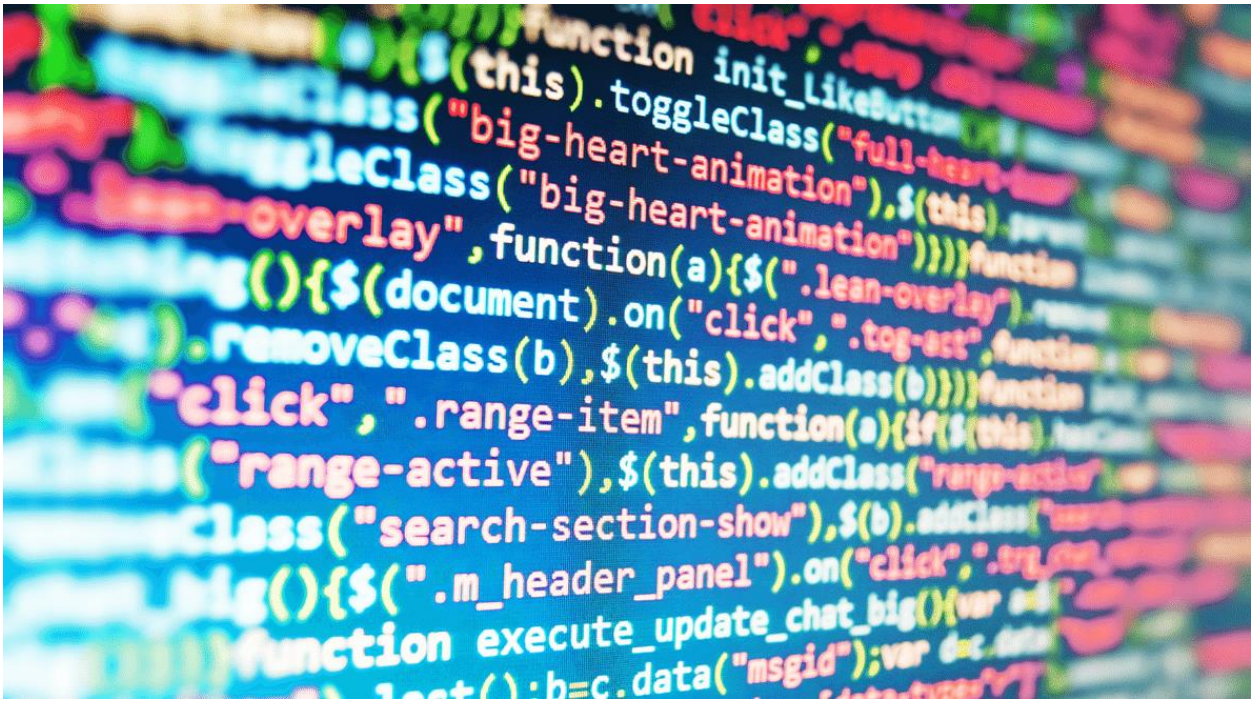

DETAILED SYLLABUS FOR M.TECH IN ELECTRONICS & COMMUNICATION ENGINEERING

Specialization in:
Communication

DEPT. OF ELECTRONICS & COMMUNICATION ENGINEERING

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

PREAMBLE

Education plays an enormously significant role in the building of a nation. There are quite a large number of educational institutions, engaged in imparting education in our country. Majority of them have entered recently into semester system to match with international educational pattern. However, our present education system is churning out youth who have to compete locally, regionally, nationally as well as globally. The present alarming situation necessitates transformation and/or redesigning of system, not only by introducing innovations but developing “learner-centric approach”.

Majority of Indian higher education institutions have been following marks or percentage-based evaluation system, which obstructs the flexibility for the students to study the subjects/courses of their choice and their mobility to different institutions. There is need to allow the flexibility in education system, so that students depending upon their interests can choose inter-disciplinary, intra-disciplinary and skill-based courses. This can only be possible when choice based credit system (CBCS), an internationally acknowledged system, is adopted. The choice based credit system not only offers opportunities and avenues to learn core subjects but also explore additional avenues of learning beyond the core subjects for holistic development of an individual. The CBCS will undoubtedly facilitate benchmarking of our courses with best international academic practices.

