Study & Evaluation Scheme

of

Bachelor of Technology (Electronics & Communication Engineering)

[Applicable w.e.f. Academic Session - 2020-21 till revised] [As per CBCS guidelines given by AICTE]



TEERTHANKER MAHAVEER UNIVERSITY

N.H.-24, Delhi Road, Moradabad, Uttar Pradesh-244001 Website: <u>www.tmu.ac.in</u>



B.Tech (EC) Syllabus Applicable w.e.f. Academic Session 2020-21



TEERTHANKER MAHAVEER UNIVERSITY

(Established under Govt. of U.P. Act No. 30, 2008)

Delhi Road, Bagarpur, Moradabad (U.P.)

<u>Study & Evaluation Scheme</u>							
	SUMMARY						
Institute Name Faculty of Engineering							
Programme	B.Tech (Electronics & Communication Engineering)						
Duration	Four-year full time (Eight Semesters)						
Medium	English						
Minimum Required Attendance	75%						
	Credits						
Maximum Credits	180						
Minimum Credits Required for Degree	172						

		Assessmen	t:		
Evaluation			Internal	External	Total
Theory		40	60	100	
Practical/ Dissertations/ Project Reports/ Viva-Voce		50	50	100	
Class Test-1 Class Test-2		Class Test-3	Assignment(s)	Attendance &	Total
	Best two out of	three		Participation	
10	10	10	10	10	40
Duration of Eveningtion			External	Intern	al
Duration of Examination		3 Hours	1.5 Hou	irs	

To qualify the course a student is required to secure a minimum of 45% marks in aggregate including the semester end examination and teachers continuous evaluation (i.e. both internal and external).A candidate who secures less than 45% of marks in a course shall be deemed to have failed in that course. The student should have at least 45% marks in aggregate to clear the semester. # Provision for delivery of 25% content through online mode.

Policy regarding promoting the students from semester to semester & year to year. No specific condition to earn the credit for promoting the students from one semester to next semester.

Maximum no of years required to complete the program: N+2 (N=No of years for program)

	Question Paper Structure					
1	The question paper shall consist of six questions. Out of which first question shall be of short answer type (not exceeding 50 words) and will be compulsory. Question no. 2 to 6 (from Unit-I to V) shall have explanatory answers (approximately 350 to 400 words) along with having an internal choice within each unit.					
2	Question No. 1 shall contain 8 parts from all units of the syllabus with at least one question from each unit and students shall have to answer any five, each part will carry 2 marks.					
3	The remaining five questions shall have internal choice within each unit; each question will carry 10 marks.					
	IMPORTANT NOTES:					
1	The purpose of examination should be to assess the Course Outcomes (CO) that will ultimately lead to of attainment of Programme Specific Outcomes (PSOs). A question paper must assess the following aspects of learning: Remember, Understand, Apply, Analyze, Evaluate & Create (reference to Bloom's Taxonomy).					
2	Case Study is essential in every question paper (wherever it is being taught as a part of pedagogy) for evaluating higher-order learning. Not all the courses might have case teaching method used as pedagogy.					
3	There shall be continuous evaluation of the student and there will be a provision of fortnight progress report.					

Program Structure- B.Tech (Electronics & Communication Engineering) A. Introduction:

Electronics & Communication Engineering is an ever-growing industry in today's digital scenario. It is the utilization of science and math applied to practical problems in the field of Electronics & Communication. Electronics & Communication Engineering engage in research, design, development and testing of the electronic equipment used in various communications systems. It is due to Electronics engineers that we enjoy such modern communication devices as cellular telephones, radios and television. The graduates are qualified for professional practise or to work in several areas of specialization. We prepare students as professional engineers through an education in fundamental principles presented in the context of real application and design. In addition to fundamentals of science and mathematics, the program provides a solid background in Devices & Circuits, Analog & Digital Electronics & Electronics & Communication Engineering finds applications in all fields of engineering and in daily life.

Students will develop and gain various skills that are transferable within the engineering world and practical skills that are equally useful in plenty of other sectors. Problem-solving skills are honed, and their interpersonal and communication skills will also improve with the amount of team work that they will be required to do. Students will also learn how to better manage their time and resources and assess the risks involved in a certain project. Other useful skills that they will learn include design, leadership and organisational skills.

The institute emphasis on the following courses *balanced with core and elective courses*: The curriculum of B.Tech. program emphasizes an intensive, flexible engineering education with 133 credits of core courses (all types), 35 credits of electives and 12 credits of field/internship projects. Total 180 credits are allotted for the B.Tech. degree.

The programme structure and credits for B.Tech. are finalized based on the stakeholders' requirements and general structure of the programme. Minimum number of classroom contact teaching credits for the B.Tech. program will be 168 credits (one credit equals 1.0 hour) and Project/internship will be of 12 credits. However, the minimum number of the credits for award of B.Tech. degree will be 172 credits. Out of 168 credits of classroom contact teaching, 54 credits are to be allotted for core courses (CC), 16 credits are allotted to Basic Science Courses (BSC), 30 credits are allotted to Engineering Science Courses (ESC), 03 credits are allotted to Mandatory Courses (MC), 06 credits are allotted to open elective courses (OEC), 14 credits are allotted to Professional Elective courses and rest of 27 credits for Laboratory courses. Credits distribution is given below in tabular form:

B.Tech -Electronics & Communication Engineering: Four-Year (8-Semester) CBCS Programme

	Bas	ic Structure: Distribution of Courses	
S.No.	Type of Course	Credit Hours	Total Credits
1	BSC - Basic Science Courses	4 Courses of 4 Credits each (Total Credit Hrs. 4X4)	16
2	ESC - Engineering Science Courses	6 Courses of 4 Credits each (Total Credit Hrs. 6X4) 2 Courses of 3 Credits each (Total Credit Hrs. 2X3)	30
3	HSMC - Humanities and Social Sciences including Management courses	4 Courses of 3 Credits each (Total Credit Hrs. 4X3) 1 Course of 2 Credits each (Total Credit Hrs.1X2)	14
4	PCC - Professional core courses	10 Courses of 3 Credits each (Total Credit Hrs. 10X3) 6 Courses of 4 Credits each (Total Credit Hrs. 6X4)	54
5	PEC - Professional Elective courses	3 Courses of 4 Credits each (Total Credit Hrs. 3X4) 2 Courses of 3 Credits each (Total Credit Hrs. 2X3)	18
6	OEC - Open Elective courses	2 Course of 3Credits each (Total Credit Hrs.2X3)	06
7	Value Added Course (VAAC)	6 Courses of 0 Credits each (Total Credit Hrs. 6X0)	0
8	LC - Laboratory course	21 Courses of 1 Credits each (Total Credit Hrs. 21X1) 3 Courses of 2 Credits each (Total Credit Hrs.3X2)	27
9	MC-Mandatory Courses	1 Course of 3 Credits each (Total Credit Hrs.1X3)	03
10	PROJ-Skill based practical training & Industrial Training Report &Viva Voce for Dissertation	1 Course of 5Credits each (Total Credit Hrs. 1X5) 1 Course of 3 Credits each (Total Credit Hrs. 1X3) 2 Course of 2 Credits each (Total Credit Hrs. 2X2)	12
11	MOOC-Optional (credits will consider only in case a student fails to secure minimum required credits for the award of degree)	4 Course of 0 Credits each (Total Credit Hrs. 4X0)	00
		Total Credits	180

Contact hours include work related to Lecture, Tutorial and Practical (LTP), where our institution will have flexibility to decide course wise requirements.

B. Tech (Honours) Programme:

A new academic programme B.Tech (Hons.) is introduced in order to facilitate the students to choose additionally the specialized courses of their choices and build their competence in a specialized area. The features of the new programme, include:

- 1. B.Tech Student in regular stream can opt for B.Tech (Hons.), provided he/she passed in all courses with minimum aggregate 75% marks upto the end of second semester.
- **2.** For B. Tech (Hons), Student needs to earn additional 24 credits (over and above the required minimum 180 credits) relevant to her/his discipline as recommended by the faculty advisor.
- **3.** The students opting for this program have to take four additional courses of their specialization of a minimum of 2 credits each from 3rd to 8th semesters.

B.Tech (EC) Syllabus Applicable w.e.f. Academic Session 2020-21

- **4.** The faculty advisor will suggest the additional courses to be taken by the students based on their choice and level of their academic competence.
- **5.** The list of such additional courses offered by the NPTEL will be approved by the Honourable Vice Chancellor in the beginning of the academic year to facilitate the registration process.
- 6. The student can also opt for post graduate level courses.
- 7. The students have to submit the NPTEL course completion certificate to exam division for considering as B.Tech (Hons)
 - * Student should have to take permission of registration for the B.Tech. (Hons.) degree from Honourable Vice Chancellor in starting of third semester.

C. Choice Based Credit System (CBCS)

Choice Based Credit System (CBCS) is a versatile and flexible option for each student to achieve his/her target number of credits as specified by the AICTE/UGC and adopted by our University.

The following is the course module designed for the B.Tech. program:

• *Program Core Course (PCC):* Core courses of B.Tech. program will provide a holistic approach to engineering education, giving students an overview of the field, a basis to build and specialize upon. These core courses are the strong foundation to establish technical knowledge and provide broad multi-disciplined knowledge can be studied further in depth during the elective phase.

The core courses will provide more practical-based knowledge, case-based lessons and collaborative learning models. It will train the students to analyze, decide, and lead-rather than merely know-while creating a common student experience that can foster deep understanding, develop decision-making ability and contribute to the society at large.

A wide range of core courses provides groundwork in the basic engineering disciplines: Electronic Devices & Circuits, Engineering Electromagnetics, Microwave Techniques, Digital communication systems etc.

The integrated foundation is important for students because it will not only allow them to build upon existing skills, but they can also explore career options in a range of industries, and expand their understanding of various Technical fields.

We offer core courses from semester III onwards during the B.Tech. program. There will be 2, 3 and 4 credits for each core course offered.

- HSMC (Humanities and Social Sciences including Management courses): As per the AICTE guidelines of Choice Based Credit System (CBCS) for all Universities, including the private Universities, the Humanities and Social Sciences including Management courses are actually Ability Enhancement Compulsory Course (AECC) which is designed to develop the ability of students in communication (especially English) and other related courses where they might find it difficult to communicate at a higher level in their prospective job at a later stage due to lack of practice and exposure in the language, etc. Students are motivated to learn the theories, fundamentals and tools of communication which can help them develop and sustain in the corporate environment and culture. We offered four HSMCs of 3 & 2 credits in I, II, III, V & VI semesters.
- *Skill Enhancement Course:* This course may be chosen from a pool of courses designed to provide value-based and/or skill-based knowledge. We offer two SECs- one each in VI Semester & VII Semester. One SEC will carry 2 credits each.
- Open Elective Course (OEC): Open Elective is an interdisciplinary additional subject that is compulsory in a program. The score of Open Elective is counted in the overall aggregate marks under Choice Based Credit System (CBCS). Each Open Elective paper will be of 3 Credits in VII and VIII semesters. Each student has to take Open/Generic Electives from department other than the parent department. Core / Discipline Specific Electives will not be offered as Open Electives.

- *Mandatory Course (MC):* This is a compulsory course that does not have any choice and will be of 2& 3 credits. Each student of B.Tech. Program has to compulsorily pass the Environmental Studies and acquire 3 credits respectively.
- *Value Added Course (VAAC):* A Value-Added Course is a non-credit course which is basically meant to enhance general ability of students in areas like soft skills, quantitative aptitude and reasoning ability required for the overall development of a student and at the same time crucial for industry/corporate demands and requirements. The student possessing these skills will definitely develop acumen to perform well during the recruitment process of any premier organization and will have the desired confidence to face the interview. Moreover, these skills are also essential in day-to-day life of the corporate world. The aim is to nurture every student for making effective communication, developing aptitude and a general reasoning ability for a better performance, as desired in corporate world. There shall be four courses of Aptitude in Semester III, IV, V & VI semesters and two courses of Soft Skills in V &VI Semesters and will carry no credit, however, it will be compulsory for every student to pass these courses with minimum 45% marks to be eligible for the certificate. These marks will not be included in the calculation of CGPI. Students have to specifically be registered in the specific course of the respective semesters.
- **Professional Elective courses (PEC):** The professional elective course is chosen to make students specialist or having specialized knowledge of a specific domain like Power system, Control system etc. It will be covered in three semesters (VI, VII & VIII) of Third and fourth years of the program relevant to chosen disciplines of core courses of the program. Each student will have to choose five professional elective courses (PECs); 1 in Semester VI, 2 in Semester VII and 2 in Semester VIII respectively.

PO – 1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO – 2	Problem analysis& Solving: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO – 3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO – 4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO – 5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO – 6	Social Interaction & effective citizenship: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO – 7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO – 8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

D. Program Outcomes for Engineering:

Г

PO – 9	Attitude (Individual and team work): Function effectively as an individual, and as member or leader in diverse teams, and in multidisciplinary settings.
DO 10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large such as, being able to comprehend
PO - 10	and write effective reports and design documentation, make effective presentations, and give and receive clean instructions.
	Project management and finance: Demonstrate knowledge and understanding of the
DO 11	engineering and management principles and apply these to one's own work, as a
PO-11	member and leader in a team, to manage projects and in multidisciplinary
	environments.
	Life-long learning: Recognize the need for, and have the preparation and ability to
PO – 12	engage in independent and life-long learning in the broadest context of technological
	change.
	Entrepreneurship: An Entrepreneurship cut across every sector of human life
PO13	including the field of engineering, engineering entrepreneurship is the process of
10-15	harnessing the business opportunities in engineering and turning it into profitable
	commercially viable innovation.
	Interpersonal skills: Interpersonal skills involve the ability to communicate and build
PO14	relationships with others. Effective interpersonal skills can help the students during the
	job interview process and can have a positive impact on your career advancement.
	Technology savvy/usage: Being technology savvy is essentially one's skill to be
PO 15	smart with technology. This skill reaches far beyond 'understanding' the concepts of
10-13	how technology works and encompasses the 'utilization' of such modern technology
	for the purpose of enhancing productivity and efficiency.

E. Programme Specific Outcomes (PSOs)

The learning and abilities or skills that a student would have developed by the end of four-year **B.Tech. Program:**

PSO – 1	Understanding the concepts of basic sciences, humanities and core technical courses of Electronics & Communication Engineering.
PSO – 2	Applying the skills to identify, formulate, design and investigate complex engineering problems of real time projects in the field of electronics and communication engineering in analog, digital and hybrid system domains
PSO – 3	Applying the acquired hardware and software knowledge to research and industrial practices while acquiring soft skills like persistence, proper judgment through these projects-based interactions.
PSO – 4	Analysing the applications of core engineering concepts in the field of communication/ networking, signal processing, embedded systems and semiconductor technology.
PSO – 5	Evaluating various electrical, electronics and communication systems consisting of electrical and electronic components through analytical knowledge in Electronics & Communication Engineering with the help of modern tools.
PSO – 6	Creating hands on experiences and exposure in the field of Solar System, Microcontroller, PCB Designing and IoT, etc.

F. Pedagogy & Unique practices adopted:

"Pedagogy is the method and practice of teaching, especially for teaching an academic subject or theoretical concept". In addition to conventional time-tested lecture method, the institute will emphasize on experiential learning.

- *Audio-Visual Based Learning:* These days technology has taken a front seat and classrooms are well equipped with equipment and gadgets. Video-based learning has become an indispensable part of learning. Similarly, students can learn various concepts through video lectures. In fact, many teachers give examples from movies during their discourses. Making students learn few important theoretical concepts through Audio visual Aids is a good idea and method. The learning becomes really interesting and easy as videos add life to concepts and make the learning engaging and effective. Therefore, our institute is promoting *Audio-Visual Based Learning* wherever possible.
- *Field / Live Projects*: The students, who take up experiential projects in companies, where senior executives with a stake in teaching guide them, drive the learning. All students are encouraged to do some live project other than their regular classes.
- *Industrial Visits:* Industrial visit are essential to give students hand-on exposure and experience of how things and processes work in industries. Our institute organizes such visits to enhance students' exposure to practical learning and work out for a report of such a visit relating to their specific topic, course or even domain.
- *MOOCs:* Students may earn credits by passing MOOCs as decided by the college. Graduate level programs may award Honors degree provided students earn pre-requisite credits through MOOCs. University allows students to undertake additional subjects/course(s) (In-house offered by the university through collaborative efforts or courses in the open domain by various internationally recognized universities) and to earn additional credits on successful completion of the same. Each course will be approved in advance by the University following the standard procedure of approval and will be granted credits as per the approval.

Keeping this in mind, University proposed and allowed a maximum of two credits to be allocated for each MOOC courses. In the pilot phase it is proposed that a student undertaking and successfully completing a MOOC course through only NPTEL could be given 2 credits for each MOOC course.

For smooth functioning and monitoring of the scheme the following shall be the guidelines for MOOC courses, Add-on courses carried out by the College from time to time.

- a) This is recommended for every student to take at least one MOOC Course throughout the programme.
- **b)** There shall be a MOOC co-ordination committee in the College with a faculty at the level of Professor heading the committee and all Heads of the Department being members of the Committee.
- c) The Committee will list out courses to be offered during the semester, which could be requested by the department or the students and after deliberating on all courses finalize a list of courses to be offered with 2 credits defined for each course and the mode of credit consideration of the student. The complete process shall be obtained by the College before end of June and end of December for Odd and Even semester respectively of the year in which the course is being offered. In case of MOOC course, the approval will be valid only for the semester on offer.
- **d)** Students will register for the course and the details of the students enrolling under the course along with the approval of the Vice Chancellor will be forwarded to the Examination department within fifteen days of start of the semester by the Coordinator MOOC through the Principal of the College.
- e) After completion of MOOC course, Student will submit the photo copy of Completion certificate of MOOC Course to the Examination cell as proof.
- f) Marks will be considered which is mentioned on Completion certificate of MOOC Course.
- **g)** College will consider the credits only in case a student fails to secure minimum required credits then the additional subject(s) shall be counted for calculating the minimum credits required for the award of degree.
- Special Guest Lectures (SGL) & Extra Mural Lectures (EML): Some topics/concepts need extra attention and efforts as they either may be high in difficulty level or requires experts from specific

industry/domain to make things/concepts clear for a better understanding from the perspective of the industry. Hence, to cater to the present needs of industry we organize such lectures, as part of lectureseries and invite prominent personalities from academia and industry from time to time to deliver their vital inputs and insights.

- *Student Development Programs (SDP):* Harnessing and developing the right talent for the right industry an overall development of a student is required. Apart from the curriculum teaching various student development programs (training programs) relating to soft skills, interview skills, SAP, Advanced excel training etc. that may be required as per the need of the student and industry trends, are conducted across the whole program. Participation in such programs is solicited through volunteering and consensus.
- *Industry Focused programs:* Establishing collaborations with various industry partners to deliver the programme on sharing basis. The specific courses are to be delivered by industry experts to provide practice-based insight to the students.
- *Special assistance program for slow learners & fast learners:* There is a provision of identify slow learners; develop the mechanism to correcting knowledge gap through result analysis of various class tests. Extra classes will be arranged for slow learners and facilitate them with required study material. There are some terms of advance topics what learning challenging it will be provided to the fast learners.
- *Induction program:* Every year 3 weeks induction program is organized for 1st year students to make them familiarize with the entire academic environment of university including Curriculum, Classrooms, Labs, Faculty/ Staff members, Academic calendar and various activities.
- **Mentoring scheme:** There is Mentor-Mentee system. One mentor lecture is provided per week in a class. Students can discuss their problems with mentor who is necessarily a teaching faculty. In this way, student's problems or issues can be identified and resolved.
- Extra-curricular Activities: organizing& participation in extracurricular activities will be mandatory to help students develop confidence & face audience boldly. It brings out their leadership qualities along with planning & organizing skills. Students undertake various cultural, sports and other competitive activities within and outside then campus. This helps them build their wholesome personality.
- Career & Personal Counseling: Identifies the problem of student as early as possible and gives time to discuss their problems individually as well as with the parents. Counseling enables the students to focus on behavior and feelings with a goal to facilitate positive change. Its major role lies in giving: Advice, Help, Support, Tips, Assistance, and Guidance. Strategies: a) Once in a week the counselors meet the students in order to inquire about problems. b) Available 24x7 on SOS basis.
- Participation in Workshops, Seminars & writing & Presenting Papers: Departments plan to organize the workshops, Seminars & Guest lecturers time to time on their respective topics as per academic calendar. Students must have to attend these programs. These participations would be count in the marks of general Discipline & General Proficiency which is the part of course scheme as noncredit course.
- Formation of Student Clubs, Membership &Organizing& Participating events: Every department has the departmental clubs with the specific club name. The entire student's activity would be performed by the club. One faculty would be the coordinator of the student clubs & students would be the members with different responsibility.
- Capability Enhancement & Development Schemes: The Institute has these schemes to enhance the capability and holistic development of the students. Following measures/ initiatives are taken up from time to time for the same: Career Counseling, Soft skill development, Remedial Coaching, Bridge Course, Language Lab, Yoga and Meditation, Personal Counseling

- Library Visit & Utilization of E-Learning Resources: Student can visit the library from morning 10 AM to evening 8 PM. Library created its resources Database and provided Online Public Access Catalogue (OPAC) through which users can be accessed from any of the computer connected in the LAN can know the status of the book. Now we are in process to move from OPAC to KOHA.
 - a) Institute Library & Information is subscribing online e-books and e-journals databases (DELNET and EBSCO host E-databases) as per the requirement of the institute and fulfilling AICTE norms. IP based access is given to all computers connected on campus LAN to access e-journals.
 - **b)** For the effective utilisation of resources, Information Literacy training programs are conducted to the staff and students.
 - c) Wi-Fi enabled campus
 - **d)** Regular addition of latest books and journals
 - e) Well maintained e-library to access e-resources

Study & Evaluation Scheme

B.Tech (Electronics & Communication Engineering)-Semester I

<i>S</i> .	Category	Course Code	Course	1	Perio	ds	Credit	Eval	uation Sche	me
No	- magery			L	T	P	crean	Internal	External	Total
1	BSC-1	EAS116	Engineering Mathematics-I	3	1	-	4	40	60	100
		EAS112/212	Engineering Physics	2	1		4	40	(0)	100
2	BSC-2	EAS113/213	Engineering Chemistry	3	1	-	4	40	60	100
2	ESC 1	EEE117/217	Basic Electrical Engineering	2	1		4	40	60	100
3	ESC-1	EEC111/211	Basic Electronics Engineering	3	1	-	4	40	60	100
4	MC-1	TMU101	Environmental Studies	2	1	-	3	40	60	100
5	HSMC-1	TMUGE101	English Communication- I	2	-	2	3	40	60	100
		EAS162/262	Engineering Physics (Lab)			2	1	50	50	100
0	LC-1	EAS163/263	Engineering Chemistry (Lab)		-	2	1	30		
_		EEE161/261	Basic Electrical Engineering (Lab)			2	1	50		100
/	LC-2	EEC161/261	Basic Electronics Engineering (Lab)		-		1	50	50	
0		EME161/261	Engineering Drawing (Lab)			4	2	50	50	100
ð	LC-3	EME162/262	Workshop Practice (Lab)	-	-	4	2	50	50	100
9	DGP-1	EGP111	Discipline & General Proficiency	-	-	-	-	100	-	100
			Total	13	4	10	22	350	450	800

<i>S</i> .	Category	Course Code	Course	1	Perio	ds	Credit	Eval	uation Sche	me					
No	curegory	course coue	course	L	T	P	crean	Internal	External	Total					
1	BSC-3	EAS211	Engineering Mathematics-II	3	1	-	4	40	60	100					
	DSC 4	EAS212	Engineering Physics	2	1		4	40	(0)	100					
2	B3C-4	EAS213	Engineering Chemistry	3	1	-	4	40	60	100					
	ESC 2	EEE217	Basic Electrical Engineering	2			4	10	(0)	100					
3	ESC-2 EEC211 Basic Electronics Engineering 3 1	1	-	4	40	60	100								
4	ESC-3	ECS212	Computer System & Programming in C++	3	-	-	3	40	60	100					
5	HSMC-2	TMUGE201	English Communication- II	2	-	2	3	40	60	100					
	LC-4	EAS262	Engineering Physics (Lab)			2	1	50	50	100					
0		EAS263	Engineering Chemistry (Lab)	-	-	2	1	50							
		EEE261	Basic Electrical Engineering (Lab)									_	-		
7	LC-5	EEC261	Basic Electronics Engineering (Lab)	-	-	2	I	50	50	100					
8	LC-6	ECS262	Computer System &Programming in C++ (Lab)	-	-	2	1	50	50	100					
		EME261	Engineering Drawing (Lab)			4	2	50	50	100					
9	LC-/	EME262	Workshop Practice (Lab)	-	-	4	2	50	50						
10	DGP-2	EGP211	Discipline & General Proficiency	-	-	-	-	100	-	100					
			Total	14	3	12	23	400	500	900					

B.Tech (Electronics & Communication Engineering)-Semester II

<i>S</i> .	Catagory	Course	Course	P	erio	ds		Evaluatio	n Scheme	
No	Calegory	Code	Course	L	T	P	Credit	Internal	External	Total
1	PCC-1	EEC311	Engineering Electromagnetics	3	1	-	4	40	60	100
2	PCC-2	EEC312	Digital Logic & Circuits	3	1	-	4	40	60	100
3	PCC-3	EEC313	Instruments and Measurements	3	-	-	3	40	60	100
4	PCC-4	EEC315	Signals & Systems	3	1	-	4	40	60	100
5	ESC-4	ECS312	Object oriented Programming using JAVA	3	1	-	4	40	60	100
6	HSMC-3	TMUGE301	English Communication- III	2	-	2	3	40	60	100
7	LC-8	EEC361	Digital Logic & Circuits (Lab)	-	-	2	1	50	50	100
8	LC-9	EEC362	Instruments & Measurements (Lab)	-	-	2	1	50	50	100
9	LC-10	ECS361	Object oriented Programming using JAVA (Lab)	-	-	2	1	50	50	100
10	DGP-3	EGP311	Discipline & General Proficiency	-	-	-	-	100	-	100
			Total	17	4	8	25	390	510	900

B.Tech (Electronics & Communication Engineering)-Semester III

Following additional Course for Lateral Entry Students with B.Sc./Polytechnic background to be taken in III semester and all should pass with minimum of 45% marks for obtaining the degree: credits will not be added

1	LC	EME161/261	Engineering Drawing (Lab)	-	-	4	-	50	50	100
2		TMU101	Environmental Studies	2	1	-	-	40	60	100

Value Added Course:

It is an audit course. The performance of the student in this course will not be counted in the overall result however the student has to pass it compulsorily with 45% marks.

1	VAAC-1	TMUGA-301	Foundation in Quantitative Aptitude	2	1	-	-	40	60	100
---	--------	-----------	--	---	---	---	---	----	----	-----

<i>S</i> .	Catagom	Course	Course	P	erio	ds		Evaluatio	n Scheme	
No	Calegory	Code	Course	L	T	P	Credit	Internal	External	Total
1	PCC-5	EEC411	Analog Communication System	3	-	-	3	40	60	100
2	PCC-6	EEC412	Electronic Devices & Circuits	3	-	-	3	40	60	100
3	ESC-5	EEE413	Network Analysis & Synthesis	3	1	-	4	40	60	100
4	ESC-6	EEE414	Power Electronics	3	1	-	4	40	60	100
5	ESC-7	ECS411	Database Management System	3	-	-	3	40	60	100
6	LC-11	EEC461	Analog Communication System (Lab)	-	-	2	1	50	50	100
7	LC-12	EEC462	Electronic Devices & Circuits (Lab)	-	-	2	1	50	50	100
8	LC-13	EEE463	Network Analysis & Synthesis (Lab)	-	-	2	1	50	50	100
9	LC-14	EEE464	Power Electronics (Lab)	-	-	2	1	50	50	100
10	DGP-4	EGP411	Discipline & General Proficiency	-	-	-	-	100	-	100
			Total	15	2	8	21	400	500	900

B.Tech (Electronics & Communication Engineering)-Semester IV

*Skill based Training/Internship of 4 weeks duration from a reputed Industry/organization after completion of 4^{th} semester end-semester examination.

Following additional Courses for Lateral Entry Students with B.Sc./Polytechnic background to be taken in IV semester and all should pass with minimum of 45% marks for obtaining the degree: credits will not be added

1	LC	EME162/262	Workshop Practice (Lab)	-	-	4	-	50	50	100
---	----	------------	-------------------------	---	---	---	---	----	----	-----

*Value Added Course:

1	VAAC-2	TMUGA-401	Analytical Reasoning	2	1	-	-	40	60	100
---	--------	-----------	----------------------	---	---	---	---	----	----	-----

<i>S</i> .				Pe	erioa	ls		Evaluatio	on Scheme	
No ·	Category	Course Code	Course	L	T	P	Credit	Internal	External	Total
1	PCC-7	EEC511	Microprocessor & Applications	3	1	-	4	40	60	100
2	PCC-8	EEC512	Microwave Techniques	3	-	-	3	40	60	100
3	PCC-9	EEC513	Digital Communication Systems	3	-	-	3	40	60	100
4	ESC-8	EEE511	Control Systems	3	1	-	4	40	60	100
5	HSMC-4	TMUGE501	English Communication- IV	2	-	2	3	40	60	100
6	LC-15	EEC561	Microprocessor & Applications (Lab)	-	-	2	1	50	50	100
7	LC-16	EEC562	Microwave Techniques (Lab)	-	-	2	1	50	50	100
8	LC-17	EEC563	Digital Communication Systems (Lab)	-	-	2	1	50	50	100
9	PROJ-1	EEC592	Skill based Practical Training & Presentation	-	-	-	2	50	50	100
10	DGP-5	EGP511	Discipline & General Proficiency	-	-	-	-	100	-	100
			Total	14	2	8	22	400	500	900

B.Tech (Electronics & Communication Engineering)-Semester V

*Value Added Course:

1	VAAC-3	TMUGA-501	Modern Algebra and Data Management	2	1	-	-	40	60	100
2	VAAC-4	TMUGS-501	Managing Self	2	1	-	-	50	50	100

1	MOOC-1	MOOC01	MOOC Program -I (Optional)	-	-	-	2	-	100	100
---	--------	--------	-------------------------------	---	---	---	---	---	-----	-----

<i>S</i> .	<i>C</i> /	Course		C	P	eriods	1		Evaluati	on Scheme	
No	Category	Code		Course	L	T	P	Credit	Internal	External	Total
1	PCC-10	EEC613	Analog Integra	g and Digital ated Electronics	3	-	-	3	40	60	100
2	PCC-11	EEC614	Antenn Propag	na & Wave gation	3	1	-	4	40	60	100
3	PCC-12	EEC615	Teleco Switch	mmunication ning Systems	3	-	-	3	40	60	100
4	PCC-13	EEC616	Mobile comm	e and cellular unication	3	-	-	3	40	60	100
5	PEC-1		Program Elective	Program Elective-I	3	1	-	4	40	60	100
6	HSMC-5	EHM613	Human Profest	n values & sional Ethics	2	-	-	2	40	60	100
7	LC-18	EEC661	Analog Integra	g and Digital ated Electronics (Lab)	-	-	2	1	50	50	100
8	LC-19	EEC662	Antenn Propag	na & Wave gation (Lab)	-	-	2	1	50	50	100
9	DGP-6	EGP611	Discip Profici	line & General ency	-	-	-	-	100	-	100
				Total	17	2	4	21	340	460	800

B.Tech (Electronics & Communication Engineering)-Semester VI

*Industrial Training of 6 weeks duration from a reputed Industry/organization after completion of 6^{th} semester end-semester examination.

