DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY

CIRCULAR NO. ACAD/NP/M.E./Syllabi/189/2013

It is hereby informed to all concerned that, on recommendations of the Faculty of Engineering and Technology, the **Hon'ble Vice-Chancellor has accepted the** following **"Revised Syllabi with Cumulative Grade Point Average [CGPA]"** under the Faculty of Engineering & Technology on behalf of the **Academic Council Under Section-14(7) of the Maharashtra Universities Act, 1994** as appended herewith :-

Sr. No.	Revised Syllabi
[1]	Revised Syllabus of M.E. [Computer Networking Engg.],
[2]	Revised Syllabus of M.E. [Structural Engineering],
[3]	Revised Syllabus of M.E. [Water Resources Engineering],
[4]	Revised Syllabus of M.E. [Environmental Engineering],
[5]	Revised Syllabus of M.E. [Software Engineering],
[6]	Revised Syllabus of M.E. [Computer Science],
[7]	Revised Syllabus of M.E. [Control System Engineering],
[8]	Revised Syllabus of M.E. [Heat Power],
[9]	Revised Syllabus of M.E. [Manufacturing Engineering],
[10]	Revised Syllabus of M.E. [Electronics],
[11]	Revised Syllabus of M.E. [Electronics & Telecommunication],
[12]	Revised Syllabus of M.E. [Embedded System],
[13]	Revised Syllabus of M.E. [Communication Engineering],
[14]	Revised Syllabus of M.E. [Digital Communication],
[15]	Revised Syllabus of M.E. [Biotechnology],
[16]	Revised Syllabus of M.E. [CAD/CAM],
[17]	Revised Syllabus of M.E. [Thermal],
[18]	Revised Syllabus of M.E. [Design Engineering],

This is effective from the Academic Year 2013-2014 and onwards.

All concerned are requested to note the contents of this circular and bring the notice to the students, teachers and staff for their information and necessary action.

University Campus,
Aurangabad-431 004.
REF.NO. ACAD/ NP/ M.E./
SYLLABI / 2013/14092-100
V.C.14[7] A-08.
Date:- 15-06-2013.

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Director,
Board of College and
University Development.

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Copy forwarded with compliments to :-

1] The Principals, affiliated concerned Colleges,
Dr. Babasaheb Ambedkar Marathwada University.

2] The Director, University Network & Information Centre, UNIC, with **a request to upload the above all syllabi on University Website [www.bamu.net].**

Copy to :-

1] The Controller of Examinations,
2] The Superintendent, [Engineering Unit],
3] The Programmer [Computer Unit-1] Examinations,
4] The Programmer [Computer Unit-2] Examinations,
5] The Superintendent, [Eligibility Unit] ,
6] The Director, [E-Suvidha Kendra], in-front of Registrar's Quarter,
Dr. Babasaheb Ambedkar Marathwada University,
7] The Record Keeper,
Dr. Babasaheb Ambedkar Marathwada University.

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S/160613/-*

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD.

Revised Syllabus of

M.E. (DIGITAL COMMUNICATION ENGINEERING)

[Effective from -2013 – 2014]

Dr. Babasaheb Ambedkar Marathwada University Aurangabad.

Faculty of Engineering & Technology

Rules and Regulations for M.E. & M.Tech. Courses

- **What is a credit system**

  A credit system is a systematic way of describing an educational program by attaching credits to its components. The definition of credits in higher education systems may be based on different parameters, such as student workload, learning outcomes and contact hours.

- **Advantages of the Credit System**
  - Represents a much-required shift in focus from teacher-centric to learner-centric education since the work load estimated is based on the investment of time in learning, not in teaching.
  - Helps to record course work and to document learner work load realistically since all activities are taken into account-not only the time learners spend in lectures or seminars but also the time they need for individual learning and the preparation of examinations etc.
  - Segments learning experience into calibrated units, which can be accumulated in order to gain and academic award.
  - Helps self-paced learning. Learners may undertake as many credits as they can cope with without having to repeat all the courses in a given semester if they fail in one or more courses. Alternatively, they can choose other courses and continue their studies.

- **What is Grading?**

  The word Grade derived from the Latin word gradus, meaning, step. Grading, in the educational context is a method of reporting the result of a learner's performance subsequent to his evaluation. It involves a set of alphabets which are clearly defined and designated and uniformly understood by all the stake holders. A properly introduced grading system not only provides for a comparison of the learner's performance but it

also indicate the quality of performance with respect to the amount of efforts put in and the amount of knowledge acquired at the end of the courses by the learners.

- **CURRICULUM:**

1.1 Curriculum:

Every program with specialization has a prescribed course structure which in general terms is known as Curriculum. It prescribes course to be studied in each semester; the relevant information containing course structure along with detail syllabus for each course of each program is updated periodically and is uploaded on the website.

1.2 Semesters:

The Faculty of Engineering & Technology implements a credit based curriculum and grade based evolution system for P.G. program is of four semesters. The academic courses are delivered in the first two semesters. Dissertation work is carried out by a student in the third and fourth semester. The first semester begins in the last week of July ends by the last week of November while the second semester begins in the first week of January and ends by the second week of May. Total duration for each semester is generally of 20 weeks including the period of examination, evaluation and grade declaration.

1.3 Course Credit:

Education is organized around the semester-based credit system of study. The prominent features of the credit system are a process of continuous evaluation of a student's performance/progress and flexibility to allow a student to progress at an optimum pace suited to his/her ability or convenience, subject to fulfilling minimum requirements for continuation.

A student's performance/progress is measured by the number of credits that he/she has earned, i.e. completed satisfactorily. Based on the course credits and grades obtained by the student, grade point average is calculated. A minimum grade point average is required to be maintained for satisfactory progress and continuation in the program. Also a minimum number of earned credits and a minimum grade point average should be acquired in order to qualify for the degree. All programmers are defined by the total credit requirement and a pattern of credit distribution over courses of different categories.

1.4 Course credits assignment

Each courses, except a few special courses, has a certain number of credits assigned to it depending upon its lecture, tutorial and laboratory contact hours in a week. This weightage is also indicative of the academic expectation that includes in-class contact and self-study outside of class hours.

Lectures and Tutorials: One lecture or tutorial hour per week per semester is assigned one credit.

Practical/Laboratory: One laboratory hour per week per semester is assigned one credit.

Example: Course: XYZ Engg: 4 credits (3-1-2)

The credits indicated for this course are computed as follows:

3 hours/week lectures = 3 credits

1 hours/week tutorial = 1 credit

2 hours/week practical = 2 x 0.5 = 1 credit

2 hours/week seminar = 2 x 0.5 = 1 credit

Dissertation seminar = 2 x 1= 2 credit

(3-1-2) 3 credit course = (3 h Lectures + 1 h Tutorial + 2 h Practical) per week

= 6 Contact hours per week

1.5 Earning Credits

At the end of every course, a letter grade is awarded in each course for which a student had registered. On obtaining a pass grade, the student accumulates the course credits as earned credits. A student's performance is measured by the number of credits that he/she has earned and by the weighted grade point average.

The credit system enables continuous evaluation of a student's performance, and allows the students to progress at an optimum pace suited to individual ability and convenience, subject to fulfilling minimum requirement for continuation.