Advantages of the choice based credit system:

- Shift in focus from the teacher-centric to student-centric education.
- Student may undertake as many credits as they can cope with (without repeating all courses in a given semester if they fail in one/more courses).
- CBCS allows students to choose inter-disciplinary, intra-disciplinary courses, skill oriented papers (even from other disciplines according to their learning needs, interests and aptitude) and more flexibility for students.
- CBCS makes education broad-based and at par with global standards. One can take credits by combining unique combinations.
- CBCS offers flexibility for students to study at different times and at different institutions to complete one course (ease mobility of students). Credits earned at one institution can be transferred to another institution.

CHOICE BASED CREDIT SYSTEM

The Indian Higher Education Institutions have been moving from the conventional annual system to semester system. Currently many of the institutions have already introduced the Choice Based Credit System. The semester system accelerates the teaching-learning process and enables vertical and horizontal mobility in learning. The credit based semester system provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching. The Choice Based Credit System provides a ‘cafeteria’ type approach in which the students can take courses of their choice, learn at their own pace, undergo additional courses to acquire more than the required credits and adopt an interdisciplinary approach to learning.

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

It has been necessary to align higher education with the emerging needs of the economy to ensure that the graduates of the higher education system have adequate knowledge and skills for employment and entrepreneurship for the last few years. The higher education system has to incorporate the requirements of various industries in its curriculum innovatively and flexibly while developing a well-groomed graduate. ECE department aims to encourage research and innovation in Advanced wireless communication, wireless sensor network, Satellite communication, pattern recognization and many more.

The M.Tech programme in Electronics & Communication Engineering (ECE) aims to prepare students to undertake careers involving innovative technologies, develop a problem solving capability, or opt for advanced studies for research-oriented jobs.

JOB OPPORTUNITIES

The booming communication and IT sector in India have plenty of jobs for Electronics postgraduates. Candidates with a high percentage of marks, good communication skills, and sound computer knowledge do not face problems getting a job. Electronics engineers can get jobs in different companies like universities, research, private and public industries, government departments, business organizations, commercial organizations, manufacturing sectors, etc. Besides, electronics engineers have plenty of options to work in IT companies in design, development, assembly, manufacture, maintenance, etc. Software Developers: Software developers are professionals concerned with facets of the software development process, which involves design and coding, computer programming, project management, etc.

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

PEO 01: Provide graduates with a strong foundation in mathematics, science and engineering fundamentals to enable them to devise and deliver efficient solutions to challenging problems in Electronics, Communications and allied disciplines.

PEO 02: Impart analytic and thinking skills to develop initiatives and innovative ideas for R&D, Industry and societal requirements.

PEO 03: Provide sound theoretical and practical knowledge of E&C Engineering, managerial and entrepreneurial skills to enable students to contribute to society's well-being with a global outlook.

PEO 04: Inculcate qualities of teamwork and social, interpersonal and leadership skills and an ability to adapt to evolving professional environments in the domains of engineering and technology.

PEO 05: Motivate graduates to become good human beings and responsible citizens for the overall welfare of society.

PROGRAMME OUTCOMES

PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to solve complex engineering problems.

PO2. Problem analysis: Identity, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. 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 public health and safety and cultural, societal, and environmental concerns**.**

PO4. 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.

PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling to complex engineering activities to understand the limitations.

PO6. The engineer and society: Apply to reason informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. 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.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and teamwork: Function effectively as an individual and as a member or leader in diverse teams and multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's work as a member and leader in a team, to manage projects and in multidisciplinary environments**.**

PO12. Life-long learning: Recognize the need for and prepare and engage in independent and life-long learning in the broadest context of technological change.

TYPES OF COURSES

1. Courses are the subjects that comprise the Electronics Engineering & Engineering Programme.
2. A course may be designed to comprise lectures, tutorials, laboratory work, fieldwork, outreach activities, project work, vocational training, viva, seminars, term papers, assignments, presentations, self-study etc. or a combination of some of these components.
3. The learning outcomes of each course will be defined before the start of a semester.