*Value Added Course:

1	VAAC-5	TMUGA-601	Advance Algebra and Geometry	2	1	-	-	40	60	100
2	VAAC-6	TMUGS-601	Managing Work and Others	2	1	-	-	50	50	100

1	MOOC-2	MOOC02	MOOC Program –II (Optional)	-	-	-	2	-	100	100
---	--------	--------	--------------------------------	---	---	---	---	---	-----	-----

B.Tech (Electronics & Communication Engineering)-Semester VII

S.	Catagom	Course		Course		Peri	ods		Evaluatio	n Scheme	
•	Calegory	Code		Course	L	Т	Р	Credit	Internal	External	Total
1	PCC-14	EEC711	Digital	Signal Processing	3	1	-	4	40	60	100
2	PEC-2		m 'e	Program Elective-II	3	1	-	4	40	60	100
3	PEC-3		Progra Electiv	Program Elective-III	3	-	-	3	40	60	100
4	OEC-1		Open Elective	Open Elective-I	3	-	-	3	40/50	60/50	100
5	LC-20	EEC763	Digital (Lab)	Signal Processing	-	-	2	1	50	50	100
6	LC-21	EEC764	Electron Lab	nic Workshop &PCB	-	-	2	1	50	50	100
7	LC-22	EEC762	Design Solar Pl (Lab)	and installation of notovoltaic System	-	1	2	2	50	50	100
8	PROJ-2	EEC792	Industri Presenta	al Training & ation	-	-	-	2	50	50	100
9	PROJ-3	EEC798	Project	Work Phase-1	-	-	10	5	100	-	100
10	DGP-7	EGP711	Discipli Proficie	ne & General ncy	-	-	-	-	100	-	100
			Total		12	3	16	25	460/470	440/430	900

1 MOOC-3	MOOC03	MOOC Program –III (Optional)	-	-	-	2	-	100	100
----------	--------	---------------------------------	---	---	---	---	---	-----	-----

B.Tech (Electronics & Communication Engineering)-Semester VIII

S.		Course	G			Period	S		Evaluatio	n Scheme	
No	Category	Code		Course	L	Т	Р	Credit	Internal	External	Total
1	PCC-15	EEC811	VLSI D	esign &Technology	3	-	-	3	40	60	100
2	PCC-16	EEC812	Optical	Fiber Communication	3	-	-	3	40	60	100
3	PEC-4		ram ive	Program Elective-IV	3	1	-	4	40	60	100
4	PEC-5		Prog Elect	Program Elective-V	3	-	-	3	40	60	100
5	OEC-2		Open Elective	Open Elective-II	3	-	-	3	40/50	60/50	100
6	LC-23	EEC862	VLSI D (Lab)	VLSI Design & Technology (Lab)		-	2	1	50	50	100
7	LC-24	EEC863	Optical (Lab)	Optical Fiber Communication (Lab)		-	2	1	50	50	100
8	PROJ-4	EEC898	Project	Project Work Phase –II		-	6	3	50	50	100
9	DGP-8	EGP811	Discipli Proficie	Discipline & General Proficiency		-	-	-	100	-	100
				Total		1	10	21	350/360	450/440	800

S. No	Code	Course				Credit		
	Semester VI - Program Elective I -(Any one)							
	Specialization in Microcontroller Programming							
1	EEC612	Embedded System	3	1	0	4		
2	EEC617	Microcontroller Hardware, Programming & its Application (Arduino)	3	1	0	4		
		Semester VII- Program Elective II -(Any one)						
		Specialization in Industrial Management						
3	EHM731	Principle of Management	3	1	0	4		
4	EHM735	Industrial Sociology	3	1	0	4		
5	EHM733	Organizational Behaviour	3	1	0	4		
	Semester VII - Program Elective III -(Any one)							
	Specialization in Robotics and Machine Learning							
6	EEC731	Robotics & Automation	3	0	0	3		
7	EEC732	Machine learning & Data Analytics	3	0	0	3		
		Semester VIII- Program Elective IV -(Any one)						
		Specialization in Industrial Management						
8	EHM831	Engineering and Managerial Economics	3	1	0	4		
9	EHM832	Total Quality Management	3	1	0	4		
10	EHM833	Entrepreneurship	3	1	0	4		
		Semester VIII- Program Elective V -(Any one)	•		•			
		Specialization in Soft Computing Techniques						
11	EEC831	Artificial Neural Network	3	0	0	3		
12	EEC815	Information Theory & Coding	3	0	0	3		
13	ECS832	Network security & cryptography	3	0	0	3		

ELECTIVE COURSES OFFERED

<u>Course</u> <u>Code:</u> EAS116	B.Tech- Semester-I Engineering Mathematics-I	L-3 T-1 P-0 C-4			
Course Outcomes:	On completion of the course, the students will be :				
CO1.	Understanding the concepts of eigenvalues and eigenvectors, Optimization & derivatives of functions of several variables, partial and total differentiation, implicit functions.				
CO2. CO3.	Understanding the concepts of curl and divergence of vector field. Understanding of Green's theorem, Gauss Theorem, and Stokes theorem.				
CO4.	Applying the concept of Leibnitz's theorem for successive derivatives.				
CO5.	Analyzing the intangibility of a differential equation to find the optimal solution of first order first degree equations.				
CO6.	Evaluating the double integration and triple integration using Cartesian, polar co-ordinates and the concept of Jacobian of transformation.				
Course Content:					
Unit-1:	Determinants- Rules of computation; Linear Equations and Cramer's rule.Matrices: Elementary row and column transformation; Rank of matrix; Linear dependence; Consistency of linear system of equations; Characteristic equation; Cayley-Hamilton Theorem (without proof); Eigen values and Eigen vectors; Complex and Unitary matrices.				
Unit-2:	Differential Equation First order first degree Differential equation: variable separable, Homogeneous method, Linear differential equation method, Exact Differential equation.				
Unit-3:	Differential Calculus: Leibnitz theorem; Partial differentiation; Euler's theorem; Change of variables; Expansion of function of several variables, Jacobians, Error function.				
Unit-4:	Multiple Integrals: Double integral, Triple integral, Beta and Gamma functions; Dirichlet theorem for three variables, Liouville's Extension of Dirichlet theorem.				
Unit-5:	 Vector Differentiation: Vector function, Differentiation of vectors, Formulae of Differentiation, Scalar and Vector point function, Geometrical Meaning of Gradient, Normal and Directional Derivative, Divergence of a vector function, Curl of a vector Vector Integration: Green's theorem, Stokes' theorem; Gauss' divergence theorem. 	8 Hours			
<u>Text Books:</u>	 Grewal B.S., <i>Higher Engineering Mathematics</i>, Khanna Publishers. 				
Reference Books: Additional	 Kreyszig E., Advanced Engineering Mathematics, Wiley Eastern. Piskunov N, Differential & Integral Calculus, Moscow Peace Publishers. Narayan Shanti, A Text book of Matrices, S. Chand *Latest editions of all the suggested books are recommended. https://www.youtube.com/watch?v=EGnI8WyYb3o 				
<u>electronics</u> <u>reference</u> <u>material:</u>	 https://www.youtube.com/watch?v=ksS_yOK1vtk&list=PLbRMh DVUMngfIrZCNOyPZwHUU1pP66vQW 				

Course	B.Tech- Semester-I	L-3
<u>Code:</u> EAS112	Engineering Physics	T-1 P-0 C-4
Course Outcomes :	On completion of the course, the students will be :	
C01.	Understanding the basic concepts of interference, diffraction and polarisation.	
CO2.	Understanding the concept of bonding in solids and semiconductors.	
<u>CO3.</u>	Understanding the special theory of relativity.	
CO4.	Applying special theory of relativity to explain the phenomenon of length contraction, time dilation, mass-energy equivalence etc.	
<u>CO5.</u>	Applying the concepts of polarized light by the Brewster's and Malus Law	
Course Content:		
Unit-1:	Interference of Light: Introduction, Principle of Superposition, and Interference due to division of wavefront: Young's double slit experiment, Theory of Fresnel's Bi-Prism, Interference due to division of amplitude: parallel thin films, Wedge shaped film, Michelson's interferometer, Newton's ring.	8 Hours
Unit-2:	Diffraction : Introduction, Types of Diffraction and difference between them, Condition for diffraction, difference between interference and diffraction. Single slit diffraction : Quantitative description of maxima and minima with intensity variation, linear and angular width of central maxima. Resolving Power : Rayleigh's criterion of resolution, resolving power of diffraction grating and telescope.	8 Hours
Unit-3:	Polarization: Introduction, production of plane polarized light by different methods, Brewster's and Malus Law. Quantitative description of double refraction, Nicol prism, Quarter & half wave plate, specific rotation, Laurent's half shade polarimeter.	8 Hours
Unit-4:	Elements of Material Science: Introduction, Bonding in solids, Covalent bonding and Metallic bonding, Classification of Solids as Insulators, Semi-Conductor and Conductors, Intrinsic and Extrinsic Semiconductors, Conductivity in Semiconductors, Determination of Energy gap of Semiconductor. Hall Effect: Theory, Hall Coefficients and application to determine the sign of charge carrier, Concentration of charge carrier, mobility of charge carriers.	8 Hours
Unit-5:	Special Theory of Relativity: Introduction, Inertial and non-inertial frames of Reference, Postulates of special theory of relativity, Galilean and Lorentz Transformations, Length contraction and Time Dilation, Relativistic addition of velocities, Variation of mass with velocity, Mass-Energy equivalence.	8 Hours
<u>Text</u> Books:	1. Elements of Properties of Matter, D. S. Mathur, S. Chand & Co.	
<u>Reference</u> <u>Books:</u> <u>Additional</u>	 F. A. Jenkins and H. E. White, Fundamentals of Optics, McGraw- Hill. Concept of Modern Physics, Beiser, Tata McGraw-Hill. R. Resnick, Introduction to Special Relativity, John Wiley, Singapore. *Latest editions of all the suggested books are recommended. 	
electronics reference material:	 nttps://www.youtube.com/watch?v=toGH5BdgRZ4&list=PLD9DDF BDC338226CA https://www.youtube.com/watch?v=CuqsU7B1MtU 	

	B.Tech- Semester-I	L-0
<u>Course Code:</u> EAS162	Engineering Physics (Lab)	T-0 P-2 C-1
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding of the operation of various models of optical devices.	
CO2.	Understanding types of Semiconductors using Hall experiments.	
СО3.	Applying the concept of interference, polarization & dispersion in optical devices through Newton's ring, Laser, polarimeter & spectrometer.	
CO4.	Applying the concept of resonance to determine the AC frequency using sonometer & Melde's apparatus.	
CO5.	Applying the concept of resolving & dispersive power by a prism.	
LIST OF EVDEDIMENTS:	Note: Select any ten experiments from the following list:	
1	To determine the wavelength of monochromatic light by Newton's ring.	
2	To determine the wavelength of monochromatic light by Michelson- Morley experiment.	
3	To determine the wavelength of monochromatic light by Fresnel's Bi-prism.To determine the Planck's constant using LEDs of different colours.	
4	To determine the Planck's constant using LEDs of different colours.	
5	To determine the specific rotation of cane sugar solution using Polarimeter	
6	To verify Stefan's Law by electrical method	
7	To study the Hall Effect and determine Hall coefficient and mobility of a given semiconductor material using Hall-effect set up	
8	To determine the Frequency of an Electrically Maintained Tuning Fork by Melde's experiment.	
9	To compare Illuminating Powers by a Photometer.	
10	To determine the frequency of A.C. mains by means of a Sonometer.	
11	To determine refractive index of a prism material by spectrometer	
12	To determine the Flashing & Quenching of Neon bulb.	
13	Determination of Cauchy's constant by using spectrometer.	
14	To study the PN junction characteristics	
15	To determine the resolving power and dispersive power by a prism	
16	To determine the value of Boltzmann Constant by studying Forward Characteristics of a Diode	
17	Study the characteristics of LDR	
18	To study the characteristics of a photo-cell.	
<u>Books:</u>	 B.Sc. Practical Physics, Gupta and Kumar, Pragati Prakashan. B.Sc. Practical Physics, C.L. Arora, S. Chand & Company Pvt. Ltd. *Latest editions of all the suggested books are recommended. 	

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL
EXPERIMENT	FILE WORK	VIVA	ATTENDANCE	EXPERIMENT	VIVA	INTERNAL
(5 MARKS)	(10 MARKS)	(10 MARKS)	(10 MARKS)	(5 MARKS)	(10 MARKS)	(50 MARKS)

External Evaluation (50 marks)

EXPERIMENT	FILE WORK	VIVA	TOTAL EXTERNAL
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

Course Code: EAS113	ourse Code: B.Tech- Semester-I EAS113 Engineering Chemistry		
Course Outcomes:	On completion of the course, the students will be :		
CO1.	Understanding the concept of softening & purification of water.		
CO2.	Understanding calorific value& combustion, analysis of coal, Physical & Chemical properties of hydrocarbons & quality improvements.		
СО3.	Understanding the concept of lubrication, Properties of Refractory & Manufacturing of cements.		
CO4.	Applying the concepts of the mechanism of polymerization reactions, Natural and synthetic rubber& vulcanization.		
CO5.	Applying the concepts of spectroscopic & chromatographic techniques.		
Course Content:			
Unit-1:	Water and Its Industrial Applications: Sources, Impurities, Hardness and its units, Industrial water, characteristics, softening of water by various methods (External and Internal treatment), Boiler trouble causes effects and remedies, Characteristic of municipal water and its treatment, Numerical problem based on water softening method like lime soda, calgonetc	8 Hours	
Unit-2:	Fuels and Combustion: Fossil fuel and classification, calorific value, determination of calorific value by Bomb and Jumker's calorimeter, proximate and ultimate analysis of coal and their significance, calorific value computation based on ultimate analysis data, Combustion and its related numerical problems carbonization manufacturing of coke, and recovery of by product, knocking relationship between knocking and structure and hydrocarbon, improvement ant knocking characteristic IC Engine fuels, Diesel Engine fuels, Cetane Number.	8 Hours	
Unit-3:	Lubricants: Introduction, mechanism of lubrication, classification of lubricant, properties and testing of lubricating Oil Numerical problem based on testing methods. Cement and Refractories: Manufacture, IS code, Setting and hardening of cement, Portland cement Plaster of Paris, Refractories. Introduction, classification and properties of refractories	8 Hours	
Unit-4:	Polymers: Introduction, types and classification of polymerization, reaction mechanism, Natural and synthetic rubber, Vulcanization of rubber, preparation, properties and uses of the following Polythene, PVC, PMMA, Teflon, Polyacrylonitrile, PVA, Nylon 6, Terylene, Phenol Formaldehyde, Urea Formaldehyde Resin, Glyptal, Silicones Resin, Polyurethanes, Butyl Rubber, Neoprene, Buna N, Buna S.	8 Hours	
Unit-5:	 A. Instrumental Techniques in chemical analysis: Introduction, Principle, Instrumentation and application of IR, NMR, UV, Visible, Gas Chromatography, Lambert and Beer's Law. B. Water Analysis Techniques: Alkalinity, Hardness (Complexometric), Chlorides, Free Chlorine, DO, BOD, and COD, Numerical Problem Based on above techniques. 	8 Hours	

<u>Text Books:</u>	1. Agarwal R. K., Engineering Chemistry, Krishna Prakashan.	
<u>Reference</u> <u>Books:</u>	 Morrison & Boyd, Organic Chemistry, Prentice Hall Barrow Gordon M., Physical Chemistry, McGraw-Hill. Manahan Stanley E., Environmental Chemistry, CRC Press *Latest editions of all the suggested books are recommended. 	
<u>Additional</u> <u>electronics</u> <u>reference</u> <u>material:</u>	 https://www.youtube.com/watch?v=RV-OyRTaIOI https://www.youtube.com/watch?v=phhfkikb6Lw 	

	B.Tech- Semester-I	L-0	
<u>Course Code:</u> EAS163	Engineering Chemistry (Lab)	Т-0 Р-2	
-		C-1	
Course Outcomes:	On completion of the course, the students will be :		
CO1.	Understanding the concepts of Hardness of water.		
CO2.	Analyzing & estimating of various parameters of water.		
СО3.	Analyzing of Calorific value of Solid fuel by Bomb calorimeter & Liquid Fuels by Junkers Gas Calorimeter.		
CO4.	CO4. Analyzing of open & closed Flash point of oil by Cleveland & Pensky's Martens apparatus.		
CO5.	Analyzing of viscosity of lubricating oil using Redwood Viscometer.		
LIST OF EXPERIMENTS:	Note: Select any ten experiments from the following list		
1	Determination of Total Hardness of a given water sample.		
2	Determination of mixed alkalinity (a) Hydroxyl & Carbonate (b) Carbonate & Bicarbonate		
3	To determine the pH of the given solution using pH meter and pH- metric titration		
4	Determination of dissolved oxygen content of given water sample		
5	To find chemical oxygen demand of waste water sample by potassium dichromate		
6	Determination of free chlorine in a given water sample		
7	To determine the chloride content in the given water sample by Mohr's method		
8	To prepare the Bakelite resin polymer		
9	To determine the concentration of unknown sample of iron spectrophotometrically		
10	To determine the viscosity of a given sample of a lubricating oil using Redwood Viscometer		
11	To determine the flash & fire point of a given lubricating oil		
12	Determination of calorific value of a solid or liquid fuel.		
13	Determination of calorific value of a gaseous fuel		
14	Determination of % of O_2 , CO_2 , % CO in flue gas sample using Orsat apparatus.		
15	Proximate analysis of coal sample.		

Evaluation Scheme of Practical Examination: Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICA	AL PERFORMA SEMESTER	NCE & VIVA DU (35 MARKS)	ON THE DAY (15 MA	Y OF EXAM RKS)	TOTAL	
EXPERIMENT	FILE WORK	VIVA	ATTENDANCE	EXPERIMENT	VIVA	INTERNAL
(5 MARKS)	(10 MARKS)	(10 MARKS)	(10 MARKS)	(5 MARKS)	(10 MARKS)	(50 MARKS)

External Evaluation (50 marks)

EXPERIMENT	FILE WORK	VIVA	TOTAL EXTERNAL
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

	B.Tech-Semester-I	L-3
<u>Course Code:</u> EEE117	Basic Electrical Engineering	T-1 P-0 C-4
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the basics of Network, AC Waveform and its characteristics.	
CO2.	Understanding the basic concept of Measuring Instruments, Transformers & three phase Power systems.	
СО3.	Understanding the basic concepts of Transformer.	
CO4.	Understanding the basic concept of power measurement using two wattmeter methods.	
CO5.	Applying the concept of Kirchhoff's laws and Network Theorems to analyze complex electrical circuits.	
Course Content:		
Unit-1:	D.C. Network Theory: Passive, active, bilateral, unilateral, linear, nonlinear element, Circuit theory concepts-Mesh and node analysis; Voltage and current division, source transformation, Network Theorems- Superposition theorem, Thevenin's theorem, Norton's theorem, and Maximum Power Transfer theorem, Star-delta & delta-star conversion.	8 Hours
Unit-2:	Steady State Analysis of A.C. Circuits: Sinusoidal and phasor representation of voltage and Current; Single phase A.C. circuit behavior of resistance, inductance and capacitance and their Combination in series & parallel; Power factor; Series and parallel resonance; Band width and Quality factor.	8 Hours
Unit-3:	Basics of Measuring Instruments: Introduction to wattmeter & Energy meter extension range of voltmeter and ammeter. Three Phase A.C. Circuits: Line and phase voltage/current relations; three phase power, power measurement using two wattmeter methods.	8 Hours
Unit-4:	Single phase Transformer: Principle of operation; Types of construction; Phasor diagram; Equivalent circuit; Efficiency and losses.	8 Hours
Unit-5:	Electrical machines: DC machines: Principle & Construction, Types, EMF equation of generator and torque equation of motor, applications of DC motors (simple numerical problems)	8 Hours
<u>Text Books:</u>	1. Nagrath I.J., Basic Electrical Engineering, Tata McGraw Hill	
<u>Reference</u> <u>Books:</u>	 Fitzgerald A.E & Higginbotham., D.E., Basic Electrical Engineering, McGraw Hill. A Grabel, Basic Electrical Engineering, McGraw Hill. Cotton H., Advanced Electrical Technology, Wheeler Publishing. Del Toro, Principles of Electrical Engineering, Prentice-Hall International. W.H. Hayt & J.E. Kemmerly, Engineering Circuit Analysis, McGraw Hill. *Latest editions of all the suggested books are recommended. 	
Additional electronics reference material:	 https://nptel.ac.in/courses/108/108/108108076/ https://sites.google.com/tmu.ac.in/dr-garima-goswami/home 	

Course Code:	B.Tech- Semester-I	L-0 T-0
EEE161	Basic Electrical Engineering (Lab)	P-2
~		C-1
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the concepts of Kirchoff & Voltage law.	
CO2.	Understanding the concepts of dc network theorem.	
СО3.	Analyzing the energy by a single-phase energy meter.	
CO4.	Analyzing the losses and efficiency of Transformer on different load conditions.	
CO5.	Analyzing the electrical circuits using electrical and electronics components on bread board.	
LIST OF EXPERIMENTS:	Note: Select any ten experiments from the following list	
1	To verify the Kirchhoff's current and voltage laws.	
2	To study multimeter.	
3	To verify the Superposition theorem	
4	To verify the Thevenin's theorem.	
5	To verify the Norton's theorem.	
6	To verify the maximum power transfer theorem	
7	To verify current division and voltage division rule.	
8	To measure energy by a single-phase energy meter	
9	To measure the power factor in an RLC by varying the capacitance	
10	To determine resonance frequency, quality factor, bandwidth in series resonance	
11	To measure the power in a 3-phase system by two-wattmeter method	
12	To measure speed for speed control of D.C. Shunt Motor	
13	To determine the efficiency of single-phase transformer by load test.	

Evaluation Scheme of Practical Examination: Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE			ON THE DAY	Y OF EXAM		
SEMESTER (35 MARKS)		(15 MA	RKS)	TOTAL		
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 MARKS)	VIVA (10 MARKS)	INTERNAL (50 MARKS)

External Evaluation (50 marks)

EXPERIMENT FILE WORK	VIVA	TOTAL EXTERNAL
(20 MARKS) (10 MARKS)	(20 MARKS)	(50 MARKS)

	B.Tech- Semester-I	L-3
<u>Course Code:</u> EEC111	Basic Electronics Engineering	T-1 P-0 C 4
Course Outcomes:	On completion of the course, the students will be :	C-4
CO1.	Understanding the concepts of electronic components like diode, BJT & FET.	
CO2.	Understanding the applications of pn junction diode as clipper, clamper, rectifier & regulator whereas BJT & FET as amplifiers	
соз.	Understanding the functions and applications of operational amplifier-based circuits such as differentiator, integrator, and inverting, non-inverting, summing & differential amplifier.	
CO4.	Understanding the concepts of number system, Boolean algebra and logic gates.	
CO5.	Applying the knowledge of series, parallel and electromagnetic circuits.	
Course Content:		
Unit-1:	p-n Junction: Energy band diagram in materials, Intrinsic & Extrinsic Semiconductor, Introduction to PN-Junction, Depletion layer, V-I characteristics, p-n junction as rectifiers (half wave and full wave), calculation of ripple factor of rectifiers, clipping and clamping circuits, Zener diode and its application as shunt regulator	8 Hours
Unit-2:	Bipolar Junction Transistor (BJT): Basic construction, transistor action; CB, CE and CC configurations, input/output characteristics, Relation between α , $\beta \& \gamma$, Biasing of transistors: Fixed bias, emitter bias, potential divider bias	8 Hours
Unit-3:	Field Effect Transistor (FET): Basic construction of JFET; Principle of working; concept of pinch-off condition & maximum drain saturation current; input and transfer characteristics; Characteristics equation; fixed and self-biasing of JFET amplifier; Introduction of MOSFET; Depletion and Enhancement type MOSFET- Construction, Operation and Characteristics	8 Hours
Unit-4:	Operational Amplifier (Op-Amp): Concept of ideal operational amplifier; ideal and practical Op-Amp parameters; inverting, non-inverting and unity gain configurations, Applications of Op-Amp as adders, difference amplifiers, integrators and differentiator.	8 Hours
Unit-5:	Switching Theory: Number system, conversion of bases (decimal, binary, octal and hexadecimalnumbers), Addition & Subtraction, BCD numbers, Boolean algebra, De Morgan's Theorems, Logic gates and truth table- AND, OR & NOT, Seven segment display & K map.	8 Hours
<u>Text Books:</u>	1. Robert Boylestad & Louis Nashelsky, Electronic Circuit and Devices, Pearson India.	
<u>Reference</u> <u>Books:</u>	 Sedra and Smith, Microelectronic Circuits, Oxford University Press. Gayakwad, R A, Operational Amplifiers and Linear Integrated circuits, Prentice Hall of India Pvt. Ltd. Chattopadhyay D and P C Rakshit, Electronics Fundamentals and Applications, New Age International. *Latest editions of all the suggested books are recommended 	
<u>Additional</u> <u>electronics</u> <u>reference</u> <u>material:</u>	1. https://www.youtube.com/watch?v=USrY0JspDEg 2. https://www.youtube.com/watch?v=Hkz27cFW4Xs	

Course Coder	B.Tech- Semester-I	L-0 T 0
EEC161	Basic Electronics Engineering (Lab)	P-2
C		C-1
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the implementation of diode-based circuits.	
CO2.	Understanding the implementation of Operational amplifier-based circuits.	
СОЗ.	Analyzing the characteristics of pn junction diode & BJT.	
CO4.	Analyzing the different parameters for characterizing different circuits like rectifiers, regulators using diodes and BJTs.	
CO5.	Analyzing the truth tables through the different type's adders.	
LIST OF EXPERIMENTS:	Note: Minimum eight experiments should be performed-	
1	To study the V-I characteristics of p-n junction diode.	
2	To study the diode as clipper and clamper	
3	To study the half-wave rectifier using silicon diode.	
4	To study the full-wave rectifier using silicon diode.	
5	To study the Zener diode as a shunt regulator.	
6	To study transistor in Common Base configuration & plot its input/output characteristics	
7	To study the operational amplifier in inverting & non-inverting modes using IC 741.	
8	To study the operational amplifier as differentiator & integrator.	
9	To study various logic gates & verify their truth tables.	
10	To study half adder/full adder & verify their truth tables	

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE			ON THE DAY	Y OF EXAM		
SEMESTER (35 MARKS)			(15 MA	ARKS)	TOTAL	
EXPERIMENT	FILE WORK	VIVA	ATTENDANCE	EXPERIMENT	VIVA	INTERNAL
(5 MARKS)	(10 MARKS)	(10 MARKS)	(10 MARKS)	(5 MARKS)	(10 MARKS)	(50 MARKS)

External Evaluation (50 marks)

EXPERIMENT	FILE WORK	VIVA	TOTAL EXTERNAL
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

	B.Tech- Semester-I	L-2
Course Code: TMU101	Environmental Studies	T-1 P-0 C-3
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding environmental problems arising due to constructional and developmental activities.	
CO2.	Understanding the natural resources and suitable methods for conservation of resources for sustainable development.	
СОЗ.	Understanding the importance of ecosystem and biodiversity and its conservation for maintaining ecological balance.	
CO4.	Understanding the types and adverse effects of various environmental pollutants and their abatement devices.	
CO5.	Understanding Greenhouse effect, various Environmental laws, impact of human population explosion, environment protection movements, different disasters and their management.	
Course Content:		
Unit-1:	Definition and Scope of environmental studies, multidisciplinary nature of environmental studies, Concept of sustainability & sustainable development. Ecology and Environment : Concept of an Ecosystem-its structure and functions, Energy Flow in an Ecosystem, FoodChain, FoodWeb, Ecological Pyramid& Ecological succession, Study of following ecosystems: Forest Ecosystem, Grass land Ecosystem & Aquatic Ecosystem & Desert Ecosystem.	8 Hours
Unit-2:	Natural Resources: Renewable & Non-Renewable resources; Landre sources and landuse change; Land degradation, Soil erosion & desertification. Deforestation: Causes & impacts due to mining, Dam building on forest biodiversity & tribal population. Energy Resources: Renewable & Non-Renewable resources, Energy scenario & use of alternate energy sources, Case studies. Biodiversity: Hot SpotsofBiodiversityinIndiaandWorld,Conservation,ImportanceandFa ctorsResponsibleforLossofBiodiversity,BiogeographicalClassification of India	8 Hours
Unit-3:	Environmental Pollutions: Types, Causes, Effects & control; Air, Water, soil & noise pollution, Nuclear hazards & human health risks, Solid waste Management; Control measures of urban & industrial wastes, pollution case studies	8 Hours
Unit-4:	Environmental policies & practices: Climate change & Global Warming (Green house Effect),Ozone Layer -Its Depletion and Control Measures, Photo chemical Smog, Acid Rain Environmental laws: Environment protection Act; air prevention & control of pollution act, Water Prevention & Control of Pollution Act, Wild Life Protection Act, Forest Conservation Acts, International Acts; Montreal & Kyoto Protocols & Convention on biological diversity, Nature reserves, tribal population & Rights & human wild life conflicts in Indian context Human population growth; impacts on environment, human health & welfore Resettlement & rehebilitation of presents of foreignet a group of	8 Hours
Unit-5:	wenare, Resettlement & renabilitation of projects affected person: A case study, Disaster Management; Earthquake, Floods & Droughts, Cyclones & Landslides, Environmental Movements; Chipko, Silent Valley, Vishnoi's of Rajasthan, Environmental Ethics; Role of Indian & other regions & culture in environmental conservation, Environmental communication & public awareness; Case study	8 Hours

B.Tech (EC) Syllabus Applicable w.e.f. Academic Session 2020-21

	1. Visit to an area to document environmental assets;
	river/forest/flora-fauna etc.
	2. Visit to a local polluted site:
Field Work:	urban/rural/industrial/agricultural.
	3. Study of common plants, insects, birds & basic principles of
	identification.
	4. Study of simple ecosystem; pond, river etc.
	1. "Environmental Chemistry". De. A. K., New Age
<u>Text Books:</u>	Publishers Pvt. Ltd.
	1. "Biodiversity and Conservation",
	Bryant, P. J., Hypertext Book
Reference	2. "Textbook of Environment Studies", Tewari, Khulbe & Tewari, I.k
<u>Books:</u>	Publication
	*Latest editions of all the suggested books are recommended.
Additional	
<u>electronics</u>	1. https://www.youtube.com/watch?v=8tamTochHb8
reference	2. https://www.youtube.com/watch?v=YlE1DDo25lQ
<u>material:</u>	

	B.Tech- Semester-I	L-2
Course Code: TMUGE101	English Communication – I	T-0 P-2 C-3
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Remembering and understanding of the basic of English grammar and vocabulary.	
CO2.	Understanding of the basic Communication process.	
СО3.	Applying correct vocabulary and tenses in sentences construction.	
CO4.	Analyzing communication needs and developing communication strategies using both verbal & non-verbal method.	
CO5.	Drafting applications in correct format for common issues.	
CO6.	Developing self-confidence.	
Course Content:		
Unit-1:	 Introductory Sessions Self-Introduction Building Self Confidence: Identifying strengths and weakness, reasons Failure, strategies to overcome Fear of Failure Importance of English Language in present scenario (Practice: Self-introduction session) 	6 Hours
Unit-2:	Basics of Grammar • Parts of Speech • Tense • Subject and Predicate • Vocabulary: Synonym and Antonym (Practice: Conversation Practice)	12 Hours
Unit-3:	 Basics of Communication Communication: Process, Types, 7Cs of Communication, Importance & Barrier Language as a tool of communication Non-verbal communication: Body Language Etiquette & Manners Basic Problem Sounds (Practice: Pronunciation drill and building positive body language) 	10 Hours
Unit-4:	 Application writing Format & Style of Application Writing Practice of Application writing on common issues. 	8 Hours
Unit-5:	Value based text reading: Short Story (Non- detailed study)Gift of Magi - O. Henry	4 Hours
<u>Text Books:</u>	1. Singh R.P., An Anthology of Short stories, O.U.P. New Delhi.	
<u>Reference</u> <u>Books:</u>	 Kumar, Sanjay. & Pushp Lata. "Communication Skills" New Delhi: Oxford University Press. Carnegie Dale. "How to win Friends and Influence People" New York: Simon & Schuster. Goleman, Daniel. "Emotional Intelligence' Bantam Book. *Latest editions of all the suggested books are recommended. 	

	1. https://www.youtube.com/watch?v=4XEa-8HD3lE
Additional	2. https://www.youtube.com/watch?v=sb6ZZ2p3hEM&feature=youtu.be
electronics	3. https://www.youtube.com/watch?v=Df3ysUkdB38
reference	4. https://www.youtube.com/watch?v=0LdYaj3jcws
<u>material:</u>	5. https://www.youtube.com/watch?v=64XIkMqPm_8
	6. https://www.youtube.com/watch?v=_vS6O8YlMq0
Methodology:	1. Language Lab software.
	2. The content will be conveyed through Real life situations, Pair
	Conversation, Group Talk and Class Discussion.
	3. Conversational Practice will be effectively carried out by Face to Face
	& Via Media (Telephone, Audio-Video Clips)
	4. Modern Teaching tools (PPT Presentation, Tongue-Twisters &
	Motivational videos with sub-titles) will be utilized

Evaluation Scheme

Internal Evaluation			External Evaluation		Total Marks
40 Marks			60 Marks		
20 Marks (Best 2 out of Three CTs) (From Unit- II, IV & V)	10 Marks (Oral Assignments) (From Unit I & III)	10 Marks (Attendance)	40 Marks (External Written Examination) (From Unit II, IV & V)	20 Marks (External Viva)* (From Unit -1 & III)	100

*Parameters of External Viva

Content	Body Language	Confidence	Question Responsiveness	TOTAL
05 Marks	05 Marks	05 Marks	05 Marks	20 Marks

Note: External Viva will be conducted by 2-member committee comprising

a) One Faculty teaching the class

b) One examiner nominated by University Examination cell.

Each member will evaluate on a scale of 20 marks and the average of two would be the 20 marks obtained by the students.

Comme Colley	B.Tech- Semester-I			
<u>Course Code:</u> EME161	Engineering Drawing (Lab)			
Course Outcomes:	On completion of the course, the students will be :			
CO1.	Understanding the concepts of Engineering Drawing.			
CO2.	Understanding how to draw and represent the shape, size & specifications of physical objects.			
CO3.	Applying the principles of projection and sectioning.			
CO4.	Applying the concepts of development of the lateral surface of a given object.			
CO5.	Creating isometric projection of the given orthographic projection.			
LIST OF EXPERIMENTS:	All to be performed			
1	To write all Numbers (0 to 9) and alphabetical Letters (A to Z) as per			
	the standard dimensions.			
2	To draw the types of lines and conventions of different materials.			
3	To draw and study dimensioning and Tolerance			
4	To construction geometrical figures of Pentagon and Hexagon			
5	To draw the projection of points and lines			
6	To draw the Orthographic Projection of given object in First Angle			
7	To draw the Orthographic Projection of given object in Third Angle			
8	To draw the sectional view of a given object			
9	To draw the development of the lateral surface of given object			
10	To draw the isometric projection of the given orthographic projection.			

Evaluation Scheme of Practical Examination: Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the drawing sheet by the students and a Viva taken by the faculty concerned. The marks shall be given on the drawing sheet & regard maintained by the faculty.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE			ON THE DAY	Y OF EXAM	TOTAL	
SEMESTER (35 MARKS)			(15 MA	ARKS)		
EXPERIMENT	FILE WORK	VIVA	ATTENDANCE	EXPERIMENT	VIVA	INTERNAL
(5 MARKS)	(10 MARKS)	(10 MARKS)	(10 MARKS)	(5 MARKS)	(10 MARKS)	(50 MARKS)

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

Drawing Sheet	FILE WORK	VIVA	TOTAL EXTERNAL
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

Note: The drawing sheet could be manual or in Auto CAD.