1.6 Evaluation System

1. Semester Grade Point Average (SGPA) =

   SUM (course credits in passed courses X earned grade points)

   SUM (Course credits in registered courses)

2. Cumulative Grade Point Average (CGPA) =

   SUM (course credits in passed courses X earned grade points) of all Semester
   ---
   SUM (Course credits in registered courses) of all Semester

3. At the end of M.E & M. Tech Program, student will be placed in any one of the divisions as detailed below.(According to AICTE Handbooks)

   Ist Division with distinction : CGPA $\geq$ 8.25 and above

   Ist Division : CGPA $\geq$ 6.75 and < 8.25

   IInd Division : CGPA $\geq$ 6.75 and < 6.25

As per AICTE Handbook (2013-14), new gradation suggested as follows,

Table 1

Grade Point	Equivalent Range
6.25	55%
6.75	60%
7.25	65%
7.75	70%
8.25	75%

Conversion of CGPA to percentage marks for CGPA $\geq$ 5.0 can be obtained using equations.

Percentage marks = (CGPA X10) – 7.5

An example of these calculations is given below:

Typically one example for academic performance calculations of semester -I

Table 2

Course No. (1)	Course Credit (2)	Grade Awards (3)	Earned Credit (4)	Grade Points (5)	Points Secured (6)=(4) x (5)
Subject 1	4	B	4	6	24
Subject 2	4	C	4	5	20
Subject 3	4	O	4	10	40
Subject 4	4	A+	4	8	32
Subject 5	4	C	4	5	20
Seminar	2	A++	2	9	18
Total	22		22	38	134

1. Semester Grade Point Average (SGPA) = $\frac{(134)}{(22)} = 6.09$

2. Cumulative Grade Point Average (CGPA) =
   Cumulative points earned in all passed courses = 134 (past semester) + 134 (this sem.) = 268

   Cumulative earned credits = 22 (past semesters) +22 (this sem) = 44

   $$\frac{\sum (134 + 134)}{\sum (22 + 22)} = 6.09$$

System Evaluation Table

Table 3

Grade	Grade Points	Marks Obtained (%)			Description Performance
		Regular Semester	Re-Examination	Summer Semester Examination/Re-appear	
O	10	91-100	--	--	Outstanding
A++	09	86-90	91-100	91-100	Excellent
A+	08	76-85	86-90	81-90	Very Good
A	07	66-75	76-85	71-80	Good
B	06	56-65	66-75	61-70	Fair
C	05	46-55	56-65	51-60	Average
D	04	40-45	40-55	40-50	Poor
F	00	Below 40	Below 40	Below 40	Fail
EE					Incomplete
WW					Withdrawal
XX	--	--	--	--	Detained
ABSENT	--	--	--	--	Absent
PP	--	--	--	--	Passed (Audit Course)
NP	--	--	--	--	Not Passed (Audit Course)

Grade Awards:

i) A ten point rating scale shall be used for the evaluation of the performance of the student to provide letter grade for each course and overall grade for the Master's Programme. Grade points are based on the total number of marks obtained by him/her in all the heads of examination of the course. These grade points and their equivalent range of marks are shown separately in Table-4.

Table 4: Ten point grades and grade description

Sr.No.	Equivalent Percentage	Grade Points	Grade	Grade Description
1	90.00 – 100	10	O	Outstanding
2	80.00 – 89.99	9	A++	Excellent
3	70.00 – 79.99	8	A+	Exceptional
4	60.00 – 69.99	7	A	Very Good
5	55.00 – 59.99	6	B+	Good
6	50.00 – 54.99	55	B	Fair
7	45.00 – 49.99	5	C+	Average
8	40.01 – 44.99	4.5	C	Below Average
9	40	4.00	D	Pass
10	<40	0.00	F	Fail

ii) Non appearance in any examination/assessment shall be treated as the student have secured zero mark in that subject examination/assessment.

iii) Minimum D grade (4.00 grade points) shall be the limit to clear/pass the course/subject. A student with F grade will be considered as 'failed' in the concerned course and he/she has to clear the course by reappearing in the next successive semester examinations. There will be no revaluation or recounting under this system.

iv) Every student shall be awarded Grade points out of maximum 10 points in each subject (based on 10 Point Scale). Based on the Grade points obtained in each subject, Semester Grade Point Average (SGPA) and then Cumulative Grade Point Average (CGPA) shall be computed. Results will be announced at the end of each semester and cumulative Grade card with CGPA will be given on completion of the course.

Proposed Coding System of M.E/M.Tech Subjects

Six Digit Code for a subject (PG Course)

	Digits →	1 2 3	4	5 6
Sr. No.	**Branch ↓**	**Branch code**	**Year**	**Subject**
1	Electronics	MEX	PG I year – 6	**Semester –I/III**
2	Communication Engineering	MEC	PG II Year - 7	1-20 Theory
3	Electronics & Telecom.	MET		21-30 Practical
4	Digital Communications	MDC		31 Dissertation-I
5	Embedded System	MES		41-49 Electives
6	Structure Engineering	MSE		**Semester –II/IV**
7	Environmental Engineering	MEV		51-70 Theory
8	Water Resource Engineering	MWR		71-80 Practical
9	Computer Engineering	MCE		81 Dissertation-II
10	Computer Network	MCN		91-99 Electives
11	Software Engineering	MSW		
12	Mechanical Engineering	MME		
13	Thermal Engineering	MTE		
14	CAD/CAM	MCC		
15	Manufacturing	MMF		
16	Heat Power	MHP		
17	Machine Design	MMD		
18	M.Tech Mechanical	MTM		
19	CSE & IT	MCI		
20	Manufacturing Processing Engineering	MMP		

Note: - Kindly, Allot Same Code for same Electives/ subjects for different branches to avoid repetitions of Question papers/settings/assessments.

DEGREE OF MASTAR OF ENGINEERING
(Course with effective from academic year: 2013-2014)

I	1	The examination for the Degree of Master of Engineering will be held in four semesters, M.E. Semester-I, M.E. Semester-II, M.E. Semester-III, and M.E. Semester-IV in case of full time course.
II	**Rules & Eligibility**	
	1	Rule for admission to P.G. Degree course in Engineering and Technology as per rules and regulation of AICTE/DTE & Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.
III	**Evaluation method**	
	1	Each theory course will be of 100 marks and be divided in to internal examination of 20 marks and semester examination of 80 marks (20+80=100 marks). Each practical course will be of 50 marks
	2	There shall be two class tests within a semester. First based on 40% syllabus taught and second based on 60% syllabus taught. The setting of question paper and assessment will be done by the concerned teacher who has taught the syllabus. Average marks obtained out of two examinations will be considered for the preparation of final sectional marks/ grade.
	3	The Question papers in theory subjects shall be set by the Examiners appointed for the purpose by the University on the recommendations of the Board of studies of the concerned PG Course.
	4	The assessment of the term work for any subject will be done by recognized post-graduate teacher.
	5	To pass the examination a candidate must obtain a minimum CGPA of 6.25 (CGPA to the scale of 10).
	6	Candidate who secures CGPA $\geq$ 6.25 and CGPA < 6.75 declared to have passed examination in second class.
	7	Candidate who secures CGPA $\geq$ 6.75 and CGPA < 8.25 declared to have passed examination in first class.
	8	Candidate who secures CGPA $\geq$ 8.25 declared to have passed examination in first class with distinction.

