36 A.C / MINUTES

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GURU GOBIND SINGH INDRAPRASTHA UNIVERSITY

GURU GOBIND SINGH INDRAPRASTHA UNIVERSITY

THIRTY SIXTH MEETING

OF THE

ACADEMIC COUNCIL

DATE : 19th Feb' 2014 (Wednesday)

TIME : 11.3 0 a.m. onwards

VENUE : VC SECTT., (Conference hall)

PROCEEDINGS

SECTOR – 16C, DWARKA, NEW DELHI

THIRTY SIXTH MEETING OF THE ACADEMIC COUNCIL TO BE HELD ON 19th Feb' 2014 (Wednesday)

INDEX OF AGENDA ITEMS

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before such appointment. Finally it was resolved that the Vice Chancellor may constitute a committee which may look into the matter and submit a feasibility report in the next Academic Council meeting.

Agenda Item No. 36.11: **Presentation by Prof. A .K. Narula regarding progress of the Centre for Pharmaceutical Technology.**

Prof. A .K. Narula did not appear for the presentation.

Agenda Item No. 36. 12: **To consider introduction of M.Tech (Robotics and Automation) programme besides provision to offer Doctorate Degree (Ph.D) in all post graduates programmes to be conducted at the University School of Information &Communication Technology w.e.f., academic session 2014-15**

The Academic Council approved for introduction of M.Tech (Robotics and Automation) programme, to be implemented after completing the exercise of syllabus formulation and related modalities w.e.f, academic session 2015-2016 besides provision to offer Doctorate Degree (Ph.D) in all post graduate programmes conducted at the University School of Information and Communication Technology w.e.f., academic session 2014-2015. The academic council further suggested that the same provision may also be applied to other schools of the University.

Agenda Item No. 36.13: **To consider and approve the scheme and syllabus alongwith modifications in various M.Tech Programmes conducted by the University School of Information and Communication Technology.**

The Academic Council approved the scheme and syllabi alongwith modifications in various M.Tech Programmes conducted by the University School of Information and Communication Technology as proposed.

Scheme and Syllabus for

Master of Technology Programmes of Study

(Computer Science & Engineering,
Electronics & Communication Engineering)
(Regular and Weekend)

And

Information Technology (Regular)

Entrepreneurship | Employability | Skill Development

Guru Gobind Singh Indraprastha University
Sector - 16 C, Dwarka New Delhi - 110 078, India
www.ipu.ac.in

Programme Outcomes

PO1: An ability to independently carry out research /investigation and development work to solve practical problems

PO2: An ability to write and present a substantial technical report/document

PO3: Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program

PO4: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

M.Tech (CSE) Regular

Programme Educational Objectives

PEO1: To develop students to critically analyze the problems in the field of Computer Science & Engineering and find optimal solutions.

PEO2: To train students to conduct research and experiments by applying appropriate techniques and tools with an understanding of the limitations for sustainable development of society.

PEO3: To prepare students to act as a member and leader of the team to contribute positively to manage projects efficiently in the field of Computer Science & engineering.

PEO4: To train the students to effectively communicate, write reports, create documentation and make presentations by adhering to appropriate standards.

PEO5: To stimulate students for life-long learning with enthusiasm and commitment to improve knowledge and competence continuously.

CO-PEO Matrix*

Filled on a scale of 1 to 3 (3=High; 2=Moderate; 1=Low; '-'for no correlation)

Course Outcomes	PEO1	PEO2	PEO3	PEO4	PEO5
PO1	3	3	2	2	2
PO2	3	1	2	3	1
PO3	3	3	3	2	3
PO4	1	2	3	2	2

SCHEME OF EXAMINATION

Master of Technology (Computer Science & Engineering)

(Regular Programme)

First Semester

Code No.	Paper	L	T/P	Credits
Theory Papers				
MECS-601	Advanced Data Structures	4	-	4
MECS -603	Advanced Software Engineering	4	-	4
MECS -605	Advances in Data & ComputerCommunications	4	-	4
Electives (Choose any TWO)				
MECS -607	Advanced Computer Architecture	4	-	4
MECS -609	Enterprise Computing using JAVA	4	-	4
MECS-611	Computational Techniques usingMATLAB	4	-	4
MEEC-613	Mathematical Statistics & Data Analysis	4	-	4
MECS- 613	Advanced Operating Systems	4	-	4
MECS- 615	Theory of Computation	4	-	4
Practicals				
MECS-651	Lab-I (ADS Lab)	0	2	1
MECS-653	Lab-II (ASE Lab)	0	2	1
MECS-655	Lab-III (ADCC Lab)	0	2	1
MECS-657*	Term paper I	-	-	2
Total		**20**	**6**	**25**

Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The term paper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by thedean shall evaluate the student.

*Non University Exam System

SCHEME OF EXAMINATION

Master of Technology (Computer Science & Engineering)

(Regular Programme)

Second Semester

Paper Code	Subject	L	T/P	Credits
MECS-602	Object Oriented Analysis and Design	4	-	4
MECS-604	Advanced Data Base Management System	4	-	4
MECS-606	Advanced Algorithm Analysis & Design	4	-	4
Electives (Choose any Two)				
MEEC-618	ESD Using ARM microcontroller	4	-	4
MEEC-604	Advanced Signal Processing	4	-	4
MECS-608	Software Requirement & Estimation	4	-	4
MECS-610	Network Programming	4	-	4
MECS-612	Soft Computing	4	-	4
MEEC-612	Cellular & Mobile Communication	4	-	4
MECS-614	Modelling & Simulation	4	-	4
MECS-616	Software Metrics	4	-	4
MEIT-604	Advanced Software Project Management	4	-	4
MECS- 620	Distributed Computing	4	-	4
MECS-624	Advanced Computer Graphics	4	-	4
MESP-612	Digital Image Processing	4	-	4
MEIT-608	Web Semantics	4	-	4
Practicals				
MECS -652	Lab-IV (OOAD Lab)	-	2	1
MECS-654	Lab-V (ADBMS Lab)	-	2	1
MECS -656	Lab-VI (AAAD Lab)	-	2	1
MECS-658*	Term paper II	-	-	2
	Total	**20**	**6**	**25**

Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The term paper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by thedean shall evaluate the student.

*Non University Exam System

SCHEME OF EXAMINATION
Master of Technology (Computer Science & Engineering)
(Regular Programme)

Third Semester

Paper Code	Paper	L	T/P	Credits
MECS-701	Advanced Data Warehousing & Data Mining	4	-	4
MECS-703	Advanced Software Testing	4	-	4
Electives (Choose any Three)				
MEEC-707	Artificial Neural Networks	4	-	4
MECS- 705	Cloud Computing	4	-	4
MECS-707	E-Commerce & Applications	4	-	4
MECS-709	Information Storage & Management	4	-	4
MECS-711	Software Quality Management	4	-	4
MECS-713	Advanced Digital Signal Processing	4	-	4
MECS-715	Advanced Multimedia	4	-	4
MECS-717	Cyber Crime Investigations and Cyber Forensics	4	-	4
MECS-719	Distributed Databases	4	-	4
MECS-721	Network Management	4	-	4
MEEC-705	Embedded Systems & RTOS	4	-	4
MEIT-703	Information Theory & Coding	4	-	4
Practicals				
MECS-751	Lab-VII (ADWDM Lab)	-	2	1
MECS-753	Lab-VIII (AST Lab)	-	2	1
MECS-755*	Term Paper III	-	-	2
MECS-757	Minor Project	-	-	4
	Total	**20**	**4**	**28**

Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The termpaper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by thedean shall evaluate the student

Minor Project: For the minor project a supervisor shall be allocated by the school, in the area of interest of the student.The student has to submit a report at the end duly approved by the supervisor for evaluation

NUES: Non University Evaluation Scheme

SCHEME OF EXAMINATION
Master of Technology (Computer Science & Engineering)
(Regular Programme)

Fourth Semester

Paper Code	Subject	L/P	Credits
MECS – 752	Dissertation	-	24
MECS- 754*	Seminar & Progress Report	-	4
MECS-756*	Term paper IV	-	2
	TOTAL	-	**30**

Dissertation: For thedissertaion a supervisor shall be allocated by the school, in the area of interest of the student.The student has to submit a report at the end duly approved by the supervisor for evaluation.

Seminar & Progress report: Seminar shall be given by the student at scheduled times together with the progress report of the dissertation.

Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The term paper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by thedean shall evaluate the student.

***Non University Exam System**

NOTE:

1. The total number of credits of the Programme M. Tech. = 108.
2. Each student shall be required to appear for examination in all courses, But for the award of the degree a student shall be required to earn the minimum of 100 credits out of 108. However only Elective Courses and Term papers may be dropped towards counting for total credits of 100 to award M. Tech. Degree.

M.Tech (CSE) Weekend

Programme Educational Objectives

PEO1: To develop students to critically analyze the problems in the field of Computer Science & Engineering and find optimal solutions.

PEO2: To train students to conduct research and experiments by applying appropriate techniques and tools with an understanding of the limitations for sustainable development of society.

PEO3: To prepare students to act as a member and leader of the team to contribute positively to manage projects efficiently in the field of Computer Science & engineering.

PEO4: To train the students to effectively communicate, write reports, create documentation and make presentations by adhering to appropriate standards.

PEO5: To stimulate students for life-long learning with enthusiasm and commitment to improve knowledge and competence continuously

SCHEME OF EXAMINATION

M.Tech. (Computer Science and Engineering)
Weekend Programme

First Semester

Code No.	Paper	L	T/P	Credits
Theory Papers				
MECS-601	Advanced Data Structures	4	-	4
MECS -603	Advanced Software Engineering	4	-	4
Electives (Choose any One)				
MECS -607	Advanced Computer Architecture	4	-	4
MECS -609	Enterprise Computing using JAVA	4	-	4
MECS-611	Computational Techniques usingMATLAB	4	-	4
MECS- 613	Advanced Operating Systems	4	-	4
MECS- 615	Theory of Computation	4	-	4
Practical				
MECS-671	ADS Lab	0	2	1
MECS-673	ASE lab	0	2	1
MECS-675*	Term paper I	-	-	2
Total		**12**	**4**	**16**

Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The term paper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by thedean shall evaluate the student.

*Non University Exam System

SCHEME OF EXAMINATION

M.Tech. (Computer Science and Engineering)
Weekend Programme

Second Semester

Paper Code	Subject	L	T/P	Credits
MECS -604	Advanced Data Base Management System	4	-	4
MECS -606	Advanced Algorithm Analysis & Design	4	-	4
Electives (Choose any One)				
MEEC-618	ESD Using ARM microcontroller	4	-	4
MECS-608	Software Requirement & Estimation	4	-	4
MECS-610	Network Programming	4	-	4
MECS-624	Advanced Computer Graphics	4	-	4
Practicals				
MECS -672	ADBMS Lab	-	2	1
MECS-674	AAAD Lab	-	2	1
MECS-676*	Term paper II	-	-	2
	Total	**12**	**4**	**16**

Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The term paper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by thedean shall evaluate the student.

*Non University Exam System

SCHEME OF EXAMINATION

M.Tech. (Computer Science and Engineering)
Weekend Programme

Third Semester

Paper Code	Paper	L	T/P	Credits
MECS-701	Advanced Data Warehousing & DataMining	4	-	4
MECS -605	Advances in Data & Computer Communications	4	-	4
Electives (Choose any One)				
MEEC-707	Artificial Neural Networks	4	-	4
MECS- 705	Cloud Computing	4	-	4
MECS-707	E-Commerce & Applications	4	-	4
MECS-715	Advanced Multimedia	4	-	4
MEEC-613	Mathematical Statistics & Data Analysis	4	-	4
Practicals				
MECS-771	Adv. Data Warehousing & Data MiningLab	-	2	1
MECS-773	Ad. In Data & Computer CommunicationLab	-	2	1
MECS-775*	Term Paper III	-	-	2
	Total	**12**	**4**	**16**

Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The term paper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by thedean shall evaluate the student.

*Non University Exam System

SCHEME OF EXAMINATION

M.Tech. (Computer Science and Engineering)
Weekend Programme

Fourth Semester

Paper Code	Subject	L	T/P	Credits
MECS-602	Object Oriented Analysis and Design	4	-	4
Electives (Choose any Two)				
MEEC-604	Advanced Signal Processing	4	-	4
MECS-612	Soft Computing	4	-	4
MEEC-612	Cellular & Mobile Communication	4	-	4
MECS-614	Modelling & Simulation	4	-	4
MECS-616	Software Metrics	4	-	4
MEIT-604	Advanced Software Project Management	4	-	4
MECS- 620	Distributed Computing	4	-	4
MESP-612	Digital Image Processing	4	-	4
MEIT-608	Web Semantics	4	-	4
Practicals				
MECS -772	OOAD Lab	-	2	1
MECS- 774*	Term paper IV	-	-	2
	Total	**12**	**4**	**15**

Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The term paper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by thedean shall evaluate the student.

*Non University Exam System

SCHEME OF EXAMINATION

M.Tech. (Computer Science and Engineering)
Weekend Programme

Fifth Semester

Paper Code	Paper	L	T/P	Credits
MECS-703	Advanced Software Testing	4	-	4
Electives (Choose any Two)				
MECS-709	Information Storage & Management	4	-	4
MECS-711	Software Quality Management	4	-	4
MECS-713	Advanced Digital Signal Processing	4	-	4
MECS-717	Cyber Crime Investigations and CyberForensics	4	-	4
MECS-719	Distributed Databases	4	-	4
MECS-721	Network Management	4	-	4
MEEC-705	Embedded Systems & RTOS	4	-	4
MEIT-703	Information Theory & Coding	4	-	4
Practicals				
MECS-871	Ad. Software Testing Lab	-	2	1
MECS-873	Minor Project	-	-	4
	Total	**12**	**2**	**17**

Minor Project: For the minor project a supervisor shall be allocated by the school, in the area of interest of the student.The student has to submit a report at the end duly approved by the supervisor for evaluation

SCHEME OF EXAMINATION

M.Tech. (Computer Science and Engineering)
Weekend Programme

Sixth Semester

Paper Code	Subject	L/P	Credits
MECS - 872	Dissertation	-	24
MECS- 874*	Seminar & Progress Report	-	4
	TOTAL	-	**28**

Dissertation: For the dissertation, a supervisor shall be allocated by the school, in the area of interest of the student.The student has to submit a report at the end duly approved by the supervisor for evaluation.

Seminar & Progress report: Seminar shall be given by the student at scheduled times together with the progress report of the dissertation.

NOTE:

1. The total number of credits of the Programme M. Tech. = 108.
2. Each student shall be required to appear for examination in all courses, But for the award of the degree a student shall be required to earn the minimum of 100 credits out of 108. However only Elective Courses and Term papers may be dropped towards counting for total credits of 100 to award M. Tech. Degree.

M.Tech (IT) Regular

Programme Educational Objectives

PEO1: To develop students to critically analyze the problems in the field of information Technology and find optimal solutions.

PEO2: To train students to conduct research and experiments by applying appropriate techniques and tools with an understanding of the limitations for sustainable development of society.

PEO3: To prepare students to act as a member and leader of the team to contribute positively to manage projects efficiently in the field of information Technology.

PEO4: To train the students to effectively communicate, write reports, create documentation and make presentations by adhering to appropriate standards.

PEO5: To stimulate students for life-long learning with enthusiasm and commitment to improve knowledge and competence continuously.

