2. P.S.Bimbhra, "Electrical Machinery", Khanna Publisher, 7th edition.

REFERENCE BOOKS:

1. Irving L.Kosow, "Electric Machine and Tranformers", Prentice Hall of India.
2. Husain Ashfaq , " Electrical Machines", DhanpatRai& Sons.
3. Electric Machinery. A.E. Fitzgerald, Charles Kingsley, JR., Stephen D. Umans 6th Edition.

ELECTRIC CIRCUIT THEORY

Subject Code: 20EET203

L	T	P	C
3	0	0	3

Course Objective:

- To impart knowledge on different network theorems.
- To impart knowledge on resonance.
- To impart knowledge on three phase networks.
- To impart knowledge on two port networks.
- To analyze D.C transient analysis &A.C transient analysis.
- To outline Causality, stability, Hurwitz and Routh's criterion& design Foster forms, Cauer forms.

Course Outcomes:

CO1: Able to understand different network theorems.
CO2: Able to explain resonance.
CO3: Able to describe three phase circuits.
CO4: Able to illustrate two port networks.
CO5: Able to analyze D.C transient analysis & A.C transient analysis.
CO6: Able to model network synthesis.

UNIT I:

Network theorems – I: Superposition, Thevenin's, Norton's and Reciprocity Theorems for D.C and sinusoidal excitations (for independent and dependent sources).

UNIT II:

Network theorems –II: Maximum Power Transfer, Millman's, Tellegen's, and compensation Theorems for D.C and sinusoidal excitations (for independent sources).

Resonance: Resonance-series, parallel circuits, concept of band width and Q factor.

UNIT-III:

Three Phase Circuits: Three phase circuits: Phase sequence- Star and delta connection-Relation between line and phase voltages and currents in balanced systems-Analysis of balanced three phase circuits Measurement of Active and Reactive power in balanced three phase systems. Analysis of Three Phase unbalanced circuits-Loop Method- Application of Millman's Theorem.

UNIT IV:

Two Port Networks: Two port network parameters – Z, Y, ABCD (transmission) and hybrid parameters and their relations, inverse of transmission & Hybrid parameters, Series and parallel two-Port Networks.

UNIT V:

D.C Transient Analysis: Transient response of R-L, R-C & R-L-C series circuits for D.C excitation-Initial conditions-solution method using differential equation and Laplace transforms, Response of R-L & R-C & R-L-C networks to pulse excitation.

A.C Transient Analysis: Transient response of R-L, R-C &R-L-C series circuits for sinusoidal excitations-Initial conditions-Solution method using differential equations and Laplace transforms.

UNIT VI:

Synthesis: Introduction, Causality and stability, Hurwitz polynomial, Routh'scriterion,Positive real functions,Sturm'stheorem,Elementary synthesis procedures.L-C Immittance functions(Foster form-1,Fosterform-2 , First Cauer form, Second Cauer form).

TEXT BOOKS:

1. Engineering Circuit Analysis by William Hayt and Jack E.Kemmerley,McGraw Hill Company,6 th edition .

2. Circuit theory Analysis & Synthesis by Chakrabarti, DhanpatRai Publishing Company (P) Ltd.

REFERENCE BOOKS:

1. Network Analysis by N.C.Jagan, C.LakshmiNarayana BS publications 2nd edition.

2. Electric circuits in SI units by Joseph A Edminister, MSE, 1st Edition.

3. Electrical Circuits by A. Sudhakar and Shyammohan S Palli, Tata McGraw- Hill.

ELECTRICAL MEASUREMENTS

Subject Code: 20EET204

L	T	P	C
3	0	0	3

CourseObjectives:

- Electrical measurements course introduces the basic principles of all measuring instruments. It alsodeals with the measurement of RLC parameters voltage, current, power, power factor, energy andmagneticmeasurements.

CourseOutcomes:
Studentswill beableto

CO1: Classify various analog instruments and understand their principle and operation

CO2: Understand the operation of C.Ts and P.Ts and also able to measure the active and reactive powers

CO3: Illustrate knowledge on measurement of energy ,P.f. in the power system using energy meter and power factor meter respectively

CO4: Evaluate different methods of measuring R,L,C parameters in an electric network

CO5: Understand the principle and operation and applications of potentio meter,flux meter and ballistic galvanometer.

CO6: Understand the principle, operation and applications of different types of electronic meters and Transducers

UNITI:
Measuring Instruments: Classification, deflecting, control and damping torques, Ammeters andVoltmeters, PMMC, moving iron type instruments, expression for the deflecting torque and controltorque,Errors andcompensations,extensionofrange usingshuntsandseriesresistance.

UNITII:
InstrumenttransformersMeasurementofPower:CTandPTRatioandphaseangleerrors, Single phase dynamometer wattmeter, LPF and UPF, Double element and three element dynamometerwattmeter,expressionfordeflectingandcontroltorques,Extensionofrangeofwattmeterusinginstrumenttransformers,Measurementof activeandreactivepowersinbalancedandunbalancedsystems, Basics ofhalleffectsensor.

UNITIII:
Measurement of Energy,P.F. meters: Single phase induction type energy meter, driving and braking torques, errors and compensations, testing by phantom loading using R.S.S. meter.

Three phase energy meter, trivector meter, maximum demand meters. Design considerations TypeofP.F.Meters, dynamometer and moving irontype,1-phand3-ph meters .

UNITIV:

D.C. Bridges: Wheatstone's bridge – Carey Foster's bridge, Kelvin's double bridge for measuring lowresistance,measurementofhighresistance,unbalancedKelvin'sbridgelossofchargemethod.

A.C. Bridges: Measurement of inductance, Quality Factor, Maxwell's bridge, Hay's bridge, Anderson'sbridge, Owen's bridge. Measurement of capacitance and loss angle Desautybridge.Wien's bridge –ScheringBridge**.**

UNITV:

Potentiometers&MagneticMeasurements: Principle and operation of D.C.Crompton's potentiometer standardization, Measurement of unknown resistance,current,voltage. A.C.Potentiometers:polarandcoordinatetypes,Drysdalepolarpotentiometer,Gall-Tinsley(co-ordinatetype)A.C.potentiometer,standardization,applications.Magneticmeasurements Ballistic galvanometer–equation of motion–flux meter constructional details, comparison with ballistic galvanometer. Analysis of B-H Loop and loss calculation.

UNITVI:

Electronic-meters &Transducer

Sweep generation, vertical amplifiers, Digital Frequency meter, Principle of operation of Digital multi-meter, Transistor Voltmeter, , Thermistors, Thermocouples, Linear Variable Differential Transformer, Peizo-Electric transducers, Strain Gauges, Optical Transducer, Electronic energy meter.

TEXTBOOKS:

1 Electrical&Electronic Measurement&InstrumentsbyA.K.SawhneyDhanpatRai&Co.Publications.
2 ElectricalMeasurementsandmeasuringInstruments– byE.W.GoldingandF.C.Widdis,fifthEdition,WheelerPublishing.