4. Following are the course types:

i. **Core Course (PCC):** This is a course that a student as a core requirement must compulsorily study to complete the requirement of M.Tech in Computer Science & Engineering.

ii. **Elective Course:** An elective course is a course, which can be chosen from a pool of courses. It is intended to support the discipline of study by providing an expanded scope, enabling exposure to another discipline/domain and nurturing a student's proficiency and skill. An elective may be of following types:

a) **Discipline Elective Courses (DE):** It is an elective course that adds proficiency to the students in the discipline.

b) **Open Elective Courses (OE):** It is an open elective course taken from other engineering disciplines and enhances the generic proficiency and interdisciplinary perspective of students.

c) **Specialization Elective (SEC):** This is a course, which is to be compulsorily studied by a student as a core requirement to complete the requirement of M.Tech in Computer Science & Engineering with Specialization in Cloud Computing/Big Data Analytics/Data Science/Block chain Technology/Information Security/Artificial Intelligence & Machine Learning.

d) **Audit/Humanities, Social Sciences & Management (HSM):** It is an elective course taken from non-engineering disciplines (humanities, social sciences and management) that broadens the perspective of an engineering student.

5. Each credit course contributes certain credits to the programme. A course can be offered either as a full course (4 credits) or as a half course (2 credits). A full course is conducted with 3 hours of lectures and either 1 hour of tutorial or 2 hours of practical work per week. A half course is conducted with 2 hours of lectures. There are also some exceptional electives with 3 credits and 1 credit.

Definition of Credit: -

1 Hr. Lecture (L) per week	1 Credit
1 Hr. Tutorial (T) per week	1 Credit
1 Hr. Practical (P) per week Or 2 Hr. Practical (Lab)/week	0.5 Credits Or 1 Credit

6. A project work/dissertation is considered as a special course involving application of the knowledge gained during the course of study in exploring, analyzing and solving complex problems in real life applications. A candidate completes such a course with an advisory support by a faculty member.
7. A student has to register for all courses before the start of a semester.
8. **Program codes:** The codes for various post graduate programmes are as follows:

i. Civil Engineering: CE

ii. Computer Science & Engineering: CSE

iii. Electronics and Communication Engineering: ECE

iv. Electrical Engineering: EE

v. Mechanical Engineering: ME

9. **Departmental and Non Departmental Course Codes:** The codes for departmental core courses and discipline-specific electives are specific to each discipline. The first two characters are derived from departmental codes listed above. This is followed by a digit sequence number:

   i. CSCyyy: Core Course

   ii. CSDxxx: Discipline-Specific Elective Course

   iii. ProgramCodexxx: Specialization-Specific Elective Courses

   iv. XXXxxx: Open Elective Courses (Depends on the respective Dept.)

   vi. INTxxx: Project/Training/Internship/ Dissertation

   v. HSMxxx: Humanities, Social Sciences & Management Course

10. **General Electives Type:** A student may take a course under the category of General Elective (GE) offered by any other Department of the Institute under the categories of Core Course (CC), Discipline Specific Electives (DE). However, such options shall be offered to a student as per prescribed guidelines of the Institute.
11. The opting of a course by the student will depend upon the requisites for that course and with the consent of the course advisor.

SCHEME – SEMESTER WISE COURSE ALLOCATION

First Semester Syllabus

Sl No.	Type	Subject Code	Topic	L	T	P	Credit Points
1.	PCC	CEC101	Advanced Communication Networks	3	0	0	3
2.	PCC	CEC102	Wireless and Mobile Communication	3	0	0	3
3.	DE	Prog. Specific Elective	Specialization Elective-I	3	0	0	3
4.	DE	Prog. Specific Elective	Specialization Elective-II	3	0	0	3
5.		Lab 1	Advanced Communication Networks Lab	0	0	4	2
6.		Lab 2	Wireless and Mobile Communication Lab	0	0	4	2
7.			Research Methodology and IPR	2	0	0	2
8.	OE	Aud I	Audit Course I	2	0	0	0
			Total	16	0	8	18