CO-PEO Matrix*

Filled on a scale of 1 to 3 (3=High; 2=Moderate; 1=Low; '-'for no correlation)

Course Outcomes	PEO1	PEO2	PEO3	PEO4	PEO5
PO1	3	3	2	2	2
PO2	3	1	2	3	1
PO3	3	3	3	2	3
PO4	1	2	3	2	2

SCHEME OF EXAMINATION

Master of Technology (Information Technology)

Regular Programme

First Semester

Code No.	Paper	L	T/P	Credits
Theory Papers				
MECS-601	Advanced Data Structures	4	-	4
MECS-603	Advanced Software Engineering	4	-	4
MECS-605	Advances in Data & ComputerCommunications	4	-	4
Electives (Choose any TWO)				
MEVS-601	Digital System Design using Verilog	4	-	4
MECS -607	Advanced Computer Architecture	4	-	4
MECS-609	Enterprise Computing using JAVA	4	-	4
MECS- 611	Computational Techniques usingMATLAB	4	-	4
MEEC-613	Mathematical Statistics & DataAnalysis	4	-	4
MECS- 613	Advanced Operating Systems	4	-	4
MEIT-601	Introduction to Computer Security	4	-	4
MEIT-603	Cellular & Mobile Communication	4	-	4
MECS- 615	Theory of Computation	4	-	4
Practicals / Viva Voce				
MEIT-651	Lab-I (ADS Lab)	-	2	1
MEIT-653	Lab-II (ASE Lab)	-	2	1
MEIT-655	Lab-III (ADCC lab)	-	2	1
MEIT-657*	Term Paper I	-	-	2
	Total	**20**	**6**	**25**

Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The term paper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by thedean shall evaluate the student.

*Non University Exam System

SCHEME OF EXAMINATION

Master of Technology (Information Technology)

Regular Programme

Second Semester

Code No.	Paper	L	T/P	Credits
MEIT-602	Advanced Mobile Computing	4	-	4
MEIT-604	Advanced Software Project Management	4	-	4
MEIT-606	Computer Graphics & Animation	4	-	4
MEEC-618	ESD Using ARM microcontroller	4	-	4
MECS- 602	Object Oriented Analysis & Design	4	-	4
MEEC-604	Advanced Signal Processing	4	-	4
MECS- 604	Advanced Database Management System	4	-	4
MEEC-606	Advanced VLSI Design	4	-	4
MECS-606	Advance Algorithm Analysis & Design	4	-	4
MECS-608	Software Requirements & Estimation	4	-	4
MECS-610	Network Programming	4	-	4
MECS-612	Soft Computing	4	-	4
MESP-612	Digital Image Processing	4	-	4
MECS-614	Modelling & Simulation	4	-	4
MECS-616	Software Metrics	4	-	4
MECS- 620	Distributed Computing	4	-	4
MEIT-608	Web Semantics	4	-	4
MEIT-652	Lab-IV (AMC Lab)	-	2	1
MEIT-654	Lab-V (ASPM Lab)	-	2	1
MEIT-656	Lab-VI (CGA Lab)	-	2	1
MEIT-658*	Term Paper II			2
Total		**20**	**6**	**25**

Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The term paper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by thedean shall evaluate the student.

*Non University Exam System

SCHEME OF EXAMINATION

Master of Technology (Information Technology)

Regular Programme

Third Semester

Code No.	Paper	L	T/P	Credits
Theory Papers				
MECS-701	Advanced Data Warehousing & DataMining	4	-	4
MEIT-703	Information Theory & Coding	4	-	4
Electives (Choose any Three)				
MECS-703	Advanced Software Testing	4	-	4
MEIT-705	Reliability Engineering	4	-	4
MECS -705	Cloud Computing	4	-	4
MECS-707	E- Commerce & Applications	4	-	4
MEEC-707	Artificial Neural Networks	4	-	4
MECS-709	Information Storage & Management	4	-	4
MECS-711	Software Quality Management	4	-	4
MECS-713	Advanced Digital Signal Processing	4	-	4
MECS-715	Advanced Multimedia	4	-	4
MECS-717	Cyber Crime Investigations and CyberForensics	4	-	4
MECS-719	Distributed Databases	4	-	4
MECS-721	Network Management	4	-	4
MEEC-705	Embedded Systems & RTOS	4	-	4
Practicals/Viva Voce				
MEIT-751	Lab-VII (ADWDM Lab)	-	2	1
MEIT-753	Lab-VIII (ITC Lab)	-	2	1
MEIT-755*	Term Paper III	-	-	2
MEIT-757	Minor Project	-	-	4
Total		**20**	**4**	**28**

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Minor Project: For the minor project a supervisor shall be allocated by the school, in the area of interest of the student.The student has to submit a report at the end duly approved by the supervisor for evaluation

NUES: Non University Evaluation Scheme

SCHEME OF EXAMINATION

Master of Technology (Information Technology)

Regular Programme

Fourth Semester

Paper Code No.	Subject	L	T/P	Credits
MEIT-752	Dissertation	-	-	24
MEIT-754*	Seminar & Progress Report	-	-	4
MEIT-756*	Term Paper IV			2
Total		-	-	**30**

Dissertation: For the dissertation a supervisor shall be allocated by the school, in the area of interest of the student.The student has to submit a report at the end duly approved by the supervisor for evaluation.

Seminar & Progress report: Seminar shall be given by the student at scheduled times together with the progress report of the dissertation.

Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The term paper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by thedean shall evaluate the student.

***Non University Exam System**

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M.Tech (IT) Weekend

Programme Educational Objectives

PEO1: To develop students to critically analyze the problems in the field of information Technology and find optimal solutions.

PEO2: To train students to conduct research and experiments by applying appropriate techniques and tools with an understanding of the limitations for sustainable development of society.

PEO3: To prepare students to act as a member and leader of the team to contribute positively to manage projects efficiently in the field of information Technology.

PEO4: To train the students to effectively communicate, write reports, create documentation and make presentations by adhering to appropriate standards.

PEO5: To stimulate students for life-long learning with enthusiasm and commitment to improve knowledge and competence continuously.

CO-PEO Matrix*

Filled on a scale of 1 to 3 (3=High; 2=Moderate; 1=Low; '-'for no correlation)

Course Outcomes	PEO1	PEO2	PEO3	PEO4	PEO5
PO1	3	3	2	2	2
PO2	3	1	2	3	1
PO3	3	3	3	2	3
PO4	1	2	3	2	2

SCHEME OF EXAMINATION

M.Tech. (Information Technology)Weekend Programme

First Semester

Code No.	Paper	L	T/P	Credits
Theory Papers				
MECS-601	Advanced Data Structures	4	-	4
MECS -603	Advanced Software Engineering	4	-	4
Electives (Choose any One)				
MEVS-601	Digital System Design using Verilog	4	-	4
MECS -607	Advanced Computer Architecture	4	-	4
MECS-609	Enterprise Computing using Java	4	-	4
MECS-611	Computational Techniques using MATLAB	4	-	4
MECS- 613	Advanced Operating Systems	4	-	4
MEIT-601	Introduction to Computer Security	4	-	4
MECS- 615	Theory of Computation	4	-	4
Practical				
MEIT-671	ADS Lab	0	2	1
MEIT-673	ASE lab	0	2	1
MECS-675*	Term paper I	-	-	2
Total		**12**	**4**	**16**

Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The term paper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by thedean shall evaluate the student.

*Non University Exam System

SCHEME OF EXAMINATION

M.Tech. (Information Technology)Weekend Programme

Second Semester

Paper Code	Subject	L	T/P	Credits
MEIT-602	Advanced Mobile Computing	4	-	4
MEIT-606	Computer Graphics & Animation	4	-	4
Electives (Choose any One)				
MEEC-618	ESD Using ARM microcontroller	4	-	4
MECS-604	Advanced Database Management System			
MECS-608	Software Requirements & Estimation	4	-	4
MECS-606	Advance Algorithm Analysis & Design	4	-	4
MECS-610	Network Programming	4	-	4
Practicals				
MEIT -672	AMC Lab	-	2	1
MEIT-674	CG & A Lab	-	2	1
MEIT-676*	Term paper II	-	-	2
	Total	**12**	**4**	**16**

Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The term paper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by thedean shall evaluate the student.

*Non University Exam System

SCHEME OF EXAMINATION

M.Tech. (Information Technology)Weekend Programme

Third Semester

Paper Code	Paper	L	T/P	Credits
MECS -605	Advances in Data & Computer Communications	4	-	4
MECS-701	Advanced Data Warehousing & Data Mining	4	-	4
Electives (Choose any One)				
MEEC-707	Artificial Neural Networks	4	-	4
MECS-715	Advanced Multimedia	4	-	4
MEIT-603	Cellular & Mobile Communication	4	-	4
MECS-707	E-Commerce & Applications	4	-	4
MEEC-613	Mathematical Statistics & Data Analysis	4	-	4
MECS- 705	Cloud Computing	4	-	4
Practicals				
MEIT-771	ADCC Lab	-	2	1
MEIT-773	ADWDM Lab	-	2	1
MEIT-775*	Term Paper III	-	-	2
	Total	**12**	**4**	**16**

Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The term paper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by thedean shall evaluate the student.

*Non University Exam System

SCHEME OF EXAMINATION

M.Tech. (Information Technology)Weekend Programme

Fourth Semester

Paper Code	Subject	L	T/P	Credits
MEIT-604	Advanced Software Project Management	4	-	4
Electives (Choose any Two)				
MECS-602	Object Oriented Analysis and Design	4	-	4
MEEC-604	Advanced Signal Processing	4	-	4
MEEC-606	Advanced VLSI Design	4	-	4
MECS-612	Soft Computing	4	-	4
MESP-612	Digital Image Processing	4	-	4
MECS-614	Modelling & Simulation	4	-	4
MECS-616	Software Metrics	4	-	4
MECS- 620	Distributed Computing	4	-	4
MEIT-608	Web Semantics	4	-	4
Practicals				
MEIT-772	ASPM Lab	-	2	1
MEIT-774*	Term paper IV	-	-	2
	Total	**12**	**4**	**15**

Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The term paper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by thedean shall evaluate the student.

*Non University Exam System

SCHEME OF EXAMINATION

M.Tech. (Information Technology)Weekend Programme

Fifth Semester

Paper Code	Paper	L	T/P	Credits
MEIT-703	Information Theory & Coding	4	-	4
Electives (Choose any Two)				
MECS-703	Advanced Software Testing	4	-	4
MEIT-705	Reliability Engineering	4	-	4
MECS-709	Information Storage & Management	4	-	4
MECS-711	Software Quality Management	4	-	4
MECS-713	Advanced Digital Signal Processing	4	-	4
MECS-717	Cyber Crime Investigations and Cyber Forensics	4	-	4
MECS-719	Distributed Databases	4	-	4
MECS-721	Network Management	4	-	4
MEEC-705	Embedded Systems & RTOS	4	-	4
Practicals				
MEIT-871	ITC Lab	-	2	1
MEIT-873	Minor Project	-	-	4
	Total	**12**	**2**	**17**

Minor Project: For the minor project a supervisor shall be allocated by the school, in the area of interest of the student.The student has to submit a report at the end duly approved by the supervisor for evaluation

SCHEME OF EXAMINATION

M.Tech. (Information Technology)Weekend Programme

Sixth Semester

Paper Code	Subject	L/P	Credits
MEIT-872	Dissertation	-	24
MEIT-874*	Seminar & Progress Report	-	4
	TOTAL	-	**28**

Dissertation: For the dissertation, a supervisor shall be allocated by the school, in the area of interest of the student.The student has to submit a report at the end duly approved by the supervisor for evaluation.

Seminar & Progress report: Seminar shall be given by the student at scheduled times together with the progress report of the dissertation.

NOTE:

3. The total number of credits of the Programme M. Tech. = 108.
4. Each student shall be required to appear for examination in all courses, But for the award of the degree a student shall be required to earn the minimum of 100 credits out of 108. However only Elective Courses and Term papers may be dropped towards counting for total credits of 100 to award M. Tech. Degree.

M.Tech (ECE) Regular

Programme Educational Objectives

PEO1: To develop students to critically analyze the problems in the field of electronics and communication and find optimal solutions.

PEO2: To train students to conduct research and experiments by applying appropriate techniques and tools with an understanding of the limitations for sustainable development of society.

PEO3: To prepare students to act as a member and leader of the team to contribute positively to manage projects efficiently in the field of electronics and communication.

PEO4: To train the students to effectively communicate, write reports, create documentation and make presentations by adhering to appropriate standards.

PEO5: To stimulate students for life-long learning with enthusiasm and commitment to improve knowledge and competence continuously.

CO-PEO Matrix*

Filled on a scale of 1 to 3 (3=High; 2=Moderate; 1=Low; '-'for no correlation)

Course Outcomes	PEO1	PEO2	PEO3	PEO4	PEO5
PO1	3	3	2	2	2
PO2	3	1	2	3	1
PO3	3	3	3	2	3
PO4	1	2	3	2	2

SCHEME OF EXAMINATION

M.Tech. (Electronics & Communication Engineering)
Regular Programme

FIRST SEMESTER EXAMINATION

Code No.	Paper	L	T/P	Credits
Theory Papers				
MEEC-601	Optoelectronics and Optical fibre communication	4	-	4
MEDC-601	Advanced Digital Communication systems	4	-	4
MEVS -603	VLSI Technology	4	-	4
Elective (Choose any two)				
MECS -607	Advanced Computer Architecture	4	-	4
MEEC-607	Advanced Computer Networks	4	-	4
MEVS-601	Digital System Design using Verilog	4	-	4
MEVS-613	Wireless Networks	4		4
MECS- 611	Computational Techniques using MATLAB	4	-	4
MEEC -611	Telecommunications system Modelling &Simulation.	4	-	4
MEEC-613	Mathematical Statistics & Data Analysis	4	-	4
MEIT-705	Reliability Engineering	4	-	4
MESP-609	Optimization Techniques	4	0	4
Practicals / Viva Voce				
MEEC-651	Lab - 1 (OOFC Lab)	-	2	1
MEEC-653	Lab - 2 (ADCS Lab)	-	2	1
MEEC-655	Lab -3 (VLSI Lab)	-	2	1
MEEC-657*	Term Paper - I	-	-	2
Total		20	6	25

Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The term paper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by thedean shall evaluate the student.

*Non University Exam System

SCHEME OF EXAMINATION

M.Tech. (Electronics & Communication Engineering)
Regular Programme

SECOND SEMESTER EXAMINATION

Code No.	Paper	L	T/P	Credits
Theory Papers				
MEIT-602	Advanced Mobile Computing	4	-	4
MEEC-604	Advanced Signal Processing	4	-	4
MEEC-606	Advanced VLSI Design	4	-	4
Electives (Choose any TWO)				
MEEC-610	Microwave Integrated circuits	4	-	4
MEEC-612	Cellular & Mobile Communication	4	-	4
MEEC-614	Advanced Radiation Systems	4	-	4
MEEC-616	Telecommunication Switching andTele-traffic Engineering	4	-	4
MEEC-618	ESD Using ARM microcontroller	4	-	4
MEEC-620	Instrumentation and ControlEngineering	4	-	4
MEEC-626	Fuzzy Logic & Design	4	-	4
MEDC-608	Satellite Communication	4	-	4
MEDC-602	Advanced Information Theory &Coding	4	-	4
MESP-612	Digital Image Processing	4	-	4
MESP-602	Detection and Estimation Theory	4	-	4
Practicals/Viva voce				
MEEC-652	Lab- 4 (AMC Lab)		2	1
MEEC-654	Lab - 5 (ASP Lab)	-	2	1
MEEC-656	Lab - 6 (Ad. VLSI Lab)	-	2	1
MEEC-658*	Term Paper II			2
Total		**20**	**6**	**25**

Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The term paper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by thedean shall evaluate the student.