B.Tech (EC) Syllabus Applicable w.e.f. Academic Session 2020-21
	B.Tech- Semester-I	L-0
<u>Course Code:</u> EME162	Workshop Practice (Lab)	T-0 P-4 C-2
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the concepts to prepare simple wooden joints using wood working tools.	
CO2.	Applying the techniques to produce fitting jobs of specified dimensions.	
CO3.	Applying the concepts to prepare simple lap, butt, T and corner joints using arc welding equipment.	
CO4.	Applying the concepts of black smithy and lathe machine to produce different jobs.	
CO5.	Creating core and moulds for casting.	
LIST OF	Perform any ten experiments selecting at least one from	
EXPERIMENTS:	each shop	
1	Carpentry Shop: 1. To prepare half-lap corner joint. 2. To prepare mortise &tenon joint. 3. To prepare a cylindrical pattern on woodworking lathe.	
2	 Fitting Bench Working Shop: 1. To prepare a V-joint fitting 2. To prepare a U-joint fitting 3. To prepare a internal thread in a plate with the help of tapping process 	
3	Black Smithy Shop:1. To prepare a square rod from given circular rod2. To prepare a square U- shape from given circular rod	
4	 Welding Shop: 1. To prepare a butt and Lap welded joints using arc welding machine. 2. To prepare a Lap welded joint Gas welding equipment. 3. To prepare a Lap welded joint using spot welding machine 	
5	Sheet-metal Shop:1. To make round duct of GI sheet using 'soldering' process.2. To prepare a tray of GI by fabrication	
6	 Machine Shop: 1. To study the working of basic machine tools like Lathe m/c, Shaper m/c, Drilling m/c and Grinding m/c. 2. To perform the following operations on Centre Lathe: Turning, Step turning, Taper turning, Facing, Grooving and Knurling 3. To perform the operations of drilling of making the holes on the given metallic work-piece (M.S.) by use of drilling machine. 	
7	Foundry Shop: 1. To prepare core as per given size. 2. To prepare a mould for given casting.	

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICA	AL PERFORMA SEMESTER	NCE & VIVA DU (35 MARKS)	URING THE	ON THE DAY (15 MA	Y OF EXAM ARKS)	TOTAL
EXPERIMENT	FILE WORK	VIVA	ATTENDANCE	EXPERIMENT	VIVA	INTERNAL
(5 MARKS)	(10 MARKS)	(10 MARKS)	(10 MARKS)	(5 MARKS)	(10 MARKS)	(50 MARKS)

External Evaluation (50 marks)

EXPERIMENT	FILE WORK	VIVA	TOTAL EXTERNAL
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

There shall be continuous evaluation of the student on the following broad parameters:

- **1.** Observance of dress code.
- 2. Participation in Conferences /Workshops / Seminars.

3. Attendance in guest lectures, invited talks and special technical sessions organized from time to time.

4. Participation in community projects including NSS.

5. Exhibiting team spirit in different Culture & extra curriculum activities, Department Club activities of the University and College organized from time to time.

6. Observance of rule & regulations in the College/University, Behavior in Campus Premises, Bus, hostel mess and hostel.

7. Performance and awards received in different events (sports/ co-curricular activities) organized at College / University and other level.

8. General behavior

9. Any extraordinary achievement.

The above is an indicative list of parameters on which the students shall be continuously evaluated. The college may evaluate the student on the specific parameters by informing them through a notice displayed on the notice board before evaluation. There shall be no external examination for this course; however, the marks shall be included for calculation of cumulative Performance Index (CPI).

Head of Department would be display GP marks on notice board in prescribed format after IInd & IIIrd CT in semester:

S N o		Enroll No.	Student Name	Dress code	Participation in Conferences /Workshops / Seminars	Participation in guest lectures, invited talks and special technical sessions	Participation in community Services	Participation in Culture & extra curriculum activities, Department Club Activities	Participation in sports/ co- curricular activities	General Behavior	Any Extra Achievement
				(5)	(15)	(20)	(10)	(20)	(20)	(5)	(5)
	Responsible for marks			Mentor	Head	Head	Mentor	Cultural Events Coordinator & Department Club Coordinator	Sports Coordinator	Mentor	Director or Principal

Course	B.Tech- Semester-II				
Code:	Encineering Mathematics II	T-1			
EAS211	Engineering Wathematics-II	P-0 C-4			
Course		C-7			
Outcomes :	On completion of the course, the students will be :				
CO1.	Understanding the concepts of the wave, diffusion and Laplace equations & Fourier series.				
CO2.	Understanding the methods of separation of variables.				
СО3.	Understanding the concepts of Fourier series' representation of single variable function.				
CO4.	Applying Laplace transform to determine the complete solutions of linear ODE.				
CO5.	Applying the method of variations of parameters to find solution of equations with variable coefficients.				
Course Content:					
Unit-1:	Differential Equations: Linear Differential Equation, Linear Differential Equation with constant coefficient: Complementary functions and particular integrals, Linear Differential Equation with variable coefficient: Removal method, changing independent variables, Method of variation of parameters, Homogeneous Linear Differential Equation, Simultaneous linear differential equations.	8 Hours			
Unit-2:	Series Solutions: Power Series solutions of ODE, Ordinary Point, Singular Points, Frobenius Method. Special Functions: Legendre equation and Polynomial, Legendre Function, Rodrigue's formula, Laplace definite integral for first and second kind, Bessel equation and Polynomial, Bessel Function, Orthogonal properties and Recurrence Relation for Legendre and Bessel function.	8 Hours			
Unit-3:	Partial differential equations –Method of separation of variables for solving partial differential equations; Wave equation up to two dimensions; Laplace equation in two-dimensions; Heat conduction equations up to two-dimensions; Equations of transmission Lines.	8 Hours			
Unit-4:	Fourier Series: Periodic functions, Trigonometric series; Fourier series; Dirichlet's conditions, Determination of Fourier coefficient by Euler's formulae; Fourier series for discontinuous functions, Even and odd functions, Half range sine and cosine series.	8 Hours			
Unit-5:	Laplace Transform: Laplace transform; Existence theorem; Laplace transform of derivatives and integrals; Inverse Laplace transform; Unit step function; Diratch delta function; Laplace transform of periodic functions; Convolution theorem.	8 Hours			
<u>Text</u> <u>Books:</u>	1. Das H.K., Engineering Mathematics Vol-II, S. Chand.				
<u>Reference</u> <u>Books:</u>	 Kreyszig E., Advanced Engineering Mathematics, Wiley Eastern. Piskunov N, Differential & Integral Calculus, Moscow Peace Publishers. Narayan Shanti, A Text book of Matrices, S. Chand Bali N.P., Engineering Mathematics-II, Laxmi Publications. 				
Additional electronics reference material:	1. https://www.youtube.com/watch?v=luJMl37-nso 2. https://www.youtube.com/watch?v=NdouX5-KD6Y				

Course	B.Tech- Semester-II		
Code: EAS212	Engineering Physics	T-1 P-0 C-4	
Course Outcomes :	On completion of the course, the students will be :		
CO1.	Understanding the basic concepts of interference, diffraction and polarisation.		
CO2.	Understanding the concept of bonding in solids and semiconductors.		
CO3.	Understanding the special theory of relativity.		
CO4.	Applying special theory of relativity to explain the phenomenon of length contraction, time dilation, mass-energy equivalence etc.		
<u>CO5.</u>	Applying the concepts of polarized light by the Brewster's and Malus Law.		
Course Content:			
Unit-1:	Interference of Light: Introduction, Principle of Superposition, and Interference due to division of wavefront: Young's double slit experiment, Theory of Fresnel's Bi-Prism, Interference due to division of amplitude: parallel thin films, Wedge shaped film, Michelson's interferometer, Newton's ring.	8 Hours	
Unit-2:	Diffraction : Introduction, Types of Diffraction and difference between them, Condition for diffraction, difference between interference and diffraction. Single slit diffraction : Quantitative description of maxima and minima with intensity variation, linear and angular width of central maxima. Resolving Power : Rayleigh's criterion of resolution, resolving power of diffraction grating and telescope.	8 Hours	
Unit-3:	Polarization: Introduction, production of plane polarized light by different methods, Brewster's and Malus Law. Quantitative description of double refraction, Nicol prism, Quarter & half wave plate, specific rotation, Laurent's half shade polarimeter.	8 Hours	
Unit-4:	Elements of Material Science: Introduction, Bonding in solids, Covalent bonding and Metallic bonding, Classification of Solids as Insulators, Semi- Conductor and Conductors, Intrinsic and Extrinsic Semiconductors, Conductivity in Semiconductors, Determination of Energy gap of Semiconductor. Hall Effect: Theory, Hall Coefficients and application to determine the sign of charge carrier, Concentration of charge carrier, mobility of charge carriers.	8 Hours	
Unit-5:	Special Theory of Relativity: Introduction, Inertial and non-inertial frames of Reference, Postulates of special theory of relativity, Galilean and Lorentz Transformations, Length contraction and Time Dilation, Relativistic addition of velocities, Variation of mass with velocity, Mass-Energy equivalence.	8 Hours	
<u>Text</u> Books:	1. Elements of Properties of Matter, D. S. Mathur, S. Chand & Co.		
<u>Reference</u> <u>Books:</u> <u>Additional</u>	 F. A. Jenkins and H. E. White, Fundamentals of Optics, McGraw- Hill. Concept of Modern Physics, Beiser, Tata McGraw-Hill. R. Resnick, Introduction to Special Relativity, John Wiley, Singapore. *Latest editions of all the suggested books are recommended. https://www.youtube.com/watch?v=toGH5BdgRZ4&list=PLD9DDF 		
reference <u>material:</u>	BDC338226CA 2. https://www.youtube.com/watch?v=CuqsU7B1MtU		

Course Code:	B.Tech- Semester-II	L-0
<u>Course Code:</u> EAS262	Engineering Physics (Lab)	Т-0 Р-2 С-1
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding of the operation of various models of optical devices.	
CO2.	Understanding types of Semiconductors using Hall experiments.	
СО3.	Applying the concept of interference, polarization & dispersion in optical devices through Newton's ring, Laser, polarimeter & spectrometer.	
CO4.	Applying the concept of resonance to determine the AC frequency using sonometer & Melde's apparatus.	
CO5.	Applying the concept of resolving & dispersive power by a prism.	
LIST OF EXPERIMENTS:	Note: Select any ten experiments from the following list:	
1	To determine the wavelength of monochromatic light by Newton's ring.	
2	To determine the wavelength of monochromatic light by Michelson- Morley experiment.	
3	To determine the wavelength of monochromatic light by Fresnel's Bi-prism. To determine the Planck's constant using LEDs of different colours.	
4	To determine the Planck's constant using LEDs of different colours.	
5	To determine the specific rotation of cane sugar solution using Polarimeter	
6	To verify Stefan's Law by electrical method	
7	To study the Hall Effect and determine Hall coefficient and mobility of a given semiconductor material using Hall-effect set up	
8	To determine the Frequency of an Electrically Maintained Tuning Fork by Melde's experiment.	
9	To compare Illuminating Powers by a Photometer.	
10	To determine the frequency of A.C. mains by means of a Sonometer.	
11	To determine refractive index of a prism material by spectrometer	
12	To determine the Flashing & Quenching of Neon bulb.	
13	Determination of Cauchy's constant by using spectrometer.	
14	To study the PN junction characteristics	
15	To determine the resolving power and dispersive power by a prism	
16	To determine the value of Boltzmann Constant by studying Forward Characteristics of a Diode	
17	Study the characteristics of LDR	
18	To study the characteristics of a photo-cell.	
<u>Books:</u>	 B.Sc. Practical Physics, Gupta and Kumar, Pragati Prakashan. B.Sc. Practical Physics, C.L. Arora, S. Chand & Company Pvt. Ltd. *Latest editions of all the suggested books are recommended. 	

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE				ON THE DAY	Y OF EXAM	
	SEMESTER	(35 MARKS)		(15 MA	ARKS)	TOTAL
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 MARKS)	VIVA (10 MARKS)	INTERNAL (50 MARKS)

External Evaluation (50 marks)

EXPERIMENT	FILE WORK	VIVA	TOTAL EXTERNAL
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

	B.Tech- Semester-II	L-3
Course Code:	Engineering Chemistry	T-1
EAS213		P-0 C-4
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the concept of softening & purification of water.	
CO2.	Understanding calorific value& combustion, analysis of coal, Physical & Chemical properties of hydrocarbons & quality improvements.	
СО3.	Understanding the concept of lubrication, Properties of Refractory & Manufacturing of cements.	
CO4.	Applying the concepts of the mechanism of polymerization reactions, Natural and synthetic rubber& vulcanization.	
CO5.	Applying the concepts of spectroscopic & chromatographic techniques.	
Course Content:		
Unit-1:	Water and Its Industrial Applications: Sources, Impurities, Hardness and its units, Industrial water, characteristics, softening of water by various methods (External and Internal treatment), Boiler trouble causes effects and remedies, Characteristic of municipal water and its treatment, Numerical problem based on water softening method like lime soda, calgonetc	8 Hours
Unit-2:	Fuels and Combustion: Fossil fuel and classification, calorific value, determination of calorific value by Bomb and Jumker's calorimeter, proximate and ultimate analysis of coal and their significance, calorific value computation based on ultimate analysis data, Combustion and its related numerical problems carbonization manufacturing of coke, and recovery of byproduct, knocking relationship between knocking and structure and hydrocarbon, improvement ant knocking characteristic IC Engine fuels, Diesel Engine fuels, Cetane Number.	8 Hours
Unit-3:	Lubricants: Introduction, mechanism of lubrication, classification of lubricant, properties and testing of lubricating Oil Numerical problem based on testing methods. Cement and Refractories: Manufacture, IS code, Setting and hardening of cement, Portland cement Plaster of Paris, Refractories. Introduction, classification and properties of refractories.	8 Hours
Unit-4:	Polymers: Introduction, types and classification of polymerization, reaction mechanism, Natural and synthetic rubber, Vulcanization of rubber, preparation, properties and uses of the following Polythene, PVC, PMMA, Teflon, Polyacrylonitrile, PVA, Nylon 6, Terylene, Phenol Formaldehyde, Urea Formaldehyde Resin, Glyptal, Silicones Resin, Polyurethanes, Butyl Rubber, Neoprene, Buna N, Buna S.	8 Hours
Unit-5:	 A. Instrumental Techniques in chemical analysis: Introduction, Principle, Instrumentation and application of IR, NMR, UV, Visible, Gas Chromatography, Lambert and Beer's Law. B. Water Analysis Techniques: Alkalinity, Hardness (Complexometric), Chlorides, Free Chlorine, DO, BOD, and COD, Numerical Problem Based on above techniques. 	8 Hours
<u>Text Books:</u>	1. Agarwal R. K., Engineering Chemistry, Krishna Prakashan.	
<u>Reference</u> <u>Books:</u>	 Morrison & Boyd, Organic Chemistry, Prentice Hall Barrow Gordon M., Physical Chemistry, McGraw-Hill. Manahan Stanley E., Environmental Chemistry, CRC Press *Latest editions of all the suggested books are recommended. 	

<u>Additional</u> <u>electronics</u> <u>reference</u> <u>material:</u>	 https://www.youtube.com/watch?v=RV-OyRTaIOI https://www.youtube.com/watch?v=phhfkikb6Lw 	
---	--	--

	B.Tech- Semester-II	L-0
<u>Course Code:</u> EAS263	Engineering Chemistry (Lab)	Т-0 Р-2
		C-1
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the concepts of Hardness of water.	
CO2.	Analyzing & estimating of various parameters of water.	
СОЗ.	Analyzing of Calorific value of Solid fuel by Bomb calorimeter & Liquid Fuels by Junkers Gas Calorimeter.	
CO4.	Analyzing of open & closed Flash point of oil by Cleveland & Pensky's Martens apparatus.	
CO5.	Analyzing of viscosity of lubricating oil using Redwood Viscometer.	
LIST OF EXPERIMENTS:	Note: Select any ten experiments from the following list	
1	Determination of Total Hardness of a given water sample.	
2	Determination of mixed alkalinity (a) Hydroxyl & Carbonate (b) Carbonate & Bicarbonate	
3	To determine the pH of the given solution using pH meter and pH- metric titration	
4	Determination of dissolved oxygen content of given water sample	
5	To find chemical oxygen demand of waste water sample by potassium dichromate	
6	Determination of free chlorine in a given water sample	
7	To determine the chloride content in the given water sample by Mohr's method	
8	To prepare the Bakelite resin polymer	
9	To determine the concentration of unknown sample of iron spectrophotometrically	
10	To determine the viscosity of a given sample of a lubricating oil using Redwood Viscometer	
11	To determine the flash & fire point of a given lubricating oil	
12	Determination of calorific value of a solid or liquid fuel.	
13	Determination of calorific value of a gaseous fuel	
14	Determination of % of O ₂ , CO ₂ , % CO in flue gas sample using Orsat apparatus.	
15	Proximate analysis of coal sample.	

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICA	AL PERFORMA SEMESTER	NCE & VIVA DU (35 MARKS)	JRING THE	ON THE DAY (15 MA	Y OF EXAM RKS)	TOTAL
EXPERIMENT	FILE WORK	VIVA	ATTENDANCE	EXPERIMENT	VIVA	INTERNAL
(5 MARKS)	(10 MARKS)	(10 MARKS)	(10 MARKS)	(5 MARKS)	(10 MARKS)	(50 MARKS)

External Evaluation (50 marks)

EXPERIMENT	FILE WORK	VIVA	TOTAL EXTERNAL
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

	B.Tech-Semester-II	L-3
<u>Course Code:</u> EEE217	Basic Electrical Engineering	T-1 P-0 C-4
Course Outcomes:	On completion of the course, the students will be :	
C01.	Understanding the basics of Network, AC Waveform and its characteristics.	
CO2.	Understanding the basic concept of Measuring Instruments, Transformers & three phase Power systems.	
CO3.	Understanding the basic concepts of Transformer.	
CO4.	Understanding the basic concept of power measurement using two wattmeter methods.	
CO5.	Applying the concept of Kirchhoff's laws and Network Theorems to analyze complex electrical circuits.	
Course Content:		
Unit-1:	D.C. Network Theory: Passive, active, bilateral, unilateral, linear, nonlinear element, Circuit theory concepts-Mesh and node analysis; Voltage and current division, source transformation, Network Theorems- Superposition theorem, Thevenin's theorem, Norton's theorem, and Maximum Power Transfer theorem, Star-delta & delta-star conversion.	8 Hours
Unit-2:	Steady State Analysis of A.C. Circuits: Sinusoidal and phasor representation of voltage and Current; Single phase A.C. circuit behavior of resistance, inductance and capacitance and their Combination in series & parallel; Power factor; Series and parallel resonance; Band width and Quality factor.	8 Hours
Unit-3:	 Basics of Measuring Instruments: Introduction to wattmeter & Energy meter extension range of voltmeter and ammeter. Three Phase A.C. Circuits: Line and phase voltage/current relations; three phase power, power measurement using two wattmeter methods. 	8 Hours
Unit-4:	Single phase Transformer: Principle of operation; Types of construction; Phasor diagram; Equivalent circuit; Efficiency and losses.	8 Hours
Unit-5:	Electrical machines: DC machines: Principle & Construction, Types, EMF equation of generator and torque equation of motor, applications of DC motors (simple numerical problems)	8 Hours
<u>Text Books:</u>	1. Nagrath I.J., Basic Electrical Engineering, Tata McGraw Hill	
<u>Reference</u> <u>Books:</u>	 Fitzgerald A.E & Higginbotham., D.E., Basic Electrical Engineering, McGraw Hill. A Grabel, Basic Electrical Engineering, McGraw Hill. Cotton H., Advanced Electrical Technology, Wheeler Publishing. Del Toro, Principles of Electrical Engineering, Prentice-Hall International. W.H. Hayt & J.E. Kemmerly, Engineering Circuit Analysis, McGraw Hill. 	
Additional electronics reference material:	*Latest editions of all the suggested books are recommended. 1. https://nptel.ac.in/courses/108/108/108108076/ 2. https://sites.google.com/tmu.ac.in/dr-garima-goswami/home	

<u>Course Code:</u> EEE261	B.Tech- Semester-II Basic Electrical Engineering (Lab)	L-0 T-0 P-2
	2	C-1
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the concepts of Kirchoff & Voltage law.	
CO2.	Understanding the concepts of dc network theorem.	
CO3.	Analyzing the energy by a single-phase energy meter.	
CO4.	Analyzing the losses and efficiency of Transformer on different load conditions.	
CO5.	Analyzing the electrical circuits using electrical and electronics components on bread board.	
LIST OF EXPERIMENTS:	Note: Select any ten experiments from the following list	
1	To verify the Kirchhoff's current and voltage laws.	
2	To study multimeter.	
3	To verify the Superposition theorem	
4	To verify the Thevenin's theorem.	
5	To verify the Norton's theorem.	
6	To verify the maximum power transfer theorem	
7	To verify current division and voltage division rule.	
8	To measure energy by a single-phase energy meter	
9	To measure the power factor in an RLC by varying the capacitance	
10	To determine resonance frequency, quality factor, bandwidth in series resonance	
11	To measure the power in a 3-phase system by two-wattmeter method	
12	To measure speed for speed control of D.C. Shunt Motor	
13	To determine the efficiency of single-phase transformer by load test.	

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE				ON THE DAY	Y OF EXAM	TOTAL
SEMESTER (35 MARKS)				(15 MA	ARKS)	
EXPERIMENT	FILE WORK	VIVA	ATTENDANCE	EXPERIMENT	VIVA	INTERNAL
(5 MARKS)	(10 MARKS)	(10 MARKS)	(10 MARKS)	(5 MARKS)	(10 MARKS)	(50 MARKS)

External Evaluation (50 marks)

EXPERIMENT	FILE WORK	VIVA	TOTAL EXTERNAL
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

	B.Tech- Semester-II	L-3
<u>Course Code:</u> EEC211	Basic Electronics Engineering	T-1 P-0 C-4
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the concepts of electronic components like diode, BJT & FET.	
CO2.	Understanding the applications of pn junction diode as clipper, clamper, rectifier & regulator whereas BJT & FET as amplifiers	
соз.	Understanding the functions and applications of operational amplifier-based circuits such as differentiator, integrator, and inverting, non-inverting, summing & differential amplifier.	
CO4.	Understanding the concepts of number system, Boolean algebra and logic gates.	
CO5.	Applying the knowledge of series, parallel and electromagnetic circuits.	
Course Content:		
Unit-1:	p-n Junction: Energy band diagram in materials, Intrinsic & Extrinsic Semiconductor, Introduction to PN-Junction, Depletion layer, V-I characteristics, p-n junction as rectifiers (half wave and full wave), calculation of ripple factor of rectifiers, clipping and clamping circuits, Zener diode and its application as shunt regulator	8 Hours
Unit-2:	Bipolar Junction Transistor (BJT): Basic construction, transistor action; CB, CE and CC configurations, input/output characteristics, Relation between α , $\beta \& \gamma$, Biasing of transistors: Fixed bias, emitter bias, potential divider bias	8 Hours
Unit-3:	Field Effect Transistor (FET): Basic construction of JFET; Principle of working; concept of pinch-off condition & maximum drain saturation current; input and transfer characteristics; Characteristics equation; fixed and self-biasing of JFET amplifier; Introduction of MOSFET; Depletion and Enhancement type MOSFET- Construction, Operation and Characteristics.	8 Hours
Unit-4:	Operational Amplifier (Op-Amp): Concept of ideal operational amplifier; ideal and practical Op-Amp parameters; inverting, non-inverting and unity gain configurations, Applications of Op-Amp as adders, difference amplifiers, integrators and differentiator.	8 Hours
Unit-5:	Switching Theory: Number system, conversion of bases (decimal, binary, octal and hexa decimal numbers), Addition & Subtraction, BCD numbers, Boolean algebra, De Morgan's Theorems, Logic gates and truth table- AND, OR & NOT, Seven segment display & K map.	8 Hours
<u>Text Books:</u>	1. Robert Boylestad & Louis Nashelsky, Electronic Circuit and Devices, Pearson India.	
<u>Reference</u> <u>Books:</u>	 Sedra and Smith, Microelectronic Circuits, Oxford University Press. Gayakwad, R A, Operational Amplifiers and Linear Integrated circuits, Prentice Hall of India Pvt. Ltd. Chattopadhyay D and P C Rakshit, Electronics Fundamentals and Applications, New Age International. 	
Additional <u>electronics</u> <u>reference</u> <u>material:</u>	 Latest editions of all the suggested books are recommended. 1. https://www.youtube.com/watch?v=USrY0JspDEg 2. https://www.youtube.com/watch?v=Hkz27cFW4Xs 	

	B.Tech- Semester-II	L-0
<u>Course Code:</u> EEC261	Basic Electronics Engineering (Lab)	P-2 C-1
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the implementation of diode-based circuits.	
CO2.	Understanding the implementation of Operational amplifier-based circuits.	
CO3.	Analyzing the characteristics of pn junction diode & BJT.	
CO4.	Analyzing the different parameters for characterizing different circuits like rectifiers, regulators using diodes and BJTs.	
CO5.	Analyzing the truth tables through the different type's adders.	
LIST OF EXPERIMENTS:	Note: Minimum eight experiments should be performed-	
1	To study the V-I characteristics of p-n junction diode.	
2	To study the diode as clipper and clamper	
3	To study the half-wave rectifier using silicon diode.	
4	To study the full-wave rectifier using silicon diode.	
5	To study the Zener diode as a shunt regulator.	
6	To study transistor in Common Base configuration & plot its input/output characteristics	
7	To study the operational amplifier in inverting & non-inverting modes using IC 741.	
8	To study the operational amplifier as differentiator & integrator.	
9	To study various logic gates & verify their truth tables.	
10	To study half adder/full adder & verify their truth tables	

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE			ON THE DAY	Y OF EXAM	TOTAL	
SEMESTER (35 MARKS)			(15 MA	RKS)		
EXPERIMENT	FILE WORK	VIVA	ATTENDANCE	EXPERIMENT	VIVA	INTERNAL
(5 MARKS)	(10 MARKS)	(10 MARKS)	(10 MARKS)	(5 MARKS)	(10 MARKS)	(50 MARKS)

External Evaluation (50 marks)

EXPERIMENT	FILE WORK	VIVA	TOTAL EXTERNAL
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

Course Code:	B.Tech Semester-II	L-3 T-0
ECS212	Computer System & Programming in C++	P-0 C-3
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the concept of various components of computer system	
CO2.	Understanding the Object-Oriented Programming Language concepts.	
соз.	Analyzing basic mathematical problem and their solutions through programming	
CO4.	Applying the concepts of programming solutions for distinct problems	
CO5.	Applying the concepts of scalable solutions through function	
Course Content:		
Unit-1:	 Problem Solving: Phases of problem solving, Algorithms, Structure Chart, Flow chart, Practice of solving Sequence Problems, Selection Problems, Repetition problem. Statements for problem solving: if, switch, while, for, do, break, continue, go to statements. 	8 Hours
Unit-2:	Concepts in Computer Application: Generations, Characteristic and Application of Computers, Functional Component of Computer: CPU, I/O devices, Type of Memory. Translators: Assembler, Compiler, and Interpreter; Number System: Decimal, Octal, Binary and Hexadecimal &their Conversions; Various Codes: BCD, ASCII and EBCDIC and Grav Code.	8 Hours
Unit-3:	Concepts in Operating System: Purpose, Services, Types, Functions. Data Communication & Networks: Types, Topology, IP address classes. C++ Basics: Data types, Variables, Constants, Keywords, Identifiers, Types of Operators, Memory Allocation operators, Expressions, Pre-processor directives. Introduction to Array. Pointers, Structures and Strings	8 Hours
Unit-4:	 Functions: Scope of variables; Parameter passing; Default arguments; Inline functions; Recursive functions; Pointers to functions. C++ Classes and Data Abstraction: Class Structure, Objects; this pointer; Friend function; Static class members; Constructors and Destructors; Data abstraction. Inheritance: Types, Access to the base class members; Virtual base class. 	8 Hours
Unit-5:	Polymorphism: Function overloading; Operator overloading; Static Binding and Dynamic bindings; Virtual function: Definition, Call mechanism, Pure virtual functions; Virtual destructors; Abstract Classes. C++ I/O: Stream classes hierarchy; Stream I/O; File streams; Overloading << and >> operators; File Modes, Reading and Writing to a file; Formatted I/O.	8 Hours
<u>Text Books:</u>	1. Bjarne Stroutrup, The C++ Programming Languge, Adison Wesley.	
<u>Reference</u> <u>Books:</u>	 Beginning C++, The Complete Language, Horton,SPD/WROX Programming with C++, Radhaganesan, Scitech Projects using C++, Varalaxmi, Scitech Object Oriented modelling & Design, RumBaugh, PHI 	
	*Latest editions of all the suggested books are recommended.	
<u>Additional</u> <u>electronics</u> <u>reference</u> <u>material:</u>	 https://www.youtube.com/watch?v=LZFoktwiars&list=PLmp4ylk- B4KrM9uOEdvPIVFUkU3jNc6D2 https://www.youtube.com/watch?v=XTiIiI- LOY8&list=PLJvIzs_rP6R73WlvumJvCQJrOY3U5zq1j 	

<u>Course Code:</u> ECS262	B.Tech - Semester-II Computer System & Programming in C++ (Lab)	L-0 T-0 P-2 C-1
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the concepts of execution to programs written in C language.	
CO2.	Applying to prepare programming solutions for specific problems.	
СО3.	Applying to prepare scalable solutions through functions.	
CO4.	Applying basic elements of a C program including arithmetic and logical operators, functions, control structures, and arrays	
CO5.	Analyzing basic mathematical problem and their solutions through programming.	
LIST OF EXPERIMENTS:	Note: Minimum 15 experiments should be performed from the following:	
1	Write a Program (WAP) to calculate Sum & average of N numbers.	
2	WAP to convert integer arithmetic to a given number of day and month.	
3	WAP to find maximum and minimum out of 3 numbers a, b & c.	
4	WAP to find factorial of positive integer.	
5	WAP to find sum of series up to n number, 2+5+8++n.	
6	WAP to print all the number between 1 to 100 which are dividing by 7.	
7	WAP to generate Fibonacci series up to n.	
8	WAP to calculate area of circle using Functions.	
9	WAP to calculate factorial of given number using Recursion function.	
10	WAP to find whether number is prime or not.	
11	WAP to find that the enter character is a letter or digit.	
12	WAP to find addition of two matrix of n*n order.	
13	WAP to find multiplication of two matrix of n*n order.	
14	WAP to find even or odd up to a given limit n.	
15	WAP to find whether a given no is palindrome or not.	
16	WAP to Swap two numbers using third Variable and without using third variable.	
17	WAP to Swap two numbers using call by value and call by reference.	
18	WAP illustrating overloading of various operators.	
19	WAP illustrating use of Friend	
20	WAP illustrating use of Inline Function.	
21	WAP illustrating use of destructor and various types of constructor.	
22	WAP illustrating various forms of Inheritance.	
23	WAP illustrating use of virtual functions, virtual Base Class.	

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)			ON THE DAY OF EXAM (15 MARKS)		TOTAL	
EXPERIMENT	FILE WORK	VIVA	ATTENDANCE	EXPERIMENT	VIVA	INTERNAL
(5 MARKS)	(10 MARKS)	(10 MARKS)	(10 MARKS)	(5 MARKS)	(10 MARKS)	(50 MARKS)

External Evaluation (50 marks)

EXPERIMENT	FILE WORK	VIVA	TOTAL EXTERNAL
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

Course Code: TMUGE201	B.Tech - Semester-II English Communication – II		
Course Outcomes:	On completion of the course, the students will be :		
CO1.	Remembering & understanding the basics of English Grammar and Vocabulary.		
CO2.	Understanding the basics of Listening, Speaking & Writing Skills.		
СО3.	Understanding principles of letter drafting and various types of formats.		
CO4.	Applying correct vocabulary and grammar in sentence construction while writing and delivering presentations.		
CO5.	Analyzing different types of listening, role of Audience & Locale in presentation.		
CO6.	Drafting Official Letters, E-Mail & Paragraphs in correct format.		
Course Content:			
Unit-1:	 Functional Grammar Prefix, suffix and One words substitution Modals Concord 	10 Hours	
Unit-2:	 Listening Skills Difference between listening & hearing, Process and Types of Listening Importance and Barriers to listening 	04 Hours	
Unit-3:	 Writing Skills Official letter and email writing Essentials of a paragraph, Developing a paragraph: Structure and methods Paragraph writing (100-120 words) 	12 Hours	
Unit-4:	 Strategies & Structure of Oral Presentation Purpose, Organizing content, Audience & Locale, Audio- visual aids, Body langauge Voice dynamics: Five P's - Pace, Power, Pronunciation, Pause, and Pitch. Modes of speech delivery and 5 W's of presentation 	8 Hours	
Unit-5:	Value based text reading: Short Essay (Non- detailed study) How should one Read a book? - Virginia Woolf	6 Hours	
<u>Text Books:</u>	1. Singh R.P., An Anthology of English Essay, O.U.P. New Delhi		
<u>Reference</u> <u>Books:</u> Additional	 Nesfield J.C. "English Grammar Composition & Usage" Macmillan Publishers Sood Madan "The Business letters" Goodwill Publishing House, New Delhi Kumar Sanjay & Pushplata "Communication Skills" Oxford University Press, New Delhi. *Latest editions of all the suggested books are recommended. https://www.youtube.com/watch?v=A0uekze2GOU 		
<u>Electronics</u> <u>Reference</u> <u>Material</u>	 https://www.youtube.com/watch?v=JIKU_WT0Bls https://www.youtube.com/watch?v=3Tu1jN65slw https://youtu.be/sb6ZZ2p3hEM 		

	5. https://youtu.be/yY6-cgShhac			
	6. https://youtu.be/cc4yXwOQsBk			
	7. https://youtu.be/yY6-cgShhac			
	8. https://youtu.be/84qoeCofXXQ			
	9. https://www.youtube.com/watch?v=-9MXmxLisI8&t=28s			
	1. Words and exercises, usage in sentences.			
	2. Language Lab software.			
	3. Sentence construction on daily activities and conversations.			
	4. Format and layout to be taught with the help of samples and			
	preparing letters on different subjects.			
Methodologies :	5. JAM sessions and Picture presentation.			
	6. Tongue twisters, Newspaper reading and short movies.			
	7. Modern Teaching tools (PPT Presentation, Tongue-Twisters			
	& Motivational videos with sub-titles) will be utilized.			
	8. Text reading: discussion in detail, critical appreciation by			
	reading the text to develop students' reading habits with voice			
	modulation.			