IV	1	In case candidate fails to get D grade in one or more heads of passing examination, he will be allowed at his option, to reappear for only those heads of passing in which he has failed or got less than D grade at subsequent examinations.
	2	The grades obtained by the candidate in any head of passing at the examination will be carried forward unless the candidates reappear for the head of passing in accordance with ref. IV (1)
	3	In case the candidate passes in all heads of passing under M.E. Semester-I, M.E. Semester-II examination and obtained a minimum CGPA of 6.25 in M.E. Semester-I, M.E. Semester-II taken together as required under ref. II(2) above, he will not be allowed to reappear for any head of passing under M.E. Semester-I, M.E. Semester-II in accordance with ref. IV(1)
	4	A candidate will not be allowed to appear for M.E. Semester-III examination unless he passes in all heads of passing under M.E. Semester-I, M.E. Semester-II examination and obtains a minimum CGPA of 6.25 in M.E. Semester-I, M.E. Semester-II taken together under reference II(2).
	5	Whenever a candidate reappears for M.E. Semester-III and M.E. Semester-IV examinations he will have to resubmit the dissertation with suitable modification and must also reappear for oral examination on it.
	6	A candidate registered for M.E. Examination must clear his examination within five years from the date of registration.
V	**Attendance Requirement**	
	1	Each semester of the course shall be treated as a separate unit for calculation of the attendance
	2	A candidate shall be considered to have satisfied the attendance requirement if he/she has attended not less 75% of the class in each subject of all the semesters (Theory, Laboratory, Semester Practical training and Dissertation work) actually conducted up to the end of the semester.
	3	A Candidate, who does not satisfy the attendance required, mentioned as above, shall not be eligible to appear for the Examination of that semester and shall be required to repeat that semester along with regular students later.
	4	The Principal of the concerned College shall display regularly, the list of such candidates who fall short of attendance, on the Notice Boards.

	5	The list of the candidates falling short of attendance shall be sent to the University at least one week prior to the commencement of theory/practical examination, whichever is earlier.
VI		The following are the syllabi in the various subjects of the examination for the Degree of Master of Engineering.

Dr Babasaheb Ambedkar Marathwada University, Aurangabad

Proposed Syllabus Structure of M.E. (Digital Communication) w.e.f. Academic Year 2013-14

Semester-I

Course code	Name of the Subject	Teaching Scheme Contact hours per week				Examination scheme Marks					Duration of Theory Exam	Credit
		L	T	P	Total hrs	Theory	Class Test	Term Work	Viva voce	Total		
ME0601	Advanced Digital Signal Processing	3	1		4	80	20			100	3 Hrs	4
ME0602	Advanced Digital Communication System	3	1		4	80	20			100	3 Hrs	4
MDC603	Mobile and Personal Communication	3	1		4	80	20			100	3 Hrs	4
MDC604	RF MEMS.	3	1		4	80	20			100	3 Hrs	4
MDC(641-642)	Elective -I	3	1		4	80	20			100	3 Hrs	4
MDC621	Digital Signal Processing Simulation Lab			4	4			50	-	50		2
MDC622	System lab-I			2	2				50	50		1
MDC623	Seminar-I			2	2				50	50		1
	Total	**15**	**5**	**8**	**28**	**400**	**100**	**50**	**100**	**650**		**24**

Semester-II

Course code	Name of the Subject	Teaching Scheme Contact hours per week				Examination scheme Marks					Duration of Theory Exam	Credit
		L	T	P	Total hrs	Theory	Class Test	Term Work	Viva voce	Total		
ME0651	Advanced Optimization Techniques	3	1		4	80	20			100	3	4
ME0652	Audio Signal Processing & Coding	3	1		4	80	20			100	3	4
MDC653	Digital Signal Compression.	3	1		4	80	20			100	3	4
ME0654	Advanced Radiation Systems.	3	1		4	80	20			100	3	4
MDC691-693	Elective -II	3	1		4	80	20			100	3	4
MDC671	ARS Lab.			4	4			50	-	50		2
MDC672	System Lab-II			2	2				50	50		1
MDC673	Seminar-II			2	2				50	50		1
	Total	**15**	**5**	**8**	**28**	**400**	**100**	**50**	**100**	**650**	**15**	**24**

Semester III

Course code	Name of the Subject	Teaching Scheme Hrs per week			Examination scheme Marks				Credit
		L	CH	Total hrs	Theory	Term work	Viva voce	Total	
MDC 731	Dissertation Phase I	--	12	12	--	50	50	100	12
	Total	--	**12**	**12**	--	**50**	**50**	**100**	**12**

Semester IV

Course code	Name of the Subject	Teaching scheme Hrs per week			Examination scheme Marks				Credit
		L	CH	Total hrs	Theory	Term work	Viva voce	Total	
MDC 781	Dissertation Phase II	--	20	20	--	100	200	300	20
	Total	--	**20**	**20**	--	**100**	**200**	**300**	**20**
	Grand Total							**1700**	**80**

Elective - I
MDC641 - Genetic Algorithm and Application.
MDC642 - Telecommunication Switching Systems

Elective - II
MDC691- Simulation of Communication Systems and N/W.
MDC692- Microwave Integrated Circuits
MDC693- Wireless Communication Network

L: Lecture hours per week T: Tutorial Hours per week P: Practical hours per week CH: Contact hours

Total Credits = SEM I + SEM II + SEM III + SEM IV
= 24 + 24 + 12 + 20
= 80.

SEMESTER - I

ME0601 - ADVANCED DIGITAL SIGNAL PROCESSING

Teaching Scheme:	Examination Scheme:
Lecture - 03 Hrs	Theory Paper - 80 Marks
Tutorial - 01 Hrs	Class Test - 20 Marks
	Credit:-04

UNIT 1- LTI DISCRETE-TIME SYSTEMS IN THE TRANSFORM DOMAIN (04 HRS)

Types of Linear-Phase transfer functions, Simple Digital Filters, Complementary Transfer Function, Inverse Systems, System Identification, Digital Two-Pairs, Algebraic Stability Test.

UNIT 2-DIGITAL FILTER SRTUCTURE AND DESIGN (08HRS)

All Pass Filters, Tunable IIR Digital Filter, IIR Tapped Cascade Lattice Structures, FIR Cascaded Lattice Structures, Parallel All Pass Realization of IIR Transfer Functions, State Space Structures, Polyphase Structures, Digital Sine Cosine Generator, Computational Complexity of Digital Filter Structures, Design of IIR Filter using pade' approximation, Least Square Design Methods, Design of Computationally Efficient FIR Filters.

UNIT 3-MULTI RATE SIGNAL PROCESSING (08HRS)

Mathematical description of change of sampling rate Interpolation and Decimation , Decimation by an integer factor - Interpolation by an integer factor, Sampling rate conversion by a rational factor, Filter implementation for sampling rate conversion- direct form FIR structures, Polyphasefilter structures, time-variant structures. Multistage implementation of multirate system.