Suggestive Choice Based Subjects

Sl No.	Type	Subject Code	Topic	L	T	P	Credit Points
1.	DE	CED103	Wireless Sensor Networks	3	0	0	3
2.	DE	CED104	Optical Networks	3	0	0	3
3.	DE	CED105	Statistical Information Processing	3	0	0	3
4.	DE	CED106	Cognitive Radio	3	0	0	3
5.	DE	CED107	RF and Microwave Circuit Design	3	0	0	3
6.	DE	CED108	DSP Architecture	3	0	0	3
7.	OE	Aud I	Audit Course I: English for Research Paper Writing	2	0	0	0
8.	OE	Aud I	Audit Course I: Disaster Management	2	0	0	0
9.	OE	Aud I	Audit Course I: Sanskrit for Technical Knowledge	2	0	0	0
10.	OE	Aud I	Audit Course I: Value Education	2	0	0	0

Second Semester Syllabus

Sl No.	Type	Subject Code	Topic	L	T	P	Credit Points
1.	PCC	CEC201	Antennas and Radiating Systems	3	0	0	3
2.	PCC	CEC202	Advanced Digital Signal Processing	3	0	0	3
3.	DE	Prog. Specific Elective	Suggestive Choice Based Subject III	3	0	0	3
4.	DE	Prog. Specific Elective	Suggestive Choice Based Subject IV	3	0	0	3
5.		Lab 3	Antennas and Radiating Systems lab	0	0	4	2
6.		Lab 4	Advanced Digital Signal Processing Lab	0	0	4	2
7.			Mini Project	0	0	4	2
8.	OE	Aud 2	Audit course 2	2	0	0	0
			Total	14	0	12	18

Suggestive Choice Based Subjects

Sl No.	Type	Subject Code	Topic	L	T	P	Credit Points
1	DE	CED201	Satellite Communication	3	0	0	3
2	DE	CED203	Internet of Things	3	0	0	3
3	DE	CED202	Voice and data networks	3	0	0	3
4	DE	CED205	Markov Chain and Queuing System	3	0	0	3
5	DE	CED204	MIMO System	3	0	0	3
6	DE	CED206	Programmable Networks – SDN, NFV	3	0	0	3
7	OE	Aud 2	Constitution of India	2	0	0	0
8	OE	Aud 2	Pedagogy Studies	2	0	0	0
9	OE	Aud 2	Stress Management by Yoga	2	0	0	0
10	OE	Aud 2	Personality Development through Life Enlightenment Skills	2	0	0	0

Third Semester Syllabus

Sl No.	Type	Subject Code	Topic	L	T	P	Credit Points
1.	DE	Prog. Specific Elective	Suggestive Choice Based Subject V	3	0	0	3
2.	OE	---	Open Elective	3	0	0	3
3.		CED391	Dissertation Phase – I	0	0	20	10
			Total	6	0	20	16

Suggestive Choice Based Subjects

Sl No.	Type	Subject Code	Topic	L	T	P	Credit Points
1	DE	CED301	High Performance Networks	3	0	0	3
2	DE	CED302	Pattern Recognition and Machine learning	3	0	0	3
3	DE	CED303	Remote Sensing	3	0	0	3

Open Elective Subjects

Sl No.	Type	Subject Code	Topic	L	T	P	Credit Points
1	OE	CEO301	Business Analytics	3	0	0	3
2	OE	CEO302	Industrial Safety	3	0	0	3
3	OE	CEO303	Operations Research	3	0	0	3
4	OE	CEO304	Cost Management of Engineering Projects	3	0	0	3
5	OE	CEO305	Composite Materials	3	0	0	3
6	OE	CEO306	Waste to Energy	3	0	0	3

Fourth Semester Syllabus

Sl No.	Type	Subject Code	Topic	L	T	P	Credit Points
1.	PTI	INT	Dissertation-II/Industrial Project	0	0	32	16
			Total				16