Evaluation Scheme

Internal Evaluation			External E	Total Marks	
40 Marks 60		60 Ma	urks		
20 Marks (Best 2 out of Three	10 Marks (Oral		40 Marks (External Written	20 Marks	
CTs)	Assignments)	10 Marks	Examination)	(External Viva)*	100
(From Unit- I, III & V)	(From Unit- II &IV)	(Attendance)	(From Unit-1, III & V)	(From Unit- II & IV)	100

*Parameters of External Viva

Content	Body Language	Communication skills	Confidence	TOTAL
05 Marks	05 Marks	05 Marks	05 Marks	20 Marks

Note: External Viva will be conducted by 2-member committee comprising *a*) One Faculty teaching the class

b) One examiner nominated by University Examination cell.

Each member will evaluate on a scale of 20 marks and the average of two would be the 20 marks obtained by the students.

Course Coder	B.Tech- Semester-II	L-0 T-0
EME261	Engineering Drawing (Lab)	P-4 C-2
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the concepts of Engineering Drawing.	
CO2.	Understanding how to draw and represent the shape, size & specifications of physical objects.	
CO3.	Applying the principles of projection and sectioning.	
CO4.	Applying the concepts of development of the lateral surface of a given object.	
CO5.	Creating isometric projection of the given orthographic projection.	
LIST OF EXPERIMENTS:	All to be performed	
	To write all Numbers (0 to 9) and alphabetical Letters (A to Z) as per	
1	the standard dimensions.	
2	To draw the types of lines and conventions of different materials.	
3	To draw and study dimensioning and Tolerance	
4	To construction geometrical figures of Pentagon and Hexagon	
5	To draw the projection of points and lines	
6	To draw the Orthographic Projection of given object in First Angle	
7	To draw the Orthographic Projection of given object in Third Angle	
8	To draw the sectional view of a given object	
9	To draw the development of the lateral surface of given object	
10	To draw the isometric projection of the given orthographic projection.	

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the drawing sheet by the students and a Viva taken by the faculty concerned. The marks shall be given on the drawing sheet & regard maintained by the faculty.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE			ON THE DAY	Y OF EXAM	TOTAL	
SEMESTER (35 MARKS)			(15 MA	ARKS)		
EXPERIMENT	FILE WORK	VIVA	ATTENDANCE	EXPERIMENT	VIVA	INTERNAL
(5 MARKS)	(10 MARKS)	(10 MARKS)	(10 MARKS)	(5 MARKS)	(10 MARKS)	(50 MARKS)

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

Drawing Sheet	FILE WORK	VIVA	TOTAL EXTERNAL
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

Note: The drawing sheet could be manual or in Auto CAD.

	B.Tech- Semester-II	L-0
<u>Course Code:</u> EME262	Workshop Practice (Lab)	T-0 P-4 C-2
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the concepts to prepare simple wooden joints using wood working tools.	
CO2.	Applying the techniques to produce fitting jobs of specified dimensions.	
СО3.	Applying the concepts to prepare simple lap, butt, T and corner joints using arc welding equipment.	
CO4.	Applying the concepts of black smithy and lathe machine to produce different jobs.	
CO5.	Creating core and moulds for casting.	
LIST OF	Perform any ten experiments selecting at least one from	
EXPERIMENTS:	each shop	
1	Carpentry Shop: 1. To prepare half-lap corner joint. 2. To prepare mortise &tenon joint. 3. To prepare a cylindrical pattern on woodworking lathe.	
2	 Fitting Bench Working Shop: 1. To prepare a V-joint fitting 2. To prepare a U-joint fitting 3. To prepare a internal thread in a plate with the help of tapping process 	
3	Black Smithy Shop:1. To prepare a square rod from given circular rod2. To prepare a square U- shape from given circular rod	
4	 Welding Shop: 1. To prepare a butt and Lap welded joints using arc welding machine. 2. To prepare a Lap welded joint Gas welding equipment. 3. To prepare a Lap welded joint using spot welding machine 	
5	Sheet-metal Shop:1. To make round duct of GI sheet using 'soldering' process.2. To prepare a tray of GI by fabrication	
6	 Machine Shop: 1. To study the working of basic machine tools like Lathe m/c, Shaper m/c, Drilling m/c and Grinding m/c. 2. To perform the following operations on Centre Lathe: Turning, Step turning, Taper turning, Facing, Grooving and Knurling 3. To perform the operations of drilling of making the holes on the given metallic work-piece (M.S.) by use of drilling machine. 	
7	Foundry Shop: 1. To prepare core as per given size. 2. To prepare a mould for given casting.	

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE			ON THE DAY	Y OF EXAM	TOTAL	
SEMESTER (35 MARKS)			(15 MA	ARKS)		
EXPERIMENT	FILE WORK	VIVA	ATTENDANCE	EXPERIMENT	VIVA	INTERNAL
(5 MARKS)	(10 MARKS)	(10 MARKS)	(10 MARKS)	(5 MARKS)	(10 MARKS)	(50 MARKS)

External Evaluation (50 marks)

There shall be continuous evaluation of the student on the following broad parameters:

- **1.** Observance of dress code.
- 2. Participation in Conferences /Workshops / Seminars.

3. Attendance in guest lectures, invited talks and special technical sessions organized from time to time.

4. Participation in community projects including NSS.

5. Exhibiting team spirit in different Culture & extra curriculum activities, Department Club activities of the University and College organized from time to time.

6. Observance of rule & regulations in the College/University, Behavior in Campus Premises, Bus, hostel mess and hostel.

7. Performance and awards received in different events (sports/ co-curricular activities) organized at College / University and other level.

8. General behavior

9. Any extraordinary achievement.

The above is an indicative list of parameters on which the students shall be continuously evaluated. The college may evaluate the student on the specific parameters by informing them through a notice displayed on the notice board before evaluation. There shall be no external examination for this course; however, the marks shall be included for calculation of cumulative Performance Index (CPI).

Head of Department would be display GP marks on notice board in prescribed format after IInd & IIIrd CT in semester:

S N o		Enroll No.	Student Name	Dress code	Participation in Conferences /Workshops / Seminars	Participation in guest lectures, invited talks and special technical sessions	Participation in community Services	Participation in Culture & extra curriculum activities, Department Club Activities	Participation in sports/ co- curricular activities	General Behavior	Any Extra Achievement
				(5)	(15)	(20)	(10)	(20)	(20)	(5)	(5)
	Responsible for marks			Mentor	Head	Head	Mentor	Cultural Events Coordinator & Department Club Coordinator	Sports Coordinator	Mentor	Director or Principal

<u>Course Code:</u>	B.Tech (Electronics & Communication)- Semester-III	L-3 T-1
EEC311	Engineering Electromagnetics	Р-0 С-4
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding EM wave propagation in free space and in dielectric medium.	
CO2.	Understanding the power flow mechanism in guiding structures and in unbounded medium.	
СОЗ.	Analyzing electromagnetic wave propagation in guiding structures under various matching conditions.	
CO4.	Analyzing power transmission lines in Electromagnetic Field Theory.	
CO5.	Evaluating Maxwell's equations using vector calculus in three standard coordinate systems.	
Course Content:		
Unit-1:	Coordinate systems and transformation: Cartesian coordinates, Cylindrical coordinates, Spherical coordinates; Vector calculus: Differential length, area and volume; Line, surface and volume integrals; Del operator; Gradient of a scalar; Divergence; Curl, Stokes' theorem, green's theorem.	8 Hours
Unit-2:	 Electrostatics: Electrostatic fields; Coulomb's law and field intensity; Electric field due to charge distribution; Electric flux density; Gauss' Law; Electric dipole and flux lines; energy density in electrostatic fields. Electric field in material space: Properties of materials; Convection and conduction currents; Conductors; Polarization in dielectrics; Dielectric constants; Continuity equation and relaxation time; Boundary conditions. 	10 Hours
Unit-3:	Plane Waves: Maxwell's equations; Wave equation in an isotropic homogeneous medium and its solution, Phasor notation, Polarization of waves, Reflection and refraction of plane waves at plane Boundaries Pointing vector.	8 Hours
Unit-4:	Waveguides: Electromagnetic fields: Parallel-plate, Rectangular and circular waveguides; TE and TM modes; Wave impedance; Wave velocities; Attenuation in waveguides.	6 Hours
Unit-5:	 Planar Transmission Line: Electromagnetic fields: Strip-lines, Micro-strip-lines, Co-planar Waveguides, Transmission line parameters; Transmission line equations; Input impedance; Standing wave ratio and power; Cavity Resonators: Rectangular and cylindrical resonators. 	8 Hours
<u>Text Books:</u>	1. Kraus, J.D. and Fleisch, D.A., Electromagnetics with Applications, McGraw Hill.	
<u>Reference</u> <u>Books:</u>	 Kaduskar, Principles of Electromagnetics, Wiley India Ida, N., Engineering Electromagnetics, Springer Kodali, Engineering Electromagnetic Compatibility, John Wiley & sons. E.C. Jordan, K.G. Balmain, E. M. Waves & Radiating Systems, Pearson Education William H. Hayt, John A. Buck, Engineering Electromagnetics, McGraw-Hill Publishing Co. Matthew N.O. Sadiku, Principles of Electromagnetics, Oxford University Press. * Latest editions of all the suggested books are recommended. 	

Additional	https://nptel.ac.in/courses/108/104/108104087/	
Electronic	https://www.voutube.com/watch?v=vRdifN00Vuc	
Reference		
Material:		

<u>Course Code:</u>	B.Tech (Electronics & Communication)- Semester-III	L-3 T-1		
EEC312	Digital Logic & Circuits	Р-0 С-4		
Course Outcomes:	On completion of the course, the students will be :			
CO1.	Remembering the various number systems and its application in digital design.			
CO2.	Understanding of the fundamental concepts and techniques used in digital electronics.			
соз.	CO3. Applying the concepts of digital logic in various digital circuits including counter, timers, etc.			
CO4.	Analyzing the design process of the various combinational and sequential circuits.			
CO5.	Evaluating the basic requirements for a design application and propose a cost-effective solution			
Course Content:				
Unit-1:	Codes: BCD codes, 8421 code, Excess-3 code, Gray code, error detection and correction, Hamming code.	6 Hours		
Unit-2:	SR, JK, D, T flip-flops & latches, Master-Slave flip-flop.Flip-flop excitation table, Classification of sequential circuits, Registers, Counters, Sequence Detector and Sequence Generator, state diagram and state reduction assignment.	10 Hours		
Unit-3:	RTL, DTL, TTL, IIL and ECL working and their characteristics, Propagation delay, Fan-In, Fan-Out, Noise Margin.	6 Hours		
Unit-4:	Binary adder and subtractor, Multiplexers, Decoders, Demultiplexers, Implementation of Combinatorial Logic using these devices.	6 Hours		
Unit-5:	Semiconductor Memories, RAM, SRAM, DRAM, ROM, PROM, EPROM and EEPROM. Memory System design, Charged-Coupled device memory, PLA, PAL.	8 Hours		
Textbooks:	1. M. Morris Mano, Digital Design, Prentice Hall of India.			
<u>Reference</u> <u>Books:</u>	 Malvino and Leach, Digital principle and applications, McGraw Hill Cheung, Modern digital systems design (WPC) Thomas Downs and Mark F Schulz, Logic Design with Pascal, Van Nostrand Reinhold. Godse A.P, Switching Theory Technical Publication. * Latest editions of all the suggested books are recommended. 			
<u>Additional</u> <u>Electronic</u> <u>Reference</u> <u>Material:</u>	Additional https://nptel.ac.in/courses/117/106/117106086/ Electronic https://www.youtube.com/playlist?list=PLDp9Jik5WjRs- Material: 2PL7nN2xTWINWBySuSot			

<u>Course Code:</u>	B.Tech (Electronics & Communication) - Semester-III	L-0 T-0	
EEC361	Digital Logic & Circuits (Lab)		
Course Outcomes:	On completion of the course, students will be:		
CO1.	Understanding the basics of gates.		
CO2.	Applying the design procedures to design basic sequential circuits.		
СО3.	Analyzing the basic combinational circuits and verifying their functionalities.		
CO4.	Creating the circuits of the counters and shift registers.		
CO5.	Creating the basic digital circuits and verifying their operation.		
Experiments:	Note: Minimum eight experiments should be performed.		
Experiments-1:	To verify truth tables of various Gates AND, OR, NOT, NAND, NOR, Ex-OR and Ex-NOR.		
Experiment-2:	To verify truth table of half adder and full adder.		
Experiments-3:	To verify truth table of half subtractor and full subtractor.		
Experiments-4:	To study Multiplexer, Demultimplexer.		
Experiments-5:	To study encoder, decoder.		
Experiments-6:	To study flip flops.		
Experiments-7:	To study magnitude comparator.		
Experiments-8:	To study registers, counters.		
Experiments-9:	To study BCD to binary converter.		
Experiments-10:	To study & test the digital IC by automatic digital IC trainer.		

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICA	AL PERFORMA	NCE & VIVA DU	ON THE DAY OF EXAM			
	SEMESTER	(35 MARKS)	(15 MARKS)		TOTAL	
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 MARKS)	VIVA (10 MARKS)	INTERNAL (50 MARKS)

External Evaluation (50 marks)

EXPERIMENT	FILE WORK	VIVA	TOTAL EXTERNAL
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

Course Code: B.Tech (Electronics & Communication) - Semester-III					
EEC313	Instruments and Measurements				
Course Outcomes:	On completion of the course, the students will be :				
C01.	Remembering the different methods to measure resistance, inductance, capacitance and potential.				
CO2.	Understanding the characteristic & classification of instruments.				
СО3.	Understanding the different types of voltmeter, ammeter and watt meter.				
CO4.	Understanding the potential transformer and current transformer.				
CO5.	Applying the CRO, multimeter and frequency meter.				
Course Content:					
Unit-1:	Philosophy of Measurement: Methods of Measurement, Measurement Systems; classification of Instruments; Characteristic of Instruments & Measurement systems; Errors in Measurement.				
Unit-2:	Analog Measurement of Electrical Quantities: Galvanometer& its types Electrodynamic type Ammeters, Voltmeters & Wattmeter, Three Phase Wattmeter, Power in three Phase System, Errors in Wattmeter. Potential Transformer (PT) & Current Transformer (CT): Phase Angle and Ratio errors; Construction and design considerations; Applications.				
Unit-3:	Unit-3:Measurement of Resistance, Capacitance and Inductance: Measurement of resistances, Inductance & Capacitance ; Q Factor Measurement. AC Potentiometer: Polar type & Co-ordinate type AC potentiometers; Applications of AC Potentiometers in Electrical Measurement.				
Unit-4:	Cathode Ray Oscilloscope: Basic CRO circuit (Block Diagram), Cathode ray tube (CRT) &its principal of operation, its component, Application of CRO and Lissajous Patterns in measurement. Digital Instruments and Measurements: Concept of Digital Measurement, Block Diagram: Digital Voltmeter, Frequency meter,multi-meter and their applications.	8 Hours			
Unit-5:	Transducers: Classification and selection of transducers; Measurement of mechanical variables: Displacement, Force, Strain, Measurement of temperature, pressure, flow and level. Display Devices and recorders: Display devices: LED, LCD, & 7 Segment Display, Analogue recorders: Strip chart, u-v light and x-y Recorders, their tracings and marking mechanisms.				
<u>Text Books:</u>	DhanpatRai & Sons,India.				
<u>Reference</u> <u>Books:</u>	 Forest K. Harries, "Electrical Measurement", Willey Eastern Pvt Ltd. India. W.D. Cooper, "Electronic Instrument & Measurement Technique", prentice hall International. Rajendra Prashad, "Electrical Measurement & Measuring Instrument", Khanna Publisher. J.B Gupta., "A Course in Electronic and Electrical Measurements & Instrumentation", S.K.Kataria& Sons. T.S Rathore," Digital Measurement Techniques" Narosa Publishing House. E.W. Golding & F.C. Widdis, "Electrical Measurement & Measuring Instrument", A.W.Wheeler& Co. Pvt Ltd. India 				

<u>Additional</u>	https://nptel.ac.in/courses/108/105/108105153/	
Electronic	https://www.voutube.com/watch?v=xLik5DrScEU	
Reference		
Material:		

	B.Tech (Electronics & Communication) - Semester-III					
<u>Course Code:</u> EEC362	Instruments & Measurements (Lab)					
		C-1				
Course Outcomes:	On completion of the course, students will be:					
CO1.	Applying various types of electrical bridges forinductance measurement.					
CO2.	Applying various types of electrical bridges for resistance measurement.					
СО3.	Applying various types of electrical bridges forcapacitance measurement.					
CO4.	Analysing of RLC series and parallel circuit.					
CO5. Evaluating ammeters and voltmeters.						
Experiments: Note: Minimum eight experiments should be performed.						
Experiment-1: To calibrate the ammeter and voltmeter.						
Experiment-2:	To measure the self-inductance by Maxwell's Bridge.					
Experiment-3:	To measure the self-inductance by Hay's Bridge.					
Experiment-4:	To measure the self-inductance by Anderson's Bridge.					
Experiment-5:	To measure the self-inductance by Owen's Bridge.					
Experiment-6:	To measure the self-capacitance by Schering Bridge.					
Experiment-7:	To measure the self-capacitance by De-Saudy's Bridge.					
Experiment-8:	To measure the low resistance by Kelvin's Double Bridge.					
Experiment-9:	To trace out the transient response of RLC series circuits using storage type CRO.					
Experiment-10:	To trace out the transient response of RLC parallel circuits using storage type CRO					

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICA	AL PERFORMA SEMESTER	NCE & VIVA DU (35 MARKS)	ON THE DAY OF EXAM (15 MARKS)		TOTAL	
EXPERIMENT	EXPERIMENTFILE WORKVIVAATTENDANCE(5 MARKS)(10 MARKS)(10 MARKS)(10 MARKS)			EXPERIMENT	VIVA	INTERNAL
(5 MARKS)				(5 MARKS)	(10 MARKS)	(50 MARKS)

External Evaluation (50 marks)

EXPERIMENT	FILE WORK	VIVA	TOTAL EXTERNAL
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

Course Code:	rse Code: B.Tech (Electronics & Communication)- Semester-III					
EEC315	Signals & Systems					
Course Outcomes:	On completion of the course, the students will be :					
C01.	Remembering the process of system implementation and characterization.					
СО2.	Understanding the knowledge of test signals, inner product, norm and orthogonal basis to signals.					
СО3.	Applying the spectral characteristics of continuous-time periodic and a periodic signals using time invariant analysis.					
CO4.	Analyzing the systems based on their properties and determine the response of LTI system using Laplace transform.					
CO5.	Evaluating the system properties based on impulse response and Fourier transforms.					
CO6.	Creating & solving the real time problems based on Laplace transform and Z- transform for continuous-time and discrete-time signals and systems					
Course Content:						
Unit-1:	Signals : Definition, Continuous time signals, Periodic and non- periodic, Even and odd, Energy and power, Deterministic and random, continuous time signals & discrete time signals, one-dimensional & multi-dimensional; Unit impulse, Unit step, Unit ramp, Rectangular, Exponential Sinusoidal: Operations on continuous time signals					
Unit-2:	Continuous time systems, causal and non-causal, linear and non-linear; Time-invariance, static and dynamic systems, Impulse response and properties, Characterization of Linear-Time invariant (LTI) systems, Step response of discrete time systems; BIBO Stability, Convolution integral Co-relations					
Unit-3:	Laplace-Transform (LT): One-sided LT and Bilateral LT of some common signals, properties and important theorems of LT, Regions of convergence (ROC) and its properties. Inverse LT					
Unit-4:	Continuous Time Fourier Transforms (CTFT) : Definition, Conditions of existence of CTFT, Properties, Magnitude and phase spectra, Some important CTFT theorems, Parseval's theorem, Inverse FT, Relation between LT and FT.					
Unit-5:	Z-Transform: One sided and two-sided Z-transforms, properties and theorems, Parseval's theorem, ROC and its properties, Z-transform of some common signals.					
<u>Text Books:</u>	1. P. Ramakrishna Rao, "Signal and Systems", Tata McGraw Hill, New Delhi.					
<u>Reference</u> <u>Books:</u>	 Chi-Tsong Chen, 'Signals and Systems', 3rd Edition, Oxford University Press. V. Oppenheim, A.S. Willsky and S. Hamid Nawab, "Signals & Systems", Pearson Education. * Latest editions of all the suggested books are recommended. 					
<u>Additional</u> <u>Electronic</u> <u>Reference</u> <u>Material:</u>	https://nptel.ac.in/courses/117/104/117104074/ https://www.youtube.com/watch?v=x5qRAihZRks					

<u>Course Code:</u> ECS312	B. Tech (Electronics & Communication)- Semester-III Object oriented Programming using JAVA			
Course Outcomes:	On completion of the course, the students will be :			
CO1.	Understanding classes, objects, members of a class and relationships among them needed for a specific problem.			
CO2.	Understanding Java application programs using OOP principles and proper program structuring.			
CO3.	Applying the concepts of polymorphism and inheritance.			
CO4.	Creating Java programs to implement error handling techniques using exception handling, AWT Packages, Swing Package.			
CO5.	Creating Java programs to implement database connectivity using JDBC.			
Course Content:				
Unit-1:	Introduction to Java: Advantages of Java, Byte Code, Java Virtual Machine, Data types, Variables, Control Statements: if, else, switch, loops; Methods & Classes, Inheritance, Package and Interface, Exception Handling, Multithread programming, Synchronization, String handling,	8 Hours		
Unit-2:	Applets: Configuring applets, Applet capabilities and restrictionsAbstract Window Toolkit (AWT): Controls, Layout managers, Menus, Images, Graphics.Java Class: Structure of a Class, Constructors, Polymorphism: Overloading and overriding methods, Garbage collection, Making methods and classes final, Abstract classes and methods.			
Unit-3:	Java Swing: Creating a Swing Applet and Application, Programming using Panes, Pluggable Look and feel, Labels, Text fields, Buttons, Toggle buttons, Checkboxes, Radio Buttons, View ports, Scroll Panes, Scroll Bars, Lists, Combo box, Progress Bar, Menus and Toolbars, Layered Panes, Tabbed Panes, Split Panes, Layouts, Windows, Dialog Boxes, Inner frame.	8 Hours		
Unit-4:	Packages: Package access. Basic concepts of networking: Working with URLs, Concepts of URLs, Sockets Cloning objects, Wrapper classes: Enumeration interface.	8 Hours		
Unit-5:	JDBC: Connectivity Model, JDBC/ODBC Bridge, java. sql package, Connectivity to remote database, navigating through multiple rows retrieved from a database.	8 Hours		
<u>Text Book:</u>	 Kogent, "Object Oriented Programming Methodology" Kogent Learning Solutions Inc. 			
<u>Reference</u> <u>Books:</u> <u>Additional</u> Electronics	 Booch Grady, "Object-Oriented Analysis & Design with Applications" Jana, "Java and Object-Oriented Programming Paradigm. * Latest editions of all the suggested books are recommended. https://www.youtube.com/watch?v=Lf_Vh-n8Faw 			
<u>Reference</u> <u>Material</u>	https://www.youtube.com/watch?v=vJ-Zn4fo0MQ			

<u>Course Code:</u> ECS361	B. Tech (Electronics & Communication)- Semester-III Object oriented Programming using JAVA (Lab)			
Course Outcomes:	On completion of the course, students will be:			
CO1.	Applying the object-oriented approach in programming and analysing and designing a computer program to solve real world problems based on object-oriented principles.			
CO2.	CO2.Applying the basic approach of graphical user interface design using Abstract window toolkit, Applet and swing packages, creating some application that are based upon some real world scenario.			
СОЗ.	Analysing the concept of database handling and creating application that are able to communicate with various database.			
CO4.	Analysing the Client server architecture, Understanding the Socket programming architecture and creating basic application using Socket programming.			
CO5.	Analysing real world problems and Creating GUI based application that is able to solve those real world problems.			
Experiments:	Note: Minimum eight experiments should be performed.			
Experiment-1:	To write a program in Java for illustrating overloading.			
Experiment-2:	To write a program in Java for illustrating over riding.			
Experiment-3:	To write a program in Java for illustrating Inheritance.			
Experiment-4:	To write programs to create packages and multiple threads in Java.			
Experiment-5:	To write programs in Java for event handling Mouse and Keyboard events.			
Experiment-6:	To create different applications using Layout Manager.			
Experiment-7:	To write programs in Java to create and manipulate Text Area, Canvas, Scroll Bars, Frames and Menus using swing/AWT.			
Experiment-8:	To create Applets using Java.			
Experiment-9:	To write program for Client Server Interaction with stream socket connections.			
Experiment-10:	To write a program in java to read data from disk file.			

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE				ON THE DAY	Y OF EXAM	
SEMESTER (35 MARKS)				(15 MA	IRKS)	TOTAL
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 MARKS)	VIVA (10 MARKS)	INTERNAL (50 MARKS)

External Evaluation (50 marks)

EXPERIMENT FILE WORK	VIVA	TOTAL EXTERNAL
(20 MARKS) (10 MARKS)	(20 MARKS)	(50 MARKS)

<u>Course Code:</u> TMUGE301	B. Tech (Electronics & Communication)- Semester-III English Communication- III	L-2 T-0 P-2 C-3
Course	On completion of the course, the students will be :	
Outcomes:		
COI.	Understanding knowledge of grammar to face competitive exams.	
CO2.	Understanding advance English language by using variety of words i.e.	
	Informs and phrase in variety of sentences in functional context.	
<u> </u>	Applying their English grammer travulades in day to day contact	
<u> </u>	Applying their English grammar knowledge in day to day context.	
CO5.	Applying writing and comprehensive skills in English.	
CO6.	Analyzing Comprehending & enriching their vocabulary through prescribed	
Course		
Content:		
	English Grammar & Vocabulary	
	• Correction of Common Errors (with recap of English Grammar with its usage	14
Unit-1:	in practical context.)	Hours
	• Synthesis: Simple, complex and compound sentence	110 41 5
	• Commonly used Idioms & phrases (Progressive learning whole semester)	
	Speaking Skills	
	• Art of public speaking	10
Unit-2:	Common conversation	Hours
	• Extempore	
	Power Point Presentation (PPt) Skins: Nuances of presenting PP1s	
Un;4 2.	• Strategies of Beading comprehension: Four S's	(Houng
Unit-3:	 Strategies of Reading comprehension. Four 5's How to solve a Comprehension (Short unseen passage: 150-200 words) 	o nours
	Professional Writing	
Unit-4:	Prenaring Notice Agenda & Minutes of the Meeting	7 Hours
	Value based text reading: Short story	
Unit-5:	• The Barber's Trade Union - Mulk Rai Anand	3 Hours
	The Dateer's Trade Onion Train Ray Thana	
<u>Text Books:</u>	1. Singh R.P., An Anthology of English Essay, O.U.P. New Delhi	
	1. Wren & Martin "High School English Grammar and Composition" S.Chand	
	& Co.Ltd., New Delhi.	
	2. Kumar Sanjay & Pushplata "Communication Skills" Oxford University	
<u>Reference</u>	Press, New Delhi.	
<u>Books:</u>	3. Agrawal, Malti "Professional Communication" Krishana Prakashan Media	
	(P) Ltd. Meerut.	
	*Latest editions of all the suggested books are recommended.	
<u>Additional</u>	1- https://www.youtube.com/watch?v=dpYltVtsS_Q	
Electronics	2- https://www.youtube.com/watch?v=Z8HttKW8jVE	
<u>Kelerence</u> Material	5- https://www.youtube.com/watch?v=Srn5Jgr91Z0	
	5- https://www.youtube.com/watch?v=aUEpmAo00vM	
	1. Idiom & Phrases and exercises. usage in sentences.	
	2. Language Lab software.	
wiethodology:	3. Power Point presentation.	
	4. Newspaper reading, short articles from newspaper to comprehend and short	

	 movies. 5. Modern Teaching tools (PPT Presentation & Motivational videos with sub- titles) will be utilized. 6. Text reading: discussion in detail, Critical appreciation by reading the text to develop students' reading habits with voice modulation. 	
--	--	--

Evaluation Scheme

Internal Evaluation			External Eva	luation	Total Marks
40 Marks			60 Marks		
20 Marks (Best 2 out of Three CTs) (From Unit- I, III, IV & V)	10 Marks (Oral Assignments) (Unit -II)	10 Marks (Attendance)	40 Marks (External Written Examination) (From Unit-1, III, IV & V)	20 Marks (External Viva)* (Unit -II)	100

***Parameters of External Viva**

Content	Body Language	Communication skills	Confidence	TOTAL
05 Marks	05 Marks	05 Marks	05 Marks	20 Marks

Note: External Viva will be conducted by 2-member committee comprising

a) One Faculty teaching the class

b) One examiner nominated by University Examination cell.

Each member will evaluate on a scale of 20 marks and the average of two would be the 20 marks obtained by the students.
1. Observance of dress code.

2. Participation in Conferences /Workshops / Seminars.

3. Attendance in guest lectures, invited talks and special technical sessions organized from time to time.

4. Participation in community projects including NSS.

5. Exhibiting team spirit in different Culture & extra curriculum activities, Department Club activities of the University and College organized from time to time.

6. Observance of rule & regulations in the College/University, Behaviour in Campus Premises, Bus, hostel mess and hostel.

7. Performance and awards received in different events (sports/ co-curricular activities) organized at College / University and other level.

8. General behaviour

9. Any extraordinary achievement.

The above is an indicative list of parameters on which the students shall be continuously evaluated. The college may evaluate the student on the specific parameters by informing them through a notice displayed on the notice board before evaluation. There shall be no external examination for this course; however, the marks shall be included for calculation of cumulative Performance Index (CPI).

S N o		Enroll No.	Student Name	Dress code	Participation in Conferences /Workshops / Seminars	Participation in guest lectures, invited talks and special technical sessions	Participation in community Services	Participation in Culture & extra curriculum activities, Department Club Activities	Participation in sports/ co- curricular activities	General Behavior	Any Extra Achievement
				(5)	(15)	(20)	(10)	(20)	(20)	(5)	(5)
	Responsible for marks			Mentor	Head	Head	Mentor	Cultural Events Coordinator & Department Club Coordinator	Sports Coordinator	Mentor	Director or Principal

	Value Added Course	
Course Code:	B.Tech Semester-III	L-2 T-1
TMUGA-301	Foundation in Quantitative Antitude	P-0
	I oundation in Quantitative Aprilude	C-0
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Solving complex problems using Criss cross method, base method and square techniques.	
CO2.	Applying the arithmetical concepts of Average, Mixture and Allegation.	
CO3.	Evaluating the different possibilities of various reasoning based problems in series, Blood relation and Direction.	
CO4.	Operationalizing the inter-related concept of Percentage in Profit Loss and Discount, Si/CI and Mixture/Allegation.	
Course Content:		
Unit-1:	Speed calculations Squares till 1000,square root, multiplications: base 100, 200 300 etc., 11-19, crisscross method for 2X2, 3X3, 4X4, 2X3, 2X4 etc., cubes, cube root	3 Hours
Unit-2:	Percentages Basic calculation, ratio equivalent, base, change of base, multiplying factor, percentage change, increment, decrement, successive percentages, word problems	5 Hours
Unit-3:	Profit Loss Discount Basic definition, formula, concept of mark up, discount, relation with successive change, faulty weights	5 Hours
Unit-4:	SI and CI Simple Interest, finding time and rate, Compound Interest, difference between SI and CI, Installments	4 Hours
Unit-5:	Averages Basic Averages, Concept of Distribution, Weighted Average, equations	3 Hours
Unit-6:	Mixtures and allegations Mixtures of 2 components, mixtures of 3 components, Replacements	5 Hours
Unit-7:	Blood relations Indicating type, operator type, family tree type	3 Hours
Unit-8:	Direction sense Simple statements, shadow type	2 Hours
<u>Reference</u> <u>Books:</u>	 R1:-Arun Shrama:- How to Prepare for Quantitative Aptitude R2:-Quantitative Aptitude by R.S. Agrawal R3:-M Tyra: Quicker Maths R4:-Nishith K Sinha:- Quantitative Aptitude for CAT R5:-Reference website:- Lofoya.com, gmatclub.com, cracku.in, handakafunda.com, tathagat.mba, Indiabix.com R6:-Logical Reasoning by Nishith K Sinha R7:-Verbal and Non Verbal Reasoning by R.S. Agrawal * Latest editions of all the suggested books are recommended. 	

<u>Course Code:</u> EEC461	B.Tech (Electronics & Communication) - Semester-IV Analog Communication System (Lab)				
Course Outcomes:	On completion of the course, students will be:				
CO1.	Understanding the analog modulation circuits as amplitude and frequency modulation.				
CO2.	Understanding the various pulse modulation techniques as PAM, PPM, PWM.				
CO3.	Analyzing the circuit to sample an analog signal.				
CO4.	Applying and simulating modulation and demodulation circuits such as AM, DSB-SC, FM.				
CO5.	Creating the pre-emphasis and de-emphasis at the transmitter and receiver respectively				
CO6.	Creating model of diode detector and AGC circuit that are necessary for good reception of the signal				
Experiments:	Note: Minimum eight experiments should be performed.				
Experiment-1:	To study amplitude modulation.	<u> </u>			
Experiment-2:	To study amplitude demodulation	1			
Experiment-3:	To study Frequency modulation.	1			
Experiment-4:	To study the generation of DSB- SC signal.	L			
Experiment-5:	To study generation of single side band signal.				
Experiment-6:	To study and detect the FM signal using PLL.				
Experiment-7:	To study and measure the noise figure using a noise generator.				
Experiment-8:	To study Pulse Width Modulation.	L			
Experiment-9:	To study Pulse Position Modulation.				
Experiment-10:	To study sampling and reconstruction of Pulse Amplitude modulation system.				