REFERENCEBOOKS:

1 ElectricalMeasurements:Fundamentals,Concepts,Applications– byReissland,M.U,NewAgeInternational(P)Limited,Publishers.
2 M.B.Stout,"BasicElectricalMeasurements",PHI,1981.
3 F.K.Harris, ElectricalMeasurements", WileyEasternPvt. Ltd., 1974

ELECTRICAL POWER GENERATION & DISTRIBUTION

Subject Code: 20EET205

L	T	P	C
3	0	0	3

Course objective:

- To impart knowledge about the generation of electrical power to meet the ever increasing demand of electrical power and operation of conventional power plants.
- To impart knowledge about the various aspects and methods of improving Voltage and power factor in distribution system.

Course outcomes:

CO1: Students are able to draw the line diagrams and identify different components in thermal &hydelpower generating stations.
CO2: Students can able to understand the operation of Gas, Solar and Nuclear power generation.
CO3: Students can summarize different distribution systems.
CO4: Students can understand the operation of Substations.
CO5: Students can analyze the economic aspects of power generation
CO6: Students can understand the different tariff methods.

UNIT I:

Thermal &Hydel Power Stations: Site selection, Line diagram of Thermal Power Station showing paths of coal, steam, water, air, ash and flue gasses- Brief description of TPS components: Boilers, Super heaters, Economizers, Turbines, Condensers, Cooling towers, and Chimney, Electro Static Precipitator, Hydro power plants.

UNIT II:

Gas, Solar and Nuclear power generation: Gas Power station: Principle of operation and component (block diagram approach only). Solar Power generation: Line diagram of solar energy storage, solar energy collector, point focusing collector, solar power generation.
Nuclear Power Stations: Working principle, Nuclear fuels. Nuclear reactor Components: Moderators, Control roads, Reflectors and Coolants. Types of Nuclear reactors and brief description of PWR, BWR and FBR. Radiation: Radiation hazards and Shielding.

UNIT III:

Distribution Systems: Classification of distribution systems, design features of distribution systems, radial distribution, ring main distribution, voltage drop calculations: DC distributors for following cases: radial DC distributor fed at one end and at ends (equal / unequal voltages), ring main distributor, stepped distributor and AC distribution. Comparison of DC and AC distribution.

UNIT IV:

Substations: Classification of substations: Air insulated substations - Indoor & Outdoor substations: Substations layout showing the location of all the substation equipment.
33/11 KV substation line diagram.
Gas insulated substations (GIS): Advantages of Gas insulated substations, different types of gas insulated substations, single line diagram of gas insulated substations.

UNIT V:

Economic Aspects of Power Generation: Load curve, load duration and integrated load duration curves, discussion on economic aspects: connected load, maximum demand, demand factor, load factor, diversity factor, capacity factor, utilization factor, capacity, utilization and plant use factors- Numerical Problems.

UNIT VI:

Tariff Methods: Costs of Generation and their division into Fixed, Semi-fixed and Running Costs. Desirable Characteristics of a Tariff Method, Tariff Methods: Simple rate, Flat Rate, Block-Rate, two-part, three –part, and power factor tariff methods.

TEXT BOOKS:

1. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagar and A.Chakrabarti, DhanpatRai& Co. Pvt. Ltd., 1999.
2. Electrical Power sytem by S.L.Uppal, KHANNA PUBLISHERS; Fifteenth edition (1 January 1987).

REFERENCE BOOKS:

1. Generation,Distribution and Utilization of Electric Energy by C.L.Wadhawa New age 6th edition 2018.
2. Power systems-I by S.Sivanagaraju, Pearson Education; 1st edition (1 January 2011)
3. Principles of Power System by V.K Mehta S Chand; 3rd edition (1 March 2005)

D.C MACHINES LAB

Subject Code: 20EEL202

L	T	P	C
0	0	3	1.5

Course Objective

- This lab aims to understand the characteristics and performance of DC machines through the conduction of experiments.

Course Outcomes

CO1: Analyze the performance of DC motor under loaded and unloaded conditions.
CO2: Analyze the characteristics of DC generator
CO3: Determine the critical field resistance and critical speed of DC Generator
CO4: Determine the efficiencies of DC Series and Shunt generators
CO5: Examine various speed control methods of DC shunt motor.
CO6: Understand losses of motor.

LIST OF EXPERIMENTS:

1. Magnetization characteristics of DC shunt generator.
2. Load test on DC shunt generator.
3. Brake test on DC shunt motor.
4. Load test on DC compound generator.
5. Hopkinson's test on DC shunts machines.
6. Fields test on DC series machines.
7. Swinburne's test on D.C shunt machine.
8. Speed control of DC shunt motor by Field and armature Control.
9. Retardation test on DC shunt motor.
10. Load test on DC series generator.

Additional Experiments:

11. Brake test on DC compound motor.
12. Separation of losses in a DC shunt motor.

ELECTRICAL CIRCUITS LAB

Subject Code: 20EEL203

L	T	P	C
0	0	3	1.5

Course Objective:

- Able to understood and analyze the network theorems
- Able to understand other network concepts through the conduction of experiments
- Able to design series and parallel resonant circuit for a given resonant frequency
- Able to measure power in 3-Phase star and delta connected loads

Course Outcomes:

CO1: Understands different theorems and thereby able to measure the load currents.
CO2: Designs the Series & Parallel resonance circuit and hence calculates band widths for different values of Quality of factors.
CO3: Calculates the two port network parameters for a given network.
CO4: Measures the active power for 3-Phase Star & Delta connected loads.
CO5: Work effectively in groups by sharing responsibilities and analyzing on findings.
CO6: Understand measurement of three phase power.

Any 10 of the following experiments are to be conducted:

1) Verification of Thevenin's Theorem
2) Verification of Norton's Theorem
3) Verification of Superposition theorem
4) Verification of Compensation Theorem and Maximum Power Transfer Theorem
5) Verification of Reciprocity, Millmann's Theorems
6) Locus Diagrams of RL and RC Series Circuits
7) Frequency response of Series and Parallel RLC circuit.
8) Determination of Self, Mutual Inductances and Coefficient of coupling of a Transformer.
9) Determination of Z and Y Parameters of Two-Port network.
10) Determination of Transmission and hybrid parameters of Two-Port network.

Additional Experiments:

11) Measurement of Active Power for Star and Delta connected balanced loads
12) Measurement of 3-phase Power by 2 Wattmeter Method for balanced loads

ELECTRICAL MEASUREMENTS LAB

Subject Code: 20EEL204

L	T	P	C
0	0	3	1.5

Course Objectives:

- To aware the students about percentage errors in different measuring instruments, measurement of active and reactive powers and applications of measuring instruments.

Course Outcomes: Student will be able to
CO1: Evaluate the percentage error in different meters.
CO2: Examine the calibration of Ammeter and Voltmeter by using D.C Potentiometer.
CO3: Determine the unknown parameters using different Bridges.
CO4: Measure the active and reactive powers**.**
CO5: Determine the choke coil parameters.
CO6: Determine the dielectric strength of transformer oil.