UNIT 4-LINEAR ESTIMATION AND PREDICTION (08HRS)

Linear prediction- Innovations representation of a stationary Random process, Relationship between the filter parameters and the autocorrelation sequence, Autoregressive (AR) & moving average (MA) process,Forward and backward predictions, Solutions of the Normal equations-Levinson-Durbin algorithms. Least mean squared error criterion -Wiener filter for filtering and prediction, FIR Wiener filter and Wiener IIR filters.

UNIT 5-POWER SPECTRAL ESTIMATION (08HRS)

Estimation of spectra from finite duration observation of signals, Non-parametric methods: Bartlett, Welch &Blackmann&Tukey methods. Parametric Methods For Power Spectrum Estimation: Relation between auto correlation & model parameters, Yule-Waker& Burg Methods, MA & ARMA models for power spectrum estimation.

UNIT 6-ADAPTIVE FILTERS (04HRS)

FIR adaptive filters -adaptive filter based on steepest descent method-Widrow-Hoff LMS adaptive algorithm, Normalized LMS. Adaptive channel equalization-Adaptive echo cancellation-Adaptive noise cancellation- Adaptive recursive filters (IIR).

TEXT BOOKS:

1. Digital Signal Processing by Sanjit K Mitra, Tata MCgraw Hill Publications.

2. Digital Signal Processing Principles, Algorithms, Applications by J G Proakis, D G Manolokis, PHI.

REFERENCE BOOKS:

1. Discrete-Time Signal Processing by A V Oppenhiem, R W Schafer, Pearson Education.

2. DSP- A Practical Approach- Emmanuel C Ifeacher Barrie. W. Jervis, Pearson Education.

3. Modern spectral Estimation techniques by S. M .Kay, PHI, 1997

SEMESTER –I

ME0602 – ADVANCED DIGITAL COMMUNICATION SYSTEM

Teaching Scheme:
Lecture - 03 Hrs
Tutorial - 01 Hrs

Examination Scheme:
Theory Paper - 80 Marks
Class Test - 20 Marks
Credit:-04

1. **INTRODUCTION** **(04 HRS)**
   Digital communication system (description of different modules of the block diagram), Complex base band representation of signals, Gram-Schmidt orthogonalization procedure. M-ary orthogonal signals, bi-orthogonal signals, simplex signal waveforms.
2. **MODULATION** **(08 HRS)**
   Pulse amplitude modulation (binary and M-ary, QAM), Pulse position modulation (binary and M-ary), Carrier modulation (M-ary ASK, PSK, FSK, DPSK), Continuous phase modulation (QPSK and variants, MSK, GMSK).
3. **RECEIVER IN ADDITIVE WHITE GAUSSIAN NOISE CHANNELS COHERENT AND NON COHERENT DEMODULATION** **(08 HRS)**
   Matched filter, Correlator demodulator, Square-law, and envelope detection; Detector: Optimum rule for ML and MAP detection Performance: Bit-error-rate, symbol error rate for coherent and non coherent schemes.
4. **BAND-LIMITED CHANNELS** **(10 HRS)**
   Pulse shape design for channels with ISI: Nyquist pulse, Partial response signaling (duobinary and modified duobinary pulses), demodulation; Channel with distortion: Design of transmitting and receiving filters for a known channel and for time varying channel (equalization);Performance: Symbol by symbol detection and BER, symbol and sequence detection, Viterbi algorithm.
5. **SYNCHRONIZATION** **(04 HRS)**
   Different synchronization techniques (Early-Late Gate,MMSE, ML and spectral line methods).
6. **COMMUNICATION OVER FADING CHANNELS** **(06 HRS)**
   Characteristics of fading channels, Rayleigh and Rician channels, receiver performance-average SNR, outage probability, amount of fading and average bit/symbol errorrate.

REFERENCES

1. J. G. Proakis and M. Salehi, *"Fundamentals of Communication Systems"*, Pearson Education, 2005.
2. S. Haykins, *"Communication Systems"*, 5th ed., John wiley, 2008.
3. M. K. Simon, S. M. Hinedi and W. C. Lindsey, *"Digital Communication Techniques: Signaling and detection"*, Prentice Hall India, N. Delhi, 1995.
4. W. Tomasi, *"Advanced Electronic Communication Systems"*, 4th Ed., Pearson Education, 1998.

SEMESTER - I

MDC603 - MOBILE AND PERSONAL COMMUNICATION

Teaching Scheme:
Lecture - 03 Hrs
Tutorial - 01 Hrs

Examination Scheme:
Theory Paper - 80 Marks
Class Test - 20 Marks
Credit:-04

1. **RADIO PROPOGATION** **(8 HRS)**
   Radio Propagation Characteristics, Models for Path loss, Shadowing & Multipath fading-delay spread, Coherence bandwidth, Coherence Time, Doppler Spread.
2. **CHANNEL ALLOCATION & HANDOVER** **(8 HRS)**
   Frequency Reuse, basic theory of hexagonal cell layout, spectrum efficiency, FDM/TDM, Cellular System, channel allocation schemes, Handover analysis, cellular CDMA, Erlang capacity, Antennas for mobile radio and characteristics.
3. **DIGITAL MODULATION AND RECEIVERS** **(4 HRS)**
   Digital modulation for Mobile radio, Analysis under fading channel, diversity techniques and RAKE demodulator.
4. **MULTIPLE ACCESS TECHNIQUES** **(4 HRS)**
   Spread Spectrum Communication, Multiple Access Techniques used in Mobile Wireless Communication.
5. **EQUALIZATION, DIVERSITY AND CODING** **(8 HRS)**
   Linear and Nonlinear Equalization, Adaptive Equalization, Diversity techniques, RAKE Receiver, Speech codes and channel codes.
6. **PCS & SATELLITE SYSTEMS** **(8 HRS)**
   PACS – Architecture, PHS, PCS and ISM bands, satellites for Personal Communication Services, WLL, Cordless telephones.

REFERENCES:

1. T. S. Rappaport, *" Wireless Communications: Principles and Practice"* , 2nd Edition, Pearson Education, Prentice Hall of India, Third Indian Reprint 2003.
2. W. C. Y. Lee, *" Mobile Communications Engineering: Theory and applications "*, 2nd Edition, McGraw-Hill International, 1998.

SEMESTER - I

MDC604 - RF MEMS

Teaching Scheme:
Lecture - 03 Hrs
Tutorial - 01 Hrs

Examination Scheme:
Theory Paper - 80 Marks
Class Test - 20 Marks
Credit:-04

1. **INTRODUCTION TO RF MEMS** **(5 HRS)**
   Introduction to MEMS, RF MEMS, Applications of RF MEMS, Photolithography and detailed MEMS etching process.
2. **SWITCHING** **(7 HRS)**
   RF MEMS relays and switches: Switch parameters, Actuation mechanisms, Bistable relays and micro actuators, Dynamics of switching operation.
3. **COMPONENTS – I** **(7 HRS)**
   MEMS inductors and capacitors: Micromachined inductor, Effect of inductor layout, Modeling and design issues of planar inductor, Gap tuning and area tuning capacitors, Dielectric tunable capacitors.
4. **COMPONENTS – II** **(7 HRS)**
   MEMS phase shifters: Types. Limitations, Switched delay lines, Micromachined transmission lines, coplanar lines, Micromachined directional coupler and mixer.
5. **FILTERS** **(7 HRS)**
   Micromachined RF filters: Modeling of mechanical filters, Electrostatic comb drive, Micromechanical filters using comb drives, Electrostatic coupled beam structures.
6. **ANTENNAS** **(7 HRS)**
   Micromachined antennas: Microstrip antennas – design parameters, Micromachining to improve performance, Reconfigurable antennas.