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICA	AL PERFORMA SEMESTER	NCE & VIVA DU (35 MARKS)	ON THE DAY OF EXAM (15 MARKS)		TOTAL	
EXPERIMENT	FILE WORK	VIVA	ATTENDANCE	EXPERIMENT	VIVA	INTERNAL
(5 MARKS)	(10 MARKS)	(10 MARKS)	(10 MARKS)	(5 MARKS)	(10 MARKS)	(50 MARKS)

External Evaluation (50 marks)

Course Code: EEC412	B.Tech (Electronics & Communication) - Semester-IV Electronic Devices & Circuits			
Course Outcomes:	On completion of the course, students will be:			
CO1.	Understanding the concepts of basics of electronics.			
CO2.	Analyzing dc circuits and relates ac models of semiconductor devices with their physical operation.			
CO3.	Analyzing & Designing of the amplifiers & Oscillators circuits.			
CO4.	Analyzing small and large signals for electronic circuits of various practical applications.			
CO5.	Creating mini projects based on concept of electronics circuit.			
Course Content:				
Unit-1:	Concept of Fermi level, Charge carriers in semiconductors, Carrier concentrations, Diffusion and drift basics, Conductivity and mobility concept, population inversion.	6 Hours		
Unit-2:	Small signal low frequency transistor amplifier circuits: Q point, h- parameter representation of transistor, Analysis of single stage & two stages transistor amplifier using h-parameters: voltage gain, current gain, Input impedance and Output impedance, Feedback Amplifiers: Concept of feedback, Classification of feedback amplifiers, General characteristics of negative feedback amplifiers,	10 Hours		
Unit-3:	Class A, Class B, Class AB, Class C operation in amplifiers. Efficiency of Class B power amplifier, transformer coupled class-A amplifier and single ended transistor class-A amplifier, Class-B Pushpull amplifier, Harmonic distortions.	10 Hours		
Unit-4	Positive feedback in amplifier, Barkhausen criterion; Wein bridge oscillator, RC-phase shift oscillator with BJT; Hartley and Colpitts oscillators; Crystal oscillators; Frequency and amplitude stability of oscillators.	8 Hours		
Unit-5	Construction and Working principles of Tunnel diode, Varactor diode, Photodiode, LED, Solar cell, pin diode, LCD, Laser diode.	6 Hours		
<u>Text Books:</u>	1. J.Millman, C.C.Halkias, and SatyabrathaJit, Electronic Devices and Circuits, Tata McGraw Hill.			
<u>Reference</u> <u>Books:</u> <u>Additional</u> Electronic	 T.F. Bogart Jr., J.S.Beasley and G.Rico, Electronic Devices and Circuits, Pearson Education. S.G.Burns and P.R.Bond, Principles of Electronic Circuits, Galgotia Publications. Millman and Grabel, Microelectronics, Tata McGraw Hill. R.L. Boylestad and Louis Nashelsky, Electronic Devices and Circuits, Pearson, Prentice Hall. *Latest editions of all the suggested books are recommended. <u>https://nptel.ac.in/courses/108/108/108108112/</u> https://www.youtube.com/watch?v=I5TsrmOynIc 			
<u>Electronic</u> <u>Reference</u> <u>Material:</u>				

Course Code: EEC462	B.Tech (Electronics & Communication) - Semester-IV Electronics Devices & Circuits (Lab)	L-0 T-0 P-2 C-1
Course Outcomes:	On completion of the course, students will be:	
C01.	Analyzing the working of lab equipment and characteristics of basic components of electronic circuits.	
CO2.	Applying the skills of circuits designing using PN Junction diode.	
соз.	Creating circuits and analyzing input-output characteristics and frequency response of circuits using BJT & FET.	
CO4.	Creating circuits of amplifiers and oscillators.	
CO5.	Creating mini projects based on concept of electronic circuit.	
Experiments:	Note: Minimum eight experiments should be performed.	
Experiment-1:	To Study the lab equipment and components: CRO, Multimeter, Function Generator, Power supply, Active, Passive Components & Bread Board.	
Experiment-2:	To study wave shape of the electrical signal of the half wave rectifier using bread board and discrete components.	
Experiment-3:	To study wave shape of the electrical signal of the full wave (centre- tapped and bridge) rectifiers using bread board and discrete components.	
Experiment-4:	To study & plot input and output characteristics for common base, common emitter configurations.	
Experiment-5:	To study & plot frequency response curve of FET.	
Experiment-6:	To study & plot frequency response curve of R-C coupled common emitter amplifier.	
Experiment-7:	To study & determine voltage gain, current gain, input impedance and output impedance of common emitter amplifier.	
Experiment-8:	To study the R-C Phase shift, Wein Bridge oscillator and verify experimentally the frequency of oscillation.	
Experiment-9:	To study BJT as a switch.	
Experiment-10:	To study the common collector configuration-emitter follower using Darlington pair.	

Evaluation Scheme of Practical Examination: Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICA	L PERFORMA	NCE & VIVA DU	ON THE DAY	Y OF EXAM		
	SEMESTER	(35 MARKS)	(15 MARKS)		TOTAL	
EXPERIMENT	EXPERIMENT FILE WORK VIVA ATTENDANCE			EXPERIMENT	VIVA	INTERNAL
(5 MARKS) (10 MARKS) (10 MARKS) (10 MARKS)				(5 MARKS)	(10 MARKS)	(50 MARKS)

External Evaluation (50 marks)

EXPERIMENT	FILE WORK	VIVA	TOTAL EXTERNAL
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

<u>Course Code:</u> EEE413	B. Tech (Electronics & Communication)- Semester-IV Network Analysis & Synthesis					
Course Outcomes:	On completion of the course, the students will be :					
C01.	Understanding the circuit matrices of linear graphs and analyzing basic electrical networks using graph theory.					
CO2.	Applying the network theorems for simplification of the electrical circuits.					
СОЗ.	Analyzing the two-port parameters with their inter-relationships and gaining the ability to solve with series, parallel and cascade connections					
CO4.	Evaluating the network functions, poles and zeroes from a given network and analyzing the network stability.					
CO5.	Creating the two element network, using passive elements through Foster and Cauer forms. Understanding the basics of filter design.					
Course Content:						
Unit-1:	Graph Theory: Graph of a Network, Definitions, Tree, Co-tree, Link, Basic loops and basic cut sets, Incidence matrix, Cut set matrix, Tie set matrix, Duality, Loop and Node methods of analysis.	8 Hours				
Unit-2:	Network Theorem: Superposition theorem; Thevenin's theorem; Norton's theorem; Maximum power transfer theorem; Reciprocity theorem; Millman's theorem; Compensation theorem; Tellegen's theorem.	8 Hours				
Unit-3:	Network Functions: Concept of Complex frequency; Transform Impedances; Network functions of one-port and two-port networks; Concept of poles and zeros; Properties of driving point and transfer functions; Time response and stability from pole zero plot; Transient Analysis & initial Conditions.	8 Hours				
Unit-4:	Two Port Networks: Characterization of LTI two-port networks Z, Y, ABCD and h parameters; Reciprocity and Symmetry; Inter-relationships between the parameters; Inter-connections of two port networks; Image parameters and characteristic impedance; Ladder and Lattice networks; T & π representation.	8 Hours				
Unit-5:	Network Synthesis: Positive real function, Definition and properties; Properties of LC, RC and RL driving point functions; Synthesis of LC, RC and RL driving point immittance functions using Foster and Cauer first and second forms. Filters: Fundamentals of Passive and active filters; Low pass, High pass, Band pass, and Band elimination filters.	8 Hours				
<u>Text Book:</u>	I. A. Chakrabarti "Circuit Theory", Dhanpat Rai & Co					
<u>Reference</u> <u>Books:</u>	 M.E. Van Valkenburg "An Introduction to Modern Network Synthesis", Wiley Eastern Ltd. W.H. Hayt & Jack E-Kemmerly "Engineering Circuit analysis", Tata McGraw Hill. D. Roy Choudhary "Networks and Systems", Wiley Eastern Ltd. Donald E. Scott "An Introduction to Circuit analysis: A System Approach", McGraw Hill Book Company. Soni, Gupta "Circuit Analysis", Dhanpat Rai & Sons. * Latest editions of all the suggested books are recommended. 					
Additional Electronics <u>Reference</u> <u>Material</u>	https://nptel.ac.in/courses/108/105/108105159/ https://onlinelibrary.wiley.com/journal/1097007x					

<u>Course Code:</u> EEE463	B. Tech (Electronics & Communication)- Semester-IV Network Analysis & Synthesis (Lab)	L-0 T-0 P-2 C-1		
Course Outcomes:	On completion of the course, students will be:			
CO1.	Understanding and verifying the network theorems like Superposition theorem, Thevenin's theorem, Norton's theorem, Reciprocity theorem, Tellegen's theorem etc. using trainer kits.			
CO2. Applying the network theorems to electrical circuits with AC and D sources.				
СО3.	Analyzing the pole zero plot of network functions for subsequent stability analysis.			
CO4.				
CO5.	Evaluating the transient responses of two element electrical circuits to standard input signals.			
Experiments: Note: Minimum ten experiments should be performed.				
Experiment-1: To verify the superposition theorem with DC and AC sources.				
Experiment-2: To verify the Thevenin's theorem with DC and AC sources.				
Experiment-3:	Experiment-3: To verify the Norton's theorem with DC and AC sources.			
Experiment-4:	To verify the Maximum power transfer theorem with DC & AC sources.			
Experiment-5:	To verify the Tellegen's theorem for two networks of the same topology.			
Experiment-6:	To verify the reciprocity theorem in a given network.			
Experiment-7:	To plot the pole-zero diagram of the given network.			
Experiment-8:	To determine the transient response for RL and RC circuits with step volta under critically damped and over damped cases.	age input,		
Experiment-9:	To determine the frequency response for RLC (series& parallel) circ sinusoidal AC input Signal.	cuits with		
Experiment-10:	To Study loading effect in the cascade connected Networks.			
Experiment-11:	To determine the frequency response of a Twin – T notch filter.			
Experiment-12:	To determine attenuation characteristics of a low pass/high pass active fi	ilters.		

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICA	AL PERFORMA SEMESTER	NCE & VIVA DU (35 MARKS)	ON THE DAY OF EXAM (15 MARKS)		TOTAL	
EXPERIMENT	FILE WORK	VIVA	ATTENDANCE	EXPERIMENT	VIVA	INTERNAL
(5 MARKS)	(10 MARKS)	(10 MARKS)	(10 MARKS)	(5 MARKS)	(10 MARKS)	(50 MARKS)

External Evaluation (50 marks)

EXPERIMENT FILE WORK	VIVA TOTAL EXTERNAL
(20 MARKS) (10 MARKS) (20	0 MARKS) (50 MARKS)

Course Code:	B.Tech (Electronics & Communication) - Semester-IV Power Electronics	L-3 T-1 P 0		
		C-4		
Course Outcomes:	On completion of the course, students will be:			
CO1.	Understanding the basics of Power Electronics components characteristics.			
CO2.	Understanding control of various Inverter circuits.			
<u> </u>	Understanding the working of various types of phase converters.			
CO4.	Analysing of converters and identifying components for them, under various load types.			
CO5.	Analysing the details of power semiconductor switches (Construction, Characteristics and operation).			
Course Content:				
Unit-1:	Power Semiconductor Devices : Types of power semiconductor devices, their symbols and static characteristics; Characteristics and specifications of switches; Types of power electronic Circuits; BJT operation: Steady state and switch characteristics, Switching limits; Operation and steady state characteristics of MOSFET and IGBT; Thyristor operation: V-I characteristics, Two transistor model, Methods of turn-on; Operation of GTO, MCT and TRIAC.	8 Hours		
Unit-2:	Power Semiconductor Devices (Contd.) : Protection of devices; Series and parallel operation of thyristors; Commutation techniques of thyristor; DC-DC Converters: Principles of step-down chopper, step down chopper with R-L load, Principle of step-up chopper, Operation with RL load, classification of choppers.	8 Hours		
Unit-3:	Phase Controlled Converters: Single-phase half-wave controlled rectifier with resistive and inductive loads, Effect of freewheeling diode; Single-phase fully-controlled and half-controlled bridge converters.	8 Hours		
Unit-4	Unit-4 AC Voltage Controllers: Principle of on-off and phase control single-phase ac voltage controller with resistive and inductive loads; Three-phase ac voltage controllers (various configurations and comparison); Single-phase transformer tap changer; Cyclo Converters: Basic principle of operation, Single-phase to single-phase, Three-phase to single-phase and three-phase to three phase guals converters, output voltage converters			
Unit-5	Inverters : Single phase series resonant inverter; Single phase bridge inverters; Three phase bridge inverters; Voltage control of inverters; Harmonics reduction techniques; Single phase and three phase current source inverters.	8 Hours		
<u>Text Book:</u>	 M. H. Rashid, "Power Electronics: Circuits, Devices & Applications", Prentice Hall of India, Ltd. 			
<u>Reference</u> <u>Books:</u>	 M.S Jamil Asghar, "Power Electronics", Prentice Hall of India Ltd. A Chakrabarti, "Fundamentals of Power Electronics & Drives", Chanpat Rai & Co. Babu K.Hari, "Power Electronics", Switch Publications. M.D. Singh & K.B. Khanchandani, "Power Electronics", Tata McGraw Hill. *Latest editions of all the suggested books are recommended. 			
<u>Additional</u> <u>electronic</u>	• https://nptel.ac.in/courses/108/102/108102145/			
<u>reference</u> <u>material</u>	https://www.springer.com/journal/43236			

Course Code:	B.Tech (Electronics & Communication) - Semester-IV Power Electronics (Lab)				
ELETOT	Tower Electronics (Lab)	P-2			
Course Outcomes:	On completion of the course, students will be:				
C01.	Understanding the basic operation of various power semiconductor devices and passive components.				
CO2.	Analyzing power electronics circuits.				
CO3.	Applying power electronic circuits for different loads.				
CO4.	Evaluating various single phase and three phase power converter circuits and understand their applications.				
C05.	Creating basic requirements for power electronics-based design application.				
Experiments:	Note: A minimum of 10 experiments has to be performed out of which at least three should be from software-based experiments.				
Experiment-1:	To study V-I characteristics of SCR and measure latching and holding currents.				
Experiment-2:	To study UJT trigger circuit for half wave and full wave control.				
Experiment-3:	To study single-phase half wave controlled rectifier with (i) Resistive load (ii) Inductive load with and without freewheeling diode.				
Experiment-4:	To study single phase (i) Fully controlled rectifier (ii) Half controlled bridge rectifier with resistive and inductive loads.	L			
Experiment-5:	To study three-phase (i) Fully controlled rectifier (ii) Half controlled bridge rectifier with resistive and inductive loads.				
Experiment-6:	To study single-phase AC voltage regulator with resistive and inductive loads.				
Experiment-7:	To study single phase Cyclo-converter.				
Experiment-8:	To study triggering of (i) IGBT (ii) MOSFET (iii) Power Transistor.				
Experiment-9:	To study operation of (i) IGBT (ii) MOSFET with Chopper circuit				
Experiment-10:	To study MOSFET/IGBT based single-phase series-resonant inverter.				
Experiment-11:	To study MOSFET/IGBT based single-phase bridge inverter.				
	SOFTWARE BASED EXPERIMENTS (PSPICE/MATLAB)				
Experiment-1:	To simulate single-phase fully-controlled bridge rectifier using SCR and draw load voltage and load current waveforms for inductive load/RL load.				
Experiment-2:	To simulate single-phase fully-controlled bridge rectifier using GTO and draw load voltage and load current waveforms for inductive load/RL load.				
Experiment-3:	To simulate single-phase fully-controlled bridge rectifier using IGBT and draw load voltage and load current waveforms for inductive load/RL load.				
Experiment-4:	To simulate single-phase full-wave AC voltage controller SCR and draw load voltage and load current waveforms for inductive load/RL load.				
Experiment-5:	To simulate single-phase full-wave AC voltage controller MOSFET and draw load voltage and load current waveforms for inductive load/RL load.				
Experiment-6:	To simulate step down dc chopper with L-C output filter for inductive load and determine steady-state values and ripple contents of output voltage.				

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE				ON THE DAY	Y OF EXAM	TOTAL
SEMESTER (35 MARKS)				(15 MA	ARKS)	
EXPERIMENT	FILE WORK	VIVA	ATTENDANCE	EXPERIMENT	VIVA	INTERNAL
(5 MARKS)	(10 MARKS)	(10 MARKS)	(10 MARKS)	(5 MARKS)	(10 MARKS)	(50 MARKS)

External Evaluation (50 marks)

EXPERIMENT	FILE WORK	VIVA	TOTAL EXTERNAL
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

<u>Course Code:</u> ECS411	B. Tech (Electronics & Communication)- Semester-IV	L-3 T-0 P-0
EC5411	Database Management System	C-3
Course Outcomes:	On completion of the course, the students will be :	
<u>CO1.</u>	Understanding the concept of Database Management System	
<u>CO2.</u>	Applying the commercial relational database system (Oracle).	
<u> </u>	Applying the basic database storage structures and access	
	techniques: file and page organizations, indexing methods including B-tree, and hashing.	
CO5.	Analysing the issues of transaction processing and concurrency control.	
Course Content:		
Unit-1:	 Introduction: Scope and purpose of database system, view of data, relational databases, database architecture, transaction management, database system Vs filesystem, Database system concept and architecture, data definitions language, DML. Data Models: The importance of data models, Basic building blocks, Business rules, The evolution of data models, Degrees of data abstraction 	8 Hours
Unit-2:	Database design and ER Model : overview, ER-Model, Constraints, ER-Diagrams, ERD Issues, weak entity etc, Codd's rules, Relational Schemas, Introduction to UML, Relational database model: Logical view of data, keys, integrity rules. Relational Database design: features of good relational database design, atomic domain and Normalization (1NF, 2NF, 3NF, BCNF)	8 Hours
Unit-3:	Relational data Model and Language: Relational algebra: introduction, Selection and projection, set operations, renaming, Joins, Division, syntax, semantics. Operators, grouping and ungrouping, Relational comparison. Calculus: Tuple relational calculus, Domain relational Calculus, calculus vs algebra, Computational capabilities, constraints, Views. Introduction on SQL: Characteristics of SQL, advantage of SQL. SQL data type and literals. Types of SQL commands. SQL operators and their procedure. Tables, views and indexes. Queries and sub queries. Aggregate functions. Insert, update and delete operations, Joins, Unions, Intersection, Minus, Cursors, Triggers, and Procedures in SQL/PL SQL.	8 Hours
Unit-4:	 Usage of Oracle: Installing oracle Creating Entity-Relationship Diagram using case tools. Writing SQL statements Using ORACLE MYSQL: a) Writing basic SQL SELECT statements. b) Restricting and sorting data. c) Displaying data from multiple tables. d) Aggregating data using group function. e) Manipulating data. f) Creating and managing tables. Normalization in ORACLE. Creating cursor in oracle. Creating procedure and functions in oracle. Creating packages and triggers in oracle. 	8 Hours
Unit-5:	Transaction management: ACID properties, serializability and concurrency control Lock based concurrency control (2PL,	8 Hours

	Deadlocks), Time stamping methods, optimistic methods, database recovery management.	
	1. Elmasri, R., Navathe, S., Fundamentals of Database	
Text Books:	Systems, Addison-Wesley.	
	1. G. K. Gupta, "Data Base Management", Tata Mc Graw Hill.	
	2. Atul Kahate, "Introduction to Database Management	
Reference Books:	Systems" Pearson Education, New Delhi, 2006.	
	*Latest editions of all the suggested books are recommended.	
Additional	https://www.youtube.com/watch?v=wkOD6mbXc2M	
<u>electronics</u>	https://www.youtube.com/watch?v=siKBrudOYwo	
<u>reference</u>		
material		

- **1.** Observance of dress code.
- 2. Participation in Conferences /Workshops / Seminars.

3. Attendance in guest lectures, invited talks and special technical sessions organized from time to time.

4. Participation in community projects including NSS.

5. Exhibiting team spirit in different Culture & extra curriculum activities, Department Club activities of the University and College organized from time to time.

6. Observance of rule & regulations in the College/University, Behaviour in Campus Premises, Bus, hostel mess and hostel.

7. Performance and awards received in different events (sports/ co-curricular activities) organized at College / University and other level.

8. General behaviour

9. Any extraordinary achievement.

The above is an indicative list of parameters on which the students shall be continuously evaluated. The college may evaluate the student on the specific parameters by informing them through a notice displayed on the notice board before evaluation. There shall be no external examination for this course; however, the marks shall be included for calculation of cumulative Performance Index (CPI).

S N o		Enroll No.	Student Name	Dress code	Participation in Conferences /Workshops / Seminars	Participation in guest lectures, invited talks and special technical sessions	Participation in community Services	Participation in Culture & extra curriculum activities, Department Club Activities	Participation in sports/ co- curricular activities	General Behavior	Any Extra Achievement
				(5)	(15)	(20)	(10)	(20)	(20)	(5)	(5)
	Responsible for marks			Mentor	Head	Head	Mentor	Cultural Events Coordinator & Department Club Coordinator	Sports Coordinator	Mentor	Director or Principal

	Value Added Course		
Course Code:	B.Tech Semester-IV	L-2 T-1	
TMUGA-401	Analytical Reasoning	P-0 C-0	
Course Outcomes:	On completion of the course, the students will be :		
CO1.	Applying the arithmetical concepts in Ratio Proportion Variation.		
CO2.	Employing the techniques of Percentage; Ratios and Average in inter related concepts of Time and Work, Time Speed and Distance.		
CO3.	Identifying different possibilities of reasoning based problems of Syllogisms and Venn diagram.		
CO4.	Examining the optimized approach to solve logs and Surds.		
Course			
Content:			
Unit-1:	Ratio, proportions and variations Concept of ratios, proportions, variations, properties and their applications	5 Hours	
Unit-2:	Time and Work Same efficiency, different efficiency, alternate work, application in Pipes and Cisterns	6 Hours	
Unit-3:	Time Speed Distance Average speed, proportionalities in Time, Distance, trains, boats, races, circular tracks	6 Hours	
Unit-4:	Logs and Surds Concept and properties of logs, surds and indices	4 Hours	
Unit-5:	Coding and decoding Sequential coding, reverse coding, abstract coding	3 Hours	
Unit-6:	Syllogisms Two statements, three statements	4 Hours	
Unit-7:	Venn diagram Basic concept and applications	2 Hours	
<u>Reference</u> <u>Books:</u>	 R1:-Arun Shrama:- How to Prepare for Quantitative Aptitude R2:-Quantitative Aptitude by R.S. Agrawal R3:-M Tyra: Quicker Maths R4:-Nishith K Sinha:- Quantitative Aptitude for CAT R5:-Reference website:- Lofoya.com, gmatclub.com, cracku.in, handakafunda.com, tathagat.mba, Indiabix.com R6:-Logical Reasoning by Nishith K Sinha R7:-Verbal and Non Verbal Reasoning by R.S. Agrawal * Latest editions of all the suggested books are recommended. 		

Course Code:	B.Tech (Electronics & Communication) - Semester-V				
EEC511	Microprocessor & Applications	P-0			
		C-4			
Course Outcomes:	On completion of the course, students will be:				
CO1.	Remembering the basic concept of digital fundamentals to Microprocessor based personal computer system.				
CO2.	Understanding the detailed s/w & h/w structure of the Microprocessor.				
СО3.	Applying the different peripherals (8255, 8253 etc.) are interfaced with Microprocessor.				
CO4.	Analyzing the properties of Microprocessors & Microcontrollers.				
CO5.	Evaluating the data transfer attributes through serial & parallel ports.				
CO6.	Creating practical modules based on assembly language programming for microprocessor.				
Course Content:					
Unit-1:	Introduction to Microprocessor: 8085 Evolution of Microprocessor, Register Structure, ALU, Bus Organization, Timing and Control, instruction set. Architecture of 16-bit Microprocessors: Architecture of 8086; (Bus Interface Unit, Execution unit) Register Organization, Bus operation, Memory segmentation.	8 Hours			
Unit-2:	Assembly Language Programming: Addressing Modes and instruction set of 8086, Arithmetic and Logic instructions, Program Control Instructions (jumps, conditional jumps, subroutine call), Loop and string instructions, Assembler Directives.	8 Hours			
Unit-3:	CPU Module: Signal Description of pins of 8086 and 8088, Clock generator, Address and Data bus Demultiplexing, Buffering Memory Organization, Read and Write cycle Timings, Interrupt Structures, Minimum Mode and Maximum Mode Operations.				
Unit-4	Peripheral Interfacing: Programmed I/O, Interrupt Driven, I/O, DMA, Parallel I/O, (8255-PPI, Parallel port), 8253/8254 programmable Timer/Counter Interfacing with ADC.	8 Hours			
Unit-5	Peripheral Interfacing (Contd.) : 8259 Programmable Interrupt controller, 8237 DMA controller Concept of Advanced 32 bit Microprocessors: Pentium Processor	8 Hours			
<u>Text Books:</u>	1. Gaonkar Ramesh S., "Microprocessor Architecture, Programming, and Applications with the 8085", Pen Ram International Publishing.				
<u>Reference</u> <u>Books:</u>	 Liu and Gibson G.A., "Microcomputer Systems: The 8086/8088 Family", Prentice Hall (India). Brey, Barry B., "INTEL microprocessors", Prentice Hall (India). Ram B., "Advanced Microprocessor & Interfacing", Tata McGraw Hill. Hall D.V, "Microprocessors Interfacing", Tata McGraw Hill. Ray, A.K. &Burchandi, K. M. "Advanced Microprocessors and Peripherals: Architecture Programming and Interfacing", Tata McGraw Hill. B.P. Singh &Renu Singh, "Microprocessors and Microcontrollers", New Age International U.S. Shah, "Microprocessor" Tech Max Publications *Latest editions of all the suggested books are recommended. 				
<u>Additional</u> <u>Electronic</u> <u>Reference</u> <u>Material:</u>	https://nptel.ac.in/courses/108/107/108107029/ https://www.youtube.com/watch?v=uKw8tB5Y7mE https://www.youtube.com/watch?v=t0Z8P_hpbFk				

<u>Course Code:</u> EEC561	Code:B.Tech (Electronics & Communication) - Semester-V61Microprocessor & Applications (Lab)					
Course Outcomes:	ourse On completion of the course, students will be:					
CO1.	CO1. Remembering the basic concept of digital fundamentals to Microprocessor based personal computer system.					
CO2.	CO2. Understanding the detailed s/w & h/w structure of the Microprocessor.					
СО3.	Applying the different peripherals (8255, 8253 etc.) are interfaced with Microprocessor.					
CO4. Analyzing the properties of Microprocessors & Microcontrollers.						
CO5.	Evaluating the data transfer attributes through serial & parallel ports.					
CO6.	Creating practical modules based on assembly language programming for microprocessor.					
Experiments:	Note: Minimum eight experiments should be performed.					
Experiment-1:	Study of 8085 Microprocessor kit.					
Experiment-2:	Write a program using 8085 and verify for addition of two 8-bit numbers.					
Experiment-3:	Write a program using 8085 and verify for addition of two 8-bit numbers (with carry).					
Experiment-4:	Write a program using 8085 and verify for 8-bit subtraction (display borrow).					
Experiment-5:	Write a program using 8085 and verify for 16-bit subtraction (display borrow)					
Experiment-6:	Write a program using 8085 for multiplication of two 8- bit numbers by successive addition method.					
Experiment-7:	Study of 8086 microprocessor kit.					
Experiment-8:	Write a program using 8086 for multiplication of two 8- bit numbers.					
Experiment-9:	Write a program using 8086 for multiplication of two 16- bit numbers.					
Experiment-10:	Write a program using 8086 and verify for finding the smallest number from an array					

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE				ON THE DAY	Y OF EXAM	TOTAL
SEMESTER (35 MARKS)				(15 MA	ARKS)	
EXPERIMENT	FILE WORK	VIVA	ATTENDANCE	EXPERIMENT	VIVA	INTERNAL
(5 MARKS)	(10 MARKS)	(10 MARKS)	(10 MARKS)	(5 MARKS)	(10 MARKS)	(50 MARKS)

External Evaluation (50 marks)

EXPERIMENT	FILE WORK	VIVA	TOTAL EXTERNAL
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

Course Code: EEC512	B.Tech (Electronics & Communication) - Semester-V Microwave Techniques	L-3 T-0 P-0 C-3
Course Outcomes:	On completion of the course, students will be:	
C01.	Understanding the performance of specialized microwave tubes such as klystron, reflex klystron, and magnetron and travelling wave tube.	
CO2.	Understanding the operation of passive waveguide components.	
СОЗ.	Understanding the limitations and application of solid state devices at microwave	
CO4.	Understanding the concept of ferromagnetic microwave devices.	
CO5.	Analysing microwave circuits using scattering parameters.	
Course		
Content:		
Unit-1:	Microwave Tubes: Design considerations for microwave tubes, principle of operation of Two cavity and reflex klystron, magnetron and traveling wave tube.	8 Hours
Unit-2:	Microwave Network Analysis: Equivalent voltages and currents, concept of impedance, impedance and admittance matrices of microwave junctions, scattering matrix representation of microwave networks, ABCD parameters, excitation techniques for waveguides.	8 Hours
Unit-3:	Power Dividers and Couplers: Scattering matrix of 3- and 4-portjunctions, T-junction power divider, Wilkinson power divider, and qualitative description of two-hole and multi-hole waveguide couplers, hybrid junctions.	8 Hours
Unit-4	Ferromagnetic Components: Permeability tensor of ferrites, plane wave propagation in ferrites, Faraday rotation, ferrite circulators, isolators and phase shifters.	8 Hours
Unit-5	Microwave Semiconductor Devices: Operation and circuit applications of Gunn diode, IMPATT diode, PIN Diode, and Schottky barrier diode; Microwave BJT, MESFET, HEMT and their applications.	8 Hours
<u>Text Books:</u>	1. Liao, S.Y., "Microwave Devices and Circuits", Prentice-Hall of India.	
<u>Reference</u> <u>Books:</u>	 Streetman, B.G. and Banerjee, S.K., "Solid-state Electronic Devices", Prentice-Hall of India. Sze, S.M. and Ng, K.K., "Physics of Semiconductor Devices", John Wiley & Sons. Bahl, I. and Bhartia, P., "Microwave Solid State Circuit Design", John Wiley & Sons. Pozar, D.M., "Microwave Engineering", John Wiley & Sons Collin, R.E., Collin, R.E., "Foundations for Microwave Engineering", John Wiley & Sons. *Latest editions of all the suggested books are recommended. 	
Additional	https://nptel.ac.in/courses/108/101/108101112/	
Electronic	https://www.youtube.com/watch?v=hN_S9USuGxI&vI=en	
<u>Reference</u> <u>Material:</u>	https://www.youtube.com/watch?v=C6gwDIIAZsk&vl=en	

<u>Course Code:</u> EEC562	B.Tech (Electronics & Communication) - Semester-V Microwave Techniques (Lab)	L-0 T-0 P-2 C-1
Course Outcomes:	On completion of the course, students will be:	
CO1.	Understanding microwave components and equipment's	
CO2.	Understanding the working of Microwave Power meter.	
CO3.	Analyzing characteristics of Microwave oscillator.	
CO4.	Analyzing the parameters of Microwave Tees.	
CO5.	Analyzing rectangular waveguide parameters.	
Experiments:	Note: Minimum eight experiments should be performed.	
Experiment-1:	To study microwave equipment and components.	
Experiment-2:	To study and measure the guide wavelength and frequency of the signal in a rectangular waveguide.	
Experiment-3:	To study & measure the VSWR using slotted line.	
Experiment-4:	To study the mode characteristics of reflex Klystron and determine the mode number, transit time & electronic tuning sensitivity.	
Experiment-5:	To study the characteristics of Gunn oscillator.	
Experiment-6:	To study & measure the coupling coefficient and directivity of a directional coupler.	
Experiment-7:	To study the insulation & coupling coefficient of a magic T.	
Experiment-8:	To study & measure the attenuation.	
Experiment-9:	To study the waveguide horn and its radiation pattern and determination of the beam width.	
Experiment-10:	To study of microwave power meter.	