*Non University Exam System

SCHEME OF EXAMINATION

M.Tech. (Electronics & Communication Engineering)
Regular Programme

THIRD SEMESTER EXAMINATION

Code No.	Paper	L	T/P	Credits
Theory Papers				
MEEC-701	Adhoc Sensor Networks	4	-	4
MERF-601	Advance ElectromagneticEngineering	4	-	4
Electives (Choose any Three)				
MEEC-705	Embedded Systems & RTOS	4	-	4
MEEC-707	Artificial Neural Networks	4	-	4
MEEC-709	Multimedia Communication	4	-	4
MEEC-711	Cryptography & Coding	4	-	4
MEEC-713	MEMS and Sensor Technology	4	-	4
MEEC-715	Broadband Access Technology	4	-	4
MEEC-717	AVR Microcontroller and itsapplication	4	-	4
MEEC-719	Robotics Engineering	4	-	4
MEEC-721	Microwave Planar TransmissionLines & Circuits	4	-	4
MEEC-725	Active Networks & Filter Design	4	-	4
MERF-707	Smart Antennas for Mobile Communication	4	-	4
MESP-717	Biomedical Signal Processing	4	0	4
MEDC-707	Spread Spectrum Technique	4	-	4
Practicals/viva voce				
MEEC-751	Lab - 7 (ASN Lab)		2	1
MEEC-753	Lab -8 (AEME Lab)	-	2	1
MEEC-755*	Term Paper-III	-	-	2
MEEC-757	Minor Project		-	4
Total		**20**	**4**	**28**

Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The termpaper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by thedean shall evaluate the student

Minor Project: For the minor project a supervisor shall be allocated by the school, in the area of interest of the student.The student has to submit a report at the end duly approved by the supervisor for evaluation

NUES: Non University Evaluation Scheme

SCHEME OF EXAMINATION

M.Tech. (Electronics & Communication Engineering)
Regular Programme

FOURTH SEMESTER EXAMINATION

Code No.	**Paper**	**L**	**T/P**	**Credits**
MEEC-752	Dissertation	-	-	24
MEEC-754*	Seminar & Progress Report	-	-	4
MEEC-756*	Term Paper-IV	-	-	2
Total				30

Dissertation: For the dissertation a supervisor shall be allocated by the school, in the area of interest of the student.The student has to submit a report at the end duly approved by the supervisor for evaluation.

Seminar & Progress report: Seminar shall be given by the student at scheduled times together with the progress report of the dissertation.

Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The term paper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by thedean shall evaluate the student.

***Non University Exam System**

NOTE:

1. The total number of credits of the Programme M. Tech. = 108.
2. Each student shall be required to appear for examination in all courses, But for the award of the degree a student shall be required to earn the minimum of 100 credits out of 108. However only Elective Courses and Term papers may be dropped towards counting for total credits of 100 to award M. Tech. Degree.

M.Tech (ECE) WEEKEND

Programme Educational Objectives

PEO1: To develop students to critically analyze the problems in the field of electronics and communication and find optimal solutions.

PEO2: To train students to conduct research and experiments by applying appropriate techniques and tools with an understanding of the limitations for sustainable development of society.

PEO3: To prepare students to act as a member and leader of the team to contribute positively to manage projects efficiently in the field of electronics and communication.

PEO4: To train the students to effectively communicate, write reports, create documentation and make presentations by adhering to appropriate standards.

PEO5: To stimulate students for life-long learning with enthusiasm and commitment to improve knowledge and competence continuously.

CO-PEO Matrix*

Filled on a scale of 1 to 3 (3=High; 2=Moderate; 1=Low; '-'for no correlation)

Course Outcomes	PEO1	PEO2	PEO3	PEO4	PEO5
PO1	3	3	2	2	2
PO2	3	1	2	3	1
PO3	3	3	3	2	3
PO4	1	2	3	2	2

SCHEME OF EXAMINATION

M.Tech. (Electronics and Communications Engineering)
Weekend Programme

First Semester

Code No.	Paper	L	T/P	Credits
Theory Papers				
MEEC-601	Optoelectronics and Optical fibre communication	4	-	4
MEDC-601	Advanced Digital Communication systems	4	-	4
Elective (Choose any ONE)				
MECS -607	Advanced Computer Architecture	4	-	4
MEEC-607	Advanced Computer Networks	4	-	4
MEVS-601	Digital System Design using Verilog	4	-	4
MEIT-705	Reliability Engineering	4	-	4
Practicals / Viva Voce				
MEEC-671	OOFC lab	-	2	1
MEEC-673	ADCS Lab	-	2	1
MEEC-675*	Term Paper - I			2
Total		12	4	16

Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The termpaper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by thedean shall evaluate the student.

*** NUES : Non University examination System**

SCHEME OF EXAMINATION

M.Tech. (Electronics and Communications Engineering)
Weekend Programme

Second Semester

Code No.	Paper	L	T/P	Credits
Theory Papers				
MEIT-602	Advanced Mobile Computing	4	-	4
MEEC-604	Advanced Signal Processing	4	-	4
Electives (Choose any ONE)				
MEEC-618	ESD Using ARM microcontroller	4	-	4
MEDC-608	Satellite Communication	4	-	4
MEDC-602	Advanced Information Theory &Coding	4	-	4
MESP-602	Detection and Estimation Theory	4	-	4
Practicals/Viva voce				
MEEC-672	AMC Lab		2	1
MEEC-674	ASP Lab	-	2	1
MEEC-676*	Term Paper II			2
Total		**12**	**4**	**16**

Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The termpaper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by thedean shall evaluate the student.

*** NUES : Non University examination System**

SCHEME OF EXAMINATION

M.Tech. (Electronics and Communications Engineering)
Weekend Programme

Third Semester

Code No.	Paper	L	T/P	Credits
Theory Papers				
MEEC-701	Adhoc Sensor Networks	4	-	4
MEVS -603	VLSI Technology	4	-	4
Elective (Choose any ONE)				
MEVS-613	Wireless Networks	4		4
MECS- 611	Computational Techniques using MATLAB	4	-	4
MEEC -611	Telecommunications system Modelling&Simulation.	4	-	4
MEEC-613	Mathematical Statistics & Data Analysis	4	-	4
MESP-609	Optimization Techniques	4	-	4
Practicals / Viva Voce				
MEEC-771	ASN Lab	-	2	1
MEEC-773	VLSI Lab	-	2	1
MEEC-775*	Term Paper - III			2
Total		12	4	16

Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The termpaper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by thedean shall evaluate the student.

*** NUES : Non University examination System**

SCHEME OF EXAMINATION

M.Tech. (Electronics and Communications Engineering)
Weekend Programme

Fourth Semester

Code No.	Paper	L	T/P	Credits
Theory Papers				
MEEC-606	Advanced VLSI Design	4	-	4
Electives (Choose any TWO)				
MEEC-610	Microwave Integrated circuits	4	-	4
MEEC-612	Cellular & Mobile Communication	4	-	4
MEEC-614	Advanced Radiation Systems	4	-	4
MEEC-616	Telecommunication Switching andTele-traffic Engineering	4	-	4
MEEC-620	Instrumentation and ControlEngineering	4	-	4
MEEC-626	Fuzzy Logic & Design	4	-	4
MESP-612	Digital Image Processing	4	-	4
Practicals/Viva voce				
MEEC-772	Ad. VLSI Lab		2	1
MEEC-774*	Term Paper IV			2
Total		**12**	**2**	**15**

Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The termpaper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by thedean shall evaluate the student.

*** NUES : Non University examination System**

SCHEME OF EXAMINATION

M.Tech. (Electronics and Communications Engineering)
Weekend Programme

Fifth Semester

Code No.	Paper	L	T/P	Credits
Theory Papers				
MERF-601	Advance ElectromagneticEngineering	4	-	4
Electives (Choose any TWO)				
MEEC-705	Embedded Systems & RTOS	4	-	4
MEEC-707	Artificial Neural Networks	4	-	4
MEEC-709	Multimedia Communication	4	-	4
MEEC-711	Cryptography & Coding	4	-	4
MEEC-713	MEMS and Sensor Technology	4	-	4
MEEC-715	Broadband Access Technology	4	-	4
MEEC-717	AVR Microcontroller and itsapplication	4	-	4
MEEC-719	Robotics Engineering	4	-	4
MEEC-721	Microwave Planar TransmissionLines & Circuits	4	-	4
MEEC-725	Active Networks & Filter Design	4	-	4
MERF-707	Smart Antennas for Mobile Communication	4	-	4
MESP-717	Biomedical Signal Processing	4	-	4
MEDC-707	Spread Spectrum Technique	4	-	4
Practicals/viva voce				
MEEC-871	Ad. EM Lab		2	1
MEEC-873	Minor Project		-	4
Total		**12**	**2**	**17**

Minor Project: For the minor project a supervisor shall be allocated by the school, in the area of interest of the student.The student has to submit a report at the end duly approved by the supervisor for evaluation

SCHEME OF EXAMINATION

M.Tech. (Electronics and Communications Engineering)
Weekend Programme

Sixth Semester

Code No.	Paper	L	T/P	Credits
MEEC-872	Dissertation	-	-	24
MEEC-874*	Seminar & Progress Report	-	-	4
Total				28

Dissertation: For the dissertation, a supervisor shall be allocated by the school, in the area of interest of the student.The student has to submit a report at the end duly approved by the supervisor for evaluation.

Seminar & Progress report: Seminar shall be given by the student at scheduled times together with the progress report of the dissertation.

NOTE:

1. The total number of credits of the Programme M. Tech. = 108.
2. Each student shall be required to appear for examination in all courses, But for the award of the degree a student shall be required to earn the minimum of 100 credits out of 108. However only Elective Courses and Term papers may be dropped towards counting for total credits of 100 to award M. Tech. Degree.

THEORY PAPERS

MECS-601 Advanced Data Structure

L	T/P	C
4	0	4

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**

Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.

Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT & EMPLOYABILITY

Unit -1

Elementary Data Structure: Arrays , Sparse Matrices , strings , stack, queues ,Evaluation of Expressions , Linked list , Polynomials : Representation and Operations binary Trees and operations , Binary search tress : Operation and Characteristics

Unit - 2

Binary Heaps, Amortized analysis of Data structures, Balanced Search Trees, AVL trees, augmented data structure, Red Black Trees and properties

Unit - 3

Graph representation and implementation, searching of a graph, application of BFS and DFS Data structure for Sets, Disjoint Set and Union – find problem and implementation, Basic Hash function and collision resolution Hash Tables (Universal Hashing, Perfect Hashing) implementation and Applications

Unit– 4

External sorting, Multiway search trees , B and B + Trees implementation, Digital Search Trees , Multiway Tries , Suffix Trees and applications

Text:

[T1] T. H. Cormen, C. E. Leiserson, R.L. Rivest, C. Stein, ***"Introduction to Algorithms"***, 3nd Edition, PHI.

[T2] Horowitz, Ellis, Sahni, Sartaj & Anderson-Freed, ***"Fundamentals of Data Structures in C (Second Edition)*** ", Universities Press

References:

[R1] Mark Allen Weiss (Second Edition) "Data Structures and Algorithm Analysis in C", Pearson

[R2] Robert L. Kruse Bruce P. Leung"Data Structures and Program Design in C(Second Edition)" , Pearson

[R3] M. Goodrich, R. Tamassia, and D. Mount "Data Structures and Algorithms in C++" , Wiley 2004

Paper Code: MEVS - 601 | **L** | **T** | **C**
Paper: Digital System Design with Verilog | **4** | **-** | **4**

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.

2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT & EMPLOYABILITY

Unit-1

ASIC Design Flow, Architecture and configuration of (Xilinx)Virtex series FPGA, Principles Hardware Description Languages, Y-Chart, Review of Synchronous and Asynchronous Design, Types of HDLs, Introduction to Verilog, Language Constructs ,Modeling style, Assignment Structures, Delays and Continuous Assignments, Assignment to Vectors, Operators,

Unit-2

Design of Adder, Subtractor, Decoders, Encoders, Multiplexer, code Converter. Behavioral Modeling: Functional Bifurcation, Initial & Always Construct, multiple always blocks, Program flow control and looping, Parallel blocks, force-release construct, design of sequential circuits using verilog: Register, Counters, Timing and Delays model, path delay modeling, timing check

Unit 3

Introduction of behavioral modelling, functional bifurcation, initial & always construct, procedural assignment statement, Delay in Procedural statements, Timing Control Statements, If and If-else, case statement assigndeassign, repeat construct, loop construct: repeat, for, while & forever, sequential and parallel blocks, forcerelease construct, design of flip flop, shift register and counters using Verilog

Unit-4

Data Subsystems, Storage Modules, Functional Modules, Data paths, Control Subsystems, Micro programmed Controller, Structure of a micro programmed controller, Micro instruction Format, Micro instruction sequencing, Micro instruction Timing, Basic component of a micro system, memory subsystem design.

Text Books:

[1] Verilog HDL by Samir Palnitkar, Pearson Pub.
[2] M. Ercegovac, T. Lang and L.J. Moreno, "Introduction to Digital Systems", Wiley,2000

Reference Books:

[1] Digital Design by Frank Vahid, Wiley, 20063.
[2] Introduction to Digital Systems by M. Ercegovac, T. Lang and L.J. Moreno, Wiley,2000.
[3] Fundamental of digital Logic with Verilog design by S. Brown & Z. Vransesic, TMH.
[4] Design through Verilog HDL by T.R. Padmanabhan& B. Bala Tripura Sundari, Wiley Pub. 2007

Paper code: MEIT-601	**L**	**T**	**C**
Paper: Introduction to Computer Security	**4**	**0**	**4**

INSTRUCTIONS TO PAPER SETTERS: Maximum Marks : 60

Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.

Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT & EMPLOYABILITY

UNIT-I

Overview of computer security: threats, vulnerabilities, controls, risk, confidentiality, integrity, availability, security policies, security mechanisms, prevention, detection, deterrence, Malicious code, viruses, Trojan horses, worms

UNIT-II

Basic Cryptography: Stream and block ciphers, Encryption, Classical cryptosystems, symmetric cryptography, asymmetric cryptography, Digital Signature, Digital certificates, Message digests and authentication codes

UNIT-III

Database Security: Security and privacy requirements, reliability, integrity, and privacy, inference data mining, anonymity. Security in conventional operating systems: Memory, time, file, object protection requirements and techniques, Protection in contemporary operating systems

UNIT-IV

Network security: eavesdropping, spoofing, modification, denial of service attacks, network security techniques: firewalls, virtual private networks, Intrusion detection, techniques to provide privacy in Internet applications and protecting digital content from unintended use.

Management of security: Security policies, Risk analysis, Physical threats and controls

Legal aspects of security, Privacy and ethics

Text Books:

1. William Stallings, “Cryptography and Network Security: Principles and Practice” (5th Edition), Pearson,2011
2. Atul kahate, ”Cryptography and Network Security” , Tata McGraw Hill,2004

Reference books

1. Tulloch, M, “Microsoft Encyclopedia of Networking” , Prentice Hall of India, 2001
2. Matt Bishop, “Introduction to Computer Security”, Addison-Wesley, 2005
3. Michael T. Goodrich and Roberto Tamassia ,”Introduction to Computer Security”, Addison Wesley, 2010

Paper Code: MEEC-601	**L**	**T**	**C**
Paper: Optoelectronics and Optical Fibre Communication	**4**	**0**	**4**

INSTRUCTIONS TO PAPER SETTERS: Maximum Marks : 60

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.

2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

Unit-1

Introduction: Key elements of OFC system, Advantages of Optical Fiber, Optical Spectral Bands, Channel Capacity, Windows & Spectral Bands, Wave properties, Basic Optical Fiber Structures, Ray Optics Presentation, meridional rays and skew rays, Concept of Modes in dielectric slab waveguide, mode theory for circular waveguide, linearly polarized modes, Cutoff wavelength mode field diameter, normalized frequency of single mode fiber

Unit - 2

Transmission Losses: Attenuation, Absorption, scattering, losses, Bending losses, dispersion, Intramodal & Intermodal, polarization mode dispersion, dispersion shifted, flatted & compensating fiber.

Unit-3

Sources & Detectors: LED-principle, material, double heterojunction LED, efficiency, modulation of an LED, Laser diode-Principle, modes threshold condition, efficiency, laser diode rate equation, PIN photo detector, Avalanche photodiode, photodectector noise, detector response time

Unit-4

Optical amplifiers, EDFA, Amplifier gain, WDM concepts, Fiber grating filters, Optical TDM, Subscriber multiplexing, SONET/SDH, OCDMA

Text Books:

1. Senior J., optical fiber communications, principles & practice, PHI.
2. Keiser G., optical fiber communications, McGraw-hill.