REFERENCES:

1. V.K.Varadan etal, "*RF MEMS and their Applications*", Wiley, 2003.
2. H.J.DELOS SANTOS : "*RF MEMS circuit Design for Wireless Communications*", Artech House, 2002.
3. G.M.REBEIZ, "*RF MEMS Theory, Design and Technology*", John Wiley, 2003.

SEMESTER - I

MDC641 –GENETIC ALGORITHM AND APPLICATION (EL-1)

Teaching Scheme:
Lecture - 03 Hrs
Tutorial - 01 Hrs

Examination Scheme:
Theory Paper - 80 Marks
Class Test - 20 Marks
Credit:-04

1. **FUNDAMENTALS OF GENETIC ALGORITHM** **(8 HRS)**
   A brief history of evolutionary computation-biological terminology-search space encoding, reproduction-elements of genetic algorithm, genetic modeling, Traditional optimization, comparison of GA and traditional search methods.
2. **GENETIC TECHNOLOGY** **(8 HRS)**
   Steady state algorithm, fitness scaling, coding a multiparameter, mapped, fixedpoint coding Discretization, constraints inversion. Genetic programming, Genetic algorithm in problem solving.
3. **ADVANCED OPERATORS** **(4 HRS)**
   Dominance, diploidy and abeyance-other micro operators-Genetic Algorithm in engineering and optimization.
4. **TECHNIQUES IN GENETIC RESEARCH** **(4 HRS)**
   Natural evolution simulated annealing, Genetic Algorithm in scientific models and theoretical foundations.
5. **COMPUTER IMPLEMENTATION OF GENETIC ALGORITHM** **(8 HRS)**
   Implementing a Genetic Algorithm – computer implementation - low level operator and knowledge based techniques in Genetic Algorithm-Improvement in basic techniques-current applications of genetic algorithms
6. **CURRENT APPLICATIONS OF GA** **(8 HRS)**
   Applications of Genetic based machine learning-Genetic Algorithm and parallel processors, composite laminates, constraint optimization, multilevel optimization, real life problem.

REFERENCES:

1. Melanie Mitchell, "*An introduction to Genetic Algorithm*", Prentice-Hall of India, New Delhi, 2004.
2. David.E.Golberg, "*Genetic algorithms in search, optimization and machine learning*", Addition,Wesley, 1999.
3. S.Rajasekaran and G.A Vijayalakshmi Pai, "*Neural Networks, Fuzzy logic and Genetic Algorithms, Synthesis and Applications*" , Prentice Hall of India, New Delhi, 2003.
4. Nils.J.Nilsson, "*Artificial Intelligence- A new synthesis*", Original Edition, 1999.

SEMESTER - I

MDC642 - TELECOMMUNICATION SWITCHING SYSTEMS (EL-1)

Teaching Scheme:	Examination Scheme:
Lecture - 03 Hrs	Theory Paper - 80 Marks
Tutorial - 01 Hrs	Class Test - 20 Marks
	Credit:-04

1. **CIRCUIT SWITCHING** **(10 HRS)**

   Analog 3-stage matrix space switch, Digital time slot interchange switch, Digital space switch, Digital time-space time switch, Signaling techniques, ISDN and SS7 signaling architecture.

2. **PACKET SWITCHING** **(5 HRS)**

   Basic Banyan architecture, Batcher sorting network, Knockout switch architecture, satellite switch architecture, Sunshine switch architecture, Large 3-stage ATM switch architecture, Input buffered switches.

3. **ATM SWITCHES** **(5 HRS)**

   Shared memory switches, tandem crosspoint switches, wireless ATM switch, IP route lookup, Associated hardware design considerations, Associated signaling architecture. Ethernet and router switches, Multicast and Multi-protocol router switches, Digital cross-connects.

4. **OPTICAL SWITCHING** **(5 HRS)**

   Basic of MEMS, Optical cross-connects, Re-configurable wavelength add-drop multiplexing using MEMS, Optical burst switching node architecture.

5. **OPTICAL SWITCHING APPLICATIONS** **(5 HRS)**

   MPLS/LOBS/variable length packet switches, Photonic GMPLS router characteristics and architecture.

6. **TRAFFIC ENGINEERING AND TELE-TRAFFIC THEORY** **(10 HRS)**

   Markov processes representing traffic, calculation of blocking probability, stationary probability measure for ergodic Markov processes, combinational interpretation, and calculation of blocking probability.

REFERENCES:

1. Tarek S. El-Bawab, "*Optical Switching*".
2. Syed Ali, "*Digital Switching Systems Reliability and Analyze*" - Aug. 1997 McGraw Hill.
3. H Jonathan Chao , Xiaolei Guo,"*Quality of Service Control in High-Speed Networks*".
4. H. Jonathan Chao, Cheuk H.Lam, Eiji Oki,"*Broadband Packet Switching Technologies: A Practical Guide to ATM Switches and IP Routers*".
5. H. Jonathan Chao , "*Quality of Service Control in High-Speed Networks*".
6. P. Gnanasivam M.E., "*Telecommunication and Switching Networks*".

SEMESTER - I

MDC621 - ADSP LAB

Teaching Scheme:	Examination Scheme:
Lecture - NA	Theory Paper - NA
Tutorial - NA	Class Test - NA
Practical Hours:-04 H/Week	Termwork:-50 Marks
	Credit:-02

Students are instructed to frame and perform laboratory assignment based on each of theory course. The assignment should encompass the hardware and software techniques/tools introduced in the concerned subjects and should prove to be useful for the PG program in the relevant field. Assignment should be a full-fledged system design problems with multidimensional solutions suggested.

Student shall submit a laboratory work document based on the assignment performed at the end of semester. The laboratory instructor shall guide the students in framing the assignments and defining the problems pertaining to the said subjects.

SEMESTER - I

MDC622 - SYSTEM LAB – I

Teaching Scheme:	Examination Scheme:
Lecture - NA	Theory Paper - NA
Tutorial - NA	Class Test - NA
Practical Hours-02 H/Week	Practical- 50 Marks
	Credit-01

Individual student will perform the work as per the following guidelines and submit the report based on result obtained and /or study performed under the guidance of respective guide (Minimum 25 pages).

The work will be assessed by two examiners out of which one will be external examiner appointed by the University and second examiner (internal) will be guide itself.

Work to be carried out by student,

1) Student should perform experimentation in any subject of the stream as assign by the respective guide, leading towards concept understanding.
2) Literature survey about the topic, research and development or thrust area subject.
3) Student should study any one of the software from given list and develop a specific software based module using C/C++/Vb/Matlab/VHDL/Microwind/LabView/PSpice/ EDA or ECAD etc.