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICA	PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)ON THE DAY OF EXAM (15 MARKS)			Y OF EXAM ARKS)	TOTAL	
EXPERIMENT	FILE WORK	VIVA	ATTENDANCE	EXPERIMENT	VIVA	INTERNAL
(5 MARKS)	(10 MARKS)	(10 MARKS)	(10 MARKS)	(5 MARKS)	(10 MARKS)	(50 MARKS)

External Evaluation (50 marks)

EXPERIMENT	FILE WORK	VIVA	TOTAL EXTERNAL
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

<u>Course Code:</u> EEC513	B.Tech (Electronics & Communication) - Semester-V Digital Communication Systems	L-3 T-0 P-0 C-3
Course Outcomes:	On completion of the course, students will be:	
CO1.	Understanding coding techniques of information.	
CO2.	Understanding various digital modulation techniques	
CO3.	Understanding multiplexing schemes used in digital communication	
CO4.	Understanding different line coding schemes	
CO5.	Applying encoder and decoder schemes for error control.	
Course Content:		
Unit-1:	Information Rate: Properties of Information, Properties of Entropy, Conditional Entropy and Redundancy; Source Coding; Source Coding Theorem.	8 Hours
Unit-2:	Coding Techniques: PCM, DM, DPCM, ADPCM; Line Coding and its properties, NRZ &RZ Types; Signaling Format for Unipolar, Polar, Bipolar (AMI) & Manchester Coding; Shannon-Fano and Huffman Coding; Optimum Filter; Matched Filter Receiver.	8 Hours
Unit-3:	Digital Modulation Techniques: Types of Digital Modulation, Wave forms for Amplitude, Frequency and Phase Shift Keying; Method of Generation and Detection of Coherent & Non-Coherent Sources Shift keying techniques: ASK, FSK, PSK, Differential PSK & Quadrature Modulation Technique (QPSK).	8 Hours
Unit-4	Digital Multiplexing: Fundamentals of Time Division Multiplexing (TDM), Frequency Division Multiplexing (FDM), Comparison& Bit-Byte Interleaving between TDM & FDM, T1 Carrier System, Synchronization, Signaling & Hierarchy of T1 TDM & PCM	8 Hours
Unit-5	Error Control Coding: Error Free Communication over a Noise Channel, Error Correcting Capability; Linear Block Codes; Encoding and Syndrome Decoding; Cyclic Codes; Encoder and Decoder for Cyclic Codes; Convolution Codes; Tree diagram, state diagram and Trellis diagram.	8 Hours
Text Books:	1. Haykin, Simon, Communication Systems, John Wiley, 4th Ed.	
<u>Reference</u> <u>Books:</u>	 Singh, R.P. &Sapre, S.D.,Communication Systems: Analog & Digital, Tata McGraw-Hill. Lathi, B.P, Modern Digital & Analog Communication Systems, Oxford University Press Simon Haykin, Digital Communication, John Wiley. *Latest editions of all the suggested books are recommended. 	
Additional Electronic Reference Material:	https://nptel.ac.in/courses/117/105/117105144/ https://www.youtube.com/watch?v=liTgysB8pS4 https://www.youtube.com/watch?v=WvDI7hNrdIQ	

<u>Course Code:</u> EEC563	B.Tech (Electronics & Communication) - Semester-V Digital Communication Systems (Lab)	L-0 T-0 P-2 C-1
Course Outcomes:	On completion of the course, students will be:	
CO1.	Understanding PCM transmitter and receiver.	
CO2.	Applying PCM, delta modulation and adaptive delta modulation.	
CO3.	Applying ASK, FSK and PSK modulation techniques.	
CO4.	Applying different coding techniques.	
CO5.	Applying sampling theorem.	
Experiments:	Note: Minimum eight experiments should be performed.	
Experiment-1:	To Study the sampling and reconstruction techniques.	
Experiment-2:	To Study the Pulse code modulation and demodulation.	
Experiment-3:	To Study the delta modulation and demodulation and observe effect of slope overload DCL-07	
Experiment-4:	To Study the Adaptive Delta modulation and demodulation	
Experiment-5:	To Study the data coding techniques.	
Experiment-6:	To Study the amplitude, shift keying modulator and demodulator.	
Experiment-7:	To Study the frequency shift keying modulator and demodulator.	
Experiment-8:	To Study the phase shift keying modulator and demodulator.	
Experiment-9:	To Study the TDM PCM Transmitter and receiver.	

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICA	L PERFORMA SEMESTER	NCE & VIVA DU (35 MARKS)	URING THE	ON THE DAY (15 MA	Y OF EXAM RKS)	TOTAL
EXPERIMENT	FILE WORK	VIVA	ATTENDANCE	EXPERIMENT	VIVA	INTERNAL
(5 MARKS)	(10 MARKS)	(10 MARKS)	(10 MARKS)	(5 MARKS)	(10 MARKS)	(50 MARKS)

External Evaluation (50 marks)

EXPERIMENT	FILE WORK	VIVA	TOTAL EXTERNAL
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

<u>Course</u> <u>Code:</u> EEE511	B.Tech (Electronics & Communication) - Semester-V Control Systems	L-3 T-1 P-0 C-4
Course Outcomes:	On completion of the course, the students will be:	
C01.	Understanding , demonstrating and understanding the fundamentals of (feedback) control systems.	
CO2.	Applying Solving the system equations in state-variable form (state variable models).	
соз.	Analysing, determining the time and frequency-domain responses of first and second-order systems to step and sinusoidal (and to some extent, ramp) inputs.	
CO4.	Evaluating , determining the (absolute) stability of a closed-loop control system.	
CO5.	Creating, applying root-locus technique to analyse and design control systems.	
Course Content:		
Unit-1:	Control Systems: Open loop & closed control; Servomechanism; Physical examples; Transfer functions: Block diagram algebra, and Signal flow graph, Mason's gain formula; Reduction of parameter variation and effects of disturbance by using negative feedback.	8 Hours
Unit-2:	Time Response Analysis: Standard test signals; Time response of first and second order systems; Time response specifications; Steady state errors and error constants; Design specifications of second order systems; Derivative errors, Derivative output, Integral error and PID compensation; Design specifications for higher order systems; Performance indices.	8Hours
Unit-3:	Control System Components: Constructional and working concept of AC Servomotor; Synchronous and stepper motor; Stability and Algebraic Criteria, Concept of stability and necessary conditions; Routh-Hurwitz criteria and limitations; Root Locus technique: Root Locus concepts, Construction of Root Loci.	8 Hours
Unit-4:	Frequency response Analysis: Frequency response, Correlation between time and frequency responses; Polar and inverse polar plots; Bode plots; Stability in frequency domain: Nyquist stability criterion, Assessment of relative stability, Gain margin and phase margin; Constant M&N circles.	8 Hours
Unit-5:	 Introduction to Design: The design problems and preliminary considerations of lead, Lag and Lead-lag networks; Design of closed loop systems using compensation techniques in time and frequency domains. Review of state variable technique: Review of state variable technique, conversion of state variable model to transfer function model and vice-versa; Diagonalization; Controllability and Observability and their testing. 	8 Hours
<u>Text Book:</u>	 I.J. Nagrath & M. Gopal "Control System Engineering", New age International. 	
<u>Reference</u> <u>Books:</u>	 Norman S. Nise "Control System Engineering", Wiley Publishing Co. M. Gopal "Control System; Principle and design", Tata McGraw Hill. M. Gopal "Modern Control system", Tata McGraw Hill. K. Ogata "Modern Control Engineering", Prentice Hall of India. *Latest editions of all the suggested books are recommended. 	
<u>Additional</u> <u>electronic</u> <u>reference</u> <u>material</u>	 <u>https://nptel.ac.in/courses/107/106/107106081/</u> <u>https://www.tandfonline.com/toc/tssc/current</u> 	

Course Code	B. Tech (Electronics & Communication)- Semester-V	L-2 T-0
<u>TMUGE501</u>	English Communication – IV	P-2
C	8	C-3
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Remembering adequate knowledge of grammar and vocabulary through prescribed text to address competitive exams.	
CO2.	Understanding the value of listening to understand the basic content.	
CO3.	Understanding the usage of English grammar in day to day context.	
CO4.	Understating about the skills required in corporate world.	
<u>CO5.</u>	Applying writing and comprehensive skills in English.	
<u> </u>	Creating a simple proposal and report.	
Course Content:		
	Vocabulary & Grammar	
Unit-1:	 Homophones and Homonyms Correction of Common Errors (with recap of English Grammar with its usage in practical context.) Transformation of sentences 	12 Hours
Unit-2:	 Essence of Effective listening & speaking Listening short conversation/ recording (TED talks / Speeches by eminent personalities) Critical Review of these abovementioned Impromptu 	5 Hours
Unit-3:	 Professional Writing Proposal: Significance, Types, Structure & AIDA Report Writing: Significance, Types, Structure& Steps towards Report writing 	8 Hours
Unit-4:	 Job Oriented Skills Cover Letter Preparing Resume and Curriculum-Vitae Interview: Types of Interview, Tips for preparing for Interview and Mock Interview Corporate Expectation & Professional ethics: Skills expected in corporate world 	10 Hours
	Value based text reading: Short story	
Unit-5:	• A Bookish Topic - R.K. Narayan	5 Hours
Text Books:	1. Singh R.P., An Anthology of English Essay, O.U.P. New Delhi	
<u>Reference</u> <u>Books:</u>	 Joseph, Dr C.J. & Myall E.G. "A Comprehensive Grammar of Current English" Inter University Press, Delhi Chaudhary Sarla "Basic Concept of Professional Communication" Dhanpat Rai Publication, New Delhi. Kumar Sanjay &Pushplata "Communication Skills" Oxford University Press, New Delhi. 	
	*Latest editions of all the suggested books are recommended.	
Additional Electronic	1- <u>nttps://www.youtube.com/watch?v=dpYItVtsS_Q</u> 2 <u>https://www.youtube.com/watch?v=OthdaID0WS</u> ?	
<u>Electronics</u> Reference	2 - <u>https://www.youtube.com/watch?v=QuiuqiD0WS8</u> 3 - https://www.youtube.com/watch?v=MrgHfK2Pafk	
Material	3 = 1100000000000000000000000000000000000	
<u>iviatoriai</u>	5 - https://www.youtube.com/watch?v=0v0Lttx151w	
	1 The content will be conveyed through Real life situations. Pair	
	Conversation, Group Talk and Class Discussion.	
Methodology	2. Language Lab software.	
	3. Sentence transformation on daily activities and conversations.	

4.	Conversational Practice will be effectively carried out by Face to Face & Via Media (Audio-Video Clips)	
5.	Modern Teaching tools (PPT Presentation & Motivational videos with sub-titles) will be utilized.	

Evaluation Scheme

Internal Evaluation			External Ev	valuation	Total Marks
	40 Marks		60 Ma	urks	
20 Marks (Best 2 out of Three CTs) <i>(From Unit - I,</i>	10 Marks (Oral Assignments)	10 Marks (Attendance)	40 Marks (External Written Examination)	20 Marks (External Viva)*	100
` III, IV & V)´	(From Unit - II & IV)		(From Unit -I, III, IV & V)	(From Unit -II & IV)	

***Parameters of External Viva**

Content	Body Language	Communication skills	Confidence	TOTAL
05 Marks	05 Marks	05 Marks	05 Marks	20 Marks

Note: External Viva will be conducted by 2-member committee comprising

- *a)* One Faculty teaching the class
- *b)* One examiner nominated by University Examination cell.

Each member will evaluate on a scale of 20 marks and the average of two would be the 20 marks obtained by the students.

<u>Course Code:</u> EEC592	B.Tech (Electronics & Communication) - Semester-V Skill based Practical Training & Presentation	L-0 T-0 P-0 C-2
Course Procedure:		
	Students will have to undergo Skill based Practical Training(Certificate course) of four weeks in any industry or reputed organization or training centre after the IV semester examination in summer. The evaluation of this certificate course shall be included in the V semester evaluation. The student will be assigned a faculty guide who would be the supervisor of the student. The faculty would be identified before the end of the IV semester and shall be the nodal officer for coordination of the training. Students will receive certificate after completion his/her training which will be duly signed by the officer under whom training was undertaken in the industry/ organization/training centre. The student at the end of the V semester will present his/her presentation about the training before a committee constituted by the Director/Principal of the College which would comprise of at least three members comprising of the Department Coordinator, Class Coordinator and a nominee of the Director/Principal. The students guide would be a special invitee to the presentation. The presentation session shall be an open house session. The internal marks would be the average of the marks given by each member of the committee separately in a sealed envelope to the Director/Principal.	
	The marking shall be as follows:	
Internal: 50 marks	By the Faculty Guide – 25 marks. By Committee appointed by the Director/Principal – 25 marks.	
External:50 marks	By External examiner appointed by the University – 50 marks	

- 1. Observance of dress code.
- 2. Participation in Conferences /Workshops / Seminars.

3. Attendance in guest lectures, invited talks and special technical sessions organized from time to time.

4. Participation in community projects including NSS.

5. Exhibiting team spirit in different Culture & extra curriculum activities, Department Club activities of the University and College organized from time to time.

6. Observance of rule & regulations in the College/University, Behaviour in Campus Premises, Bus, hostel mess and hostel.

7. Performance and awards received in different events (sports/ co-curricular activities) organized at College / University and other level.

8. General behaviour

9. Any extraordinary achievement.

The above is an indicative list of parameters on which the students shall be continuously evaluated. The college may evaluate the student on the specific parameters by informing them through a notice displayed on the notice board before evaluation. There shall be no external examination for this course; however, the marks shall be included for calculation of cumulative Performance Index (CPI).

S N o		Enroll No.	Student Name	Dress code	Participation in Conferences /Workshops / Seminars	Participation in guest lectures, invited talks and special technical sessions	Participation in community Services	Participation in Culture & extra curriculum activities, Department Club Activities	Participation in sports/ co- curricular activities	General Behavior	Any Extra Achievement
				(5)	(15)	(20)	(10)	(20)	(20)	(5)	(5)
	Responsible for marks			Mentor	Head	Head	Mentor	Cultural Events Coordinator & Department Club Coordinator	Sports Coordinator	Mentor	Director or Principal

	Value Added Course		
Course Code:	B.Tech Semester-V	L-2 T-1	
TMUGA-501	Modern Algebra and Data Management		
Course Outcomes:	On completion of the course, the students will be :		
CO1.	Applying the concepts of modern mathematics Divisibility rule, Remainder Theorem, HCF /LCM in Number System.		
CO2.	Relating the rules of permutation and combination, Fundamental Principle of Counting to find the probability.		
CO3.	Applying calculative and arithmetical concepts of ratio, Average and Percentage to analyze and interpret data.		
CO4.	Correlating the various arithmetic concepts to check sufficiency of data		
Course			
Unit-1:	Number theory Classification of Numbers, Divisibility Rules, HCF and LCM, Factors, Cyclicity(Unit Digit and Last Two digit), Remainder Theorem, Highest Power of a Number in a Factorial, Number of trailing zeroes	8 Hours	
Unit-2:	Data interpretation Data Interpretation Basics, Bar Chart, Line Chart, Tabular Chart, Pie Chart, DI tables with missing values	7 Hours	
Unit-3:	Data Sufficiency Introduction of Data Sufficiency, different topics based DS	5 Hours	
Unit-4:	Permutations and combinations Fundamental counting, and or, arrangements of digits, letters, people in row, identical objects, rank, geometrical arrangements, combination: - basic, handshakes, committee, selection of any number of objects, identical and distinct, grouping and distribution, de-arrangements	6 Hours	
Unit-5:	Probability Introduction, Probability based on Dice and Coins, Conditional Probability, Bayes Theorem	4 Hours	
<u>Reference</u> <u>Books:</u>	 R1:-Arun Shrama:- How to Prepare for Quantitative Aptitude R2:-Quantitative Aptitude by R.S. Agrawal R3:-M Tyra: Quicker Maths R4:-Nishith K Sinha:- Quantitative Aptitude for CAT R5:-Reference website:- Lofoya.com, gmatclub.com, cracku.in, handakafunda.com, tathagat.mba, Indiabix.com R6:-Logical Reasoning by Nishith K Sinha R7:-Verbal and Non Verbal Reasoning by R.S. Agrawal * Latest editions of all the suggested books are recommended. 		

<u>Course Code:</u>	B. Tech (Electronics & Communication)- Semester-V			
TMUGS-501	Managing Self	P-0 C-0		
Course Outcomes:	On completion of the course, the students will be :			
CO1.	Utilizing effective verbal and non-verbal communication techniques in formal and informal settings			
CO2.	Understanding and analyzing self and devising a strategy for self growth and development.			
СО3.	Adapting a positive mindset conducive for growth through optimism and constructive thinking.			
CO4.	Utilizing time in the most effective manner and avoiding procrastination.			
CO5.	Making appropriate and responsible decisions through various techniques like SWOT, Simulation and Decision Tree.			
CO6.	Formulating strategies of avoiding time wasters and preparing to-do list to manage priorities and achieve SMART goals.			
Course Content:				
Unit-1:	Personal Development: Personal growth and improvement in personality Perception Positive attitude Values and Morals High self motivation and confidence Grooming	10 Hours		
Unit-2:	Professional Development: Goal setting and action planning Effective and assertive communication Decision making Time management Presentation Skills Happiness, risk taking and facing unknown			
Unit-3:	Career Development: Resume Building Occupational Research Group discussion (GD) and Personal Interviews	12 Hours		
<u>Reference</u> <u>Books:</u>	 Robbins, Stephen P., Judge, Timothy A., Vohra, Neharika, Organizational Behaviour (2018), 18th ed., Pearson Education Tracy, Brian, Time Management (2018), Manjul Publishing House Hill, Napolean, Think and grow rich (2014), Amazing Reads Scott, S.J., SMART goals made simple (2014), Createspace Independent Pub https://www.hloom.com/resumes/creative-templates/ https://www.mbauniverse.com/group-discussion/topic.php Rathgeber, Holger, Kotter, John, Our Iceberg is melting (2017), Macmillan Burne, Eric, Games People Play (2010), Penguin UK https://www.indeed.com/career-advice/interviewing/job- interview-tips-how-to-make-a-great-impression * Latest editions of all the suggested books are recommended. 			

<u>Course Code:</u> EEC613	B.Tech (Electronics & Communication) - Semester-VI Analog and Digital Integrated Electronics	L-3 T-0 P-0 C-3
Course Outcomes:	On completion of the course, students will be:	
CO1.	Understanding the frequency response of op amp and different types of multivibrator using op amp.	
CO2.	Understanding about the 555 timer and applications of 555 timer.	
СОЗ.	Understanding the low pass, high pass, band pass and band reject filters using op amp.	
CO4.	Analyzing various circuits using op amp like rectifier, sample and hold circuit.	
CO5.	Creating the different types of converters using op amp.	
Course		
Unit-1:	Frequency response of op-amp & multivibrators: Frequency response, compensating Networks, Frequency response of internally compensated and uncompensated Op-Amps, equivalent circuit, Astable, Monostable, Bistable multiviberator, Instrumentation Amplifier.	8 Hours
Unit-2:	Nonlinear circuits & regulators: Voltage Comparators, Schmitt Triggers, Precision Rectifiers-half wave, full wave, Analog Switches Peak detectors, sample and hold circuit, Linear Regulators, Switching Regulators,723-general purpose regulator.	8 Hours
Unit-3:	Active filters & converters: First and second order filters-low pass, High pass, Band Pass, band Reject, All Pass filter-I convertors, I-V convertors, Analog to Digital and Digital to Analog Convertors.	8 Hours
Unit-4:	Nonlinear amplifiers & phase locked loops: Log/Antilog Amplifiers, Analog multipliers, operational Transconductance Amplifiers(OTA), Phase Locked Loops, Monolithic PLLs, Noise in integrated Circuits.	8 Hours
Unit-5:	Introduction of IC 555: Functional block diagram, Implementations of Monostable, Astable Multivibrator, Schmitt trigger, Voltage controlled oscillator, Square & Triangular wave generator.	8 Hours
<u>Text Books:</u>	1. Ramakant A.Gayakwad, Op-Amp and Linear Integrated Circuits, Prentice Hall of India.	
<u>Reference</u> <u>Books:</u>	 Millman J.& Halkias, Integrated Electronics Analog and Digital Circuits & Systems, Tata McGraw, Hill. Soclof.S .Application of Analog Integrated Circuits, Prentice Hall of India. Bell, David A, Operational Amplifiers Linear ICS, Prentice Hall of India. Franco Sergio, Design with operational Amplifiers and integrated Circuits, Tata McGraw Hill. *Latest editions of all the suggested books are recommended. 	
<u>Additional</u> <u>Electronic</u> <u>Reference</u> <u>Material:</u>	https://nptel.ac.in/courses/108/102/108102112/ https://www.youtube.com/watch?v=QCkVjRYKilQ	

<u>Course Code:</u> EEC661	B.Tech (Electronics & Communication) - Semester-VI Analog and Digital Integrated Electronics (Lab)	
Course Outcomes:	On completion of the course, students will be:	
CO1.	Analyzing the characteristics of operational amplifier.	
CO2.	Evaluating with various application circuits using 555 timer.	
СО3.	Evaluating and demonstrating with various application circuits using op-amp.	
CO4.	Evaluating and demonstrating amplifier using bipolar junction transistor.	
CO5.	Evaluating and demonstrating with various waveform generator and filters.	
Experiments:	Note: Minimum eight experiments should be performed.	
Experiment-1:	To study the characteristics of operational amplifier to get data for input bias current, measure the output- voltage and reduce it to zero and calculate slew rate.	
Experiment-2:	To study the operational amplifier in inverting and non-inverting modes.	
Experiment-3:	To study the operational amplifier as scalar and summer.	
Experiment-4:	To study the operational amplifier as differentiator and integrator.	
Experiment-5:	To study the LPF and HPF using Op-Amp IC741.	
Experiment-6:	To study the band pass and band reject active filters using operational amplifier IC 741.	
Experiment-7:	To study the oscillators: RC phase shift, Hartley & Colpitts using operational amplifier.	
Experiment-8:	To study the astable & monostable multivibrators using IC-555 timer.	
Experiment-9:	To study the triangular & square wave generator using 555 timers.	
Experiments- 10:	To study the amplifier using bipolar junction transistor.	

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE				ON THE DAY	Y OF EXAM	TOTAL
SEMESTER (35 MARKS)				(15 MA	ARKS)	
EXPERIMENT	FILE WORK	VIVA	ATTENDANCE	EXPERIMENT	VIVA	INTERNAL
(5 MARKS)	(10 MARKS)	(10 MARKS)	(10 MARKS)	(5 MARKS)	(10 MARKS)	(50 MARKS)

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT	FILE WORK	VIVA	TOTAL EXTERNAL
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

B.Tech (EC) Syllabus Applicable w.e.f. Academic Session 2020-21

Course Code: EEC614	B.Tech (Electronics & Communication)- Semester-VI Antenna & Wave Propagation	L-3 T-1 P-0 C-4
Course Outcomes:	On completion of the course, students will be:	
CO1.	Understanding the concept of radiation through mathematical	
	formulation.	
CO2.	Understanding the behaviour of nature on wave propagation	
CO4	Analyzing the characteristics of reflector broadband and planar	
04.	antennas.	
CO5.	Evaluating the antenna parameters.	
Course		
Content:		
Unit-1:	Basic Antenna Parameters, Radiation Patterns, Beam Area (or Beam Solid Angle), Radiation Intensity, Directivity and Gain, Directivity and Resolution, Antenna Apertures.	8 Hours
Unit-2:	Introduction of Dipole antenna, Radiated Power, Directivity & Radiation resistance, The Short Electric Dipole: Fields & Radiation Resistance, Half Wave dipole.	8 Hours
Unit-3:	Antenna Arrays: Two element Array, Endfire and Broadside arrays, Pattern multiplication, Binomial and Dolph- Chebyshev arrays.	6 Hours
Unit-4:	 Reflector and Broadband Antennas: Parabolic reflector antenna, Yagi-Uda Antenna, Long-Periodic antenna, Folded Dipole Antenna, Rhombic Antenna, Helical Antenna. Planar Antennas: Introduction, Radiation from rectangular microstrip patch antennas and feeding techniques, Dual band patch antenna. 	8 Hours
Unit-5:	Wave Propagation : Ground Wave, Sky wave, Surface wave, Space Wave, Effects of Imperfect Earth, Effects of Curvature of Earth, Introduction of structural Details of the ionosphere, Refraction and Reflection of Sky Waves by ionosphere, Ray Path, Critical Frequency, MUF, LUF, Virtual Height and Skip Distance.	10 Hours
<u>Text Books:</u>	1. Prasad, K.D, Antennas and Wave Propagation, Khanna Publications	
<u>Reference</u> <u>Books:</u>	 Kraus, John D. & Mashefka, Ronald J,Antennas: For All Applications, Tata McGraw Hill, Collin, R,Antennas and Radio Wave Propagation, Tata McGraw- Hill. A. R. Harish, M. Sachidananda, Antennas and Wave Propagation, Oxford University Press. Jordan Edwards C. and Balmain, Keith G.,Electromagnetic Waves and Radiating Systems, PHI. Jordan Edwards C &Balmain Keith G,Electromagnetic Waves and Radiating Systems, PHI John D Krauss, Ronald J Marhefka and Ahmad S. Khan,"Antennas and Wave Propagation", Tata McGraw Hill. *Latest editions of all the suggested books are recommended. 	
<u>Additional</u> <u>Electronic</u> <u>Reference</u> <u>Material:</u>	https://nptel.ac.in/courses/108/101/108101092/ https://www.youtube.com/watch?v=BnYVuGCxu5U	

<u>Course Code:</u> EEC662	B.Tech (Electronics & Communication)- Semester-VI Antenna & Wave Propagation (Lab)	L-0 T-0 P-2 C-1
Course Outcomes:	On completion of the course, students will be:	
CO1.	Understanding the different types microwave kits and instruments required to install antenna at different sites.	
CO2.	Analyzing onsite power pattern required as per the line of site communication.	
соз.	Analyzing the right antenna as per their power pattern for different sites.	
CO4.	Analyzing polarization of microwave which helps in interfacing two antennas.	
CO5.	Creating the power pattern direction as per the customer population density.	
Experiments:	Note: Minimum eight experiments should be performed.	
Experiment-1:	To study, analyze & plot the radiation pattern of Dipole antennas.	
Experiment-2:	To study, analyze & plot the radiation pattern of Half Wave Dipole antenna.	
Experiment-3:	To study, analyze & plot the radiation pattern of Yagi Antenna.	
Experiment-4:	To study, analyze & plot the radiation pattern of Log Periodic Antenna.	
Experiment-5:	To study, analyze & plot the radiation pattern of Helix Antenna.	
Experiment-6:	To study, analyze & plot the radiation pattern of Microstrip Antenna.	
Experiment-7:	To study & measure the VSWR of coaxial line section	
Experiment-8:	To calculate & measure the unknown impedance of coaxial line section	
Experiment-9:	To study the technique of stub matching in coaxial line section.	
Experiments- 10:	To study the design & test the RF circuits RF filters (LP, HP, BP)	

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICA	AL PERFORMA SEMESTER	NCE & VIVA DU (35 MARKS)	ON THE DAY OF EXAM (15 MARKS)		TOTAL
EXPERIMENT	FILE WORK	VIVA	EXPERIMENT	VIVA	INTERNAL
(5 MARKS)	(10 MARKS)	(10 MARKS)	(5 MARKS)	(10 MARKS)	(50 MARKS)

External Evaluation (50 marks)

EXPERIMENT	FILE WORK	VIVA	TOTAL EXTERNAL
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

Course Code: EEC615	B.Tech (Electronics & Communication) - Semester-VI Telecommunication Switching Systems	L-3 T-0 P-0
Comment		C-3
Course Outcomes:	On completion of the course, students will be:	
CO1.	Understanding the characteristics of the telephone systems.	
CO2.	Understanding the network synchronization and management.	
<u>CO3.</u>	Understanding telecom switching systems.	
<u>CO4.</u>	Applying the telecom traffic and blocking performance of the switches.	
<u> </u>	Applying the concepts of digital network and protocols.	
Course		
Content:		
Unit-1:	Telecommunication Switching Systems: Introduction, Evolution of Telecommunications, Elements of a switching system, principles of cross bar switching, Electronic space division switching, Time division switching.	8 Hours
Unit-2:	Telephone Networks: Subscriber loop systems, switching hierarchy and routing, numbering plan, charging plans, Signalling Techniques: In channel signalling, common channel signalling.	8 Hours
Unit-3:	Telecommunication Traffic Engineering: Network traffic load and parameters, grade of service and blocking probability, Incoming Traffic and Service Time Characterization: Birth-death process, pure birth process, pure death process.	8 Hours
Unit-4:	Blocking models and loss estimates: Introduction to LCC, LCR, LCH models. Delay systems: Introduction to LCD. Public switched data networks, connection oriented & connection less service, Circuit Switching, packet switching concepts, OSI reference model, Repeaters, Bridges, Routers and gate ways.	8 Hours
Unit-5:	Integrated Services Digital Network (ISDN): Introduction, ISDN architecture, DSL Technology: ADSL, Cable Modem, Traditional Cable Networks, HFC Networks, CM &CMTS and DOCSIS. Protocols: TCP/IP& IPV4.	8 Hours
<u>Text Books:</u>	1. Thyagarajan Viswanath, Tele communication switching system and networks, PHI	
<u>Reference</u> <u>Books:</u>	 J. Bellamy, Digital telephony, John Wiley. Achyut. S.Godbole, Data Communications & Networks, Tata McGraw Hill. H. Taub& D. Schilling, Principles of Communication Systems, Tata McGraw Hill. B.A. Forouzan, Data Communication & Networking, Tata McGraw Hill. J E Flood, Telecommunication switching, Traffic and Networks, Pearson Education. Wayne Tomasi, Advanced electronic communications systems, PHI *Latest editions of all the suggested books are recommended. 	
<u>Additional</u> <u>Electronic</u> <u>Reference</u> <u>Material:</u>	https://nptel.ac.in/courses/117/105/117105076/ https://www.youtube.com/watch?v=mLoLouF026g	

Course Code: EEC616B.Tech (Electronics & Communication) - Semester-VIMobile and Cellular Communication				
Course	On completion of the course, students will be:	C-3		
Outcomes:	On completion of the course, students win be.			
CO1.	Remembering and understanding the cellular radio concepts, cellular interference as well as methods of improving coverage and capacity.			
CO2.	Understanding the classification of multiple access techniques in mobile communication.			
CO3.	Analyzing the GSM system including its features, architecture, frame structure and channels used for mobile communication.			
CO4.	Applying the various propagation effects and associated losses on small-scale(fading) and large scale propagation models.			
C05.	Evaluating the need of the emerging wireless networks including Bluetooth technology, Intelligent networks and WSNs.			
Course Content:				
Unit-1:	The Cellular Concept : System design fundamentals, frequency reuse, channel assignment strategies, handoff strategies, Interference system capacity, Improving coverage and capacity in cellular systems. Introduction to Spread spectrum multiple access: FDMA, TDMA, CDMA, SDMA.	8 Hours		
Unit-2:	GSM Overview: GSM system for mobile: Services and features, System Architecture, Radio Subsystem Channel types, Frame Structure, Introduction to GPRS.	8 Hours		
Unit-3:	Mobile radio propagation (Large scale path loss): Free space propagation model, Two ray propagation model, Fresnel zone geometry, knife edge diffraction model, multiple knife edge diffraction.	8 Hours		
Unit-4:	Mobile radio propagation (small scale fading and multipath): Small scale multipath propagation: factors influencing small scale fading, doppler shift, Small scale multipath measurements: Direct Rf pulse system, spread spectrum sliding correlator channel sounding, frequency domain channel sounding. Parameters of mobile multipath channels, time dispersion parameters, coherence and bandwidth, Doppler spread and coherence time Types of small scale fading: flat fading, frequency selective fading, fast fading slow fading.			
Unit-5:	Emerging Technologies: Bluetooth protocol stack, Introduction to wireless networks: 2G, 3G&4G Wireless Standards, Intelligent network, Introduction to WSN.	6 Hours		
<u>Text Books:</u>	 T.S. Rappaport, Wireless Communication-Principles and practice, Pearson 			
<u>Reference</u> <u>Books:</u>	 Yi-Bing Lin and ImrichChlamtac Wireless and Mobile Network Architecture, Wiley Publication. KaseraSumit, NarangNishit, 3G Networks: Architecture, Protocols and Procedures, TMH. Haykin S & Moher M., Modern wireless communication, Pearson Schiller, J. Mobile Communication, Pearson Education *Latest editions of all the suggested books are recommended. 			
<u>Additional</u> <u>Electronic</u> <u>Reference</u> <u>Material:</u>	https://nptel.ac.in/courses/106/106/106106167/ https://www.youtube.com/watch?v=4R1qHE0E8IE https://www.youtube.com/watch?v=1bMxOihQinM			

<u>Course Code:</u>	B. Tech (Electronics & Communication)- Semester-VI Human Values & Professional Ethics				
EHM613					
Course Outcomes:	On completion of the course, the students will be :				
CO1.	Understanding the importance of value education in life and method of self-exploration				
CO2.	Understanding 'Natural Acceptance' and Experiential Validation- as the mechanism for self-exploration.				
соз.	Applying right understanding about relationship and physical facilities.				
CO4.	Analysing harmony in myself, harmony in the family and society, harmony in the nature and existence.				
CO5.	Evaluating human conduct on ethical basis.				
Course Content:					
Unit-1:	Understanding of Morals, Values and Ethics; Introduction to Value Education- need for Value Education. Self- Exploration–content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self-exploration. Continuous Happiness and Prosperity- basic Human Aspirations. Gender Issues: Gender Discrimination and Gender Bias (home & office), Gender issues in human values, morality and ethics.	8 Hours			
Unit-2:	Conflicts of Interest: Conflicts between Business Demands and Professional Ethics. Social and Ethical Responsibilities of Technologists. Ethical Issues at Workplace: Discrimination, Cybercrime, Plagiarism, Sexual Misconduct, Fraudulent Use of Institutional Resources. Intellectual Property Rights and its uses. Whistle blowing and beyond, Case study.	8 Hours			
Unit-3:	Harmony in the Family and Society- Harmony in Human-Human Relationship, Understanding harmony in the Family- the basic unit of human interaction. Understanding values in human-human relationship; meaning of Nyaya; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship. Understanding the meaning of Vishwas; Difference between intention and competence. Understanding the meaning of Samman and other salient values in relationship.	8 Hours			
Unit-4:	Understanding Harmony in the Nature and Existence – Whole existence as Co-existence. Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature. Understanding Existence as Coexistence (Sah-astitva) of mutually interacting units in all pervasive space. Holistic perception of harmony at all levels of existence.	8 Hours			
Unit-5:	 Implications of the above Holistic Understanding of Harmony on Professional Ethics. Natural acceptance of human values. Definitiveness of Ethical Human Conduct. Competence in professional ethics: a) Ability to utilize the professional competence for augmenting universal human order b) Ability to identify the scope and characteristics of people friendly and eco-friendly production systems c) Ability to identify and develop appropriate technologies and management patterns for above production systems. 	8 Hours			

<u>Text Book:</u>	1. R R Gaur, R Sangal, G P Bagaria, A Foundation Course in Value Education.	
<u>Reference Books:</u>	 Ivan Illich, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA 2. E.F. Schumacher, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain. A Nagraj, Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak. Sussan George, How the Other Half Dies, Penguin Press. Reprinted. PL Dhar, RR Gaur, Science and Humanism, Commonwealth Purblishers. A.N. Tripathy, Human Values, New Age International Publishers. E G Seebauer & Robert L. Berry, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press. *Latest editions of all the suggested books are recommended. 	
Additional	https://www.youtube.com/watch?v=Cnw1nK3K5qk	
electronics	https://www.youtube.com/watch?v=hTTCMrQyF8E	
<u>reference</u> material		

1. Observance of dress code.

2. Participation in Conferences /Workshops / Seminars.

3. Attendance in guest lectures, invited talks and special technical sessions organized from time to time.

4. Participation in community projects including NSS.

5. Exhibiting team spirit in different Culture & extra curriculum activities, Department Club activities of the University and College organized from time to time.