Reference Books:

1. Gowar J., optical communication systems, PHI.
2. William B. Jones jr., Introduction to optical fiber communication systems, Holt, Rinehart and Winston, Inc.
3. Fiber Optic Communication Systems by Mynbev, Pearson
4. Fiber Optic Communication Systems by G.P. Aggarwal, John Wiley & sons.

Paper code: MEDC-601	**L**	**T/P**	**C**
Paper: Advance Digital Communication	**4**	**0**	**4**

INSTRUCTIONS TO PAPER SETTERS: Maximum Marks : 60

1. Question No. 1 should be compulsory and cover the entire syllabus and will be of 20 marks.

2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT & EMPLOYABILITY

UNIT I

Waveform coding Techniques: Discretization in time and amplitude, linear quantizer, quantization noise power calculations, signal to quantization noise ratio, non-uniform quantizer, a-Law & μ-law, companding, encoding and PCM, Channel noise and error probability, DPCM and DM, Coding speech at low bit rates, PredMEion and adaptive filters, Baseband shaping for data transmission, PAM signals and their power spectra, Nyquist criterion, ISI and eye pattern

UNIT II

Digital modulation techniques: Binary and M-ary modulation techniques, Bit vs. symbol error probability and bandwidth efficiency, ASK, FSK, PSK Modulation techniques, comparison of QPSK, MSK & GMSK systems, Coherent and Non-Coherent detection techniques, Phase-Locked loops, Probability of error calculation for M-ary systems.

UNIT III

Equalization: Optimal Zero-Forcing Equalization, Fractionally Spaced and Transversal Filter Equalizers, Adaptive Linear Equalizer, Pass band Equalization.

Fading & Diversity: Types of diversity, Receiver Diversity, Performance analysis for Rayleigh Fading, The Diversity-Interference Trade-off.

The Gaussian MIMO Channel, Basics of MIMO systems.

UNIT IV

Error control coding: Concept of channel coding, Channel coding & Channel capacity theorems, Linear block codes, cyclic codes and convolution codes, Viterbi decoding algorithm, Turbo codes, Trellis codes, TCM.

Spread-spectrum modulation: Pseudo noise sequences, direct sequence and frequency-Hop spread spectrum, Signal-space dimensionality and processing gain.

.

Text Books:

1) Communication Systems By Simon Haykin, John Wiley and Sons,4th Edition, 2006.

2) Digital Communication-Fundamentals and Applications By Sklar, 2nd edition, Pearson Education India.

Reference Books:

1) Communication Systems Engineering, By J. G. Proakis, Prentice Hall, 2nd Edition.

2) Electronic Communication Systems, Fundamentals through Advanced, By Wayne Tomasi, 4th edition, Pearson Education India.

3) Digital communication by John R. Barry, Third edition, Springer International Edition

Paper code: MERF-601	**L**	**T/P**	**C**
Paper: Advanced Electromagnetic Engineering	**4**	**-**	**4**

INSTRUCTIONS TO PAPER SETTERS: Maximum Marks : 60

1. Question No. 1 should be compulsory and cover the entire syllabus and will be of 20 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

Unit I:
The Source Concept, Duality, Uniqueness, Image Theory, The Equivalence Principal, Fields in Half-space, The Induction Theorem, Reciprocity, Green's Function

Unit II:
The Wave Function, Plane Waves, The Rectangular Waveguide, Alternative Mode Sets The Rectangular Cavity, Partially Filled Waveguide, The Dielectric-Slab Waveguide, Surface-Guided Waves, Modal Expansion of Fields, Current in Waveguides

Unit III:
The Wave Function, The Circular Waveguide, Radial Waveguides, The Circular Cavity Other Guided Waves, Source of Cylindrical Waves, Two-dimensional Radiation, Waves Transformations, Scattering by Cylinders, Scattering by Wedges, Three-dimensional Radiation

Unit IV:
The Wave Function, The Spherical Cavity, Orthogonality Relationships, Space as a Waveguide, Other Radial waveguide, Other resonators

Text Books:
1) Introduction to Electrodynamics By David J. Griffith, John Wiley & Sons,3rd Edition.

Reference Books:
2) Time Harmonic Electromagnetic Fields By R.F Harrington, McGraw Hill, 1961.
3) Electromagnetic Waves and Radiating Systems By Jordan and Balmain, Pretice Hall,2nd Edition.

Paper Code: MEVS-603	**L**	**T**	**C**
Paper: VLSI Technology	**4**	**-**	**4**

INSTRUCTIONS TO PAPER SETTERS: Maximum Marks : 60

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.

2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

Unit 1

Cleanroom technology - Clean room concept – Growth of single crystal Si, surface contamination, Chemical Mechanical Polishing, wafer preparation, DI water, RCA and Chemical Cleaning. Processing considerations: Chemical cleaning, getting the thermal Stress factors etc.

Epitaxy : Physical Vapour Deposition, Vapors phase Epitaxy Basic Transport processes & reaction kinetics, doping & auto doping, equipments, & safety considerations, epitaxial defects, molecular beam epitaxy, equipment used, film characteristics, SOI structure.

Unit 2

Oxidation :Growth mechanism & kinetics, Silicon oxidation model, interface considerations, orientation dependence of oxidation rates thin oxides. Oxidation technique & systems dry & wet oxidation. Masking properties of SiO2.

Diffusion :Diffusion from a chemical source in vapor form at high temperature, diffusion from doped oxide source, Ion Implantation, Annealing and diffusion from an ion implanted layer.

Unit 3

Lithography

Optical Lithography: optical resists, contact & proximity printing, projection printing, electron lithography: resists, mask generation. Electron optics: roster scans & vector scans, variable beam shape. X-ray lithography: resists & printing, X ray sources & masks. Ion lithography.

Unit 4

Etching: Reactive plasma etching, AC & DC plasma excitation, plasma properties, chemistry & surface interactions, feature size control & apostrophic etching, ion enhanced & induced etching, properties of etch processing. Reactive Ion Beam etching, Specific etches processes: poly/polycide. Trench etching.

Metallisation - Different types of metallization, uses & desired properties

Text Books

[1] S.M. Sze, ” VLSI Technology”, John Wiley & Sons, 2000.

Reference Books

[1]B.G. Streetman, “Solid State Electronics Devices”, Prentice Hall, 2002.

[2] Wai-Kai Chen,“VLSI Technology” Wiley, March 2003.

MEIT-603 Cellular and Mobile Communication

L	T/P	C
4	0	4

INSTRUCTIONS TO PAPER SETTERS: Maximum Marks : 60

Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.

Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT & EMPLOYABILITY

Unit-I

Basic cellular system, performance criteria, uniqueness of mobile radio environment, operation of cellular systems, planning a cellular system, analog & digital cellular systems, Elements of Cellular Radio Systems Design: General description of the problem, concept of frequency reuse channels, co-channel interference reduction factor, desired C/I from a normal case in an omni directional antenna system, cell splitting, consideration of the components of cellular systems, Introduction to co-channel interference, co-channel measurement design of antenna system, antenna parameter and their effects.

Unit-II

General introduction, obtaining the mobile point to point mode, Radio propagation characteristics: models for path loss, shadowing and multipath fading, propagation over water or flat open area,foliage loss, propagation near in distance, long distance propagation, point to point prediction modelcharacteristics,cell site, antenna heights and signal coverage cells, mobile to mobile propagation,Characteristics of antennas, antenna at cell site, mobile antennas,Frequency management, fixed channel assignment, non-fixed channel assignment, traffic & channel assignment, Why hand off, types of handoff and their characteristics, handoff analysis, dropped call rates & their evaluation.

Unit-III

Modulation methods in cellular wireless systems, OFDM, Block Coding, convolution coding and Turbo coding, FDMA/TDMA, CDMA. FDM/TDM Cellular systems, Cellular CDMA, soft capacity, Earlang capacity comparison of FDM/TDM systems and Cellular CDMA.

Unit-IV

GSM Architecture, Mobility management, Network signaling ,Frequency allocation and control, Base System andMaster System, GSM, DCS 1800, Various value added services, Mobile IP,Wireless LAN, Routing protocols forMANETs:DSDV, DSR,AODV,Role of TCP in MANTs

TEXT BOOKS:

[T1]. William, C. Y. Lee, “Mobile Cellular Telecommunications”, 2nd Edition, McGraw Hill, 1990.
[T2]. Theodore S Rappaport, “Wireless Communication Principles and Practice”, 2nd Edition, Pearson Education,2002.

REFERENCE BOOKS:

[R1]. “Mobile Communication Hand Books”, 2nd Edition, IEEE Press.
[R2]. Mischa Schwartz, “Mobile Wireless Communications”, Cambridge University Press, UK, 2005.
[R3]. Lawrence Harte, “3G Wireless Demystified”, McGraw Hill Publications, 2001.

MECS-603 Advanced Software Engineering	**L**	**T/P**	**C**
4	**0**	**4**

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**

Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.

Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT, EMPLOYABILITY & ENTERPRENEURSHIP

Unit-I

Introduction: Software Crisis, Software Processes & Characteristics, Software life cycle models, Waterfall, Prototype, Evolutionary and Spiral Models, Overview of Quality Standards like ISO 9001, SEI – CMM.
Software Requirements analysis & specifications: Requirement engineering, requirement elicitation techniques like FAST, QFD & Use case approach, requirements analysis using DFD, Data dMEionaries & ER Diagrams, Requirements documentation, Nature of SRS, Characteristics & organization of SRS.

Unit-II

Software Architecture: Role of Software Architecture, Architecture views, Component and Connector view: Components, Connectors, Architecture style for C and C view: pipe and filter, shared data style, client server style, Evaluating Architecture.
Software Project Planning:Size Estimation like lines of Code & Function Count, Cost Estimation Models, Static single & Multivariable Models, COCOMO, COCOMO-II, Putnam resource allocation model, Risk Management.

Unit-III

Software Design: Cohesion & Coupling, Classification of Cohesiveness & Coupling, Function Oriented Design, Object Oriented Design, User Interface Design.
Software Maintenance: Management of Maintenance, Maintenance Process, Maintenance Models, Reverse Engineering, Software Re-engineering, Configuration Management, Documentation.
Software Metrics:Software measurements: What & Why, Token Count, Halstead Software Science Measures, Design Metrics, Data Structure Metrics, Information Flow Metrics

Unit-IV

Software Testing:Testing process, Design of test cases, functional testing: Boundary value analysis, Equivalence class testing, Decision table testing, Cause effect graphing, Structural testing, Path Testing, Data flow and mutation testing, Unit Testing, Integration and System Testing, Debugging, Alpha & Beta Testing, Regression Testing, Testing Tools & Standards.
Software Reliability:Importance, Hardware Reliability & Software Reliability, Failure and Faults, Reliability Models, Basic Model, Logarithmic Poisson Model, Calender time Component.

Test Books:

1. K. K. Aggarwal & Yogesh Singh, “Software Engineering”, New Age International, 2001.
2. R. S. Pressman, “Software Engineering – A practitioner’s approach”, 5th Ed., McGraw Hill Int. Ed., 2001.
3. P. Jalote, “An Integrated approach to Software Engineering”, Springer Publications, 2005.

Reference Books:

1. R. Fairley, “Software Engineering Concepts”, Tata McGraw Hill, 1997.
2. Yogesh Singh, “Software Testing”, Cambridge University Press, New York, 2012.
3. Stephen R. Schach, “Classical & Object Oriented Software Engineering”, IRWIN, 1996.
4. James Peter, W. Pedrycz, “Software Engineering”, John Wiley & Sons., 1999
5. I. Sommerville, “Software Engineering”, Addison. Wesley, 1999

MECS -605 Advances in Data & Computer communications	**L**	**T/P**	**C**
4	**0**	**4**

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**

Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.

Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT, EMPLOYABILITY & ENTERPRENEURSHIP

Unit-I

Network Architecture and Standardization: OSI,TCP/IP Models, Network Characteristics: Types of characteristics, Performance, Reliability, Security, Methods of ensuring QoS: Application & QoS, Queue Mechanisms, Queue Analysis, Queue management algorithms, Feedback, Resource reservation, Traffic engineering.

LAN Overview, Ethernet, High-Speed Ethernet, Gigabit Ethernet, Switched LAN Basics, Wireless LANs (IEEE 802.11)

Unit-II

Virtual Circuit WAN: X.25, Frame Relay, ATM, IP WANs: Pure IP WANs, IP over ATM, MPLS, Remote Access
Methods.

Addressing in TCP/IP Networks, IPv6 & ICMPv6, ARP, RARP, Unicast Routing protocols, Multicast routing protocols, Advance features of IP routers.

Unit-III

User Datagram Protocol (UDP), Transmission Control Protocol (TCP) and Stream Controlled Transmission Protocol (SCTP)

DNS, Telnet, FTP &TFTP, Electronic-mail: SMTP, POP, IMAP, SNMP, WWW: HTTP

Unit-IV

Cryptography, Network Security, Secure Transport Services: IPSec, VPN, MPLS VPN, SSL/TLS, PGP, Firewalls.

Textbooks:

1. Behrouz A. Forouzan, “TCP/IP Protocol Suit”, TMH, 3rd Ed, 2006
2. Stallings W., “Data and Computer Communications”, 7th Ed., PHI, 2007
3. N. Olifer,”Computer Networks”, 2nd Ed., Wiley,2006

References:

1. Black U, “Computer Networks-Protocols, Standards and Interfaces”, PHI, 1996
2. Wayne Tomasi, “Introduction to Data communications and Networking”, Pearson Ed. 2007
3. Tananbaum A. S., “Computer Networks”, 3rd Ed., PHI, 1999
4. Laurra Chappell (Ed), “Introduction to Cisco Router Configuration”, Techmedia

MECS -607 Advance Computer Architecture

L	T/P	C
4	0	4

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**

Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.

Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

Unit-I

Parallel computer models: The state of computing, Classification of parallel computers, Multiprocessors and multicomputers, Multivector and SIMD computers.

Program and network properties: Conditions of parallelism, Data and resource Dependences, Hardware and software parallelism, Program partitioning and scheduling, Grain Size and latency, Program flow mechanisms, Control flow versus data flow, Data flow Architecture, Demand driven mechanisms, Comparisons of flow mechanisms

Unit-II

System Interconnect Architectures: Network properties and routing, Static interconnection Networks, Dynamic interconnection Networks, Multiprocessor system Interconnects, Hierarchical bus systems, Crossbar switch and multiport memory, Multistage and combining network.

Advanced processors:Advanced processor technology, Instruction-set Architectures, CISC Scalar Processors, RISC Scalar Processors, Superscalar Processors, VLIW Architectures, Vector and Symbolic processors

Unit-III

Pipelining: Linear pipeline processor, nonlinear pipeline processor, Collision free scheduling, Instruction pipeline Design, Mechanisms for instruction pipelining, Dynamic instruction scheduling, Branch Handling techniques, branch predMEion, Arithmetic Pipeline Design, Computer arithmetic principles, Static Arithmetic pipeline, Multifunctional arithmetic pipelines

Unit-IV

Multiprocessors and Multicomputers: Multiprocessors System Interconnects, Hierarchal Bus system, Multistage and combining networks, Three generations of multicomputer, Message Passing Mechanism Deadlock and virtual channels.

Multivector and SIMD computers: Vector Processing principals: Vector Instruction Types, Vector Access memory Schemes, Multivector Multiprocessors, Performance directed Design rules.

