AC-14/7/2016
Item No.4.27

UNIVERSITY OF MUMBAI

Revised Syllabus for the

Master of Engineering (M.E.) Electronics and Telecommunication Engineering

(As per Choice Based Credit & Grading System with effect from the academic year 2016–2017)

From Co-ordinator's Desk:-

To meet the challenge of ensuring excellence in engineering education, the issue of quality needs to be addressed, debated taken forward in a systematic manner. Accreditation is the principal means of quality assurance in higher education. The major emphasis of accreditation process is to measure the outcomes of the program that is being accredited. In line with this Faculty of Technology of University of Mumbai has taken a lead in incorporating philosophy of outcome based education in the process of curriculum development.

Faculty of Technology, University of Mumbai, in one of its meeting unanimously resolved that, each Board of Studies shall prepare some Program Educational Objectives (PEO's) give freedom to affiliated Institutes to add few (PEO's) course objectives course outcomes to be clearly defined for each course, so that all faculty members in affiliated institutes understand the depth approach of course to be taught, which will enhance learner's learning process. It was also resolved that, maximum senior faculty from colleges experts from industry to be involved while revising the curriculum. I am happy to state that, each Board of studies has adhered to the resolutions passed by Faculty of Technology, developed curriculum accordingly. In addition to outcome based education, **Choice Based Credit and Grading System** is also introduced to ensure quality of engineering education.

Choice Based Credit and Grading System enables a much-required shift in focus from teacher-centric to learner-centric education, since the workload estimated is based on the investment of time in learning and not in teaching. It also focuses on continuous evaluation which will enhance the quality of education. University of Mumbai has taken a lead in implementing the system through its affiliated Institutes Faculty of Technology has devised a transparent credit assignment policy adopted ten points scale to grade learner's performance. Choice Based Credit and Grading System will be implemented for First year Master of Engineering from the academic year 2016-2017. Subsequently this system will be carried forward for Second Year Master of Engineering in the academic year 2017-2018.

Dr. S. K. Ukarande
Co-ordinator,
Faculty of Technology,
Member - Academic Council
University of Mumbai, Mumbai

Preamble:

The curriculum in higher education is a living entity. It evolves with time; it reflects the ever changing needs of the society and keeps pace with the growing talent of the students and the faculty. The engineering education in India is expanding in manifolds and the main challenge is the quality of education. All stakeholders are very much concerned about it. The curriculum of Electronics & Telecommunication in Mumbai University is no exception. In keeping with the demands of the changing times, it contains innovative features. The exposure to the latest technology and tools used all over the world is given by properly selecting the subjects. It is designed in such a way to incorporate the requirements of various industries. The major emphasis of this process is to measure the outcomes of the program. Program outcomes are essentially a range of skills and knowledge that a student will have at the time of post-graduation. So the curriculum must be refined and updated to ensure that the defined objectives and outcomes are achieved.

I, as Chairman Ad-hoc Board of Studies in Electronics and Telecommunication Engineering, University of Mumbai, happy to state here that, the heads of the department and senior faculty from various institutes took timely and valuable initiative to frame the Program Educational objectives as listed below.

Objectives:

1. To produce Electronics & Telecommunication engineers, having strong theoretical foundation, good design experience and exposure to research and development.
2. To produce researcher who have clear thinking, articulation and interest to carry out theoretical and/or applied research resulting in significant advancement in the field of specialization.
3. To develop an ability to identify, formulate and solve electronics and telecommunication engineering problems in the latest technology.
4. To develop the ability among students to synthesize data and technical concepts from applications to product design.

These are the suggested and expected main objectives, individual affiliated institutes may add further in the list. I believe that the small step taken in the right direction will definitely help in providing quality education to the stake holders.

This book of curricula is the culmination of large number of faculty members and supporting staff. It also reflects the creative contribution of hundreds of teachers – both serving and retired. I sincerely hope that the faculty and students of Electronics and Telecommunication in Mumbai University will take full advantage of dynamic features of curriculum and make teaching-learning process a truly sublime experience for all.

At the end I must extend my gratitude to all experts and colleagues who contributed to make curriculum competent at par with latest technological development in the field of Electronics & Telecommunication Engineering.

Dr. Uttam D. Kolekar
Chairman, Ad-hoc Board of Studies in Electronics and Telecommunication Engineering

Program Structure for M.E. (Electronics & Telecommunication)

(w.e.f. A.Y. 2016-2017) Semester I

Subject Code	Subject Name	Teaching Scheme (Contact Hours/week)			Credits Assigned			
		Theory	Pract.	Tut.	Theory	Pract.	Tut.	Total
ETC101	Statistical Signal Processing	04	--	--	04	--	--	04
ETC102	Optical Communication Network	04	--	--	04	--	--	04
ETC103	Modern Digital Signal Processing Applications	04	--	--	04	--	--	04
ETDLO101X	Department Level Optional Course-1	04	--	--	04	--	--	04
ILO101X	Institute Level Optional Course-1	03	--	--	03	--	--	03
ETL101	Laboratory I - Optical Communication Network	--	02	--	--	01	--	01
ETL102	Laboratory II - Modern Digital Signal Processing Applications	--	02	--	--	01	--	01
Total		**19**	**04**	**--**	**19**	**02**	**--**	**21**