6. Observance of rule & regulations in the College/University, Behaviour in Campus Premises, Bus, hostel mess and hostel.

7. Performance and awards received in different events (sports/ co-curricular activities) organized at College / University and other level.

- 8. General behaviour
- 9. Any extraordinary achievement.

The above is an indicative list of parameters on which the students shall be continuously evaluated. The college may evaluate the student on the specific parameters by informing them through a notice displayed on the notice board before evaluation. There shall be no external examination for this course; however, the marks shall be included for calculation of cumulative Performance Index (CPI).

S N o		Enroll No.	Student Name	Dress code	Participation in Conferences /Workshops / Seminars	Participation in guest lectures, invited talks and special technical sessions	Participation in community Services	Participation in Culture & extra curriculum activities, Department Club Activities	Participation in sports/ co- curricular activities	General Behavior	Any Extra Achievement
				(5)	(15)	(20)	(10)	(20)	(20)	(5)	(5)
	Responsible for marks			Mentor	Head	Head	Mentor	Cultural Events Coordinator & Department Club Coordinator	Sports Coordinator	Mentor	Director or Principal
	Value Added Course										
-----------------------------------	--	------------	--	--	--						
Course Code:	B.Tech Semester-VI	L-2 T 1									
TMUGA-601		1-1 P-0									
	Advance Algebra and Geometry	C-0									
Course											
Outcomes:	On completion of the course, the students will be :										
CO1.	Recognizing the rules of Crypt-arithmetic and relate them to find out the solutions.										
CO2.	Illustrating the different concepts of Height and Distance and Functions.										
CO3.	Employing the concept of higher level reasoning in Clocks, Calendars and Puzzle Problems.										
CO4.	Correlating the various arithmetic and reasoning concepts in checking sufficiency of data.										
Course											
Content:	Cleaks and calendars										
Unit-1:	Unit-1:Clocks and calendarsIntroduction , Angle based , faulty Clock, Interchange of hands, Introduction of Calendars, Leap Year , Ordinary Year										
Unit-2:	Set theory Introduction, Venn Diagrams basics, Venn Diagram – 3 sets, 4-Group Venn Diagrams										
Unit-3:	Heights and Distance Basic concept, Word problems										
Unit-4:	Functions Introduction to Functions, Even and Odd Functions, Recursive										
Unit-5:	Problem Solving Introduction, Puzzle based on 3 variable, Puzzle based on 4 variable	6 Hours									
Unit-6:	Data Sufficiency Introduction, Blood relation based, direction based, ranking based	5 Hours									
Unit-7:	Crypt Arithmetic Introduction of Crypt Arithmetic, Mathematical operations using Crypt Arithmetic, Company Specific Pattern	4 Hours									
<u>Reference</u> <u>Books:</u>	 R1:-Arun Shrama:- How to Prepare for Quantitative Aptitude R2:-Quantitative Aptitude by R.S. Agrawal R3:-M Tyra: Quicker Maths R4:-Nishith K Sinha:- Quantitative Aptitude for CAT R5:-Reference website:- Lofoya.com, gmatclub.com, cracku.in, handakafunda.com, tathagat.mba, Indiabix.com R6:-Logical Reasoning by Nishith K Sinha R7:-Verbal and Non Verbal Reasoning by R.S. Agrawal * Latest editions of all the suggested books are recommended. 										

<u>Course Code:</u> TMUGS-601	B. Tech (Electronics & Communication)- Semester-VI Managing Work and Others			
Course Outcomes:	On completion of the course, the students will be :			
CO1.	Communicating effectively in a variety of public and interpersonal settings.			
CO2.	Applying concepts of change management for growth and development by understanding inertia of change and mastering the Laws of Change.			
CO3.	Analyzing scenarios, synthesizing alternatives and thinking critically to negotiate, resolve conflicts and develop cordial interpersonal relationships.			
CO4.	Functioning in a team and enabling other people to act while encouraging growth and creating mutual respect and trust.			
<u>CO5.</u>	Handling difficult situations with grace, style, and professionalism.			
Course				
Unit-1:	Intrapersonal Skills: Creativity and Innovation Understanding self and others (Johari window) Stress Management Managing Change for competitive success Handling feedback and criticism			
Unit-2:	Unit-2: Interpersonal Skills: Conflict management Development of cordial interpersonal relations at all levels Negotiation Importance of working in teams in modern organisations Manners, etiquette and net etiquette			
Unit-3:	Interview Techniques: Job Seeking Group discussion (GD) Personal Interview	10 Hours		
<u>Reference</u> <u>Books:</u>	 Robbins, Stephen P., Judge, Timothy A., Vohra, Neharika, Organizational Behaviour (2018), 18th ed., Pearson Education Burne, Eric, Games People Play (2010), Penguin UK Carnegie, Dale, How to win friends and influence people (2004), RHUK Rathgeber, Holger, Kotter, John, Our Iceberg is melting (2017), Macmillan Steinburg, Scott, Nettiquette Essentials (2013), Lulu.com https://www.hloom.com/resumes/creative-templates/ https://www.indeed.com/career-advice/interviewing/job- interview-tips-how-to-make-a-great-impression * Latest editions of all the suggested books are recommended. 			

<u>Course Code:</u> EEC612	Program Elective-I B.Tech (Electronics & Communication) - Semester-VI Embedded System	L-3 T-1 P-0 C-4			
Course Outcomes:	On completion of the course, students will be:				
CO1.	Understanding hardware and software design requirements of embedded systems.				
CO2.	Understanding the data types used in the programming of embedded system.				
CO3.	Understanding embedded systems related software architectures and tool chain.				
CO4.	Analysing the embedded system and develop software programs.				
CO5.	Evaluating the requirements of programming embedded systems.				
Course Content:					
Unit-1:	Basic difference between microprocessor, microcontroller and embedded, Introduction to AVR, General purpose registers in AVR, AVR data memory, AVR status registers.	8 Hours			
Unit-2:	Instructions with data memory, Branch instructions and looping, call instructions and stack, AVR time delay and instruction pipelining & RISC architecture in AVR				
Unit-3:	Introduction to AVR assembly programming, Input output programming in AVR, Input output bit manipulation programming, Arithmetic, logic instructions and programmes.				
Unit-4:	AVR programming in C: Data types and time delays in C, Input /output programming in C, Logic operations in C, Data conversion programs in C, Data serialization in C, Memory allocation in C.	8 Hours			
Unit-5:	AVR timer programming in assembly and C programming timers 0,1,2, counter programming, AVR interrupts & programming, AVR serial ports& programming.	8 Hours			
<u>Text Books:</u>	1. Muhhmad Ali Mazidi, SarmadNaimi, SepehrNaimi. "The AVR Microcontroller and Embedded Systems using Assembly and C"Pearson Education.				
<u>Reference</u> <u>Books:</u>	 Rajkamal Embedded Systems, TMH. David Simon Embedded systems software primer, Pearson Steve Furber, ARM System-on-Chip Architecture, Pearson Jean J Labrose, Micro C/OS-II, Indian Low Price Edition DR.K.V.K.K. Prasad, Embedded/Real Time System, Dreamtech Iyer, Gupta, Embedded Real Systems Programming, TMH *Latest editions of all the suggested books are recommended. 				
<u>Additional</u> <u>Electronic</u> <u>Reference</u> <u>Material:</u>	https://nptel.ac.in/courses/108/102/108102045/ https://www.youtube.com/watch?v=csttt3VHxf8				

	Program Elective-I				
Course Code:	B Tech (Flectronics & Communication) - Semester-VI	L-3 T 1			
EEC617	Microcontroller Hardware, Programming & its	1-1 P-0			
	Application (Arduino)	C-4			
Course Outcomes:	On completion of the course, students will be:				
CO1.	Remembering the concept of data types and programming syntax used in arduino.				
CO2.	Understanding the Microcontroller internal architecture and its operation within the area of controlling hardware using software.				
СО3.	Applying programming skills to design electrical circuitry to the Microcontroller I/O ports in order to interface the processor to external devices.				
CO4.	Analyzing the interfacing of a microcontroller system to user controls and other electronic systems.				
CO5.	Creating small projects using different sensor modules.				
Course					
Content:	Getting started with Arduino: Introduction and Familiarization to				
Unit-1:	Arduino, pin structure of Arduino Uno, different types of Arduino, Setup your computer to use Arduino, Download and Install the Arduino IDE, Arduino IDE and Sketch Overview, Understanding Arduino Syntax Module, Understanding and Using Variables, Reading Analog Pins and Converting the Input to a Voltage Understanding electronics elements – Resistors, capacitors, transistors, relays. Arduino & LEDs interfacing, Blinking of LEDs, Fading of LED, Circling of LEDs. Blinking of EVEN and ODD states of LEDs, Traffic light system.	8 Hours			
Unit-2:	Serial monitoring: Controlling of LEDs from your computer, reading analog and digital inputs, Controlling LED using pushbutton, Switching ON a relay. If-Else Statement, Comparison Operators and Conditions, For Loop Iteration, how to Use Arrays, Switch Case Statement, While Statement.	8 Hours			
Unit-3:	Analog inputs: Controlling of LEDs using a joystick, controlling a DC motor, PWM, Changing the brightness of LEDs using potentiometers.LCD displays: Wiring of LCD screen with Arduino, displaying a message in LCD screen, Screen navigation on LCD, Turn ON a LED by entering the password, Knowing the status of the LED, scrolling of text, Displaying room temperature.	8 Hours			
Unit-4:	Seven segment display: Simple automatic countdown and count up. Increment or decrement a number by using pushbutton. Introduction to servomotor, Controlling Servo Motor with Joystick, Indexing of Servomotor, Direction control of Servo Motor, Synchronizing 2 Servo Motors. Interfacing with Sensor modules: HC-SR04 Ultrasonic Module, IR	8 Hours			
Unit-5:	Infrared Obstacle Avoidance Sensor Module, Soil Hygrometer Detection	8 Hours			

B.Tech (EC) Syllabus Applicable w.e.f. Academic Session 2020-21

	Module Soil Moisture Sensor, Microphone Sensor, MQ-2Gas Sensor	
	Module Smoke Methane Butane Detection, Humidity and Rain Detection	
	Sensor Module, Speed Sensor Module, IR Infrared Flame Detection	
	Sensor Module, HC-SR501 Pyroelectric Infrared Sensor Module,	
	Accelerometer Module, DHT11 Temperature and Humidity Sensor, HC-	
	05 Bluetooth module.	
	1. Jeremy Blum "Exploring Arduino", Wiley Publishing Co.	
<u>Text Books:</u>		
	1.J.M. Hughes "Arduino: A technical reference", O'Reilly Media, Inc.	
	2. Simon Monk "Programming Arduino; Getting started with sketchs", Tata	
Reference	McGraw Hill.	
Books:		
	*I start aditions of all the suggested backs are recommended	
	Latest editions of an the suggested books are recommended.	
<u>Additional</u>	https://nptel.ac.in/courses/106/105/106105166/	
Electronic	https://www.youtube.com/watch?v=cAKnTSJb-SE	
Reference	https://www.youtube.com/watch?v=k_XWbVzJLIo	
Material:		

Note-To introduce experimental and project learning the CT1 evaluation will be based on theoretical and programming knowledge and CT2 ,CT3 evaluation will be based on small working projects.

External exam will be the test for theoretical and programming evaluation on embedded C specific to arduino.

*Tutorial will be programming exercise with hands-on work on small projects.

*Advice- In group of 3 to 5 students will get arduino boards & laptop for practice during tutorial.

Course Code: EEC711	B.Tech (Electronics & Communication) - Semester-VII Digital Signal Processing	L-3 T-1 P-0 C-4				
Course Outcomes:	On completion of the course, students will be:					
C01.	Understanding the fundamental properties of various discrete time systems.					
CO2.	Understanding the frequency domain analysis of discrete time systems.					
CO3.	Understanding properties and concepts of digital filters like FIR & IIR filters.					
CO4.	Understanding stable analog filters into stable digital filters.					
CO5.	Creating low pass, high pass, band pass and band reject FIR filters.					
Course Content:						
Unit-1:	Causal, anti-causal and non-causal, Static & dynamic, Linear and non- linear, Time-invariance, Characterization of linear time-invariant (LTI) systems, Impulse response, convolution sum, BIBO Stability, deconvolution, Step response of discrete time systems.	8 Hours				
Unit-2:	DTFT, Inverse DTFT, Convergence, Properties and theorems, Parseval's theorem, DTFT of some elementary discrete time signals. Frequency domain sampling, Introduction to DFT, Computation methods of discrete Fourier transform, DFT as a linear transformation, Periodicity, Linearity, Symmetry Properties. Multiplication and various methods of circular convolution of two discrete time signals					
Unit-3:	Fast Fourier Transform : Definition, Radix-2 FFT algorithms, Basic butterfly structures of DIT and DIF algorithms, Computation of DFT & IDFT using DIT-FFT and DIF-FFT algorithms.	6 Hours				
Unit-4	 IIR Filter Structures: Signal flow graph, Direct forms (I & II), Cascade and Parallel realizations, Transposed structure. FIR filter structures: Direct form structure, Linear phase FIR structure, Lattice structure. 	8 Hours				
Unit-5	IIR Filter Design by the Bilinear transformation. Symmetric and Anti- symmetric FIR Filters, Design of FIR Filters Using Windows, Design of Linear-Phase. Introduction to Butterworth & Chebyshev filters.	8 Hours				
<u>Text Books:</u>	1. Proakis.J.G.& Manolakis.D.G,Digital Signal Processing: Principles Algorithms and Applications, Prentice Hall (India).					
<u>Reference</u> <u>Books:</u>	 Sanjit K. Mitra, Digital Signal Processing, TMH Oppenheim A.V. & Schafer, Ronald W, Digital Signal Processing, Pearson Education. Rabiner, L.R. and Gold B., Theory and applications of DSP, PHI. DeFatta, D.J., Lucas, J.G. & Hodgkiss, W.S., Digital Signal Processing, John Wiley & Sons. *Latest editions of all the suggested books are recommended. 					
<u>Additional</u> <u>Electronic</u> <u>Reference</u> <u>Material:</u>	https://nptel.ac.in/courses/117/102/117102060/ https://www.youtube.com/watch?v=8zbBJkw5KsM					

<u>Course Code:</u> EEC763	B.Tech (Electronics & Communication) - Semester-VII Digital Signal Processing (Lab)				
Course Outcomes:	On completion of the course, students will be:				
CO1.	Understanding the basic signal generation and handling discrete/digital signals using MATLAB.				
CO2.	Understanding basic concepts of DSP and its applications using DSP toolkit in MATLAB.				
CO3.	Applying quantization and Phase Modulation Technique.				
CO4.	Applying digital signal processing algorithms in MATLAB, including the design, implementation, and real-time operation of digital filters, and applications of the fast Fourier transform.				
CO5.	Applying BER performance of communication systems using MATLAB.				
Experiments:	Note: Minimum eight experiments should be performed.				
Experiment-1:	Generation of unit step, unit impulse and unit ramp signals				
Experiment-2:	Program to implement Phase Modulation.				
Experiment-3:	To demonstrate sampling and quantization.				
Experiment-4:	To find linear convolution with and without using DFT.				
Experiment-5:	To find circular convolution.				
Experiment-6:	To verify linearity and time invariance properties of a system.				
Experiment-7:	To find FFT of a 4 point sequence by using radix-2 DIT-FFT.				
Experiment-8:	To simulate BER performance of communication system using MATLAB script.				
Experiment-9:	To simulate BER performance of digital communication system using Simulink.				
Experiments- 10:	To simulate BER performance of digital communication system with cyclic encoder using Simulink.				

Note: The entire practical's to be performed on MATLAB DSP tool kit.

Evaluation Scheme of Practical Examination: Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE			ON THE DAY	Y OF EXAM	TOTAL	
SEMESTER (35 MARKS)			(15 MA	ARKS)		
EXPERIMENT	FILE WORK	VIVA	ATTENDANCE	EXPERIMENT	VIVA	INTERNAL
(5 MARKS)	(10 MARKS)	(10 MARKS)	(10 MARKS)	(5 MARKS)	(10 MARKS)	(50 MARKS)

External Evaluation (50 marks)

EXPERIMENT	FILE WORK	VIVA	TOTAL EXTERNAL
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

<u>Course Code:</u> EEC764	B.Tech (Electronics & Communication) - Semester-VII Electronic Workshop & PCB Lab				
Course Outcomes:	On completion of the course, students will be:				
CO1.	Understanding of concepts about step down transformer.				
CO2.	Understanding of regulated dc power supply fabrication and energy- meter.				
CO3.	Understanding of PCB layout using printing and photo technology.				
CO4.	Applying operations on PCB as artwork, printing, etching, drilling, soldering shop etc.				
CO5.	Creating PCB layout using SPRINT software.				
Experiments:	Note: Minimum eight experiments should be performed.				
Experiment-1:	To study winding shop & design a Step-down transformer winding of less than 5VA.				
Experiment-2:	To study the PCB design & layout using software's (P-SPICE&SPRINT)				
Experiment-3:	To study soldering shop& learn fabrication of DC regulated power supply				
Experiment-4:	To study PCB layout of circuits using printing technology.				
Experiment-5:	To study artwork, printing of a simple PCB & perform these operations on PCB.				
Experiment-6:	To study etching, drilling of PCB& perform these operations on PCB.				
Experiment-7:	To study wiring & fitting shop: Fitting of power supply along with a meter in cabinet.				
Experiment-8:	To study the testing techniques of regulated power supply fabricated & test the PCB				
Experiment-9:	To study audio amplifier & fabricate/ test the audio amplifier circuit by using above power supply PCB.				
Experiments- 10:	To study & design a electronic circuit using available software's & perform fabrication using all techniques of electronics workshop & PCB design.				

Evaluation Scheme of Practical Examination: Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE			ON THE DAY	Y OF EXAM	TOTAL	
SEMESTER (35 MARKS)			(15 MA	RKS)		
EXPERIMENT	FILE WORK	VIVA	ATTENDANCE	EXPERIMENT	VIVA	INTERNAL
(5 MARKS)	(10 MARKS)	(10 MARKS)	(10 MARKS)	(5 MARKS)	(10 MARKS)	(50 MARKS)

External Evaluation (50 marks)

EXPERIMENT	FILE WORK	VIVA	TOTAL EXTERNAL
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

Course Code:	B.Tech (Electronics & Communication) - Semester-VII	L-0 T 1
<u>EEC762</u>	Design and Installation of Solar Photovoltaic System	P-2
	(Lab)	C-2
Course	On completion of the course students will be	
Outcomes:	On completion of the course, students will be:	
CO1.	Understanding basics of solar energy.	
CO2.	Applying methods Risk Management and to ensure safety and performance.	
	Analysing everything on Solar Modules, Optimizers (DC/DC	
CO3	converters), Junction Boxes, Inverters, Solar Meters, Learn all the	
005.	fundamentals of Solar PV energy, Applications of Solar PV Systems,	
	Advantages and Disadvantages of Solar photovoltaic energy.	
CO4.	Analysing Grid-Tie PV System, Calculating Solar Array size, Installing Maintaining and Servicing of solar power plant	
C05.	Analysing the Power concepts & Units	
Course		
Content:		
	Basics of PV Technology: What is Solar Energy, Solar Collectors,	
	Photovoltaic Systems, History of Photovoltaics, Photovoltaic Effect,	
	Photovoltaic Cells, PV Modules and Arrays.	
	Solar PV technology overview: How does PV technology work, Other Types of Photovoltaic Technology Costs of Solar Photovoltaics	
	Modern Photovoltaics.	T Hrs-
Unit-1:	Fundamentals of Solar Components Solar PV System: Solar	4.5, P Uma
	Radiation, Solar Cell Parameters and Equivalent Circuit, Losses and	пгs - 3 5
	Efficiency Limits, Crystalline Silicon Solar Cells, Thin-film solar cells,	0.0
	PV System Design. Site survey assessment & feasibility study: DV Site Location	
	Assumptions and Input Data for Analysis Potential Rate Increases	
	Conclusions and Recommendations.	
	Assess the customer's Solar PV requirement:pv cost considerations,	
	permits and covenants, stand-alone small solar electric systems, grid-	
	connected small solar electric systems, estimating energy cost savings	т н
∐nit_?•	for net-metered pv system.	I Hrs- 4 P
01111-2.	determine power consumption demands. Inverter sizing, Battery sizing,	Hrs -5
	available area for installation of SPV.	
	Design of SPV Plants: Load estimation, Estimation of number of PV	
	panels, Estimation of battery bank, Cost estimation of the system.	
	Preparation of Bill of Materials (BoM): Mechanical or electrical	
	the Plant Type of Roof Module Make and Specs Inverter Make and	
	Specs, Whether Remote Monitoring is separately required.	T Hrs-
Unit-3:	Installation, Maintenance and Service of SPV Plants: Modularity &	4, P
	scalability, Flexible location.	Hrs -5
	Civil and Mechanical parts of Solar PV System: Get Equipment	
	Foundation constructed, Install Mounting System, Install Photovoltaic	
<u> </u>	Electrical components of Solar PV System: Install Array JB. cost	
	effective wiring, Using MCCBs and other essential components.	
	Advanced Solar Power plant Engineering: Photovoltaic Inverter	
	Topologies for Grid Integration Applications, Advanced Control	T T
T:4 4	Techniques for PV Maximum Power Point Tracking, Maximum Power	T Hrs-
Unit-4	Power Tracking Using Particle Swarm Ontimization with Artificial	0, ľ Hre _5
	Neural Network Algorithm	1113-3
	Intro - Google Sketchup, PV Syst, AutoCAD: Creation of a grid-	
	connected project, Construction and use of 3D shadings scenes,	
	Meteorological data in PV-syst.	

Unit-5	 Solar project development phases and issues: Initiation phase, Definition phase, Design phase, Development phase, Implementation phase, Follow-up phase. Project planning and schedule of activities: Management activities, Project planning, Project scheduling, Risk management, Risk identification, Risk analysis, Risk planning, Risk monitoring Best practices in design & installation to ensure safety and performance: Work History, Financial Transparency, Health and Safety, Insurance. 	T Hrs- 7, P Hrs -1
--------	--	--------------------------

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment (Min. 06 experiment) would be evaluated by external trainer or by faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by external trainer or the faculty concerned. The marks shall be entered on the index sheet of the practical file. Each experiment will be evaluated in 5 marks as per given distribution.

Evaluation scheme:

S. No.	Experiment (10 marks)	Attendance (10 marks)	Test result (20 marks)	Viva (10 MARKS)	Average in 5 Marks
Experiment 1					
Experiment 2					
:					
Experiment 10					

External Evaluation (50 marks)

The external evaluation would also be done by the external trainer or industrial expert or by faculty based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)
--------------------------	-------------------------	--------------------	---------------------------------

Course Code:
EEC792

B.Tech (Electronics & Communication) - Semester-VII Industrial Training & Presentation

		C-2
Course		
Procedure:		
	Students will have to undergo industrial training of six weeks in any	
	industry or reputed organization after the VI semester examination in	
	summer. The evaluation of this training shall be included in the VII	
	semester evaluation.	
	The student will be assigned a faculty guide who would be the	
	supervisor of the student. The faculty would be identified before the end	
	of the VI semester and shall be the nodal officer for coordination of the	
	training.	
	Students will prepare an exhaustive technical report of the training	
	during the VII semester which will be duly signed by the officer under	
	whom training was undertaken in the industry/ organization. The	
	covering format shall be signed by the concerned office in-charge of the	
	training in the industry. The officer-in-charge of the trainee would also	
	give his rating of the student in the standard University format in a	
	sealed envelope to the Director/Principal of the college.	
	The student at the end of the VII semester will present his report about	
	the training before a committee constituted by the Director/Principal of	
	the College which would comprise of at least three members comprising	
	of the Department Coordinator, Class Coordinator and a nominee of the	
Director/Principal. The students guide would be a special invitee to the		
	presentation. The seminar session shall be an open house session. The	
	internal marks would be the average of the marks given by each member	
	of the committee separately in a sealed envelope to the	
	Director/Principal.	
	The marks by the external examiner would be based on the report	
	submitted by the student which shall be evaluated by the external	
	examiner and cross examination done of the student concerned.	
	Not more than three students would form a group for such industrial	
	training/ project submission.	
	The marking shall be as follows.	
Internal: 50	By the Faculty Guide – 25 marks.	
marks	By Committee appointed by the Director/Principal – 25 marks.	
External:50	By Officer-in-charge trainee in industry – 25 marks.	
marks	By External examiner appointed by the University – 25 marks	
	Technical report will consist five chapter as per given format:	
Chapter 1:	Brief about organization	
Chapter 2:	Detail of business carried out by organization	
	Specific contribution during the industrial training (not more than 500	
Chapter 3:	words)	
Chapter 4:	Learning during the industrial training (not more than 200 words)	
Chapter 5:	Conclusion	

<u>Course Code:</u> EEC798	B.Tech (Electronics & Communication) - Semester-VII Project Work Phase-I	L-0 T-0 P-10 C-5
Course Procedure:		
	A group of students, not more than three, will be assigned a faculty guide who would be the supervisor of the group. The faculty would be identified in the starting of the VII semester.	
	The group will carry out the literature search and collect required material for carrying out the project.	
	The group will prepare a report not exceeding 15 pages at the end of semester.	
	The assessment of performance of students should be made at least twice in each semester i.e. VII and VIII. In this semester, the student shall present the progress of project live as also using overheads project (30% Project completion) or power point presentation on LCD to the internal committee.	
	The evaluation committee shall consist of faculty members constituted by the college which would comprise of at-least three members comprising of the Department Coordinator, Class Coordinator and a nominee of the Director/Principal. The students guide would be a special invitee to the presentation. The seminar session shall be an open house session. The internal marks would be the average of the marks given by each member of the committee separately in a sealed envelope to the Director/Principal.	
	The marking shall be as follows.	
Internal: 100 marks	By the Faculty Guide - 50 marks By Committee appointed by the Director/Principal – 50 marks	

There shall be continuous evaluation of the student on the following broad parameters:

- 1. Observance of dress code.
- 2. Participation in Conferences /Workshops / Seminars.

3. Attendance in guest lectures, invited talks and special technical sessions organized from time to time.

4. Participation in community projects including NSS.

5. Exhibiting team spirit in different Culture & extra curriculum activities, Department Club activities of the University and College organized from time to time.

6. Observance of rule & regulations in the College/University, Behaviour in Campus Premises, Bus, hostel mess and hostel.

7. Performance and awards received in different events (sports/ co-curricular activities) organized at College / University and other level.

8. General behaviour

9. Any extraordinary achievement.

The above is an indicative list of parameters on which the students shall be continuously evaluated. The college may evaluate the student on the specific parameters by informing them through a notice displayed on the notice board before evaluation. There shall be no external examination for this course; however, the marks shall be included for calculation of cumulative Performance Index (CPI).

Head of Department would be display GP marks on notice board in prescribed format after IInd & IIIrd CT in semester:

S N o		Enroll No.	Student Name	Dress code	Participation in Conferences /Workshops / Seminars	Participation in guest lectures, invited talks and special technical sessions	Participation in community Services	Participation in Culture & extra curriculum activities, Department Club Activities	Participation in sports/ co- curricular activities	General Behavior	Any Extra Achievement
				(5)	(15)	(20)	(10)	(20)	(20)	(5)	(5)
	Responsible for marks			Mentor	Head	Head	Mentor	Cultural Events Coordinator & Department Club Coordinator	Sports Coordinator	Mentor	Director or Principal

	Program Elective- II	L-3	
Course Code:	B. Tech (Electronics & Communication)- Semester-VII		
EHM731	Principle of Management	P-0	
	T finelple of Munugement	C-4	
Course Outcomes:	On completion of the course, students will be:		
CO1.	Understanding the concept, evolution and current trends of management.		
CO2.	Applying managerial functions like planning, organizing, staffing, leading & controlling in decision making.		
CO3.	Applying theories of motivation and leadership in organizational settings.		
CO4.	Analyzing techniques and methods of HR planning, recruitment, selection, training and development, performance management.		
CO5.	Evaluating controlling techniques- budgetary and non-budgetary, and productivity problems in management.		
Course			
Content:			
Unit-1:	IntroductionToManagementAndOrganizationsDefinition of Management – Science or Art – Manager Vs Entrepreneur - types of managers - managerial roles and skills – Evolution of Management – Scientific, human relations , system and contingency approaches – Types of Business organization - Sole proprietorship, 	8 Hours	
Unit-2:	Planning Nature and purpose of planning – planning process – types of planning – objectives – setting objectives – policies – Planning premises – Strategic Management – Planning Tools and Techniques –Decision making steps and process.	8 Hours	
Unit-3:	Organising Nature and purpose – Formal and informal organization – organization chart – organization structure – types – Line and staff authority – departmentalization – delegation of authority – centralization and decentralization – Job Design - Human Resource Management – HR Planning, Recruitment, selection, Training and Development, Performance Management, Career planning and management.	8 Hours	
Unit-4	Directing Foundations of individual and group behaviour – motivation – motivation theories – motivational techniques – job satisfaction – job enrichment – leadership – types and theories of leadership – communication – process of communication – barrier in communication – effective communication – communication and IT.	8 Hours	
Unit-5	Controlling: System and process of controlling – budgetary and non- budgetary control techniques – use of computers and IT in Management control – Productivity problems and management – control and performance – direct and preventive control – reporting.	8 Hours	
<u>Text Books:</u>	 Stephen P. Robbins & Mary Coulter, "Management", Prentice Hall (India) Pvt. Ltd. JAF Stoner, Freeman R.E and Daniel R Gilbert "Management: Pearson Education. 		
<u>Reference</u> <u>Books:</u>	 Stephen A. Robbins & David A. Decenzo & Mary Coulter, "Fundamentals of Management" 7th Edition, Pearson Education. Robert Kreitner & Mamata Mohapatra, "Management", Biztantra. Harold Koontz & Heinz Weihrich "Essentials of Management" Tata McGraw Hill. *Latest editions of all the suggested books are recommended. 		