TEXT BOOKS:

1. Kai Hwang, “Advanced computer architecture”; TMH. 2000
2. D. A. Patterson and J. L. Hennessey, “Computer organization and design”, Morgan Kaufmann, 2nd Ed. 2002

REFERENCES:

1. J.P.Hayes, “computer Architecture and organization”; MGH. 1998
2. V.Rajaranam & C.S.R.Murthy, “Parallel computer”; PHI. 2002
3. Kai Hwang and Zu, “Scalable Parallel Computers Architecture”, MGH. 2001
4. Stalling W, “Computer Organisation & Architecture”, PHI. 2000
5. M.J Flynn, “Computer Architecture, Pipelined and Parallel Processor Design”; Narosa Publishing. 1998
6. D.A.Patterson, J.L.Hennessy, “Computer Architecture :A quantitative approach”; Morgan Kauffmann feb,2002.
7. Hwan and Briggs, “ Computer Architecture and Parallel Processing”; MGH. 1999

Paper Code: MEEC-607 **L T C**
Paper: Advanced Computer Networks **4 0 4**
INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**

3. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
4. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT, EMPLOYABILITY & ENTERPRENEURSHIP

Unit - I
Introduction: Introduction to Network models-ISO-OSI, SNA, Appletalk and TCP/IP models. Review of Physical layer and Data link layers, Review of LAN (IEEE 802.3, 802.5, 802.11b/a/g, FDDI) and WAN (Frame Relay, ATM, ISDN) standards.

Unit- II
Network layer: ARP, RARP, Internet architecture and addressing, internetworking, IPv4, overview of IPv6, ICMP, Routing Protocols- RIP, OSPF, BGP, IP over ATM.

Unit- III
Transport layer: Design issues, Connection management, Transmission Control Protocol (TCP), User Datagram Protocol (UDP)
Application layer : WWW, DNS, e-mail, SNMP, RMON

Unit- IV
Network Security: Cryptography, Firewalls, Secure Socket Layer (SSL) and Virtual Private Networks (VPN).
Study of various network simulators, Network performance analysis using NS2

TEXT BOOKS:
1. Behrouz A. Forouzan, “TCP/IP Protocol Suit”, TMH, 2000.
2. Tananbaum A. S., “Computer Networks”, 3rd Ed., PHI, 1999.

REFERENCES:
1. Black U, “Computer Networks-Protocols, Standards and Interfaces”, PHI, 1996.
2. Stallings W., “Data and Computer Communications”, 6th Ed., PHI, 2002.
3. Stallings W., “SNMP, SNMPv2, SNMPv3, RMON 1 & 2”, 3rd Ed., Addison Wesley, 1999.
4. Laurra Chappell (Ed), “Introduction to Cisco Router Configuration”, Techmedia, 1999.

MECS– 609 Enterprise Computing in JAVA

L	T/P	C
4	0	4

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**

Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.

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SKILL DEVELOPMENT, EMPLOYABILITY & ENTERPRENEURSHIP

UNIT-I

Introduction to J2EE :- n-Tier Client Server Computing and Model View Controller Architecture. Markup Languages : HTML and XML. JDBC : Drivers and Interfaces . Servlets : Servlet LifeCycle, Generic Servlet , Http Servlet , Java Server Pages : Tags , Directives , Expressions and Scriptlets , Introduction to Enterprise Java Beans, Session EJBs, Entity EJBs, JMS and message driven.

UNIT-II

Struts, Struts architecture, Struts classes - ActionForward, ActionForm, ActionServlet, Action classes , Understanding struts-config.xml , Struts Tiles , Combining Struts and Tiles, Tiles file structure , Understanding Tiles Definitions and Attributes.

UNIT-III

Hibernate: Comparison between JDBC and HIBERNATE , Principles of Object Relational Mapping, Hibernate configuration, HQL making objects persistent, Hibernate semantics, Session management, flushing, concurrency and Hibernate, Optimistic and Pessimistic Locking, Object mapping Mapping simple properties, Single and multi valued associations, Bi-directional associations, Indexed collections, Querying, Session management, Transaction integration and demarcation.

UNIT-IV

Spring: Introduction of Spring Framework: Spring Architecture, Spring Framework definition, Inversion of Control (IoC), Spring Aspect Oriented Programming Concepts : Join Point and Point Cuts.
Web Services: Interoperability in Web Services, Service-Oriented Architectures SOAP, SOAP message structure, handling errors WSDL, UDDI.

Text Books:

1. Jim Farley, William Crawford, O'Reilly and Associates, "Java Enterprise in a Nutshell", 2005
2. Brett McLaughlin, O'Reilly, "Java and XML, 2nd Edition", 2001

Reference Books:

1. Holzner , Structs : Essential skills , TMH
2. Reference Books:
3. Elliott Rusty Harold and W. Scott Means, O'Reilly, "XML in a Nutshell", 2001
4. James Cooper, "Java Design Pattern: A Tutorial", Addison Wesley
5. Govind Sesadri, "Enterprise java Computing: Application and Architectures", Cambridge University
6. Publications, 1999
7. Ivan Bayross , sharanam shah Java Server Programming , shroff Publishers

Paper code: MESP-609 **L** **T/ P** **C**
Paper: Optimization Techniques **4** **0** **4**
INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**
1. Question No. 1 should be compulsory and cover the entire syllabus and will be of 20 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT & EMPLOYABILITY

UNIT-I
Introduction: Statement of an Optimization problem, Classification of Optimization problems Classical Optimization Techniques: Single variable optimization, Multivariable optimization with no constraints– Hessian matrix, Multivariable saddle point, Optimization with equality constraints – Lagrange multiplier method, Multivariable optimization with inequality constrains – Kuhn-Tucker conditions.

UNIT-II
One-Dimensional Minimization Methods: Elimination Methods, UnrestrMEed Search Method, Fibonacci Methods, Interpolation Methods – Quadratic and Cubic Interpolation Methods Integer Programming: Gomory's Cutting Plane Method for Integer Linear Programming, Formulation and Solution of Integer Polynomial and Non-linear problems.

UNIT III
Unconstrained Minimization Methods: Univariate and pattern search method, steepest descent method, Newton method, Powell method.
Constrained Minimization Methods: Characteristics of a constrained problem, Direct Methods of feasible directions, Indirect Methods of interior and exterior penalty functions

UNIT-IV
Genetic Algorithm: Introduction to GA, fitness function, GA operators, Unconstrained and constrained optimization using Genetic algorithm, Global optimization using GA.

Text Books
1. "Engineering optimization: Theory and practice"-by S. S.Rao, New Age International (P) Limited, 3rd edition, 1998.
2. Optimization Concepts and Applications in Engineering – Ashok D.Belegundu and Tirupathi R Chandrupatla — Pearson Education.

References
1. "Operations Research : An Introduction" – by H.A. Taha, PHI Pvt. Ltd., 6th edition
2. "Optimization for Engineering Design: Algorithms and Examples", Kalyanmoy deb, PHI publication
3. "Genetic Algorithm in Search Optimization and Machine Learning", D.E. Goldberg, Addision-Wesley Publication, 1989

MECS-611 Computational Techniques using MATLAB

L	T/P	C
4	0	4

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**

Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.

Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT & EMPLOYABILITY

Unit-I

MATLAB Usage and Computational Errors: Introduction to MATLAB, Types of Computer Errors, IEEE 64-bit Floating-Point Number Representation, Vectors in MATLAB, Efficient programming techniques System of Linear Equations: Solution for a System of Linear Equations, Solving a System of Linear Equations, Inverse Matrix, Decomposition (Factorization), Iterative Methods to Solve Equations

Unit-II

Interpolation and Curve Fitting: Interpolation by Lagrange, Newton, and Chebyshev Polynomial, Hermite Interpolating Polynomial, Cubic Spline interpolation, Straight Line, Polynomial Curve, and Exponential Curve Fit, Fourier transform

Nonlinear Equations: Bisection Method, Regula Falsi Method, Newton Raphson Method, Secant Method, Newton Method for a System of Nonlinear Equations

Unit-III

Numerical Differentiation/Integration: Difference Approximation for First Derivative, Approximation Error of First Derivative, Numerical Integration and Quadrature, Trapezoidal Method and Simpson Method, Romberg Integration,Adaptive and Gauss Quadrature.

Ordinary Differential Equations: Euler's Method, Runge–Kutta Method, PredMEor–Corrector Method, Vector Differential Equations, Boundary Value Problem (BVP)

Unit-IV

Optimization: Unconstrained Optimization, Constrained Optimization, MATLAB Built-In Routines for Optimization, Matrices and Eigenvalues: Eigenvalues and Eigenvectors, Power Method, Jacobi Method Partial Differential Equations: Elliptic , Hyperbolic, and Parabolic PDE, Finite Element Method (FEM) for solving PDE,

Text Books

1. "Applied Numerical methods using MATLAB", By W. Y. Yang, Wiley Publications, 2005
2. "Applied Numerical Methods with MATLAB," Steven C. Chapra, McGraw-Hill, 2005

Reference Books

1. "Numerical Methods using MATLAB", John H. Mathews, Prentice Hall
2. "Introduction to MATLAB® for Engineers", W.J Palm, McGraw-Hill

Paper Code: MEEC-611 **L T C**
Paper: Telecommunication System Modeling and Simulation **4 0 4**
INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT & EMPLOYABILITY

UNIT – I
SIMULATION OF RANDOM VARIABLES RANDOM PROCESS
Generation of Random numbers and Sequence, Gaussian and Uniform random numbers Correlated random sequences, testing of random numbers generators, Stationary and Uncorrelated Noise, Goodness of fit test.

UNIT – II
MODELING OF COMMUNICATION SYSTEMS
Radio frequency and Optical sources, Analog and Digital signals, Communication channel and Models, Free Space channels, Multipath channel and discrete channel noise and interference.

UNIT – III
ESTIMATION OF PERFORMANCE MEASURE FOR SIMULATION
Quality of Estimator, Estimation of SNR, Probability density function and Bit Error Rate, Monte Carlo method, Importance Sampling method, Extreme Value Theory.

UNIT – IV
SIMULATION AND MODELING METHODOLOGY
Simulation Environment, Modeling considerations, Performance Evaluation techniques, Error Source Simulation,
Validation. Case Studies: Simulations of QAM Digital Radio link in environment, Light wave communication link and Satellite system.

TEXTBOOKS
1 MC.Jeruchim, P.Balaban and Sam K Shanmugam, “Simulation of communication systems: Modeling, Methodology and Techniques”, Plenum Press, New York, 2001.

REFERENCES
1 Averill.M.Law and W.David Kelton, “Simulation Modeling and Analysis”, McGraw-Hill, 2000.
2 Geoffrey Garden, “System Simulation”, Prentice Hall of India, 2nd Edition, 1992.
3 W.Turin, “Performance Analysis of Digital Communication Systems”, Computer Science Press, New York, 1990.
4 Jery Banks and John S.Carson, “Discrete Event System Simulation”, Prentice Hall of India, 1984.

Paper Code: MEEC-613 **L T C**
Paper: Mathematical Statistics & Data Analysis **4 0 4**
INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT & EMPLOYABILITY

Unit - I
Introduction: The basic goal of statistics: draw conclusions based on data. Various aspects of statistics ranging from formulating the question, designing experiments to address the question, collecting the data, and analyzing the data, Random sample drawn from a parameterized family of distributions, Review of Probability: Sample spaces and events, Kolmogorov's axioms, principles of combinatorics including permutations and combinations, conditional probability and independence, Bayes' theorem, random variables, probability mass functions for discrete random variables, probability density functions for continuous random variables, cumulative distribution functions, expected value, mean and variance of a distribution, selected discrete and continuous distributions.

Unit – II
Collecting Data: Types of statistical studies, observational studies, basic sampling designs, Summarizing and Exploring Data, Sampling Distributions of Statistics: Sampling Distribution of the Sample Mean, Sampling Distribution of the Sample Variance, Student's t-distribution, Snedecor-Fisher's F-distribution

Unit – III
Basic Concepts of Inference: Point Estimation, Maximum Likelihood Estimation, Confidence Interval Estimation,
Hypothesis Testing, Likelihood Ratio Tests; Inferences for Single Samples: Inferences on Mean (Large Samples), Inferences on Mean (Small Samples), Inferences on Variance (if time permits)

Unit - IV
Simple linear regression and correlation: The least squares method, The model for simple linear regression, Fitting a line, goodness of fit, Statistical inference with the simple linear regression model, predMEion and confidence intervals, Regression diagnostics. Multiple linear regression, The model for multiple linear regression, Goodness of fit, multiple correlation coefficient, Arrays, matrices, and linear algebra for multiple linear regression,
Statistical inference for multiple regression, ANOVA tables , Introduction to Bayesian Inference, Principles of Bayesian statistics. The Bernoulli process, The Poisson process. The normal process.

Textbook:
1. *Statistics and Data Analysis* by Ajit C. Tamhane and Dorothy D. Dunlop, Prentice-Hall, 2000.
2. Probablity and statistics by Paupollis & Pillai, McGraw Hill Publication

MECS-613 Advanced Operating System **L T/P C**

4 0 4

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**

Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.

Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT & EMPLOYABILITY

UNIT – I

Introduction, What is an Operating System, Simple Batch Systems, Multiprogrammed Batches systems, Time-Sharing Systems, Personal-computer systems, Parallel systems, Distributed Systems, Real-Time Systems

Memory Management: Background, Logical versus Physical Address space, swapping, Contiguous allocation, Paging, Segmentation, Segmentation with Paging

Virtual Memory: Demand Paging, Page Replacement, Page-replacement Algorithms, Performance of Demand Paging, Allocation of Frames, Thrashing

UNIT – II

Processes: Process Concept, Process Scheduling, Operation on Processes, Cooperating Processes, Interprocess Communication

CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Multiple-Processor Scheduling, Real-Time Scheduling, Algorithm Evaluation

Process Synchronization: Background, The Critical-Section Problem, Synchronization Hardware, Semaphores, Classical Problems of Synchronization, Critical Regions, Monitors.

UNIT – III

Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock, Combined Approach to Deadlock Handling.

Device Management: Techniques for Device Management, Dedicated Devices, Shared Devices, Virtual Devices;

Device Characteristics-Hardware Consideration, Input or Output Devices, Storage Devices, Channels and Control

Units, Independent Device Operation, Buffering, Multiple Paths, Block Multiplexing, Device Allocation Consideration,

Secondary-Storage Structure: Disk Structure, Disk Scheduling, Disk Management, Swap-Space Management, Disk Reliability, Stable-Storage Implementation

UNIT – IV

Information Management: Introduction, A Simple File System, General Model of a File System, Symbolic File System, Basic File System, Access Control Verification, Logical File System, Physical File System File-System Interface: File Concept, Access Methods, Directory Structure, Protection, Consistency Semantics File-System Implementation: File-System Structure, Allocation Methods, Free-Space Management, Directory Implementation

TEXT BOOKS:

1. Madnick E., Donovan J., “Operating Systems”, Tata McGraw Hill, 2001
2. Silbersachatz and Galvin, “Operating System Concepts”, Pearson, 5th Ed., 2001
3. Willium Stallings, “ Operating systems: Internals aaaaaand design Prinicipals., Pearson education, Sixth edition

REFERENCES:

1. Tannenbaum, “Operating Systems”, PHI, 4th Edition, 2000

Paper Code: MEVS – 613 | **L** | **T** | **C**
Paper: Wireless Networks | **4** | **-** | **4**

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT & EMPLOYABILITY

Unit 1
Introduction to Personal Communication Services (PCS): PCS architecture, Mobility management, Networks signaling.
Global system for Mobile Communication (GSM) system overview: GSM Architecture, Mobility Management, Network signaling.

Unit 2
General Packet Radio Services (GPRS): GPRS architecture, GPRS Network nodes. Enhanced Data rates for GSM Evolution (EDGE), Mobile Data Communication: WLANs (Wireless LANs) IEEE 802.11 standard, Mobile IP. Wireless Application Protocol (WAP): The Mobile Internet standard, WAP Gateway and Protocols, Wireless Markup Languages (WML).