LIST OF EXPERIMENTS:
The following experiments are required to be conducted as compulsory experiments:
1. Calibration and Testing of single phase energy Meter.
2. Calibration of dynamometer power factor meter.
3. Crompton D.C. Potentiometer – Calibration of PMMC ammeter and PMMC voltmeter
4. Kelvin's double Bridge – Measurement of resistance – Determination of Tolerance.
5. Calibration of LPF wattmeter – by Phantom loading.
6. Schering bridge& Anderson bridge.
7. Measurement of 3 phase reactive power with single-phase wattmeter.
8. Measurement of parameters of a choke coil using 3 voltmeter and 3 ammeter methods.
9. Measurement of 3 phase power with single watt meter and 2 No's of C.T.
10. Dielectric oil testing using H.T. testing Kit

In addition to the above ten experiments, at least any two of the experiments from the following list are required to be conducted:
11. Transformer turns ratio measurement using A.C Bridge.
12. A.C. Potentiometer – Polar form/Cartesian form – Calibration of AC Voltmeter, Parameters of Choke.
13. Measurement of % ratio error and phase angle error of given C.T. bycomparison.

PYTHON PROGRAMMING

L	T	P	C
3	0	3	4.5

Subject Code: 20ESI204

Course Objectives

This course will enable students to

1. Learn Syntax and Semantics and create Functions in Python
2. Handle Strings and Files in Python
3. Understand Lists, Dictionaries and Regular expressions in Python
4. Understand use of functions and file handling in python
5. Implement Object Oriented Programming concepts in Python
6. Introduction to Regular Expressions and matching in Python

Course Outcomes

By the end of this course the student will be able to

1. Examine Python syntax and semantics and be fluent in the use of Python flow control and functions
2. Demonstrate proficiency in handling Strings and File Systems
3. Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions
4. Implement file handling functions and user defined functions in python
5. Interpret the concepts of Object-Oriented Programming as used in Python
6. Implement Regular Expressions and matching in Python

Unit – I

Introduction to Python: History, Features, Installing Python, Running Python, Operators, Statements and Expressions.

Control Structures: Conditional Statements, Loops

Exercise Questions: 1

Ex 1: Write the python programs to calculate the following

a) Find the factorial of given number
b) To print all the prime numbers below n. n value should be taken from the user at the time of execution

Ex 2: Write the python programs to perform the following

a) To check given number Armstrong or not.
b) To check Strong number.
c) To print Fibonacci series.

Unit – II

Data Types: Mutable vs immutable data type, Numbers - Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers, Operators, Built-in Functions, Related Modules

Sequences - Strings, Lists, and Tuples, Dictionaries and Set Types

Exercise Questions: 2

Ex 3: Write the python programs to calculate the following

a) Write a Python program to get a string from a given string where all occurrences of its first char have been changed to '$', except the first char itself.

b) Write a Python program to remove the characters which have odd index values of a given string.

c) To remove punctuations from the string

d) Write a Python program to count repeated characters in a string

e) Write a Python program to count Uppercase, Lowercase, special character and numeric values in a given string

Ex 4: Write the python programs to perform the following

a) Implement a STACK program by using PYTHON.
b) Implement a QUEUE program by using PYTHON.
c) Implement a Python Program for creating a dictionary and display its keys alphabetically.
d) Write a Python program to convert a list into a nested dictionary of keys.
e) Write a python program to remove duplicates from the list

Unit – III

Functions: Definitions, Declaration, Parameter passing, calling functions

File Handling: creating a file, opening a file, I/O with file (read, write, append), closing a file

Exercise Questions: 3

Ex 5: Write the python programs to calculate the following

a) To find HCF or GCD of two numbers

b) To find sum of natural numbers using recursive function

Ex 6: Write the python programs to perform the following

a) Read a file line by line into a list
b) Get filename, line count, file extension, file creation and modification date .
c) Reads and displays the content of the file
d) Write a program that inputs a text file. The program should print all of the unique words in the file in alphabetical order.

Unit – IV

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

Exercise Questions: 4

Ex 7: Write the python programs to calculate the following

a) Write a python program to define a module to find Fibonacci Numbers and import the module to another program.

b) Write a python program to define a module and import a specific function in that module to another program.

Unit – V

Classes in Python : Principles of Object Orientation , Creating Classes , Instance Methods , Special Methods ,class Variables and Inheritance, Data base connectivity .

Exercise Questions: 5

Ex 8: Write the python programs to calculate the following

a) Define a class, which have a class parameter and have a same instance parameter.

b) Define a class named 'Shape' and its subclass 'Square'. The Square class has an 'init' function which takes a given length as an argument. Both classes have an area function which can print the area of the shape, where Shape's area is 0 by default..

Unit-VI

Regular Expressions: Introduction, Special Symbols and Characters, Res and Python

Exercise Questions: 6

Ex 9: Write the python programs to calculate the following

a) implement Re.findall, re.split, re.sub, re.subn, re.search and Match.group.

b) Write a Python program to check the validity of a password (input from users).

Validation :

- At least 1 letter between [a-z] and 1 letter between [A-Z].
- At least 1 number between [0-9].
- At least 1 character from [$#@].
- Minimum length 6 characters.
- Maximum length 12 characters.

Text Books

1. Wesley J .C hun "Core Python Applications Programming", 3rd Edition, 2012, Prentice Hall.
2. Brian jones, David Beazley “Python Cookbook ”, 3rd Edition.

References Books

1. Mark Lutz "Programming Python, 4th Edition" O'Reilly Media.
2. Think Python, Allen Downey, Green Tea Press

Web Links

https://docs.python.org/3/tutorial/index.html
https://pythonprogramminglanguage.com

ENGINEERING MECHANICS

Subject Code: 20EST203

L	T	P	C
3	0	0	3

COURSEOBJECTIVES:

- To develop an understanding of the principles of statics and the ability to analyze problems using static equilibrium equations.
- To introduce the basic principles of mechanics applicable to rigid bodies in equilibrium.
- To develop the fundamentals of engineering mechanics and problem solving skills essential for mechanical engineering
- To teach the basic principles of mechanics applicable to the motion of particles and rigid bodies. .

COURSE OUTCOMES:

CO 1. Determine the resultant of a planar force system using resolution of force and principle of moments.

CO 2. Draw free-body diagrams of given rigid bodies and compute unknown forces using equations of equilibrium of a planar force system by graphical and analytical methods.

CO 3. Comprehend the effect of friction on equilibrium of rigid bodies. Analyze the plane trusses by calculating axial forces in the members using method of joints.

CO 4. Calculate centroid and moment of inertia of plane figures of triangular, rectangular and circular cross sections.

CO 5. Predict the motion parameters of bodies under rectilinear, curve linear and general plane motion.

CO 6. Solve the problems involving dynamics of particles and rigid bodies

UNIT- I

System of forces: Fundamental concepts and principles of engineering mechanics – Laws of mechanics – Forces and components - Resultant of coplanar concurrent forces - Vector approach on addition, subtraction of forces.

Equilibrium of force systems: Equilibrium – Free body diagrams – Equations of equilibrium – Equilibrium of planar systems – Graphical methods and analytical methods for equilibrium of planar systems - Equilibrium of rigid bodies - Principle of transmissibility

UNIT-II

Moment of a force: Introduction – Principle of moments – Equivalent system of forces – Reduction of system of forces into single force and couple - Resultant of planar force systems.

Moment Applications: Varignon's theorem – Moment of a force and its applications.