Subject Code	Subject Name	Examination Scheme							
		Theory					Term Work	Pract. /oral	Total
		Internal Assessment			End Sem.Exam.	Exam. Duration (in Hrs)			
		Test1	Test 2	Avg.					
ETC101	Statistical Signal Processing	20	20	20	80	03	--	--	100
ETC102	Optical Communication Network	20	20	20	80	03	--	--	100
ETC103	Modern Digital Signal Processing Applications	20	20	20	80	03	--	--	100
ETDLO101X	Department Level Optional Course-I	20	20	20	80	03	--	--	100
ILO101X	Institute Level Optional Course-I	20	20	20	80	03	--	--	100
ETL101	Laboratory I - Optical Communication Network	--	--	--	--	--	25	25	50
ETL102	Laboratory II –Modern Digital Signal Processing Applications	--	--	--	--	--	25	25	50
Total		**100**	**100**	**100**	**400**	**--**	50	**50**	**600**

Subject Code	Department Level Optional Course I	Subject Code	Institute Level Optional Course I
ETDLO1011	Next Generation Networks	ILO1011	Product Life cycle Management
ETDLO1012	Advanced Antenna Design	ILO1012	Reliability Engineering
ETDLO1013	Image Analysis using Machine learning	ILO1013	Management Information System
ETDLO1014	Embedded Communication Systems Design	ILO1014	Design of Experiments
		ILO1015	Operations Research
		ILO1016	Cyber Security and Laws
		ILO1017	Disaster Management & Mitigation Measures
		ILO1018	Energy Audit and Management

Semester II

Subject Code	Subject Name	Teaching Scheme (Contact Hours/week)			Credits Assigned			
		Theory	Pract.	Tut.	Theory	Pract.	Tut.	Total
ETC201	Modern Digital Communication	04	--	--	04	--	--	04
ETC202	Wireless Adhoc and Sensor Networks	04	--	--	04	--	--	04
ETC203	RF and Microwave Engineering	04	--	--	04	--	--	04
ETDLO202X	Department Level Optional Course II	04	--	--	04	--	--	04
ILO202X	Institute Level Optional Course II	03	--	--	03	--	--	03
ETL201	Laboratory III – Wireless Adhoc and Sensor Networks	--	02	--	--	01	--	01
ETL202	Laboratory IV – RF and Microwave Engineering	--	02	--	--	01		01
Total		**19**	**04**	**--**	**19**	**02**	**--**	**21**

Subject Code	Subject Name	Examination Scheme							
		Theory					Term Work	Pract. /oral	Total
		Internal Assessment			End Sem.Exam.	Exam. Duration (in Hrs)			
		Test1	Test 2	Avg.					
ETC201	Modern Digital Communications	20	20	20	80	03	--	--	100
ETC202	Wireless Adhoc and Sensor Networks	20	20	20	80	03	--	--	100
ETC203	RF and Microwave and Engineering	20	20	20	80	03	--	--	100
ETDLO202X	Department Level Optional Course II	20	20	20	80	03	--	--	100
ILO202X	Institute Level Optional Course- II	20	20	20	80	03	--	--	100
ETL201	Laboratory III - Wireless Adhoc and Sensor Networks	--	--	--	--	--	25	25	50
ETL202	Laboratory IV - RF and Microwave Engineering	--	--	--	--	--	25	25	50
Total		**100**	**100**	**100**	**400**	--	**50**	**50**	**600**

Subject Code	Department Level Optional Course II	Subject Code	Institute Level Optional Course II
ETDLO2021	Satellite Networking	ILO2021	Project Management
ETDLO2022	Network and Cyber Security	ILO2022	Finance Management
ETDLO2023	Remote Sensing	ILO2023	Entrepreneurship Development and Management
ETDLO2024	Error Control Coding	ILO2024	Human Resource Management
		ILO2025	Professional Ethics and CSR
		ILO2026	Research Methodology
		ILO2027	IPR and Patenting
		ILO2028	Digital Business Management
		ILO2029	Environmental Management

Semester III

Subject Code	Subject Name	Teaching Scheme (Contact Hours/week)			Credits Assigned			
		Theory	Pract.	Tut.	Theory	Pract.	Tut.	Total
ETS301	Special Topic Seminar	--	06	--	--	03	--	03
ETD301	Dissertation I	--	24	--	--	12	--	12
Total		**--**	30	--	--	15	--	15

Subject Code	Subject Name	Examination Scheme						
		Theory				Term Work	Pract. / Oral	Total
		Internal Assessment			End Sem.Exam.			
		Test1	Test 2	Avg.				
ETS301	Special Topic Seminar	**--**	**--**	**--**	--	50	50	100
ETD301	Dissertation I	**--**	**--**	**--**	--	100	--	100
Total		**--**	**--**	**--**	**--**	**150**	**50**	**200**

Semester IV

Subject Code	Subject Name	Teaching Scheme (Contact Hours/week)			Credits Assigned			
		Theory	Pract.	Tut.	Theory	Pract.	Tut.	Total
ETD401	Dissertation II	--	30	--	--	15	--	15
Total		**--**	30	--	--	15	--	15

Subject Code	Subject Name	Examination Scheme						
		Theory				Term Work	Pract. / Oral	Total
		Internal Assessment			End Sem.Exam.			
		Test1	Test 2	Avg.				
ETD401	Dissertation II	**--**	**--**	**--**	--	100	100	200
Total		**--**	**--**	**--**	**--**	**100**	**100**	**200**

Note:

- In case of Seminar (ETS301), 01 Hour / week / student should be considered for the calculation of load of a teacher
- In case of Dissertation I (ETD301) and Dissertation II (ETD401), 02 Hour / week / student should be considered for the calculation of load of a teacher