Unit 3
Third Generation (3G) Mobile Services: Introduction to International Mobile Telecommunications 2000 (IMT 2000) vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of services in 3G. Fourth Generation (4G) Mobile services: Introduction to Long Term Evaluation (LTE), Orthogonal Frequency Division Multiple Access (OFDMA), Multi-In Multi-Out Antenna system (MIMO), LTE-Advanced Wireless local Loop (WLL): Introduction to WLL architecture, WLL technologies, WMAN (Wireless MAN), IEEE802.16 standard, WiMAX

Unit 4
Global Mobile Satellite Systems: Case studies of IRIDIUM and GLOBALSTAR systems.
Bluetooth technology. Wireless Sensor Networks: Introduction, Architecture, ZigBee protocol, Applications.

Text Books:
[T1] Yi –Bing Lin & Imrich Chlamatac ,“Wireless and mobile Networks Architecture,” John Wiley & Sons Publication, 2001.
[T2] Raj Pandya, “Mobile & Personnel communication Systems and Services”, Prentice Hall India, 2001.
[T3] Theodore S. Rappaport, “Wireless Communication- Principles and practices,” 2nd Ed. Pearson Education Pvt. Ltd, 2003.
[T4] Jochen Schiller, “Mobile communications,” Pearson Education Pvt. Ltd., 2002.
[T5] Singhal & Bridgman, “ The Wireless Application Protocol,” Pearson Education, 2004.

References Books :
[R1] Hensmann, Merk, & Stober, “Principles of Mobile Computing,” 2nd Ed., Springer International Edition, 2003.
[R2] Talukdar & Yaragal, “Mobile Computing,” TMH, 2005.
[R3] Smith & Collins, “3G Wireless Networks,” TMH, 2007.

MECS-615 Theory of Computation

L	T	C
4	0	4

INSTRUCTIONS TO PAPER SETTERS: Maximum Marks : 60

Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.

Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

UNIT-I

Church-Turing thesis: Turing machines – Variants of Turing Machines – Hilbert's problems. Decidability: Decidable languages – Halting problem.

UNIT-II

Reducibility: Undecidable problems from Language theory – A simple Undecidable problem – Mapping Reducibility. Advanced topics in Computability Theory: The Recursion Theorem – Decidability of logical theories – Turing Reducibility.

UNIT-III

Time Complexity: Measuring Complexity – The Class P – The class NP – NPcompleteness – Additional NP complete Problems.

UNIT-IV

Space Complexity: Savitch's Theorem – The Class PSPACE – PSPACE-completeness – The classes L and NL – NL-completeness – NL equals coNL. Intractability: Hierarchy Theorems – Relativization – Circuit Complexity.

Advanced topics in complexity theory: Approximation Algorithms – Probabilistic Algorithms – Alternation – Interactive Proof Systems – Parallel Computation – Cryptography

TEXT BOOKS:

1. Michael Sipser, Introduction to the Theory of Computation, Thomson Brook/cole, 1997.(2006)
2. John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Introduction to Automata Theory, Languages and Computation, 3/E, Pearson Education, 2009.

REFERENCES

1. Peter Linz, An Introduction to formal Languages and Automata, 4/ E, Jones & Bartlett Pub, 2006.
2 Kamala Krithivasan, Rama R, Introduction to Formal Languages, Automata Theory and Computation, Pearson, 2009
3. Dr. B. N. Srinivasa Murthy, Formal Languages and Automata Theory, Sanguine Publishers, 2006.

Paper Code: MECS – 602	L	T	C
Subject: Object Oriented Analysis & Design	4	0	4

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**

Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.

Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT, EMPLOYABILITY & ENTERPRENEURSHIP

UNIT I

Object Oriented Design Fundamentals: The object model - Classes and Objects, Complexity ,Classification, Notation, Process - Pragmatics - Binary and entity relationship, Object types -Object state, OOSD life cycle

UNIT II

Object Oriented Analysis: Overview of Object Oriented Analysis, Shaler/Mellor, Coad/Yourdon, Rumbagh, Booch's Approach towards the analysis, UML ,Usecase, Conceptual model, Behaviour ,Class, Analysis patterns, Overview, Diagrams, Aggregation.

UNIT III

Object Oriented Design Methods: Unified Modeling Language : UML –static view, Dynamic view, Model Management View, UML Diagrams, Collaboration - Sequence - Class – Design patterns and frameworks - Comparison with other Design methods

UNIT IV

Managing Object Oriented Development Managing analysis and design - Evaluation testing - Coding - Maintenance Metrics, case Studies In Object Oriented Development Design of foundation class libraries - Object Oriented databases - Client/Server computing - Middleware.

Text Books:

1. Craig Larmen, Applying UML and Patterns: An Introduction to Object Oriented Analysis and Design and Iterative Development, Prentice Hall (2004)
2. Booch G., Rambaugh J., Jacobson Ivar, The Unified Modeling Language User Guide, Pearson Education (2003)

Reference Books:

1. Yogesh Singh, RuchikaMalhotra , Object oriented software engineering, PHI 2012
2. Booch G, Maksimchuk, Engel, Young, Conallen and Housten, Object Oriented Analysis and Design with Applications, Addison Wesley Professional (2007)
3. Booch G., Object Oriented Analysis and Design, Addision Wesley (1994)

Paper Code: MEIT – 602 **L T C**
Subject: Advanced Mobile Computing **4 0 4**
INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**
Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

UNIT I
Introduction: Short history of wireless communication, Applications, Frequency for radiotransmission, Signals, Antennas, Signal propagation, Multiplexing, Modulation, SpreadSpectrum, Cellular systems (DSSS & FHSS), Motivation for a specialized MAC: Hidden and Exposed terminals. Near and Far terminals;Multiple access with collision avoidance, Polling, Inhibit sense multiple access; CDMA:Spread Aloha multiple access
Mobile Computing Architecture: Three Tier Architecture for mobile computing, Designconsiderations, Mobile Computing through Internet. File systems: Consistency, Examples; World Wide Web: Hypertext transfer protocol, Mobile File System, Mobile databases.

UNIT II
Wireless LAN and Blue tooth(IEEE 802.11,802.15)Wireless LAN: Infrared vs. Radio transmission, Infrastructure and Ad hoc Networks : System architecture, Protocol architecture, Physical layer, Medium Access Control layer, MAC management, Future development; HIPERLAN: Protocol architecture, Physical layer, Channel access control sub layer, Medium Access Control sub layer, Information bases and Networking.
Bluetooth: User Scenarios, Physical Layer, MAC layer, networking. Security, linkmanagement, Enterprise PCS: Office Level , Local Area Wireless: An Example of WPBX,Capacity Planning for WPBX, IrDA ZigBee, RFID, Wireless Broadband (WiMax)

UNIT III
Mobile Network and Transport LayersMobile IP: Goals, assumptions and requirements, Entities and Terminology, IP packet delivery, Agent advertisement and discovery, Registration, Tunnelling and Encapsulation, Optimizations, Reverse tunneling, Ipv6; Dynamic host configuration protocol, Dynamic Host Configuration Protocol - Routing – DSDV – DSR – Alternative Metrics.
Mobile Transport Layer: Traditional TCP: Congestion control, Slow start, Fastretransmit/fast recovery, Implications on mobility; Indirect TCP, Snooping TCP, Mobile TCP,Fast retransmit/fast recovery, Transmission/time-out freezing, Selective retransmission,Transaction oriented TCP.

UNIT IV
Support for Mobility:Wireless application protocol: Architecture, Wireless datagram protocol, Wireless transport layer security, Wireless transaction protocol, Wireless session protocol, WAPUAProf and Caching , User Agent Profile , Caching Model , Wireless Bearers for WAP , WAPDeveloper Toolkits and application environment, Wireless telephony application, Mobile agents, Application Server, Gateways, Portals, Service Discovery, Device Management Language Support: Hypertext markup language (XHTML)-MP, Wireless mark-up language; WML script, Mobile Application Languages-XML, Voice XML. Java, J2ME and Java Card.
Wireless devices and their Operating System: PalmOS; Windows CE; EPOC; Symbian OS; Linux for Mobile Devices. Mobile Agents
Synchronization: Synchronization Software for Mobile Devices, Synchronization Protocols, SyncML-Synchronization Language for Mobile Computing.Introduction to Threats and Security Issues in Mobile Computing

Text Books:
1. Jochen Schiller, "Mobile communications", Addison wisely, Pearson Education.
2. Yi Bang Lin and ImrichChlamtech , “Wireless and Mobile Network Architecture”, Wiley.
3. RajKamal , “Mobile Computing”, Oxford.

Reference Books:
1. Rappaort, "Wireless Communications Principals and Practices”.
2. P. Nicopolitidis, "Wireless Networks”, John Wiley.
3. K. Pahlavan, P. Krishnamurthy, "Principles of Wireless Networks".

Paper code: MEDC-602 **L T/P C**
Paper: Advanced Information Theory & Coding **4 0 4**
INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**

1. Question No. 1 should be compulsory and cover the entire syllabus and will be of 20 marks.

2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

UNIT I

Measure of Information, Information contents of discrete memoryless sources, Entropy & Mutual Information, Source coding theorem: Huffman coding, Shannon-Fano coding, Lempel-Ziv algorithm, Prefix codes,

UNIT II

Channel Coding theorem, Channel capacity theorem, Channel models, BSC, DMC, Lossless, Noiseless channels, Linear Block codes, Systematic & Non-Systematic codes, Repitition codes, Hamming codes, Cyclic codes, Cyclic Redundancy check (CRC) codes, Golay codes, BCH Codes, Read-Solomon codes.

UNIT III

Convolutional codes, Polynomial representation of Convolutional codes, Tree, State and Trellis diagrams, Maximum-likelihood/Viterbi Decoding of Convolutional codes, Concept of Interleaving, Turbo Codes, Turbo decoding,

UNIT IV

Combined coding and Modulation, Trellis Coded Modulation (TCM), Mapping by set partitioning, TCM decoder, TCM for fading channels, Concept of Space time Trellis Codes.

Text Books:

1. Information Theory, Coding and Cryptography By Ranjan Bose, Tata McGraw Hill, 2002.
2. Introduction to Error Control Codes by Salvatore Gravano, Oxford University Press

Reference Books:

1, Information Theory, Inference, and Learning Algorithms By David J.C. MacKay, Cambridge University Press, 2003.
2, Entropy & Information Theory by Robert M Gray, Springer-Verlag, Newyork, INC, 1990.

Paper code: MESP-602 | **L** | **T/ P** | **C**
Paper: Detection and Estimation Theory | **4** | **0** | **4**

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**

1. Question No. 1 should be compulsory and cover the entire syllabus and will be of 20 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

UNIT I

Classical Detection and Estimation Theory, Karhunen-Loeuve Transform and its application to Detection of signals in Gaussian noise, Waveform estimation, Linear estimation problems, Wiener filtering, Kalman filtering.

UNIT II

Classical detection Theory: Binary and m-ry hypothesis testing, Bayes' criterion, NP test, the general Gaussian problem, min-max test, erasure decision problem;

UNIT III

Classical estimation theory: random parameter estimation; MMSE absolute error cost function, uniform error cost function estimators, CRLB for random parameter case, non-random parameter estimation; ML estimator. CRLB.

UNIT IV

Composite and non-parametric hypothesis testing; Sign test, Wilcoxon test.

Text Books/ References:

1) Detection, Estimation and Modulation Theory vol-I By Harry.L.Van Trees, John Wiley & Sons Inc.
2) Signal Detection and Estimation By Mourad Barkat, Artech House London.

Paper Code: MECS – 604	L	T	C
Subject: Advanced Database Management System	4	0	4

INSTRUCTIONS TO PAPER SETTERS: Maximum Marks : 60

Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.

Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT, EMPLOYABILITY & ENTERPRENEURSHIP

UNIT I

Relational Databases: Integrity Constraints revisited, Extended ER diagram, Relational Algebra & Calculus, Functional, Muiltivalued and Join Dependency, Normal Forms, Rules about functional dependencies.
Query Processing and Optimization: Valuation of Relational Operations, Transformation of Relational Expressions, Indexing and Query Optimization, Limitations of Relational Data Model, Null Values and Partial Information.

UNIT II

Deductive Databases :Datalog and Recursion, Evaluation of Datalog program, Recursive queries with negation.
Objected Oriented and Object Relational Databases: Modeling Complex Data Semantics, Specialization, Generalization, Aggregation and Association, Objects, Object Identity, Equality and Object Reference, Architecture of Object Oriented and Object Relational Databases
Parallel and Distributed Databases: Distributed Data Storage – Fragmentation & Replication, Location and Fragment Transparency Distributed Query Processing and Optimization, Distributed Transaction Modeling and concurrency Control, Distributed Deadlock, Commit Protocols, Design of Parallel Databases, Parallel Query Evaluation.

UNIT III

Advanced Transaction Processing: Nested and Multilevel Transactions, Compensating Transactions and Saga, Long Duration Transactions, Weak Levels of Consistency, Transaction Work Flows, Transaction Processing Monitors.
Active Database and Real Time Databases: Triggers in SQL, Event Constraint and Action: ECA Rules, Query Processing and Concurrency Control, Compensation and Databases Recovery
Image and Multimedia Databases: Modeling and Storage of Image and Multimedia Data, Data Structures – Rtree, k-d tree, Quad trees, Content Based Retrieval: Color Histograms, Textures, etc., Image Features, Spatial and Topological Relationships, Multimedia Data Formats, Video Data Model, Audio & Handwritten Data, Geographic Information Systems (GIS)

UNIT IV

WEB Database: Accessing Databases through WEB, WEB Servers, XML Databases, Commercial Systems.
Data Warehousing: Data Warehousing Architecture, Multidimensional Data Model, Update Propagation OLAP Queries. Data Mining: Knowledge Representation Using Rules, Association and Classification Rules, Sequential Patterns, Algorithms for Rule Discovery
Case Study: Oracle Xi

Text Books:

1. Elmarsi, Navathe, Somayajulu, Gupta, “Fundamentals of Database Systems”, 4th Edition, Pearson Education, 2007
2. Garcia, Ullman, Widom, “Database Systems, The complete book”, Pearson Education, 2007
3. R. Ramakrishnan, “Database Management Systems”, McGraw Hill International Editions, 1998

Reference Books:

1. Date, Kannan, Swaminathan, “An Introduction to Database Systems”, 8th Edition Pearson Education, 2007
2. Singh S.K., “Database System Concepts, design and application”, Pearson Education, 2006.
3. Silberscatz, Korth, Sudarshan, “Database System Concepts”, Mcgraw Hill, 6th Edition, 2006

4. D. Maier, “The Theory of Relational Databases”, 1993, Computer Science Press, Rokville, Maryland
5. Ullman, J. D., “Principals of database systems”, Galgotia publications, 1999
6. Oracle Xi Reference Manual

Paper Code: MEIT – 604 **L T C**
Subject: Advanced Software Project Management **4 0 4**
INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**

Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT, EMPLOYABILITY & ENTERPRENEURSHIP

UNIT I

Introduction to Software Project Management: Software development as a project; Stakeholders in software project; Software product, process, resources, quality, and cost; Objectives, issues, and problems relating to software projects. Overview of Project Planning: Steps in project planning; Defining scope and objectives; work breakdown structure; Deliverables and other products; time, cost, and resource estimation; Alternatives in planning, Project Evaluation: Strategic assessment; Technical assessment; Cost-benefit analysis; Cash flow forecasting; Cost-benefit evaluation techniques; Break-even analysis; Risk evaluation Selection of Appropriate Project Approach: Choosing development technology and methodology; choice of process model; Rapid application development; Waterfall model; V-process model; Spiral model; Prototyping,; Incremental delivery.

UNIT II

Software Effort Estimation : Problem in software estimation; Effort estimation techniques; Expert judgement; Estimation by analogy; Delphi technique; Algorithmic methods; Top-down and bottom-up estimation; Function point analysis; Object points; COCOMO model.
Activity Planning : Network planning model; Activity-on-arrow network; Precedence network; Forward pass; Backward pass; Critical path; Slack and float. Risk Analysis and Management : Nature and categories of risk in software development; risk Identification; Risk assessment; Risk mitigation, monitoring, and management; Evaluating schedule risk using PERT.