UNIT- III

Analysis of Trusses:Types of loads – Types of supports and their reactions – Analysis of plane trusses using method of joints.

Friction: Introduction – Limiting friction – Types of friction and laws of friction – Application of friction - Inclined plane –Ladder, wedge and screw friction.

UNIT- IV

Centroid and Centre of gravity: Centroid of lines and areas – Determination of centroid of regular laminas by integration method – Centroid of composite figures – Theorems of Pappus and Guldinus – Concept of center of gravity.

Area moment of inertia: Determination of moment of inertia of area by integration – Moment of Inertia by analytical method – Radius of gyration – Parallel and perpendicular axis theorems – Polar moment of inertia – Concept of mass moment of inertia

UNIT- V

Kinematics: Rectilinear motion – Curvilinear motion – Rectangular components of curvilinear motion - Normal and Tangential components of acceleration.

Kinematics of rigid bodies: Angular motion – fixed axis rotation – Analysis of plane motion.

UNIT- VI

Kinetics: Kinetics of rigid bodies – Fixed axis rotation – rolling bodies - General plane motion –

Equilibrium of rigid bodies in plane motion – D'Alembert's Principle- Work Energy Principle- for rigid bodies in plane motion

TEXT BOOKS:

1. Engineering Mechanics, S.S. Bhavikatti, J.G. Rajasekharappa, New Age Publications,
2. Engineering Mechanics, A.K. Tayal, Umesh Publications, 13th Edition, 2008.
3. Ferdinand L. Singer: Engineering Mechanics, Harper Collins Publishers India, 3rd Edition, 2008.

REFERENCES BOOKS:

1. Irving. H. Shames: Engineering Mechanics, PHI Publishers, 4th Edition, 2008.
2. Ferdinand P. Beer, E. Russell Johnston (2010), Vector Mechanics for Engineers: Statics and Dynamics (9th Edition), Tata McGraw-Hill International Edition.
3. Russell C Hibbeler, (2009), Engineering Mechanics: Statics and Dynamics (12th Edition), Prentice Hall
4. Timoshenko & Young: Engineering Mechanics, MGH Publishers, 4th Edition, 2010.
5. K.L. Kumar, Engineering Mechanics, TMH Publishers, 3rd Edition, 2009.
6. Engineering Mechanics by S. Timoshenko and D.H.Young, McGraw-Hill.
7. Engg. Mechanics / S.S. Bhavikati& J.G. Rajasekharappa.

A.C MACHINES

Subject Code: 20EET206

L	T	P	C
2	1	0	3

Course objective:

- Ability to understand the principle of operation, construction and characteristics of both three phase and single phase induction motor and its application.
- Describe the methods to analyze the construction and performance of synchronous machines and its applications

Course outcomes:

CO1: Acquire knowledge about the working principle and Performance of 3- phase induction motor.
CO2: Summarize different techniques related to speed control and starting of 3-phase induction motor.
CO3: Outline different types of Alternators and their performance criteria**.**
CO4: Identify different types of synchronous motors; interpret their performance under different load conditions.
CO5: Recognize areas of application of synchronous and induction machines
CO6: Analyze the working principle and different types of single-phase induction motors

UNIT I:

Three phase Induction Machine – I: Constructional features-Squirrel cage & Slip ring induction motors, Rotating magnetic field, Principle of operation, Torque and power equations, Torque- slip characteristics, Equivalent circuit.

UNIT II:

Three phase Induction Machine- II: No load & blocked rotor tests-circle diagram, Starting methods, Speed control methods, Induction generator, Applications.

UNIT III:

Synchronous Machine –I: Constructional features, Armature winding, EMF Equation, Winding Coefficients, Equivalent circuit and phasor diagram, Armature reaction.

UNIT IV:

Synchronous Machine II: O. C. & S. C. tests, Voltage regulation using Synchronous Impedance method, MMF method, Potier's Triangle method, Two reaction theory, Applications.

UNIT V:

Synchronous Motor: Principle of operation, Starting methods, Effect of varying field current at different loads, V and Λ curves, Synchronous condenser, Applications.

UNIT – VI

Single Phase Induction Motor:

Single phase induction motor: Principle of operation, Double field revolving theory, equivalent circuit analysis, split phase motor, construction, principle of operation, capacitor start motor, shaded pole motor, torque speed characteristics, Applications.

TEXT BOOKS:

1. P S Bimbra, ―Electrical Machines, Khanna Publishers, 2nd Edition, 2008.
2. I J Nagrath, D P Kothari, ―Electrical Machines, TMH publication, 3rd Edition, 2010.

REFERENCE BOOKS:

1. A. E Fitzgerald, Charles Kingsley JR., Stephen D Umans, ―Electric Machinery‖, McGraw Hill,6th Edition, 1985.
2. M G Say, ―Alternating Current Machines‖, Pitman Publishing Ltd, 4th Edition, 1976.
3. J B Gupta, ―Theory and Performance of Electrical Machines‖, S K Kataria& Sons Publication, 14thEdition, 2010

CONTROL SYSTEMS

Subject Code: 20EET207

L	T	P	C
3	0	0	3

Course objective:

- To describe the feedback controls with basic components of control systems.
- To formulate mathematical models of physical systems and block diagram representation.
- To analyze stability of the system from transfer function approach.
- To describe and analyze various time domain and frequency domain tools for analysis and design of linear control systems.
- To Represent physical systems in state space form and analyze them.

Course outcomes:

CO1: Able to understand basic components of feedback control systems; formulate mathematical models of physical systems and represent them in block diagrams and signal flow graphs.
CO2: Able to understand the time- domain specifications; Analyze first and second order control systems in time domain;
CO3: Able to understand the concepts of stability; Analyze stability of the system from transfer functions approach and graphical methods.
CO4: Able to understand frequency response analysis.
CO5: Able to Design controllers, compensators for improve the performance specifications.
CO6: Able to Represent physical systems in state space form and analyze them.

UNIT I:

Introduction: Concepts of Control Systems- Open Loop and closed loop control systems- examples- Classification of control systems- Feedback characteristics- Effects of feedback characteristic.
Mathematical models of physical systems: Differential equations- transfer functions and block diagram representation of systems considering electrical systems as examples -Block diagram algebra – Representation by Signal flow graph - Reduction using Mason's gain formula - Translational and Rotational mechanical systems.

UNIT II:

Transfer function of elements of control systems: Transfer Function of DC Servo motor - AC Servo motor- Synchro transmitter and Receiver,
Time response analysis: Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems, and proportional integral derivative systems.

UNIT III:

Concept of stability: The concept of stability – Routh's stability criterion – qualitative stability and conditional stability

Root Locus Technique: The root locus concept - construction of root loci-effects of adding poles and zeros to G(s)H(s) on the root loci.

UNIT IV:

Frequency response analysis: Introduction, Frequency domain specifications-Bode plots-Determination of Frequency domain specifications and transfer function from the Bode plot-Phase margin and Gain margin-Stability Analysis from Bode Plots.Polar Plots- Nyquist Plots-Stability Analysis.

UNIT V:

Design and Compensation techniques: Introduction and preliminary design considerations-Lag, Lead, Lead-Lag compensation based on frequency response approach.