	Program Elective- II				
<u>Course Code:</u> EHM735	B. Tech (Electronics & Communication) - Semester-VII Industrial Sociology	L-3 T-1 P-0 C-4			
Course Outcomes:	On completion of the course, students will be:				
CO1.	Understanding the concepts of sociology, trace its historical development, and social impact of industrialization.				
CO2.	Understanding the nature of modern societies, significance of the current service sector, and importance of work experience in Industry				
CO3.	Understanding the concepts related the industrial work.				
CO4.	Analyzing the problems of business Ethics.				
CO5.	Creating corporate culture, reputation and ethical leadership in organizational settings.				
Course					
Content:					
Unit-1:	Sociology in the industrial Perspective: Concept of Sociology, Sociology as a Science, Sociology of work & industry, Perspectives for sociological analysis of work, Class- Conflict in Industry, Social impact of industrialization, Corporate skills in the fast growing multinational set up.	8 Hours			
Unit-2:	Work and Social change: Nature of modern societies, emergence of industrial capitalism, Technology & Social change, the information society after the industrial society, post-modernity, globalization & Convergence, Significance of the service sector today, work restructuring and corporate management.				
Unit-3:	Work experience in Industry: The concept of alienation, Work satisfaction, Technology & work experience, and Social background of workers, Work orientations, Stress & anxiety of the worker, Work & Leisure, Unemployment, Conflicts in the work place.				
Unit-4	General and Applied Ethics - Ethics and the professions – Standard of right and wrong, problems of Ethical Certainty, Significance of professional Ethics for Engineers, New Technology and Ethics, Applied Ethics - Cases in professional Engineering Practice, Principles of business ethics, Individual in the organization.	8 Hours			
Unit-5	Ethical Leadership: Decision making, corporate culture and reputation management, corporate social responsibility and social reporting.	8 Hours			
<u>Text Books:</u>	1. Sheth N.R., Social Frame Work of Indian Factory, O.U.P. Bombay.				
<u>Reference</u> <u>Books:</u>	 Fleddermann Charles, Engineering Ethics, Upper Saddle River- N.J. Prentice Hall. Miller & Form, Industrial Sociology, London Harper & Row. Parsons Richard D., The Ethics of Professional Practice- Allyn& Bacon, London. Govinda rajan- Engineering Ethics- Prentice Hall (India) New Delhi. Gisbert P., Fundamentals of Industrial Sociology, O.U.P. New Delhi. Watson Tony J., Sociology: Work & Industry, New York. Routledge. Schinzinger, Roland & Mike W. Martin, Introduction to Engineering Ethics- Boston, McGraw Hill. *Latest editions of all the suggested books are recommended 				

Additional	https://nptel.ac.in/courses/109/104/109104074/	
<u>Electronic</u>	https://www.youtube.com/watch?v= Jd0-DdDmBg	
Reference		
Material:		

	Program Elective- II					
Course Code:		L-3 Т-1				
EHM733	B. Tech (Electronics & Communication)- Semester-VII	P-0				
	Organizational Behaviour	C-4				
Course						
Outcomes:	On completion of the course, students will be:					
CO1.	Understanding the concept, nature, characteristics and models of organizational behaviour.					
CO2.	Understanding the process of perception, theories of personality shaping, and theories of learning.					
CO3.	Applying the theories of motivation for motivating the workforce.					
CO4.	Analyzing different leadership styles and theories.					
C05	Evaluating strategies of emotional intelligence, resistance to change,					
	conflict management, and stress management.					
Course Content:						
Unit-1:	Concept, Nature, Characteristics, Models of Organizational Behaviour, Management Challenge, Organizational Goal.Global challenges and Impact of culture.	8 Hours				
Unit-2:	 Perception: Concept, Nature, Process, Importance. Attitudes and Workforce Diversity. Personality: Concept, Nature, Types and Theories of Personality Shaping, Learning: Concept and Theories of Learning. 	8 Hours				
Unit-3:	Motivation: Concepts and Their Application, Principles, Theories, Motivating a Diverse Workforce. Leadership: Concept, Function, Style and Theories of Leadership-Trait, Behavioural and Situational Theories. Analysis of Interpersonal Relationship.	8 Hours				
Unit-4	Organizational Power and Politics: Concept, Sources of Power, Approaches to Power, Political Implications of Power. Knowledge Management & Emotional Intelligence in Contemporary Business Organization. Organizational Change: Concept, Nature, Resistance to change,					
Unit-5	Conflict: Concept, Sources, Types, Functionality and Dysfunctional of Conflict, Classification of Conflict Intra, Individual, Interpresonal, Intergroup and Organizational, Resolution of Conflict, Stress: Understanding Stress and Its Consequences, Causes of Stress, Managing Stress.	8 Hours				
<u>Text Books:</u>	1. Dwivedi, D. N, Managerial Economics, Vikas Publishing House.					
Reference Books:	 Robbins Stephen P., Organizational Behavior Pearson Education Hersey Paul, "Management of Organizational Behavior: Leading Human Resources" Blanchard, Kenneth H and Johnson Dewey E., Pearson Education Khanka S. S. "Organizational Behavior. Varshney & Maheshwari, Managerial Economics, Sultan Chand & Sons. *Latest editions of all the suggested books are recommended.					
<u>Additional</u> <u>Electronic</u> <u>Reference</u> <u>Material:</u>	https://npte1.ac.in/courses/110/105/110105033/ https://www.youtube.com/watch?v=ehSOv5rkEhc					

	Program Elective- III					
Course Code:	R Tech (Flectronics & Communication) - Semester-VII	L-3 T-0				
EEC731	Robotics & Automation	P-0				
	Robolics & Automation	C-3				
Course Outcomes:	On completion of the course, students will be:					
CO1.	Understanding origin of robotics and types of robotics.					
CO2.	Understanding sensors used in robotics.					
CO3.	Understanding actuators and grippers.					
CO4.	Understanding path planning and programming techniques.					
CO5.	Creating of robot cell and machine interface.					
Course						
Content:						
Unit-1:	Basic Concepts: Definition and origin of robotics – different types of robotics – various generations of robots – degrees of freedom – Asimov's laws of robotics – dynamic stabilization of robots.	8 Hours				
Unit-2:	Power Sources and Sensors: Hydraulic, pneumatic and electric drives – determination of HP of motor and gearing ratio – variable speed arrangements – path determination – micro machines in robotics – machine vision – ranging – laser – acoustic – magnetic, fiber optic and tactile sensors.	8 Hours				
Unit-3: Manipulators, Actuators and Grippers: Construction of manipulators – manipulator dynamics and force control – electronic and pneumatic manipulator control circuits – end effectors – U various types of grippers – design considerations.						
Unit-4	Unit-4 Kinematics and Path Planning: Solution of inverse kinematics problem - multiple solution jacobian work envelop – hill climbing techniques – robot programming languages					
Unit-5	Case Studies: Mutiple robots – machine interface – robots in manufacturing and non- manufacturing applications – robot cell design – selection of robot.	8 Hours				
<u>Text Books:</u>	1.Mikell P. Weiss G.M., Nagel R.N., Odraj N.G., Industrial Robotics, McGraw-Hill Singapore.					
<u>Reference</u> <u>Books:</u>	 Deb.S.R., Robotics technology and flexible Automation, John Wiley, USA 1992. 2. Asfahl C.R., Robots and manufacturing Automation, John Wiley, USA. Klafter R.D., Chimielewski T.A., Negin M., Robotic Engineering – An integrated approach, Prentice Hall of India, New Delhi. McKerrow P.J. Introduction to Robotics, Addison Wesley, USA. Issac Asimov I Robot, Ballantine Books, New York. *Latest editions of all the suggested books are recommended. 					
<u>Additional</u> <u>Electronic</u> <u>Reference</u> <u>Material:</u>	https://nptel.ac.in/courses/112/101/112101098/ https://www.youtube.com/watch?v=0yD3uBshJB0					

	Program Elective- III						
Course Code:	B. Tech (Electronics & Communication)- Semester-VIII	L-3 T-0 P-0					
EEC/52	Machine learning & Data Analytics	C-3					
Course Outcomes:	On completion of the course, the students will be :						
CO1.	Understanding concepts of machine learning and data analytics like bagging and boosting, clustering.						
CO2.	CO2. Understanding Bayesian learning and Bayesian Network.						
СО3.	Applying Kmeans Clustering and Agglomerative Hierarchical Clustering						
CO4.	Applying decision trees for problem solving.						
CO5.	Analysing a variety of learning algorithms.						
Course Content:							
Unit-1:	Introduction, Different Types of Learning, Hypothesis Space & Inductive Bias, Evaluation and Cross- Validation, Linear Regression, Introduction to Decision Trees, Learning Decision Tree, Overfitting	8 Hours					
Unit-2:	K- Nearest Neighbour, Feature Selection, Feature Extraction, Collaborative Filtering, Bayesian Learning, Naïve Bayes, Bayesian Network	8 Hours					
Unit-3:	Logistic Regression, Introduction of Support Vector machine, The Dual Formulation, Maximum Margin with Noise, Nonlinear SVM & Kernel Function, Solution to the Dual Problem.	8 Hours					
Unit-4:	Multilayer Neural Network, Neural Network and Back propagation Algorithm, Deep Neural Network Introduction to Computational Learning Theory, Sample Complexity: Finite Hypothesis Space, VC Dimension						
Unit-5:	Introduction to Ensembles, Bagging and Boosting, Introduction to Clustering, Kmeans Clustering, Agglomerative Hierarchical Clustering.	8 Hours					
<u>Text Books:</u>	 Machine Learning by Tom M. Mitchell, Mc Graw Hill Publication. 						
<u>Reference</u> <u>Books:</u>	 1.Machine Learning: A Probabilistic Perspective (Adaptive Computation and Machine Learning series) by Kevin P. Murphy, MIT Press. 2.Deep Learning (Adaptive Computation and Machine Learning series) by Ian Good fellow, Yoshua Bengio and Aaron Courville, MIT Press. 3.Introduction to Machine Learning with Python: A Guide for Data Scientists by Andreas Muller *Latest editions of all the suggested books are recommended. 						
<u>Additional</u> <u>Electronic</u> <u>Reference</u> <u>Material:</u>	https://nptel.ac.in/courses/106/106/106106139/ https://nptel.ac.in/courses/106/107/106107220/						

Course Code:	B.Tech (Electronics & Communication)- Semester-VIII						
EEC811	VLSI Design & Technology	P-0					
		C-3					
Course Outcomes:	On completion of the course, the students will be :						
CO1.	Understanding the concepts of basic building blocks.						
CO2.	Understanding the working of MOS structures and MOSFET.						
CO3.	Understanding properties of different logic family.						
CO4.	Applying software skills like SPICE for circuit simulation and computer aided design technology.						
CO5.	Applying principles of programmable logic devices and VLSI testing.						
Course Content:							
Unit-1:	Era of Integrated Circuit: Introduction to Monolithic Integrated Circuit Technology, Bipolar &MOS IC, Film IC, Crystal Growth Process: Czochralaski technique, Floating zone refining process, silicon wafer preparation & characterization, Oxidation: Thermal oxidation, Oxide thickness measurement, Oxidation system.	8 Hours					
Unit-2:	Diffusion, Ion Implantation,Epitaxy,Etching&Film Deposition of dopants: Diffusion Equations.Dopant profiles, sheet resistance, diffusion furnace, liquid and gaseous dopants: Ion implantation techniques, dopant profiles, apparatus used, Epitaxial growth of Si, apparatus for epitaxy, Photolithography techniques for pattern transfer, Mask making, photo resist &techniques.Vacuum deposition & Sputtering apparatus, Basics of CVD Processes.	10 Hours					
Unit-3:	MOS& CMOS Transistor: MOS System under externalbias, MOSFET Scaling & Small-Geometry Effects, MOS Inverters, static & dynamic characteristics, NAND, NOR, AOI Circuits, Design Considerations, Layout Design, Micron & Submicron technologies, parasitic effects, Physical limitations.						
Unit-4:	Concepts of SPICE for Circuit simulation, Standard Digital ICs:Combinational and Sequential MOS Logic Circuits, Design of standard Cellsfor LSI, VLSI Circuits, Computer-Aided Design Technology.						
Unit-5:	Programmable Logic Devices : PAL,PLA, PLD/CPLD, PGA/FPGA, ASIC, VLSI Testing.	6 Hours					
<u>Text Books:</u>	1. S.M. Sze (Ed.), VLSI Technology, McGrawHill.						
<u>Reference</u> <u>Books:</u>	 S. Gandhi, VLSI Fabrication Principles ED. John Willey. S.A. Campbell, The Science and Engineering of Microelectronic Fabrication, Oxford Univ. Press. K. Gopalan, Introduction to Digital Microelectronics Circuits, McGrawHill. Sedra, Smith (International Student Edition), Microelectronic Circuits, Oxford Univ. Press. Milman&Grabel, Microelectronics McGraw-Hill. D.A.Pucknell&Eshraghian, Basic VLSI Design, (PHI). Wayne Wolf, Modern VLSI Design Systems on Silicon, (Pearson Pub.). *Latest editions of all the suggested books are recommended. 						
Additional Electronic Reference Material:	https://nptel.ac.in/courses/117/106/117106093/ https://www.youtube.com/watch?v=DxGYiNOI7Ts						

<u>Course Code:</u> EEC862	B.Tech (Electronics & Communication)- Semester-VIII VLSI Design & Technology (Lab)					
Course Outcomes:	On completion of the course, students will be:					
CO1. Understanding Tanner EDA tool.						
CO2.	Applying the skills of coding and simulation of all logic gates using HDL.					
СОЗ.	Applying the skills of coding and simulation of encoder, decoder, shift register, flip-flops using Xilinx tool.					
CO4.	Applying Xilinx tool for programming.					
CO5.	Analysing of CMOS inverter, CMOS NAND & CMOS NOR gates and their comparison using Tanner EDA tool.					
Experiments: Note: Minimum eight experiments should be performed.						
Experiment-1:	Introduction to Xilinx tool					
Experiment-2:	HDL code to realize all logic gates					
Experiment-3:	Design of 8-to-3 encoder using Xilinx tool					
Experiment-4:	Design of 2-to-4 decoder using Xilinx tool					
Experiment-5:	Design Shift register using Xilinx tool					
Experiment-6:	Design of flip flops (SR, JK, D) using Xilinx tool					
Experiment-7:	Introduction to Tanner EDA Tool					
Experiment-8:	To find D.C. and transient response of a CMOS Inverter circuit					
Experiment-9:	To analyse the CMOS NAND and NOR Gates and compare their schematicusing tanner EDA tool					
Experiments- 10:	To design and analyse D-LATCH and SRAM circuit					

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICA	AL PERFORMA SEMESTER	NCE & VIVA DU (35 MARKS)	ON THE DAY (15 MA	Y OF EXAM RKS)	TOTAL
EXPERIMENT	FILE WORK	VIVA	EXPERIMENT	VIVA	INTERNAL
(5 MARKS)	(10 MARKS)	(10 MARKS)	(5 MARKS)	(10 MARKS)	(50 MARKS)

External Evaluation (50 marks)

<u>Course</u> <u>Code:</u> EEC812	B.Tech (Electronics & Communication)- Semester-VIII Optical Fiber Communication	L-3 T-0 P-0 C-3
Course Outcomes:	On completion of the course, students will be:	
CO1.	Understanding different components of an OpticalFiber Communication link.	
CO2.	Understanding optical source and optical detector operational parameters.	
CO3.	Understanding various losses in fibers.	
CO4.	Understanding WDM, Optical Amplifiers, Optical Switching and networking technology	
	concepts.	
<u>CO5.</u>	Analysing modulation techniques used in optical communication systems.	
Course Content:		
Unit-1:	Introduction to Optical Fiber Communication System: Block diagram of OFCS, Advantage andDisadvantage of OFCS over other communication systems. Ray theory of transmission and concept of acceptance angle and Numerical Aperture (Numerical based on this), Meridional and skew propagate wave theory of optical propagation: cut – off wavelength. Group velocity and Group delay, Types of fibers, Mode of propagation, fiber optic splices, connectors, couplers.	8 Hours
Unit-2:	Light Sources and Detectors Sources: Light Emitting diodes, Laser diodes, Surface emitter LEDS, Edge emitter LEDS, Super luminescent LEDS, LED operating Characteristics, Laser Diode: Laser principles, semiconductor laser diode, Hetero junction Laser, P-N photo diode, P-I-N Photo diode.	8 Hours
Unit-3:	Intensity Modulation: Basic coherent system, Analog modulation formats; AM/IM Sub carrier Modulation, FM/IM Sub carrier Modulation, Coherent detection, Heterodyne Synchronous Detection, orthogonal frequency division multiplexing.	8 Hours
Unit-4:	Losses in Fibers: Absorption, scattering and bending losses. Signal distortion in optical fiber:Material dispersion, waveguide dispersion, intermodal dispersion. Noise in optical fiber: Thermal Noise, shot noise, S/N Ratio, Measurement of Attenuation, dispersion, refractive index, Optical time domain reflectometry (OTDR)	8 Hours
Unit-5:	Advanced Systems and Techniques: Wavelength Division Multiplexing, DWDM, opticalamplifiers, Optical filters, Optical Networks: SONET/SDH, Photonic switching, Local Area Networks, Optical Sensors.	8 Hours
<u>Text</u> <u>Books:</u>	1. G. Keiser - Optical Fiber Communication, TMH	
<u>Reference</u> <u>Books:</u>	 Joseph PalaisFiber Optic Communications, Pearson. Wilson Hawkes,Opto Electronics, PHI. Selvrajan, Srinivas,Optical Fiber Communication, TMH. Jonn M. Senior, Optical fiber communication (Principles and Practice), Pearson Govind P. Agrawal - Fiber Optic Communications Systems, Wiley *Latest editions of all the suggested books are recommended.	
Additional Electronic Reference Material:	https://nptel.ac.in/courses/117/104/117104127/ https://www.youtube.com/playlist?list=PLDQCtNMf2k0qbf1mHtvHzcmdwkeKUpCx9	

<u>Course Code:</u> EEC863	B.Tech (Electronics & Communication)- Semester-VIII Optical Fiber Communication (Lab)				
Course Outcomes:	On completion of the course, students will be:	<u>C-1</u>			
CO1.	Understanding the working principle of OTDR.				
CO2.	Analyzing the characteristics of LED and LASER diode.				
CO3.	Analyzing the characteristics of photodiode and LDR.				
CO4.	Analyzing the characteristics of phototransistor.				
CO5.	Evaluating the attenuation of optical cable.				
Experiments:	Note: Minimum eight experiments should be performed.				
Experiment-1:	To study the electrical characteristics of different types of LED.				
Experiment-2:	To study the characteristics of Laser Diode.				
Experiment-3:	To study the characteristics of Photodiode.				
Experiment-4:	To study & measure attenuation of optical fiber				
Experiment-5:	To study characteristics of Photo Transistor.				
Experiment-6:	To study Fiber optic Analog/Digital, transmitter/receiver link.				
Experiment-7:	To study the fiber optical connectors.				
Experiment-8:	To study the characteristics of optocoupler.				
Experiment-9:	To study the characteristics of Photovoltaic cell and LDR.				
Experiments- 10:	To study the OTDR in detail.				

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICA	AL PERFORMA SEMESTER	NCE & VIVA DU (35 MARKS)	ON THE DAY (15 MA	Y OF EXAM RKS)	TOTAL
EXPERIMENT	FILE WORK	VIVA	EXPERIMENT	VIVA	INTERNAL
(5 MARKS)	(10 MARKS)	(10 MARKS)	(5 MARKS)	(10 MARKS)	(50 MARKS)

External Evaluation (50 marks)

EXPERIMENT	FILE WORK	VIVA	TOTAL EXTERNAL
(20 MARKS)	(10 MARKS)	(20 MARKS)	(50 MARKS)

<u>Course Code:</u> EEC898	B.Tech (Electronics & Communication)- Semester-VIII Project Work Phase-II	L-0 T-0 P-6 C-3
Course Procedure:		
	Students should devote themselves to prepare something tangible, which could be a working model of their thoughts based on their subject of choice. The project shall be finalized by the students based on the VII semester project work report and shall be completed (100% working condition) and submitted at least one month before the last teaching day of the VIII semester, date of which shall be notified in the academic calendar. The assessment of performance of students should be made at least twice in each semester i.e. VII and VIII. In this semester student shall present the final project live as also using overheads project or power point presentation on LCD to the internal committee as also the external examiner. The evaluation committee shall consist of faculty members constituted by the college which would comprise of at-least three members comprising of the Department Coordinator, Class Coordinator and a nominee of the Director/Principal. The students guide would be a special invitee to the presentation. The seminar session shall be an open house session. The internal marks would be the average of the marks given by each member of the committee separately in a sealed envelope to the Director/Principal.	
	The marking shall be as follows.	
Internal:	By the Faculty Guide - 25 marks	
External: 50 marks	By External examiner appointed by the University – 50 marks.	

There shall be continuous evaluation of the student on the following broad parameters:

- **1.** Observance of dress code.
- 2. Participation in Conferences /Workshops / Seminars.

3. Attendance in guest lectures, invited talks and special technical sessions organized from time to time.

4. Participation in community projects including NSS.

5. Exhibiting team spirit in different Culture & extra curriculum activities, Department Club activities of the University and College organized from time to time.

6. Observance of rule & regulations in the College/University, Behaviour in Campus Premises, Bus, hostel mess and hostel.

7. Performance and awards received in different events (sports/ co-curricular activities) organized at College / University and other level.

8. General behaviour

9. Any extraordinary achievement.

The above is an indicative list of parameters on which the students shall be continuously evaluated. The college may evaluate the student on the specific parameters by informing them through a notice displayed on the notice board before evaluation. There shall be no external examination for this course; however, the marks shall be included for calculation of cumulative Performance Index (CPI).

Head of Department would be display GP marks on notice board in prescribed format after IInd & IIIrd CT in semester:

S N o		Enroll No.	Student Name	Dress code	Participation in Conferences /Workshops / Seminars	Participation in guest lectures, invited talks and special technical sessions	Participation in community Services	Participation in Culture & extra curriculum activities, Department Club Activities	Participation in sports/ co- curricular activities	General Behavior	Any Extra Achievement
				(5)	(15)	(20)	(10)	(20)	(20)	(5)	(5)
	Responsible for marks			Mentor	Head	Head	Mentor	Cultural Events Coordinator & Department Club Coordinator	Sports Coordinator	Mentor	Director or Principal

Course	Program Elective- IV	L-3 T-1
Code: FHM831	B. Tech (Electronics & Communication)- Semester-VII Engineering and Managarial Economics	P-0
L1111031	Engineering and Managerial Economics	C-4
Course Outcomes:	On completion of the course, students will be:	
CO1.	Understanding the role of managerial economics in engineering perspective.	
CO2.	Understanding different market structures and price determination in different market conditions.	
CO3.	Understanding the concepts of national income, inflation, and business cycles.	
CO4.	Applying the concepts of demand analysis.	
<u>CO5.</u>	Evaluating fixed cost, variable cost, average cost, marginal cost, Opportunity cost.	
Course Content:		
Unit-1:	Introduction: Meaning, Nature and Scope of Economics, Meaning of Science, Engineering and Technology; Managerial Economics and its scope in engineering perspective.	8 Hours
Unit-2:	Demand: Basic Concepts Demand Analysis; Law of Demand; Determinates of Demand; Elasticity of Demand-Price, Income and cross Elasticity; Uses of concept of elasticity of demand in managerial decisions.	8 Hours
Unit-3:	 Forecasting: Demand forecasting; Meaning, significance and methods of demand forecasting; production function; Laws of returns to scale & Law of Diminishing returns scale. Short and Long run Cost curves: fixed cost, variable cost, average cost, marginal cost, Opportunity cost. 	8 Hours
Unit-4	Market Study: Market Structure Perfect Competition; Imperfect competition: Monopolistic competition, Monopoly, Oligopoly, Duopoly Sorbent features of price determination and various market conditions.	8 Hours
Unit-5	Inflation: National Income; Concept of N.I. and Measurement; Inflation: Meaning of Inflation; Type, causes& prevention methods; Business Cycles, Phases of business cycle.	8 Hours
<u>Text</u> <u>Books:</u>	1. Koutsoyiannis, A : Modern Microeconomics, ELBS.	
<u>Reference</u> <u>Books:</u>	 Dwivedi, D.N., Managerial Economics, Vikas Publishing. Maheshwari, Y., Managerial Economics, Prentice Hall of India. Kakkar, D.N., Managerial Economics for Engineering, New Age International Publication. *Latest editions of all the suggested books are recommended. 	
Additional Electronic Reference Material:	https://nptel.ac.in/courses/110/101/1101005/ youtube.com/watch?v=3Q9pc2pR4EA&list=PLXjJ5c4vskp4ZGiFfvf4mcnxXWsHgqe_k	

	Program Elective- IV	L-3
Course Code: EHM832	B. Tech (Electronics & Communication)- Semester-VIII Total Quality Management	T-1 P-0 C-4
0		C-4
Outcomes:	On completion of the course, the students will be :	
C01.	Understanding basic and modern concepts of quality and TQM.	
CO2.	Understanding importance of human factor in quality	
СОЗ.	Understanding the concept of TPM and six sigma along with the applications.	
CO4.	Applying quality control techniques like control charts, 7 QC & 7 New QC tools.	
CO5.	Analysing quality related costs.	
Course		
Content:		
Unit-1:	Quality Concepts : Introduction; Meaning; Quality characteristics of goods and services; Evolution of Quality control, TQM; Modern concept, Basic concepts of quality; Dimensions of quality; Juran's quality trilogy; Deming's 14 principles; PDCA cycle; Total quality management (TQM) models.	8 Hours
Unit-2:	Quality Management : Organizational structure and design; Quality function; Decentralization; Designing and fitting organization for different types products and company; Human Factor in Quality: Attitude of top management; Co-operation of groups; Operators attitude, responsibility; Causes of operators error and corrective methods; Quality circles.	8 Hours
Unit-3:	Quality improvement and cost reduction : 7 QC tools and new QC tools; Economics of quality value and contribution; Quality cost; Optimizing quality cost; Quality assurance.	8 Hours
Unit-4:	Control Charts : Theory of control charts; Control charts construction: Construction of Mean & Range charts, fraction defective chart and number of defective charts; Attributes control charts: Defects, construction and analysis of c-chart.	8 Hours
Unit-5:	ISO-9000, Six sigma and TPM : ISO 9000 series; Concept of Six Sigma and its application; Total Productive Maintenance (TPM).	8 Hours
<u>Text Books:</u>	1. Sharma D. D Total Quality Management, S. Chand.	
<u>Reference</u> <u>Books:</u>	 Menon, H.G., TQM in New Product Manufacturing, McGraw Hill. LaI H., Total Quality Management, Wiley Eastern Limited. Greg Bounds, Beyond Total Quality Management, McGraw Hill. *Latest editions of all the suggested books are recommended. 	
<u>Additional</u> <u>Electronic</u> <u>Reference</u> <u>Material:</u>	https://nptel.ac.in/courses/110/104/110104080/ https://nptel.ac.in/courses/110/104/110104085/	

	Program Elective- IV	
<u>Course Code:</u> EHM833	B. Tech (Electronics & Communication)- Semester-VIII	L-3 T-1 P-0
	Entrepreneurship	C-4
Course Outcomes:	On completion of the course, the students will be:	
CO1.	Understanding the concepts and skills needed to run a business successfully.	
CO2.	Applying the steps of project formulation and market research.	
CO3.	Analyzing the techno economic feasibility of a project.	
CO4.	Analyzing various growth strategies in small scale industry.	
CO5.	Evaluating breakeven point, working capital requirements, and taxes.	
Course Content:		
Unit-1:	Entrepreneurship: Entrepreneur – Types of Entrepreneurs – Difference between Entrepreneur and Intrapreneur Entrepreneurship in Economic Growth, Factors Affecting Entrepreneurial Growth.	8 Hours
Unit-2:	Motivation: Major Motives Influencing an Entrepreneur – Achievement Motivation Training, Self-Rating, Business Games, Thematic Apperception Test – Stress Management, Entrepreneurship Development Programs – Need, Objectives.	8 Hours
Unit-3:	Business: Small Enterprises – Definition, Classification – Characteristics, Ownership Structures – Project Formulation – Steps involved in setting up a Business – identifying, selecting a Good Business opportunity, Market Survey and Research, Techno Economic Feasibility Assessment – Preparation of Preliminary Project Reports – Project Appraisal – Sources of Information – Classification of Needs and Agencies.	8 Hours
Unit-4:	Financing and Accounting: Need – Sources of Finance, Term Loans, Capital Structure, Financial Institution, Management of working Capital, Costing, Break Even Analysis, Taxation – Income Tax, Excise Duty – Sales Tax.	8 Hours
Unit-5:	Support to Entrepreneurs: Sickness in small Business – Concept, Magnitude, Causes and Consequences, Corrective Measures – Business Incubators – Government Policy for Small Scale Enterprises – Growth Strategies in small industry – Expansion, Diversification, Joint Venture, Merger and Sub Contracting.	8 Hours
<u>Text Book:</u>	 Khanka. S.S., "Entrepreneurial Development" S. Chand & Co. Ltd., Ram Nagar, New Delhi. 	
<u>Reference</u> <u>Books:</u>	 Hisrich R D, Peters M P, "Entrepreneurship" 8th Edition, Tata McGraw-Hill. Mathew J Manimala, "Entrepreneurship theory at cross roads: paradigms and praxis" 2nd Edition Dream tech. Rajeev Roy, 'Entrepreneurship', Oxford University Press. Donald F Kuratko, "Entrepreneurship – Theory, Process and Practice", Cengage Learning. *Latest editions of all the suggested books are recommended. 	

https://nptel.ac.in/courses/110/106/110106141/ https://nptel.ac.in/courses/127/105/127105007/

Evaluation Scheme:

Internal Evaluation	External Evaluation	Total Marks
40 Marks	60 Marks	
 The Internal evaluation will be performed by the internal faculty on the basis of the below mentioned parameters: Problem Identification Data Collection and Data Analysis Case study Proposal of innovative Business idea 	External evaluation will be performed by the external examiner on the basis of following parameters: Report Presentation VIVA	100

	Program Elective- V	т 2
Course Code		L-3 T 0
EEC921	B. Tech (Electronics & Communication)- Semester-VIII	1-U D ()
LECOJI	Artificial Neural Network	1-0 C-3
		C-3
Course Outcomes:	On completion of the course, students will be:	
CO1.	Understanding the concepts of Artificial Intelligence and Neural Network.	
CO2.	Understanding the concepts of different types Layer Feed Forward Neural Networks	
СО3.	Applying Biological and Artificial Neuron Models, and variousLearning strategies.	
CO4.	Analyzing Perceptron Models and Training Algorithms.	
C05	Evaluating problems through BAM Training Algorithms: Storage and	
	Recall Algorithm	
Course Content:		
Unit-1:	Artificial Intelligence: Issues, Techniques, Problems, Problem solving state space search; DFS; BFS Production: System, Problem characteristics; Heuristic Search Techniques; generate and Test; Hill Climbing; Best First Search; Constraint satisfaction.	8 Hours
Unit-2:	Knowledge representation : Approaches; Issues; Representing simple facts in logic; Resolution and natural deduction; Representing knowledge using rules; Procedural vs. Declarative knowledge; Forward v/s Backward chaining. Slot and Filler Structures: Semantic nets; Frames; Conceptual dependency; Scripts; parsing techniques.	8 Hours
Unit-3:	Introduction to Neural Network: Introduction, Organization of the Brain, Biological and Artificial Neuron Models, Characteristics of ANN, McCulloch-Pitts Model, Potential Applications of ANN. Essentials of Artificial Neural Networks: Artificial Neuron Model, Types of Neuron Activation Function, ANN Architectures, Learning Strategy (Supervised, Unsupervised, Reinforcement).	8 Hours
Unit-4	Single Layer Feed Forward Neural Networks: Introduction, Perceptron Models and Training Algorithms. Multilayer feed forward Neural Networks: Credit Assignment Problem, Generalized Delta Rule, Derivation of Back propagation (BP) Training.	8 Hours
Unit-5	Expert System: Definition and Characteristics; Expert system life cycle & Expert system tools; MYCIN & DENDRAL. Associative Memories: Paradigms of Associative Memory, Pattern Engineering, Hebbian Learning, Bidirectional Associative Memory (BAM) Architecture, BAM Training Algorithms: Storage and Recall Algorithm, BAM Energy Function, Architecture of Hopfield Network.	8 Hours
Text Books:	1. E Rich. and K Knight, "Artificial Intelligence", Tata McGraw Hill.	
<u>Reference</u> <u>Books:</u>	 "Simon Haykin, Neural Networks- A comprehensive foundation, Pearson Education. S.N. Sivanandam, S. Sumathi,S. N. Deepa, Introduction to Neural Networks using MATLAB 6.0", TMH. James A Freeman and Davis Skapura, Neural Networks Pearson Edu. Timothy J. Ross, Fuzzy Logic with Engineering Applications, McGraw-Hill Inc. *Latest editions of all the suggested books are recommended. 	
Additional	https://nptel.ac.in/courses/117/105/117105084/	
Electronic	https://nptel.ac.in/courses/108/108/108108148/	
Reference		
<u>Material:</u>		

	Program Elective- V	
<u>Course Code:</u> EEC815	B. Tech (Electronics & Communication)- Semester-VIII Information Theory & Coding	L-3 T-0 P-0 C-3
Course Outcomes:	On completion of the course, students will be:	
CO1.	Understanding basic knowledge of Information theory and various coding techniques.	
CO2.	Understanding the coding techniques used for error detection and correction.	
CO3.	Understanding cyclic code and generator polynomials.	
CO4.	Applying error correcting codes.	
CO5.	Applying the liner block code for parity checking.	
Course Content:		
Unit-1:	Introduction to Information theory: Information and entropy, properties of information and entropy, source coding theorem, Shannonfano coding, Huffman coding, Symmetric channel ,binary symmetric channel, Basics of mutual information ,channel capacity, channel coding theorem.	5 Hours
Unit-2:	Coding Techniques : Block Code: Block diagram, Parity check code, Weight, Hamming distance, minimum distance, error correction and detection.	5 Hours
Unit-3:	Linear block codes: generator matrix, encoder, parity check matrix, constructing hamming codes, error correction and error detection capabilities.	5 Hours
Unit-4	Cyclic codes, systematic cyclic codes, generator polynomial and generator matrix of cyclic codes.	5 Hours
Unit-5	Convolutional codes: Convolutional encoder, code tree, state diagram, trellis diagram. Basic definitions of BCH and Reed Solomon codes.	5 Hours
<u>Text Books:</u>	 Norman Abramson, Information Theory, John Wiley. Shu Lin, Costello D.J, Fundamentals and Applications, of Error Control Coding, Prentice Hall Inc. Englewood Cliffs. B.P. Lathi, Modern Digital and Analog Communication Systems, Oxford University Press. 	
<u>Reference</u> <u>Books:</u> <u>Additional</u> <u>Electronic</u>	 Simon Haykin, Digital Communications, John Wiley. Taub& Schilling, Principles of Communication System, Tata McGraw Hill. Tomasi, Electronic Communication, Fundamentals Through Advanced, Pearson education. Sklar,Digital Communication, Pearson Education. T. Cover and Thomas, Elements of Information Theory,John Wiley & Sons 1991. *Latest editions of all the suggested books are recommended. <u>https://nptel.ac.in/courses/117/101/117101053/</u> https://www.youtube.com/watch?v=Q1iSgv-Omv0 	
Reference Material:	https://www.youtube.com/watch?v=4wDzl4bevdA	

	Program Elective- V	L-3
Course Code:	B. Tech (Electronics & Communication)- Semester-VII	T-0
EC8832	Network security & cryptography	P-0 C-3
		00
Course Outcomes:	On completion of the course, students will be:	
CO1.	Understanding the most common type of cryptographic algorithms used to provide confidentiality, integrity and authenticity.	
CO2.	Understanding different types of cryptosystems.	
CO3.	Applying different approaches of Network security.	
<u>CO4.</u>	Analyzing modes of operation for block ciphers.	
<u>CO5.</u>	Evaluating different hash functions in Information Security.	
<u> </u>	Creating mechanisms for electronic mail security.	
Course Content:		
Unit-1:	Network Security: Attacks; Services & Mechanisms; Conventional Encryption: Classical Encryption Techniques, Steganography.	8 Hours
Unit-2:	Encryption Schemes: DES: Standard, Strength; Block Cipher Design Principles; Block Cipher Modes of Operation: Triples DES; Key Distribution, Random Number Generation.	8 Hours
Unit-3:	Public-Key Cryptography: Principles; RSA Algorithm; Key Management; Fermat's & Euler's Theorems; Primarily Miller Test; Chinese Remainder Theorem.	8 Hours
Unit-4	Message Authentication & Hash Functions: Authentication: Requirements, Protocols, Introduction to Message Authentication Codes and Hash Functions, MD5 Message Digest Algorithm, Secure Hash Algorithm (SHA), Digital Signature.	8 Hours
Unit-5	 IP Security: Electronic Mail Security; Pretty Good Privacy (PGP); S/MIME; Authentication Header; Encapsulating Security Payloads. Web Security: Secure Socket Layer & Transport Layer Security, Secure Electronic Transaction (Set); 	8 Hours
<u>Text Books:</u>	1. Stallings, W., Cryptography and Network Security: Principles and Practice, Prentice Hall.	
<u>Reference</u> <u>Books:</u>	 Johannes, A. B., Introduction to Cryptography, Springer. Kahate, A., Cryptography and Network Security, Tata McGraw Hill. *Latest editions of all the suggested books are recommended. 	
Additional	https://pptel.ac.in/courses/106/105/106105162/	
<u>Electronic</u> <u>Reference</u> <u>Material:</u>	https://nptel.ac.in/courses/106/105/106105031/	