UNIT III

Recourse Allocation : Nature of project resources; Identifying resource requirement of activities; Allocating and scheduling resources; cost of resources; Standard, planned, and actual cost; Cost variance; time-cost trade-off. Project Tracking and Control : Measurement of physical and financial progress; Earned value analysis; Status reports; Milestone reports; Change control. Contact Management : Outsourcing of products and services; Types of contracts; Stages in contract placement; Terms of contract; Contract monitoring; Acceptance testing

UNIT IV

Managing People and Organizing Teams : Organizational behaviour; Recruitment and placement; Motivation; Group behaviour; Individual and group decision making; Leadership and leadership styles; forms of organizational structures.
Software Quality Assurance: Planning for quality; Product versus process quality management; Procedural and quantitative approaches; Defect analysis and prevention; Statistical process control; Pareto analysis; Causal analysis; Quality standards; ISO 9000; Capability Maturity Model; Quality audit. Configuration Management : Configuration management process; Software configuration items; Version control; change control; Configuration audit; Status reporting.

Text Books:

1. Bob Hughes and Mike Cotterell, “Software Project Management”, Third Edition 2002, McGraw-Hill
2. PankajJalote, “Software Project Management in Practice”, 2002, Pearson Education Asia.

Reference Books:

1. Roger S. Pressman, “Software Engineering: A practitioner’s Approach”, Fifth Edition 2001 McGraw-Hill
2. Robert T. Futrell, Donald F. Shafer, and Linda I.. Shafer, “Quality Software Project Management” 2002, Pearson Education Asia.
3. Ramesh Gopalaswamy, “Managing Global Software Projects”, 2003, Tata McGraw-Hill

Paper Code: MEEC-604 **L T C**
Subject: Advanced Signal Processing
INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**
1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT & EMPLOYABILITY

Unit I
Discrete Time Signals and Systems, Frequency Domain Representation, Z-Transforms, Discrete Fourier Transforms, Impulse Response and Transfer functions, Convolution and Correlation.

Unit II
IIR Filter Design: Filter Approximation, Impulse Invariant Method, Bi-linear Transformation method filter structures, Finite word length effects, limitations of IIR filters. FIR Filter Design: Linear phase response, Windowing technique, Gibb's Phenomenon, Frequency Sampling Method, FIR Filter structures.

Unit III
Frequency Domain Realization of Digital Filters, Radix-2 FFT Algorithm. Introduction to Multirate digital signal processing

Unit IV
Power Spectrum Estimation, Classical Spectral Estimation, Parametric Modeling - AR, MA, ARMA methods, Minimum variance spectral estimations. Principles of DSP Architecture.

Text:
1. G. J. Proakis and D. G. Manolakis, "Digital Signal Processing, Principles, algorithms and applications", 4th ed. Pearson Education.
2. S. K. Mitra, " Digital Signal Processing" 3rd ed. TMH.

References:
1. A.V. Oppenheim and R.W. Schafer "Discrete Time Signal Processing", PHI 1992.
2. Steven M. Kay "Modern Spectral Estimation", PHI 1988.
3.. Clark Cory.L, "Lab view DSP and Digital comm.", TMH 2005.
4. .Roman Kuc "Introduction to Digital Signal Processing", McGraw Hill 1988

Paper Code: MECS – 606 **L T C**
Subject: Advanced Algorithm Analysis & Design **4 0 4**
INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**
Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT & EMPLOYABILITY

UNIT I
Review of various Design and Analysis Techniques and their comparisons: Overview of Divide-and-Conquer, Dynamic Programming and Greedy Algorithms, Comparison of dynamic programming and Greedy algorithm with Knapsack as case studyTheoretical foundation of greedy algorithm, Matroids and Greedy methods, A Task Scheduling problem as a Matroid.Comparisons of all techniques with reference to their time complexity, space complexity, guaranteed optimization and Stability.

UNIT II
Review of Graph Theory, Internal Representations, Traversal algorithms, Tree, Spanning tree generation. Maximum Flow: Flow networks, The ford-fulkerson method, Maximum bipartite matching, Push-Rebel Algorithms, The relable-to-front algorithms.
Computational Geometry: Line segments properties, determining whether any pair of segment intersects, Finding a convex hull, finding the closest pair of points

UNIT III
Matrix Operations: Solving system of linear equation, Inverting Matrices, Symmetric positive-definite matrices and least square approximation
Polynomial and FFT: Representation of polynomials, The DFT and FFT, efficient FFT implementation
Number–Theoretic Algorithm: Elementary number-theoretic notion, Greatest common divisor, modular arithmetic, solving modular linear equation, the Chinese remainder theorem, Power of an element, The RSA public-key cryptosystem, Primality testing, Integer Factorization.

UNIT IV
NP-Completeness, Polynomial time, Polynomial time verification, NP completeness and reducibility, NP Completeness proofs. Few examples NP complete problems.
Approximation Algorithms- the vertex-cover problem, The Traveling-Salesman Problem, The set covering problem, Randomization and linear programming, Subset-sum problem.

Text Books:
1. T. H. Cormen, C. E. Leiserson, R.L. Rivest, C. Stein, “Introduction to Algorithms”, 2nd Edition, PHI.

Reference Books:
1. A.V. Aho, J. E. Hopcroft, J.D. Ulman, “The Design & Analysis of Computer Algorithms”, Addison Wesley.
2. V. Manber, “Introduction to Algorithms – A Creative Approach”, Addison Wesley.
3. Ellis Harwitz and SartazSahani, “Fundamentals of Computer Algorithms”, Galgotia.

Paper Code: MEIT – 606 **L T C**
Subject: Computer Graphics & Animation **4 0 4**
INSTRUCTIONS TO PAPER SETTERS: Maximum Marks : 60
Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT & EMPLOYABILITY

UNIT I
Raster graphics, Vector graphics, Basic raster graphics algorithms for drawing 2 D Primitives line, circles, ellipses, arcs etc., Anti-aliasing and its techniques. Clipping: clipping points, line and area clipping. & polygon filling algorithm.

UNIT II
Geometric Transformation: 2D transformations like translation, rotation, scaling, reflection and shearing etc., composite transformation and homogeneous coordinate system in transformation. 3D transformations, window to viewport transformations, projection: Types of projection methods, perspective projection with different location of centre of projection. Graphics Hardware: Hardcopy & display techniques, Input devices, image scanners etc.,

UNIT III
Modeling: parametric and non-parametric. Curves and its blending methods.Uniform, non-uniform curvs, rational and non-rational curves, NURBS, Surfaces and its generation techniques. Hardware and software color models and its applications in different fields.
Wireframe, surface and solid modeling, Polygon meshes and its need of approximation , Shading Techniques : Lambert, Gouraud and Phong methods. Illumination models: Global and local illumination model, ransparency, Shadows, Visible surface determination techniques for visible determination like Z-buffer algorithm, A buffer algorithm, scan line algorithm, area subdivision algorithm for implementation of visible surface detection. Visible surfaces ray-tracing, recursive ray tracing, radio-city methods.

UNIT IV
Animation: introduction to 2D and 3D animation. Dynamics and role of dynamics in animation. Different 3D animation techniques like key frame animation, path animation, reactive animation and Forward and Inverse Kinematics Skelton animation.

Text Books:
1. Foley et. al., “Computer Graphics Principles & practice”, Addison Wesley Ltd., 2003.
Reference Books:
1. R.H. Bartels, J.C. Beatty and B.A. Barsky, “An Introduction to Splines for use in Computer Graphics and Geometric Modeling”, Morgan Kaufmann Publishers Inc., 1987.
2. D. Hearn and P. Baker, “Computer Graphics”, Prentice Hall, 2003.
3. W. Newman and R. Sproul, “Principles of Interactive Computer Graphics, McGraw-Hill, 1973.
4. R. Plastock and G. Kalley, “Theory and Problems of Computer Graphics”, Schaum’s Series, McGraw Hill, 2001.
5. F.P. Preparata and M.I. Shamos, “Computational Geometry: An Introduction”, Springer-Verlag New York Inc., 1985.
6. D. Rogers and J. Adams, “Mathematical Elements for Computer Graphics”, MacGraw-Hill International Edition, 1989.
7. David F. Rogers, “Procedural Elements for Computer Graphics”, McGraw Hill Book Company, 1985.
8. Alan Watt and Mark Watt, “Advanced Animation and Rendering Techniques”, Addison-Wesley, 2002

Paper Code: MEEC-606 **L T C**
Paper: Advanced VLSI Design **4 - 4**
INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT & EMPLOYABILITY

Unit 1
Introduction : Basic principle of MOS transistor, Introduction to large signal MOS models (long channel) for digital design.
MOS Circuit Layout & Simulation and manufacturing: scaling, MOS SPICE model and simulation, CMOS layout: design rules, Transistor layout, Inverter layout, NMOS and CMOS basic manufacturing steps.

Unit 2
The MOS Inverter : Inverter principle, the basic CMOS inverter, transfer characteristics, logic threshold, Noise margins, switching characteristics, Propagation Delay, Power Consumption.
Combinational MOS Logic Design : Static MOS design, Ratioed logic, Pass Transistor logic, complex logic circuits.

Unit 3
Sequential MOS Logic Design
Static latches, Flip flops & Registers, Dynamic Latches & Registers, CMOS Schmitt trigger, Astable Circuits.
Memory Design: ROM & RAM cells design Dynamic MOS design : Dynamic logic families and performances.
Clock Distribution Clock Distribution. Input and Output Interface circuits.

Unit 4
Subsystem design
Design styles, design concepts: Hierarchy, Regularity, Modularity, Locality. CMOS Sub system design: Adders, Multipliers.

Text Books
[1] S. Kang & Y. Leblebici "CMOS Digital IC Circuit Analysis & Design"- McGraw Hill, 2003.
[2] J. Rabaey, "Digital Integrated Circuits Design", Pearson Education, Second Edition, 2003.

Reference Books
[1] Neil Weste and David Harris :" CMOS VLSI design" Pearson Education 2009

Paper Code: MECS – 608 **L T C**
Subject: Software Requirements& Estimation **4 0 4**
INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**
Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT & EMPLOYABILITY

UNIT I
Introduction to software life cycle, Management activities in a software project, Requirements engineering: Requirements Elicitation, Requirement Elicitation techniques, Requirement Analysis, Requirement Analysis Models, Requirement Documentation, Requirement Management

UNIT II
Size Estimation: Function Point Analysis from DFD's, ER diagram, Function Point Analysis from Use Case Diagram & Class Diagram, Mask II FPA, LOC estimation, Conversion between size measures

UNIT III
Effort, schedule & cost estimation: Estimation factors, COCOMO-II, Estimation by Analogy, Validating Software Estimates Tools: Software Estimation Tools

UNIT IV
Industry Resources; IFPUG, UQAM-SEMRL, COSMIC, IEEE, Two latest Research papers to be covered

Text Books:
1. Kishore, Swapna, “Software Requirements and Estimation”, Tata McGraw Hill, 2001
Reference Books:
1. Norman E. Fenton, “Software Metrics: A Rigorous and Practical Approach”, International Thomson Computer Press, 1996.
2. B. Henderson-Sellers, “Object-Oriented Metrics, Measures of Complexity”, Prentice Hall, 1996.

Paper Code: MEIT-608 **L T C**
Subject: Web Semantics **4 0 4**
INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT, EMPLOYABILITY & ENTERPRENEURSHIP

UNIT – I
Review of Internet and Web, it's origin and growth, W3C, various versions of Web, Limitations of present web, Semantic Web as the next generation web and it's various concerns. Semantic Web roadmap, it's need and goal, capabilities and limitations, various issues, applications.

UNIT – II
Tim Berner's Lee architecture of Semantic Web (various versions), it's various technologies and tools. Basic elements of HTML & XML, Examples, XML, XMLS, XML Query Language, RDF, RDFS, RDF/XML, URI, Cryptography concerns and issues. Programming and mathematical concerns.

UNIT – III
Ontology as a backbone for incorporating semantics and it's various significant concerns and issues, SPARQL Semantics execution and Query processing, optimization and execution along with implementation illustrations for filtering RDF using Jena and twinkle tool.

UNIT – IV
Significant concerns of Web Semantics like Semantic Web Services, Software agents, Search Engines, Information Extraction and Retrieval, Semantic Annotation, NLP, Web usage mining, Social Networks for Network Analysis and visualization etc.

TEXT BOOKS
1. Berners-LEE, Godel and Turing, "Thinking on the Web", Wiley, 2006.
2. Devedzic V, "Semantic Web Education", Springer, 2006
3. John Hebeler and Matthew Fisher, "Semantic Web Programming", Wiley, 2009
4. Karin Breitman and Marco," Semantic Web: Concepts, Technologies and Applications", 2009
5. Rajendra Akerkar, "Foundations of the Semantic Web:XML,RDF and Ontology",2009,Oxford.

REFERENCES
1. Geroimenko and Chen, "Visualizing the Semantic Web", Springer, 2004.
2. Passin, "Explorer's guide to the Semantic Web", Manning, 2004.
3. Pascal, Krotzsch and Rudolph, "Foundations of Semantic Web Technologies", SRC Press.
4. Grigoris Antoniou and Paul Groth, "A Semantic Web Primer", 2012
5. Peter, Gergely and Tamas, "The Semantic Web explained-the technology and mathematics behind web 3.0", Cambridge University Press, 2014.

Paper code: MEDC-608	**L**	**T/P**	**C**
Paper: Satellite Communication	**4**	**0**	**4**

INSTRUCTIONS TO PAPER SETTERS: Maximum Marks : 60

1. Question No. 1 should be compulsory and cover the entire syllabus and will be of 20 marks.

2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

UNIT-I

ORBITAL MECHANICS: Orbits, Orbit Equations, Orbital Elements-Look Angle Determination and Visibility - Orbital Perturbations, Orbit Determination, Launch Vehicles, Orbital Effects in Communication System - Performance Attitude control; Satellite launch vehicles. spectrum allocations for satellite systems.

UNIT-II

SPACECRAFT SUB SYSTEMS AND EARTH STATION: Altitude and Orbit Control, Telemetry and Tracking, Power Systems, Communication Subsystems, Transponders, Antennas, Equipment Reliability, Earth Stations, Example of payloads of operating and planned systems.

UNIT-III

SPACE LINKS: Satellite Link Design - Satellite uplink -down link power Budget, Basic Transmission Theory, System Noise Temperature, G/T Ratio, Noise Figure, Design of Down links, Domestic Satellite Systems Using Small Earth stations, Uplink Design, Design of Satellite Link for Specified (C/N).

UNIT-IV

MULTIPLE ACCESS TECHNIQUES AND NETWORK ASPECTS: Single access vs. multiple access, FDMA, TDMA, Single channel per carrier (SCPC) access - Code division multiple access (CDMA). Demand assignment techniques, Mobile satellite network design, ATM via satellite, TCP/IP via satellite - Call control, Hybrid satellite-terrestrial networks. VSATs.

SERVICES AND APPLICATIONS: Fixed and mobile services, Multimedia satellite services, advanced applications based on satellite platforms.

Text Books:

1 Dennis Roddy, “Satellite Communications”, Third Edition, Mc Graw Hill International Editions, 2001

2. Timothy Pratt, “Satellite Communication”, Addison Wesley.

Reference Books:

1. Bruce R.Elbert, "The Satellite Communication Applications Hand Book, Artech House Boston,1997.

Paper code: MEEC-610	**L**	**T**	**P**
Paper: Microwave Integrated Circuits	**4**	**0**	**4**

INSTRUCTIONS TO PAPER SETTERS: Maximum Marks : 60

1. Question No. 1 should be compulsory and cover the entire syllabus and will be of 20 marks.

2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT & EMPLOYABILITY

Unit I

Classification of transmission lines: Planar, quasiplanar and 3-D structures, their basic properties, field distribution and range of applications. Types of MICs and their technology, Propagating models, Analysis of MIC by conformal transformation Numerical analysis, Hybrid mode analysis, Substrate materials and fabrication steps in MIC

Unit-II

Introduction to microstrip line, slot line and coplanar wave guide Microstrip circuit design: Introduction, Impedance transformers, Directional couplers, branch line couplers, filters, resonators. Design and Fabrication of Lumped elements for MICs, Comparison with distributed circuits

Unit-III

Non-reciprocal components and active devices for MICs: Ferromagnetic substrates and inserts, Microstrip circulators, Phase shifters, Microwave transistors, Parametric diodes and Amplifiers, PIN diodes, Transferred electron devices, IMPATT, BARITT, Avalanche diodes

Unit-IV

MMIC technology: Fabrication process of MMIC, Hybrid MICs, Configuration, Dielectric substances, thick and thin film technology, Testing methods, Encapsulation and mounting of Devices.