UNIT VI:

State Space Analysis of Continuous Systems: Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix.

TEXT BOOKS:

1. Control Systems Engineering – by I. J. Nagrath and M. Gopal, New Age International Limited Publishers, 2nd edition.
2. Automatic Control Systems byFaridGolnaraghi, Benjamin C. KUO,Wileyindia Pvt. Ltd, Ninth Edition.

REFERENCE BOOKS:

1. Control Systems by A.Anand Kumar, PHI Publications,4th edition.
2. Control Systems Engineering by S.Palani,TataMcGraw Hill Publications.
3. Modern Control Engineering, Fifth edition, Kotsuhiko Ogata, Prentice Hall of India Pvt. Ltd.

NUMERICAL METHODS
(Interdisciplinary Elective – I)

Subject Code: 20IET212

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

- To Solve the algebraic and transcendental equations, using different numerical method.
- Calculate the value of dependent variable for a particular x by deducing the unknown function y=f(x) for an evenly or unevenly spaced points.
- To estimate the value of derivatives using different numerical methods.
- To evaluate the definite integrals using different numerical methods.
- To calculate the numerical solution of an ordinary differential equation i.e IVP .
- Estimate an equation of curve which fits a given data.

COURSE OUTCOMES

On completion of this course, students should be able to

- Solve the algebraic and transcendental equations by identifying suitable numerical methods.
- Estimate a linear and non-linear curve to the given data by the method of least squares.
- Calculate the value of dependent variable for a particular x by deducing the unknown function y = f(x) for an evenly or unevenly spaced points.
- Estimate the value of derivatives and evaluate the definite integrals using different numerical methods and evaluate an IVP.
- Calculate the numerical solution of an ordinary differential equation i.e IVP .
- Enables to fit a equation of curve to the given data.

Unit – I
Algebraic and Transcendental Equations:
Solution of Algebraic and Transcendental Equations: Introduction – The Bisection Method – The Method of False Position – The Iteration Method – Newton-Raphson Method.

Unit-II
Interpolation:
Interpolation**:** Introduction – Finite differences- Forward Differences – Backward differences – Central differences-Relation between different operators- Newton's Interpolation formulae –Gauss Interpolation Formulae- Interpolation with unevenly spaced points – Lagrange's Interpolation formula.

Unit-III

Numerical Differentiation:

Numerical Differentiation– Differentiation using finite differences- Newton's Forward – Backward- Lagranges- Stirling's formula-Lagrange's interpolation formula.

UNIT-IV

Numerical Integration:

Numerical Integration – Trapezoidal rule – Simpson's 1/3 Rule –Simpson's 3/8 Rule.
Numerical double integration - Trapezoidal rule – Simpson's 1/3 Rule.

Unit-V

Numerical solution of Ordinary Differential equations:

Solution by Taylor's series – Picard's Method of successive Approximations – Euler's Method – Runge – Kutta Method(4^{th} order).

Unit-VI

Curve Fitting:

Curve fitting: Fitting a straight line-Second degree curve-Exponential curve-Power curve by method of least squares.

Text Books:

1. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, New Delhi, 42^{nd} edition, 2012.
2. A Text Book on Mathematical Methods, Ravindranath, V. and Vijayalaxmi, A.,Himalaya Publishing House, Bombay, 2^{nd} edition, 2012.

Reference Books:

1. Engineering Mathematics Vol.2.-Mathematical Methods(JNTU Kakinada), Dr.T. K.V.Iyengar, Dr.M.V.S.S.N.Prasad, S.Ranganatham, Dr.B.Krishna Gandhi, , S. Chand Publications.
2. Engineering Mathematics, B. V. Ramana, Tata McGraw Hill, New Delhi.

REMOTE SENSING
(Interdisciplinary Elective – I)

Course Code: 20IET215

L	T	P	C
3	0	0	3

Course Objectives

The objective of the course is to

1. To demonstrate the working principle of remote sensing
2. To differentiate the types platforms and orbits
3. To describethe various types of sensors and resolutions
4. To utilize different digital image processing and visual interpretation techniques to extract meaningful information from spatial data
5. To illustrate the image classification procedure
6. To explain the use of remote sensing in different applications.

Course Outcomes

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

1. Demonstrate the working principle of remote sensing
2. Differentiate the types of platforms and orbits
3. Describe the types of sensors & resolutions
4. Utilize different digital image processing and visual interpretation techniques to extract meaningful information from spatial data
5. Illustrate the image classification procedure
6. Explain the use of remote sensing in different applications.

Unit – I

Introduction: Definition, Basic components of remote sensing, Electromagnetic radiation, Electromagnetic spectrum, EMR interaction with atmosphere - EMR interaction with Earth Surface Materials.

Unit – II

Platforms: Introduction, Platforms- Ground borne, Airborne remote sensing, Space borne remote sensing; Orbital Characteristics, Type of Orbits

Unit – III

Sensors & Resolution: Introduction, Sensors- Passive sensors, Active sensors; Spatial Resolution, Spectral Resolution, Temporal Resolution, Radiometric Resolution.

Unit – IV

Image Analysis: Introduction, Digital Image processing, elements of visual interpretations, image enhancement techniques

Unit – V

Image classification: Introduction, Principles of Image classification, Process of image classification supervised classification, unsupervised classification

Unit – VI

Applications: Land use/Land cover, Agriculture, Forest, Water Resources and Urban Planning

Text Books

1. LRA Narayana, "Remote Sensing and its Applications" University Press, 1999.
2. M. Anji Reddy, "Remote Sensing and Geographical Information Systems", BS Publications, 4th edition,2014.
3.Basudeb Batta, "Remote Sensing and GIS", Oxford University Press, New Delhi, 2nd Edition, 2011

References Books

1. S.Kumar, "Basics of Remote Sensing and GIS", Laxmi Publications, 1st Edition, 2016.
2. Lillesand, Kiefer, Chipman, "Remote Sensing and Image Interpretation", Willy Publishers, 7th Edition, 2015
3. James B. Cambell, Rondolph H. Wynne, "Introduction to Remote Sensing", Guilford Press, London and Newyork, 5th Edition, 2011

MATHEMATICAL MODELING AND SIMULATION

(Interdisciplinary Elective – I)
(Except EEE)

Subject Code: 20IET216

L	T	P	C
3	0	0	3

Course Objectives:

By the end of this course, students in this class will understand the basic principles of programming and implementing mathematical concepts in MATLAB. Specifically, they will be able to write numerical algorithms and evaluate the computational results using graphical representations. The ultimate goal is to motivate the students for their profession and for future courses in curriculum.

Course Outcomes:

CO1: Translate mathematical methods to MATLAB code.
CO2: Generalize results and represent data visually.
CO3: Apply computer methods for solving a wide range of engineering problems.
CO4: Utilize computer skills to enhance learning and performance in other engineering and science courses.
CO5: Demonstrate professionalism in interactions with industry.
CO6: Understands about Scilab.

UNIT I
Introduction to Matlab
Historical Background, Applications, Scope of MATLAB, Importance of MATLAB for Engineers, Features, MATLAB Windows (Editor, Work Space, Command History, Command Window). Operations with Variables, Clearing Operations, Commands, Data types, Operators.