SEMESTER - I

MDC623 – SEMINAR - I

Teaching Scheme:	Examination Scheme:
Lecture - NA	Theory Paper - NA
Tutorial - NA	Class Test - NA
Hours:-02 H/Week	Seminar:-50 Marks
	Credit:-01

Student should deliver seminar on the state of the art topic in front of the external examiners and internal examiners, staff and student colleagues. Prior to presentation student should carry the details of literature survey form standard references such as international journals and periodicals, recently published reference books etc. student should submit a report on same along with computer based presentation copy to the concerned examiner/guide at the end of seminar. The assessment shall be based on selection of topic its relevance to present context, report documentation and presentation skills.

SEMESTER -II

ME0651 – ADVANCED OPTIMIZATION TECHNIQUES

Teaching Scheme:
Lecture - 03 Hrs
Tutorial - 01 Hrs

Examination Scheme:
Theory Paper - 80 Marks
Class Test - 20 Marks
Credit:-04

1. **INTRODUCTION** **(02 HRS)**
   Optimal problem formulation, Engineering optimization problems, Optimization algorithms.
2. **SINGLE VARIABLE OPTIMIZATION ALGORITHMS** **(06 HRS)**
   Optimality criteria, bracketing methods, region elimination methods, point estimation methods, gradient base, root finding using optimization techniques.
3. **MULTIVARIABLE OPTIMIZATION ALGORITHMS** **(08 HRS)**
   Optimality criteria, unidirectional search, direct Search methods, gradient based methods, computer programs on above methods.
4. **CONSTRAINED OPTIMIZATION ALGORITHMS** **(08 HRS)**
   Kuhn-Tucker conditions, transformation methods, sensitivity analysis, direct search for constrained minimization, linearised search techniques, feasible direction method, generalized reduced gradient method, gradient projection method, computer programs on above methods.
5. **SPECIAL OPTIMIZATION ALGORITHMS** **(08 HRS)**
   Integer programming, Geometric programming, Genetic Algorithms, simulated annealing, global optimization, Computer programs on above methods.
6. **OPTIMIZATION IN OPERATIONS RESEARCH** **(08 HRS)**
   Linear programming problem, simplex method, artificial variable techniques, dual phase method, sensitivity analysis.

REFERENCE BOOKS

1. Deb Kalyanmoy, *"Optimization in Engineering Design"*, PHI, New Delhi.
2. Rao S.S. *"Engineering Optimization"*, John Wiley, New Delhi.
3. Deb Kalyanmoy, *"Multi-objective Algorithms using Evolutionary Algorithms"*, John Wiley, New Delhi.
4. Paplambros P.Y. and Wilde D.J., *"Principles of Optimum Design: Modeling and Computation"*, Cambridge University Press, UK
5. Chandrupatla, *"Optimization in Design"*, PHI, New Delhi.

SEMESTER -II

ME0652 – AUDIO SIGNAL PROCESSING AND CODING

Teaching Scheme:
Lecture - 03 Hrs
Tutorial - 01 Hrs

Examination Scheme:
Theory Paper - 80 Marks
Class Test - 20 Marks
Credit:-04

1. **FUNDAMENTALS OF SPEECH** **(04 HRS)**
   Nature of Speech, type of speech, voiced an unvoiced decision making, audio file formats, process of speech production, acoustic theory of speech production.
2. **DIGITAL MODELS FOR THE SPEECH SIGNAL** **(08 HRS)**
   Lossless tube models and Digital models for speech signals, time domain model for speech processing, time dependent processing of speech, parameter of speech: pitch &formats, fundamental frequency or pitch frequency, Parallel Processing Approach for calculation of pitch frequency, pitch period measurement using spectral domain, Spectral domain, estimation of formats.
3. **SPECTRAL PARAMETER OF SPEECH** **(04 HRS)**
   Homomorphic Processing, Cepstal analysis of speech, the auditory system as a filter bank, perceptual linear prediction, log frequency power coefficients, relative Spectral perceptual linear prediction, short-time spectral analysis of speech, wavelet transformation analysis of speech.
4. **SPEECH QUANTIZATION AND CODING** **(08 HRS)**
   Uniform and non-uniform quantization and coder, companded quantizer, waveform coding of speech, comparison of different waveform coding techniques, parameter speech coding technique, mixed excitation linear prediction coder, multi-mode speech coding, transform domain coding of speech.
5. **SHORT TIME FOURIER ANALYSIS** **(08 HRS)**
   Linear filtering interpretation, filter bank summation method, overlap addition method, design of digital filter bank, implementation using FFT, spectrographic displays, pitch detection, analysis by synthesis, analysis sysnthesis system, homomorphic speech processing: homomorphic system for convolution, complex spectrum, pitch detection, format estimation , homomorphic vocoder.

6. **SPEECH SYNTHESIS AND SPEECH PROCESSING APPLICATION (08 HRS)**

A text to speech system, synthesizer technologies, speech sysnthesis using other methods, speech transformations, emotion recognition from speech, speech recognition for ASR, statical sequence recognition for ASR, VQ-HMM- based speech recognition, word spotting/key-word spotting, speaker recognition, speech enhancement, adaptive echo cancellation, audio processing: auditory perception and psychoacoacoustis masking frequency and loudness perception, spatial perception, digital audio, audio coding, high quality, low bit rate, audio coding standard, MPEG, AC-3.

TEXT BOOKS:

1. L.R.Rabiner and R.W. Schafer, *"Digital processing of speech signal"* Pearson Education (Asia) Pte.Ltd, 2004
2. D.O'Shaughnessy, *"Speech Communication: Human and Machine"*, Universities Press2001
3. L.R. Rabiner and B.Juang, *"Fundamentals of Speech Recognition"*, Pearson Education Pte.Ltd, 2004
4. Z.Li and M.S. Drew, *"Fundamentals of Multimedia"*, Pearson Education Pte.Ltd, 2004

REFERENCEBOOK:

1. C Becchetti & L P Ricotti, *"Speech Recognition Theory & C++ Implementation"*, John Wiley & Sons
2. B Gold & N. Morga +n, *"Speech & Audio Signal Processing"*, John Wiley & Sons.

SEMESTER -II

MDC653 - DIGITAL SIGNAL COMPRESSION

Teaching Scheme:	Examination Scheme:
Lecture - 03 Hrs	Theory Paper - 80 Marks
Tutorial - 01 Hrs	Class Test - 20 Marks
	Credit:-04

1. **INTRODUCTION** **(4 HRS)**

   Overview of information theory - redundancy. Need for Compression – evolution of data compression and its applications -Taxonomy of compression techniques.

2. **SOURCE CODING TECHNIQUES** **(4 HRS)**

   Overview of source coding, source models, scalar and vector quantization theory, rate distribution theory, vector quantisation, structure quanitizers. Evaluation techniques-error analysis and methodologies.

3. **TEXT COMPRESSION** **(8 HRS)**

   Compaction techniques – Huffmann coding – Adaptive Huffmann Coding – Arithmatic coding – Shannon-Fano coding – Dictionary techniques – LZW family algorithms.

4. **AUDIO COMPRESSION** **(8 HRS)**

   Audio signal representation, compression techniques Frequency domain and filtering – Basic subband coding – G.722– MPEG audio, progressive encoding for audio – Silence compression, speech compression techniques –Vocoders.