UNIT II
Data and Data Flow in Matlab
Vectors, Matrix Operations & Operators, Reshaping Matrices, Arrays, Colon Notations, Functions.

UNIT III
Matlab Programming
Conditional Statements, Loops, Writing Script Files, Error Correction, Saving Files, Worked out Examples.

UNIT IV
Matlab Advanced
Plotting graphs, Creating Plot & Editing Plot, MATLAB-Algebra, Calculus, Differential, Integration, Polynomials, solving a system of linear equations.

UNITV
Simulink-I
Introduction, Importance, Model Based Design, Tools, Mathematical Modeling,

UNITVI
Simulink-II
Converting Mathematical Model into Simulink Model, Running Simulink Models, Introduction to scilab.

Text Books:

1. Getting Started With Matlab: A Quick Introduction for Scientists and Engineers (English) by RudraPratap, OXFORD University Press.
2. Matlab Programming by Y. Kirani Singh, B.B. Chaudhuri, PHI Publication

Reference Books:

1. MATLAB® Programming For Engineers Fourth edition by Stephen J. Chapman
2. Applied Numerical Methods Using MATLAB 1st Edition by Won Y. Yang ,WenwuCao,Tae-SangChung,JohnMorris.

3.https://in.mathworks.com/products/simulink.html.

FUNDAMENTALS OF MATERIALS SCIENCE

(Interdisplinary Elective – I)

Subject Code: 20IET217

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

To understand different engineering materials and their structures.

COURSE OUTCOMES:

On completion of this course, students should be able

CO 1. To gain thorough knowledge in engineering materials and their structures.
CO 2. To gain thorough knowledge in deformation in different engineering materials.
CO 3. Understand necessity of hot and cold working methods.
CO 4. Understand thoroughly mechanical properties.
CO 5. To acquire knowledge on material testing methods and its process
CO 6. Understand necessity of making components using powder metallurgy route

UNIT-I

Introduction: Introduction, classification of materials, crystal defects.

UNIT-II

Plastic deformation of single crystals: Plastic deformation of single crystals. Deformation by slip, Deformation of single crystal. Deformation by twinning.

UNIT-III

hot working, cold working. Recovery, recrystallization and grain growth. Solidification mechanism.

UNIT-IV

Mechanical properties: Mechanical properties. Tensile stress-strain diagrams, proof stress, yield stress diagrams, modules of elasticity. Hardness Testing: -Rockwell, Brinell and Vickers.

UNIT-V

Impact toughness, Charpy V-Notch, fracture, ductile, brittle, creep, creep mechanisms, fatigue-mechanism-factors to improve fatigue resistance

Unit- VI

Powder Metallurgy: Definition, Methods of production of metal powders, Stages in powder metallurgical components preparation, Design considerations.

TEXT BOOKS:

1. An introduction to material Science – V Raghavan.
2. Mechanical Metallurgy – GE Dieter.
3. Material Science – Callister.

REFERENCE BOOKS:

1. Material Science for Engineers – Vanvlack.
2. Material Science for Engineers – Schakleford.

INTRODUCTION TO ELECTRONIC MEASUREMENTS

(Interdisciplinary Elective-I)

Subject Code: 20IET218

L	T	P	C
3	0	0	3

Course Objectives:

- To provide knowledge of performance characteristics and classify static errors of different measuring instruments.
- To construct DC Ammeter, DC Voltmeter, Ohmmeters for measurement of unknown current, voltage and resistance.
- To introduce various Signal generators and Harmonic Distortion analyzers.
- To become familiar with the working of CRO and special Oscilloscopes for measurement of electronic parameters.
- To construct AC and DC bridges for measurement of unknown Resistance, Inductance and Capacitance.
- To understand working principles of transducers for the measurement of non-electrical quantities.

Course Outcomes:

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

CO 1. Define various performance characteristics and classify static errors of Instruments.
CO 2. Calculate the resistance values for construction of DC voltmeter, Ammeter and Ohmmeters.
CO 3. Explain the working of various signal generators and analyzers for distortion measurements.
CO 4. Describe the working and use of CRO and special oscilloscopes.
CO 5. Determine the value of unknown resistance, inductance, capacitance and frequency of excitation.
CO 6. Classify transducers and identify suitable transducer for measuring various non-electrical quantities.

Unit - I

Performance characteristics of instruments: Static characteristics - accuracy, resolution, precision, expected value, error and sensitivity, Error in measurement, Types of Static error, Dynamic characteristics - speed of response, fidelity, lag and dynamic error.

Unit - II

DC Meters: DC Ammeter Construction, Multirange ammeter, Universal Shunt and Extending Range. RF ammeter. DC Voltmeter – Construction, Multirange voltmeter, Extending Range. Ohmmeters - Series type and shunt type.

Unit - III

Signal Generators and Harmonic Distortion Analyzers:

Signal Generators - Standard signal generator, AF sine and square wave generator, Function Generator.

Harmonic Distortion Analyzers: Fundamental Suppression Type – Resonance Bridge, Wien's Bidge, Bridged T-Network.

Unit - IV

CRO and Special Oscilloscopes: CRT features, Block Diagram of oscilloscope, Dual Beam CRO, Dual trace oscilloscope, Storage oscilloscope.

Unit - V

DC and AC Bridges: DC Bridge – Measurement of Resistance – Wheatstone's Bridge. AC Bridges - Measurement of inductance - Maxwell's Bridge, Anderson's bridge. Measurement of capacitance – Schering's Bridge and Wien's Bridge

Unit - VI

Transducers: Classification**,** Resistive Transducer – Potentiometer type – Pressure Transducer and Position Transducer, unbonded and bonded strain gauges, Thermistor, Inductive Transducer- LVDT, Capacitive Transducer – Pressure Transducer, Temperature Transducer-Thermocouple.

Text Books:

1. Electronic instrumentation – H.S.Kalsi, Tata McGraw Hill, 2004, 2/e.
2. Modern Electronic Instrumentation and Measurement Techniques – A.D. Helfrick and W.D. Cooper, PHI, 2002, 5/e.

Reference Books:

1. Electronic Instrumentation & Measurements - David A. Bell, PHI, 2003, 2/e.
2. Electronic Test Instruments, Analog and Digital Measurements - Robert A.Witte, Pearson Education, 2004, 2/e.

https://nptel.ac.in/courses/108/105/108105153/
http://nitttrc.edu.in/nptel/courses/video/108105153/108105153.html

UNIX UTILITIES
(Interdisciplinary Elective-I)

Subject Code: 20IET219

L	T	P	C
3	0	0	3

Course Objectives

- Know about UNIX operating system
- Understand important commands which are used in UNIX
- Learn shell programming
- Study UNIX file system
- Understand the process mechanism

Course Outcomes

1. Describe UNIX Architecture and Functions of OS
2. Demonstrate the basic set of commands and utilities in UNIX system
3. Design and Implement of UNIX file system
4. Familiar with various shell commands
5. Develop shell scripts to automate various tasks
6. Analyze the different types of processes in UNIX environment

Unit – I

Introduction to Unix-Brief History,What is Unix-Unix Components, Operating system services, Assumptions about hardware. Introduction to the Kernel: Architecture of the UNIX operating system, Introduction to system concepts – Kernel data structures – System administration.

Unit – II

Using Unix-Commands, Unix-Some Basic Commands-. Unix Command - man, echo, printf, script, passwd, uname, who, date, stty, pwd, cd, mkdir, rmdir, ls, cp, mv, rm, cat, more, wc, lp, od, tar, gzip. Unix Utilities:- Introduction to unix file system, vi editor, file handling utilities, security by file permissions, process utilities, disk utilities, networking commands, unlink, du, df, mount, umount, find, unmask, ulimit, ps, w, Text processing utilities and backup utilities , detailed commands to be covered are tail, head , sort, nl, uniq, grep, egrep, fgrep, cut, paste, join, comm, cmp, diff, tr.

Unit – III

The File system –The Basics of Files-What's in a File-Directories and File Names-Permissions-I Nodes-The Directory Hierarchy, File Attributes and Permissions-The File Command knowing the File Type-The Chmod Command Changing File Permissions-The Chown Command Changing the Owner of a File-The Chgrp Command Changing the Group of a File.

Unit – IV

Using the Shell-Command Line Structure-Met characters-Creating New Commands-Command Arguments and Parameters-Program Output as Arguments-Shell Variables- -More on I/O Redirection-Looping in Shell Programs.

Unit – V

Shell Programming-Shell Variables-The Export Command-The Profile File a Script Run During Starting-The First Shell Script-The read Command-Positional parameters-The $? Variable knowing the exit Status-More about the Set Command-The Exit Command-Branching Control Structures-Loop Control Structures-The Continue and Break Statement-The Expr Command: Performing Integer Arithmetic-Real Arithmetic in Shell Programs-The here Document(<<)-The Sleep Command-Debugging Scripts-The Script Command-The Eval Command-The Exec Command.

Unit – VI

The Process-The Meaning-Parent and Child Processes-Types of Processes-More about Foreground and Background processes-Internal and External Commands-Process Creation-The Trap Command-The Stty Command-The Kill Command-Job Control.

Text Books

1. Introduction to Unix Shell Programming by M.G.Venkateshmurthy, Parson.
2. Your Unix the ultimate guide, Sumitabha Das, TMH. 2nd Edition.

Reference Books

1. Unix and shell programmingby B.M. Harwani, OXFORD university press.
2. Unix programming environment, Kernighan and Pike, PHI. / Pearson Education
3. Beginning shell scripting, E. Foster – Johnson & other, Wile Y- India

FUNDAMENTALS OF DATA STRUCTURES
(Interdisciplinary Elective-I)

Subject Code: 20IET21A

L	T	P	C
3	0	0	3

Course Outcomes:

On completion of this course, the student will be able to:

1. Compute the time and space complexities and calibrate the performance of a given algorithm.
2. Compare the performances of various Searching and Sorting techniques.
3. Illustrate the applications of Stacks and Queues.
4. Demonstrate the advantages of dynamic memory allocation via linked lists.
5. Implement the basic operations and Traversals on binary Trees.
6. Understand traversals and shortest path algorithms on a Graph.

Unit – I

Introduction: Basic Concepts of Data Structures and types of Data Structures; Performance Analysis of algorithms; Asymptotic Notations (O,Ω, θ)

Unit – II

Searching: Linear Search, Binary Search: Algorithm & Analysis; Sorting: Methodology & Performance Analysis of Sorting Algorithms: Selection, Bubble, Insertion, Quick, Merge sort.

Unit – III

Stacks: Definition, operations, Applications of Stacks: Conversion of infix to postfix expression

Queues: Definition, operations, Applications of Queues;

Unit – IV

Linked Lists: Comparison with Arrays; Operations on Singly linked list: Creation, Insertion, Deletion, Traversing; Operations on Doubly linked list; Operations on Implementation of Stack and Queue using Linked Lists.

UNIT-V

Trees: Basic Terminology of Trees; Binary Tree: Traversals; Binary Search Tree Operations: Insert, Delete;

UNIT-VI

Graph: Basic Terminologies and Representations of Graphs; Graph traversal algorithms: Breadth-FS & Depth-FS; Minimum spanning tree algorithms: Prim's and kruskal's algorithms

Text Books:

1. Mark Allen Weiss , "Data Structures and Algorithm Analysis", Fourth Edition , Pearson.
2. Ellis Horowitz, Sartaj Sahni, "Fundamentals of Data Structures", Illustrated Edition,Computer- Science Press.

Reference Books:

1. Michel T. Goodrich, Roberto Tamassia, David Mount, "Data Structures and Algorithm Analysis", 2nd Edition, John Wiley & Sons, Inc.
2. Adam. Drozdek , "Data Structure And Algorithms In C++", 4th edition, Ceng

COMPETITIVE PROGRAMMING-I
(Interdisciplinary Elective-I)

Subject Code: 20IET21C

L	T	P	C
3	0	0	3

Course Objectives:

- Understanding importance of Mathematics and Problem solving approaches for Programming
- Understanding importance of optimized solution for problem solving

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

1. Solve problems using programming
2. Design solution using OOP principles
3. Analyze time and space Complexity of a Solution.
4. Select appropriate container to organize data for problem solving.
5. Design a Relational Database schema for a subject of interest
6. Identify Redundancy in the Database using Normal Forms

UNIT-I

CPP Essentials:

Basics: Basic Syntax, Variables, Data types, Operators, Input and output, Conditional Statements and loops, pointers and Dynamic memory allocation, arrays ,vector , built in functions, user defined functions.

Problems to Practice: Missing Number ,Integer to English Words ,Integer to Roman, Roman to Integer, 2sum, 3sum,3sum closet,4sum,Remove duplicates in a list, Circular Array Loop,
Fruit Into Baskets,, K-diff Pairs in an Array, Move Zeroes, Rotate Array, Flipping an Image, circular Array Loop

UNIT-II

OOP Principles:
Implementation of OOP principles(Encapsulation , Abstraction, Inheritance ,polymorphism) in cpp and Exception Handling.

UNIT-III

Algorithm Analysis:

Characteristics of algorithm, Algorithm Analysis-operation count , step counts,. asymptotic complexity, recurrence equations

UNIT-IV

Standard Template Library: Containers, Container Classes,Vectors, Lists, Iterators, Maps, Set structures, Bit set, Stack, Queue, Deque, Priority queue.

Recursion: Recursion and its applications, Exhaustive search using Backtracking.

Problems to Practice: Permutations, Palindrome Partitioning, Beautiful Arrangement, N-Queens , Path with Maximum Gold

UNIT-V

Introduction to DBMS, ER Model, ER to Relation Model Conversion

SQL Part1: SQL Command, Data Types, Operators and Expressions, DDL statements, DML statements, Functions, Sorting Data, Grouping Data

UNIT-VI

SQL Part2: Cartesian Product and Inner Join, Self Join, Outer Join, Subquery, Independent Subquery, Correlated Subquery

Normalization: Functional Dependency and Normal Forms (1NF,2NF,3NF,BCNF)

Text Books:

1. The Complete Reference C++ by Herbert Schildt ,4th Edition
2. Raghurama Krishnan, Johannes Gehrke: Database Management System, TATA McGrawHill 3rd Edition

Reference Books:

1. 2. J.Kleinberg & E. Tardos – Algorithm Design, Pearson Education, New Delhi, 2006.
2. G.Brassard & P. Bratley – Fundamentals of Algorithms, PHI, New Delhi, 2005.
3. T.H. Cormen et.al. – Introduction to Algorithms – PHI, New Delhi, 2005.
4. S.Dasgupta et.al. – Algorithms, TMH, New Delhi – 2007.