5. **IMAGE COMPRESSION** **(8 HRS)**

   Predictive techniques – DM, PCM, DPCM: Optimal Predictors and Optimal Quantization – Contour based compression, Quad trees – Transform Coding – JPEG Standard – Sub-band coding algorithms: Design of Filter banks – Wavelet based compression: EPIC, SPIHT coders – JPEG 2000 standards - JBIG, JBIG2 standards.

6. **VIDEO COMPRESSION** **(8 HRS)**

   Video compression techniques and standards – MPEG Video Coding – Motion estimation and compensation techniques – H.261 Standard – DVI technology – PLV performance – DVI real time compression.

REFERENCES:

1. Khalid Sayood, "*Introduction to Data Compression*", Morgan Kauffman Harcourt India, 2nd Edition, 2000.
2. David Salomon, " *Data Compression*", the Complete Reference, Springer Verlag New York Inc., 2nd Edition, 2001.
3. Yun Q.Shi, Huifang Sun, "*Image and Video Compression for Multimedia Engineering*".
4. "*Fundamentals, Algorithms & Standards*", CRC press, 2003.
5. Peter Symes, "*Digital Video Compression*", McGraw Hill Pub., 2004.
6. Mark Nelson, "*Data compression*", BPB Publishers, New Delhi,1998.
7. Mark S.Drew, Ze-Nian Li, " *Fundamentals of Multimedia*", PHI, 1st Edition, 2003.
8. Watkinson.J, "*Compression in Video and Audio*", Focal press, London, 1995.
9. Jan Vozer, "*Video Compression for Multimedia*", AP Profes, NewYork, 1995.

SEMESTER -II

MDC654 - ADVANCED RADIATION SYSTEMS

Teaching Scheme:	Examination Scheme:
Lecture - 03 Hrs	Theory Paper - 80 Marks
Tutorial - 01 Hrs	Class Test - 20 Marks
	Credit:-04

1. **PLANAR ANTENNAS** **(5 HRS)**
   Introduction to planar antennas, Types, Antenna parameters, VSWR, Reflection coefficient, Return loss bandwidth, Impedance bandwidth, Circular polarization, Axial ratio, Antenna efficiency and Radiation efficiency.
2. **MICROSTRIP ANTENNAS** **(5 HRS)**
   Microstrip Antennas: Rectangular and circular patch antennas- Analysis and design, Feeding methods; Circularly polarized microstrip antennas.
3. **CPW ANTENNAS** **(5 HRS)**
   CPW antennas; Design procedure of CPW feed. Two examples of CPW fed antennas.
4. **ARRAY CONCEPT AND PLANAR ANTENNA ARRAYS** **(10 HRS)**
   Array Theory – Linear array; Broadside and end fire arrays; Planar array: array factor, beam-width, directivity; Design examples (2x2) of microstrip patch arrays (RMSA and CMSA) and feed networks.
5. **BANDWIDTH ENHANCEMENT TECHNIQUES** **(10 HRS)**
   Broadband Antennas: Bandwidth enhancement techniques; Slot antennas, Feed variations, Thick and air filled substrates, Coplanar capacitive coupled probe fed microstrip antennas.
6. **ANTENNAS FOR MOBILE COMMUNICATION** **(5 HRS)**
   Handset antennas, Base station antennas; Beam-steering and antennas for MIMO applications; miniaturized antennas, Micromachined antennas, Active and smart microstrip antennas.

REFERENCES:

1. C. A. Balanis, "*Antenna Theory and Design*", John Wiley & Sons, 1997.
2. J. D. Kraus, "*Antennas*", McGraw-Hill, 1988.
3. R. Garg, P. Bharhia, I. Bahl, and A. Ittipiboon, "*Microstrip Antenna Design Handbook*", Artech House.
4. J. R. James, P.S. Hall and C. Wood, "*Microstrip Antennas: Theory & Design*", Peter Peregrinns UK.
5. G Kumar and K P Ray, "*Broadband Microstrip Antennas*" Artech House, 2003.

SEMESTER -II

MDC691 – SIMULATION OF COMMUNICATION SYSTEMS AND NETWORKS (EL-II)

Teaching Scheme:
Lecture - 03 Hrs
Tutorial - 01 Hrs

Examination Scheme:
Theory Paper - 80 Marks
Class Test - 20 Marks
Credit:-04

1. **MODELING OF COMMUNICATION SYSTEM** **(5 HRS)**
   Model of speech and picture signals, Pseudo noise sequences, Non-linear sequences, Analog channel model, Noise and fading.
2. **DIGITAL CHANNEL MODELS** **(5 HRS)**
   Digital channel model-Gilbert model of busty channels, HF, Troposcatter and satellite channels, Switched telephone channels, Analog and Digital communication system models, Light wave system models.
3. **SIMULATION OF RANDOM VARIABLES** **(5 HRS)**
   Univariate and multivariate models, Transformation of random variables, Bounds and approximation,
4. **RANDOM PROCESS** **(5 HRS)**
   Random process models-Markov AND a ARMA Sequences, Sampling rate for simulation, Computer generation and testing of random numbers.
5. **ESTIMATION OF PERFORMANCE MEASURES** **(10 HRS)**
   Quality of an estimator, estimator for SNR, Probability density functions of analog communication system, BER of digital communication systems, Montre carlo method and Importance sampling method, estimation of power spectral density of a process.
6. **COMMUNICATION NETWORKS** **(10 HRS)**
   Queuing models, M/M/I and M/M/I/N queues, Little formula, Burke's theorem, M/G/I queue, Embedded Markov chain analysis of TDM systems, Polling, Random access systems.

REFERENCES:

1. M.C.Jeruchim,Philip Balaban and K.Sam Shanmugam,"*Simulation of communication systems*", Plenum Press, New York, 1992.
2. A.M.Law and W.David Kelton, "*Simulation Modelling and Analysis*", Mc Graw Hill Inc.,New York , 1991.
3. J.F.Hayes, "*Modeling and Analysis of Computer Communication Networks*", Plenum Press, New York, 1984. Jerry Banks and John S.Carson, "*Discrete-event System Simulation*", Prentice Hall, Inc., New Jersey, 1984.

SEMESTER -II

MDC692 - MICROWAVE INTEGRATED CIRCUITS (EL-II)

Teaching Scheme:	Examination Scheme:
Lecture - 03 Hrs	Theory Paper - 80 Marks
Tutorial - 01 Hrs	Class Test - 20 Marks
	Credit:-04

1. **MICRO STRIP LINES-DESIGN & ANALYSIS (8 HRS)**
   Analysis of MIC by conformal transformation, Numerical analysis, Strip line, Parallel Strip line, Mictrostripline, Losses in Microstrip, Slot lines and Coplanar wave guide.
2. **COPLANAR WAVE GUIDE TRANSMISSION LINES (4 HRS)**
   Introduction to CPW lines, Analysis, Micromachining for performance improvement of CPW lines, Two examples reported in literature.
3. **POWER DIVIDER, DIRECTIONAL COUPLERS AND LUMPED ELEMENTS FOR MICS (8 HRS)**
   Wilkinson power divider, Even and odd analysis, Directional couplers, branch line couplers, Bethe Hole coupler, Couple line coupler, The 180 degree Hybrid,-Ring hybrid, Design of Lumped elements for MICs.
4. **COMPONENTS AND ACTIVE DEVICES FOR MICS (8 HRS)**
   Microwave Transistors, Parametric diodes and amplifiers, PIN diodes, Transferred electron devices, IMPATT, BARITT, Microwave Tunnel diode.
5. **MICROVE FILTERS AND IMPEDANCE MATCHING (8 HRS)**
   Impedance transformers, Single stub tuning, Double Stub Tuning, Quarter wave transformer , Chebyshev multisection matching Transformer, filters, Periodic Structures, Filter Design by the image parameter method, Constant K filter, m derived filter.
6. **MMIC TECHNOLOGY (4 HRS)**
   Fabrication process of MMIC, Hybrid Integrated circuit fabrication, thin film technology, planar resistor film, planar inductor film, planar capacitor film.