Resourses:

1. https://leetcode.com/problems/
2. https://nptel.ac.in/courses/106106131/
3. https://www.spoj.com/problems

A.C MACHINES LAB

Subject Code: 20EEL205

L	T	P	C
0	0	3	1.5

Course objective:
To develop on hand experience with Transformers, Induction motors, Synchronous generators and motor by allowing them to conduct various experiments.

Course outcomes:
CO1: Explain testing and experimental procedures on different types of electrical machines.
CO2: Prepare laboratory setup (circuits) with proper connections on electrical Transformers and AC-machines
CO3: Analyze the performance of induction motors and synchronous machines
CO4: Summarize experiment results in a written report
CO5: Analyze possible causes of discrepancy in comparison to theory
CO6: Originate a professional experience on working in any practical field and to be ready for life-long involvement in the farther improvement of relevant technology

LIST OF EXPERIMENTS:
1. O.C. &S.C. Tests on single phase transformer.
2. Sumpner's test on a pair of single-phase transformers.
3. Brake test on three phase squirrel cage induction motor.
4. No-load& blocked rotor tests on three phase Slip ring Induction motor.
5. Regulation of a three-phase alternator by synchronous impedance method.
6. V and inverted V curves of a three –phase Synchronous motor.
7. No-load& blocked rotor tests on single phase induction motor.
8. Regulation of a three-phase alternator by ZPF method.
9. Parallel Operation of Single-Phase Transformers.
10. Separation of core losses of a single-phase transformer.

Additional Experiments:
11. Scott connection of Transformers.
12. Determination of Xd and Xq of a salient pole synchronous machine

CONTROL SYSTEMS LAB

Subject Code: 20EEL206

L	T	P	C
0	0	3	1.5

Course Objective:

- To understand the modeling, simulation, transfer function and implementation of a physical dynamical system by a linear time invariant ordinary differential equation.
- To examine electrical modeling of a second order system and analyze the under-damped, over-damped and critically damped cases
- To interpret the effects of poles and zeros location in the s-plane on the transient and steady state behavior.
- To Measure the characteristics of Servo-Motor.
- To Design Lead, Lag and Lag-Lead series compensator on a second order system.

Course Outcomes:

CO1: Students can predict transfer function and implementation of a physical dynamical system by a linear time invariant ordinary differential equation.
CO2: Students can examine electrical modeling of a second order system and analyze the under- damped, over-damped and critically damped cases.
CO3: Students can interpret the effects of poles and zeros location in the s-plane on the transient and steady state behavior.
CO4: Students can measure the characteristics of Servo-Motor.
CO5: Students can design Lead, Lag and Lag-Lead series compensator on a second order system.
CO6: Students can understand Characteristics of magnetic amplifiers

ANY TEN OF THE FOLLOWING EXPERIMENTS ARE TO BE CONDUCTED:

1. Time response of Second order system
2. Characteristics of Synchros
3. Effect of feedback on DC servo motor
4. Transfer function of DC motor
5. Effect of P, PD, PI, PID Controller on a second order systems
6. Lag and lead compensation – Magnitude and phase plot
7. Transfer function of DC generator
8. Temperature controller using PID
9. Characteristics of magnetic amplifiers
10. Characteristics of AC servo motor
11. Root locus and bode plot from MATLAB
12. State space model for classical transfer function using MATLAB-verification.
13. Simulation of transfer function using operational amplifiers.

REFERENCE BOOKS:

1. Simulation of Electrical and electronics Circuits using PSPICE – by M.H.Rashid, PHI Publications.
2. MATLAB and its Tool box user's manual and – Math works, USA.

INTRODUCTION TO ELECTRICAL VEHICLE TECHNOLOGY

(Honors Course)

Subject Code: 20EVT201

L	T	P	C
3	1	0	4

Course Objectives:

1. To describe the different types of electrical and hybrid vehicles
2. To discuss the basic components of Electric vehicle power train.
3. To discuss the basics of different Motor Principles
4. To describe the concepts of Hybrid Electric Drive Trains
5. To describe and analyze different types of batteries and energy storage systems
6. To describe different controllers and converters in Electric Vehicles

Course Outcomes:

At the end of the course the student will able to

1. Understand basics of Electric vehicle & Hybrid Electric Vehicle.
2. Understand about power train drives and control in Electric Vehicles.
3. Understand basics of different Motor Principles
4. Understand concepts in different Electrical Drive trains
5. Analyze different types of batteries and energy storage requirements.
6. Understand different controllers and converters in Electric Vehicles

Unit-I- Introduction to Electric vehicle

Comparison of Conventional Vehicle vs Electric Vehicle, Introduction to Electric Vehicles: Types of EVs, Hybrid Electric Vehicles, Introduction to EV Technology, History of Electric Vehicle, Benefits Of Electric Vehicles, Types of Electric vehicle and Hybrid Vehicles. Norms and Standards.

Unit-II- Power Train in Electric vehicle

Working of an Electric Vehicle, Major Components in an Electric Vehicle Power train, Energy Source of an EV, Transmission configuration, Components – Motor, gears, differential, clutch, brakes regenerative braking, Battery pack, Controller. Hybrid Electric Drive-train

Unit-III- Motor-Principles of Electrical Machines

Motor-Principles of Electrical Machines, EM Fundamentals**,** Classification of Motors, Selection of Motor, Motor Specifications Calculations, Gear ratio Calculations.

Unit-IV- Electrical Drive trains

Concept of Hybrid Electric Drive Trains, Electric Propulsion unit, Configuration and control of DC Motor drives, Induction Motor drives, Permanent Magnet Motor drives, switched reluctance motor

Unit-V- Energy Storage systems

Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles:- Battery based energy , storage , Types of Batteries and Classification, different energy storage devices. Battery Selection Criteria, Major Components of a Battery pack, Applications

Unit-VI- Controllers & Converters

Controller & Converters, EV Controllers**,** DC-DC Converter**,** DC-AC Converter

Text Books:

1. Iqbal Husain, "Electric and Hybrid Vehicles Design Fundamentals", CRC Press, 2010
2. James Larminie, John Lowry, "Electric Vehicle Technology Explained", Wiley 2012.
3. Mehrdad Ehsani, Yimin Gao, Sebastien E. Gay, Ali Emadi, "Modern Electric, Hybrid Electric, and Fuel Cell Vehicles Fundamentals, Theory, and Design", CRC Press, 2004

References:

1. Mehrdad Ehsani, Yimin Gao, Ali Emadi, “Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals”, CRC Press, 2010.
2. Sandeep Dhameja, “Electric Vehicle Battery Systems”, Newnes, 2000 .http://nptel.ac.in/courses/108103009/