REFERENCES:

1. David M Pozer. "*Microwave Engineering*" John Wiley & Sons ,New York.
2. Gupta K.C. & Amarjit Singh, "*Microwave Integrated Circuits*" John Willey New York 1971.
3. Samuel Y. Liao, "*Prentice Hall of India Private Ltd*" New Delhi 1995.

SEMESTER -II

MDC693 – WIRELESS COMMUNICATION NETWORKS (EL-II)

Teaching Scheme:	Examination Scheme:
Lecture - 03 Hrs	Theory Paper - 80 Marks
Tutorial - 01 Hrs	Class Test - 20 Marks
	Credit:-04

1. **CELLULAR CONCEPT AND WIRELESS STANDARDS** **(8 HRS)**
   Frequency reuse, Channel Assignment Strategies, Hand off Strategies, Interference and System Capacity, Trunking and Grade of Service, Improving coverage and capacity in cellular systems, interference suppression and power control, multiple access schemes Standards - GSM, IS-95,UMTS, IMT-2000.
2. **WIRELESS NETWORKING** **(8 HRS)**
   1G, 2G, 3G wireless networks, Fixed Network Transmission Hierarchy, Traffic Routing in Wireless Networks, Wireless Data Services, CCS, ISDN, SS7, PCS/PCNs, Protocols for network access, Network Data bases.
3. **WIRELESS LAN** **(4 HRS)**
   Types of Networks, IEEE 802.11, System and Protocol Architecture, Physical and Medium Access Control Layers, MAC management,802.11b, 802.11a, HIPERLAN.
4. **BLUE TOOTH** **(4 HRS)**
   Blue tooth Architecture, radio layer, base band layer, link manager protocol, L2CAP, Security, SDP, Profiles, 802.15.
5. **MOBILE NETWORK AND TRANSPORT LAYERS** **(8 HRS)**
   Mobile IP, mobile adhoc network – Routing, DSDV, DSR, Traditional TCP, TCP improvements, Indirect TCP, Snooping TCP, mobile TCP, TCP over 2.5 / 3G wireless networks, MAC layer scheduling and connection admission in mobile communication.
6. **TRAFFIC MODELING** **(8 HRS)**
   Tele-traffic modeling and Queuing theoretic analysis of cellular mobile networks, Resource allocation and mobility management.

REFERENCES:

1. Joschen Schiller , "*Mobile Communication*", Pearson Education 2003
2. T.S.Rappaport, "*Wireless Communications: Principles and Practice*", Second Edition, Pearson Education/ Prentice Hall of India, Third Indian Reprint 2003.
3. R. Blake, "*Wireless Communication Technology*", Thomson Delmar, 2003.

4. W.C.Y Lee, "*Mobile Cellular Telecommunications Systems*", McGraw Hill, International Editions 1990.
5. David Tse and Pramod Viswanath, "*Fundamentals of wireless communication*" Cambridge University Press, 2005.

SEMESTER -II

MDC671 – ARS LAB

Teaching Scheme:	Examination Scheme:
Lecture - NA	Theory Paper - NA
Tutorial - NA	Class Test - NA
Practical Hours:-04 H/Week	Termwork:-50 Marks
	Credit:-02

Students are instructed to frame and perform laboratory assignment based on each of theory course. The assignment should encompass the hardware and software techniques/tools introduced in the concerned subjects and should prove to be useful for the PG program in the relevant field. Assignment should be a full-fledged system design problems with multidimensional solutions suggested.

Student shall submit a laboratory work document based on the assignment performed at the end of semester. The laboratory instructor shall guide the students in framing the assignments and defining the problems pertaining to the said subjects.

SEMESTER -II

MDC672 – SYSTEM LAB - II

Teaching Scheme:	Examination Scheme:
Lecture - NA	Theory Paper - NA
Tutorial - NA	Class Test - NA
Practical Hours-02 H/Week	Practical- 50 Marks
	Credit-01

Individual student will perform the work as per the following guidelines and submit the report based on result obtained and /or study performed under the guidance of respective guide (Minimum 25 pages).

The work will be assessed by two examiners out of which one will be external examiner appointed by the University and second examiner (internal) will be guide itself.

Work to be carried out by student,

1) Student should perform experimentation in any subject of the stream as assign by the respective guide, leading towards concept understanding.
2) Literature survey about the topic, research and development or thrust area subject.
3) Student should build any one of the software/Hardware based mini project as per guidelines given by respective committee and/or guide.

SEMESTER -II

MDC673 – SEMINAR - II

Teaching Scheme:	Examination Scheme:
Practical - 2 Hrs/Week	Practical - 50 Marks
	Credit: 01

Student should deliver seminar on the state of the art topic infront of the external examiners and internal examiners, staff and student colleagues. Prior to presentation student should carry the details of literature survey form standard references such as international journals and periodicals, recently published reference books etc. student should submit a report on same along with computer based presentation copy to the concerned examiner/guide at the end of seminar. The assessment shall be based on selection of topic its relevance to present context, report documentation and presentation skills.

SEMESTER-III

MDC731 – DISSERTATION-I

Teaching Scheme:	Examination Scheme:
Lecture - NA	Theory Paper - NA
Tutorial - NA	Class Test - NA
Hours:-12 H/Week	Termwork:-50 Marks
	Practical Oral-50 marks
	Credit:-12

The dissertation Seminar will consist of a type written report covering the topic selected for Final Dissertation. This should include the literature survey, technical details and related data required for the proposed dissertation work. The candidate shall deliver the dissertation seminar on the topic which will be judged by two examiners (one external and one internal guide). The assessment shall be based on selection of topic its relevance to present context, report documentation and presentation skills, utility of the dissertation work & publications based on the same.

SEMESTER-IV

MDC781 – DISSERTATION-II

Teaching Scheme:	Examination Scheme:
Lecture - NA	Theory Paper - NA
Tutorial - NA	Class Test - NA
Hours:-20 H/Week	Termwork:-100 Marks
	Practical Oral-200 marks
	Credit:-20

The student shall be allowed to submit the dissertation- II report only after the completion of dissertation- I. Student should deliver Viva-Voca Presentation on topic of Dissertation-II in front of the external examiners and internal examiners, staff and student colleagues The assessment shall be based on design and implementation aspects, report documentation and presentation skills, utility of the dissertation work & publications based on the same.