Text Books :

1. Microwave Engineering using Microstrip Circuits – E H Fooks, R A Zakarevicius-prentice Hall
2. Microwave Microwave Engineering By D.M.Pozar,

Reference Books:

1. G. Gonzalez, Microwave Transistor Amplifiers: Analysis and Design, 2nd ed., Prentice Hall, 1996. Reference
2. Liao S.Y.: Microwave Circuits & Devices. PHI
3. Hoffman R.K."HandBook of Microwave intergrated circuits",Artech House,Boston,1987
4. B.Bhat and , Stripline-like transmission lines for MICs, John Wiley, 1989.

Paper Code: MECS – 610 **L T C**
Subject: Network Programming **4 0 4**
INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**
Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT & EMPLOYABILITY

UNIT I
Introduction to Systems Programming: Files, System Files, File Formats, Buffered I/O,Directories, File System, Inodes, links, fcntl, links, locks, Device I/O, Terminal I/O,ioctl(), Files and Devices ,Signals, video I/O ,Multi-Tasking

UNIT II
Processes and Inter-Process Communication: timers, polling vs interrupts, environment,fork, exec, wait, environment, exit and wait, pipe, fifos, message queues, semaphore

UNIT III
Network Programming: Sockets, Operation, Socket types, Domains Name Binding,Closing Sockets, I/O Multiplexing, Client/Server Models, Connection Based Services,Handling Out of Band Data, Connectionless Services, Design issues of Concurrent anditerative servers, Socket options

UNIT IV
XDR and Remote Procedure Calls, Network Programming at the level of ProgrammingLanguage (can use Java or Python as case study)

Text Books:
1. Unix Network Programming, W. Richard Stevens, Prentice Hall, 1998 Reference Books:
1. Internetworking with TCP/IP, Volume1, Fifth Edition, Douglas Comer, Prentice Hall,2006.
2. Internetworking With TCP/IP Volume II,Third Edition, Douglas Comer, Prentice Hall, 1999.
3. Internetworking with TCP/IP, Volume3, Douglas Comer, Prentice Hall,2000

Paper code: MESP-612	**L**	**T/ P**	**C**
Paper: Digital Image Processing	**4**	**0**	**4**

INSTRUCTIONS TO PAPER SETTERS: Maximum Marks : 60

1. Question No. 1 should be compulsory and cover the entire syllabus and will be of 20 marks.

2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT & EMPLOYABILITY

UNIT I

Introduction to 2-D Signals and Systems, Image Digitization, Image Transforms, Image Data Compression: Transform Domain Coding, Predictive Coding, JPEG. Image Enhancement:

UNIT II

Image Restoration: Inverse Filtering, Algebraic Approach to Restoration, Wiener (LMS) approach, Constrained Least Squares Restoration, Interactive and other methods for restoration.

UNIT III

Image Reconstruction: The Filtered Back-Projection Algorithm, Algebraic reconstruction Method. Image Segmentation: Detection of Discontinuities, Edge Linking and Boundary Detection,

UNIT IV

Thresholding, Region-Oriented Segmentation, Selected Topics of Current Interest (for example multiresolution analysis, morphological processing etc.).

Text books/ References:

1) Digital Image Processing By R. C. Gonzalez and R. E. Woods, Prentice-Hall.
2) Digital Image Processing and Computer vision By Milan Sonka, CL-Engineering Publisher

Paper Code: MECS – 612 **L T C**
Subject: Soft Computing **4 0 4**
INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**

Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.

Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT, EMPLOYABILITY

UNIT I

Introduction: Introduction to Soft Computing Concepts, Importance of tolerance in imprecision and uncertainty, Soft Computing Constituents and Conventional Artificial Intelligence, From Conventional AI to Computational Intelligence, Fuzzy Set Theory, Neural Networks and Evolutionary Computation

Neural Networks: Overview of biological Neuro-system, Mathematical Models of Neurons, ANN architecture, Learning rules, Learning Paradigms-Supervised, Unsupervised and reinforcement Learning, ANN training Algorithms-perceptions, Training rules, Delta, Back Propagation Algorithm, Multilayer Perceptron Model, Hopfield Networks, Associative Memories, Applications of Artificial Neural Networks.

UNIT II

Introduction to Fuzzy Sets: Classical and Fuzzy Sets: Overview of Classical Sets, Membership Function, Fuzzy rule generation.

Operations on Fuzzy Sets: Compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations.

Fuzzy Arithmetic: Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations.

Fuzzy Logic: Classical Logic, Multivalued Logics, Fuzzy Propositions, Fuzzy Qualifiers, Linguistic Hedges.

Uncertainty based Information: Information & Uncertainty, Nonspecificity of Fuzzy & Crisp Sets, Fuzziness of Fuzzy Sets, Defuzzyfication.

UNIT III

Evolutionary Computation: Genetic Algorithms and Genetic Programming, Evolutionary Programming, Evolutionary Strategies and Differential Evolution Coevolution, Different operators of Genetic Algorithms, Analysis of Selection Operations, Convergence of Genetic Algorithms

UNIT IV

Rough Sets: Introduction, Imprecise categories Approximations and Rough Sets, Reduction of Knowledge, Decision Tables, and Applications.

Hybrid Systems: Introduction of Neuro-Fuzzy Systems, Architecture of Neuro Fuzzy Networks.Fuzzy Logic bases Neural Networks, Genetic Algorithm for Neural Network Design and Learning, Fuzzy Logic and Genetic Algorithm for Optimization, Applications.

Text Books:

1. Anderson J.A, “An Introduction to Neural Networks”,PHI, 1999.
2. Hertz J. Krogh, R.G. Palmer, “Introduction to the Theory of Neural Computation”, Addison-Wesley, California, 1991.

Reference Books:

1. “Neural Networks-A Comprehensive Foundations”, Prentice-Hall International, New Jersey,1999.
2. Freeman J.A. & D.M. Skapura. “Neural Networks: Algorithms, Applications and Programming Techniques”, Addison Wesley, Reading, Mass, (1992).
3. G.J. Klir& B. Yuan, “Fuzzy Sets & Fuzzy Logic”, PHI, 1995.
4. Melanie Mitchell, “An Introduction to Genetic Algorithm”, PHI, 1998.

Paper Code: MEEC-612 **L T C**
Paper:Cellular & Mobile Communication **4 0 4**
INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

Unit I
Introduction to Cellular Mobile Systems: A basic cellular system, performance criteria, uniqueness of mobile radio environment, operation of cellular systems, planning a cellular system, overview of generations of cellular systems.
Elements of Cellular Radio Systems Design and interference
General description of the problem, concept of frequency reuse channels, co-channel interference reduction factor, desired C/I from a normal case in an omni directional antenna system, cell splitting, consideration of the components of cellular systems. Introduction to co-channel interference, co-channel measurement design of antenna system, antenna parameter and their effects,

Unit II
Cell Coverage for Signal & antenna structures: General introduction, obtaining the mobile point to point mode, propagation over water or flat open area, foliage loss, propagation near in distance, long distance propagation, point to point prediction model- characteristics, cell site, antenna heights and signal coverage cells, mobile to mobile propagation. Characteristics of basic antenna structures, antenna at cell site, mobile antennas.
Frequency Management & Channel Assignment, Hand Off & Dropped Calls: Frequency management, fixed channel assignment, non-fixed channel assignment, traffic & channel assignment. Why hand off, types of handoff and their characteristics, dropped call rates & their evaluation.

Unit III
Modulation methods and coding for error detection and correction: Introduction to Digital modulation techniques, modulation methods in cellular wireless systems, OFDM. Block coding, convolution coding and Turbo coding. Multiple access techniques: FDMA, TDMA, CDMA; Time-division multiple access (TDMA), code division multiple access (CDMA), CDMA capacity, probability of bit error considerations, CDMA compared with TDMA.

Unit IV
Second generation, digital, wireless systems: GSM, IS_136 (D-AMPS), IS-95, mobile management, voice signal processing and coding.

Text Books:
1 Mobile Cellular Telecommunications; 2nd ed.; William, C Y Lee McGraw Hill
2 Mobile wireless communications; Mischa Schwartz, Cambridge University press, UK, 2005

Reference Books
1 Mobile Communication Hand Book; 2nd Ed.; IEEE Press
2 Wireless communication principles and practice, 2nd Ed, Theodore S rappaport, Pearson Education.
3 3G wireless Demystified; Lawrence Harte, Mc. Graw Hill pub.
4 Principles of Wireless Networks, Kaveh Pahlavan and Prashant Krishnamurthy: PHI
5 Wireless communication theory, Blake, pub: Thomson Delmar 2004

Paper Code: MEEC-614	**L**	**T**	**C**
Paper: Advanced Radiation Systems	**4**	**0**	**4**

INSTRUCTIONS TO PAPER SETTERS: Maximum Marks : 60

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.

2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

Unit I

Basic Concepts of Radiation, Radiation from Apertures, Synthesis of Array Antennas, Microstrip Antennas, EMIs/EMC/Antenna Measurements

Unit-II

Radiation from surface current and current line current distribution,Basic antenna parameters,Radiation mechanism-Current distribution ofn Antennas,Impedance concept-Balance dto Unbalanced transformer Field equivalence principle,Rectangular and circular apertures,Uniform distribution on an infinite ground plane,Aperture fields of Horn antenna-Babinets principle,Geometrical theory of diffgraction,Reflector antennas,Design considerations - Slot antennas

Unit-III

Types of linear arrays,current distribution in linear arrrays,Phased arrays,Optimization of Array patterns,Continuous aperture sources,Antenna synthesis techniques Radiation mechanisms,Feeding structure,Retangular patch,Circular patch,Ring antenna.Input impedance of patch antenna,Microstrip dipole,

Unit-IV

Microstrip arrays Log periodic,Bi-conical,Log spiral ridge Guide,Multi turn loop,Travelling Wave antenna,Antenna measurement and instrumenatation ,Amplitude and Phase measurement,Gain,Directivity.Impedance and polarisation measurement,Antenna range,Design and Evaluation

Text Book:

1. Kraus.J.D.,"Antennas"II Edition,John wiley and Sons ,1997
2. Balanis.A, "Antenna Theory Analysis and Design",John Wiley and Sons,New York,1982

Reference Books:

1. Collin.R.E. and Zucker.F.,"Antenna Theory"Part I,Mc Graw Hill,New York,1969

Paper Code: MECS – 614 **L T C**
Subject: Modelling & Simulation **4 0 4**
INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**
Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT & EMPLOYABILITY

UNIT I
System definition and components, stochastic activities, continuous and discrete systems, system modeling, types of models, static and dynamic physical models, static and dynamic mathematical models, full corporate model, types of system study.

UNIT II
System simulation, why & when to simulate, nature and techniques of simulation, comparison of simulation and analytical methods, types of system simulation, real time simulation, hybrid simulation, simulation of pure-pursuit problem, single-server queuing system and an inventory problem, Monte-Carlo simulation, Distributed Lag models, Cobweb model.

UNIT III
Simulation of continuous systems, analog vs. digital Simulation, Simulation of water reservoir system, Simulation of a servo system, simulation of an autopilot ,Discrete system simulation, fixed time-step vs. even to even model, generation of random numbers, test for randomness, Monte-Carlo computation vs. stochastic simulation. System dynamics, exponential growth models, exponential decay models, modified exponential growth models, logistic curves, generalization of growth models, system dynamic diagrams

UNIT IV
Introduction to SIMSCRIPT: Program, system concepts, origination, and statements, defining the telephone system model. Simulation of PERT Networks, critical path computation, uncertainties in activity duration, resource allocation and consideration. Simulation languages and software, continuous and discrete simulation languages, expression based languages, object oriented simulation, general purpose vs. application - oriented simulation packages, CSMP-III, MODSIM-III.

Text Books:
1. Geoftrey Gordon, " System Simulation", PHI

Reference Books:
1. Jerry Banks, John S. C Barry L. Nelson David M. Nicol, "Discrete Event System Simulation", Pearson Education
2. V P Singh, "System Modeling and simulation", New Age International.
3. Averill M. Law, W. David Kelton, "System Modeling and simulation and Analysis",TMH

Paper Code: MEEC-616 **L T C**
Paper: Telecommunication Switching and Tele-traffic Engineering **3 0 4**
INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

Unit – I: Multiplexing
Transmission Systems, FDM Multiplexing and modulation, Time Division Multiplexing, Digital Transmission and Multiplexing: Pulse Transmission, Line Coding, Binary N – Zero Substitution, Digital Biphase, Differential Encoding, Time Division Multiplexing, Time Division Multiplex Loops and Rings.
SONET/SDH: SONET Multiplexing Overview, SONET Frame Formats SONET Operations, Administration and Maintenance, Payload Framing and Frequency Justification, Virtual Tributaries, DS3 Payload Mapping, E4 Payload Mapping, SONET Optical Standards, SONET Networks. SONET Rings: Unidirectional Path-Switching Ring, Bidirectional Line-Switched Ring.

Unit – II: Digital Switching
Switching Functions, Space Division Switching, Time Division Switching, two-dimensional switching: STS Switching, TST Switching, No.4 ESS Toll Switch, Digital Gross-Connect Systems, and Digital Switching in an Analog Environment. Elements of SSNO7 Signaling.

Unit – III: Network Synchronization Control and Management
Timing: Timing Recovery: Phase-Locked Loop, Clock Instability, Jitter Measurements, Systematic Jitter. Timing Inaccuracies: Slips, Asynchronous Multiplexing, Network Synchronization, U.S. Network Synchronization, Network Control, Network Management.

Unit – IV: Digital Subscriber Access and traffic analysis
ISDN: ISDN Basic Rate Access Architecture, ISDN U Interface, ISDN D Channel Protocol. High-Data-Rate Digital Subscriber Loops: Asymmetric Digital Subscriber Line, VDSL. Digital Loop Carrier Systems: Universal Digital Loop Carrier Systems, Integrated Digital Loop Carrier Systems, Next-Generation Digital Loop Carrier, Fiber in the Loop, Hybrid Fiber Coax Systems, and Voice band Modems: PCM Modems, Local microwave Distribution Service, Digital Satellite Services. Traffic Characterization: Arrival Distributions, Holding Time Distributions, Loss Systems, And Network Blocking Probabilities: End-to-End Blocking Probabilities, Overflow Traffic, And Delay Systems:Exponential Service Times, Constant Service Times, Finite Queues.

Text:
1. Bellamy John, “Digital Telephony”, John Wily & Sons, Inc. 3rd ed. 2000
2. Viswanathan. T., “Telecommunication Switching System and Networks”, PHI 1994

References:
1. Robert G. Winch, “Telecommunication transmission systems”, 2nd ed. TMH 2004
2. Marion Cole, “Intro. to Telecommunications” 2nd ed. Pearson education 2008.
3. Tom Sheldon, “Encyclopedia of Networking and telecom.” TMH seventh reprint2006

Paper Code: MECS – 616 **L T C**
Subject: Software Metrics **4 0 4**
INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**
Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

UNIT I
Introduction: What is measurement and why do it? Measurement in software engineering, scope of software metrics. The Basics of Measurement: Representational theory, Measurement & Models, Measurement Scales and Scale Types, Meaningfulness in Measurement

UNIT II
A Goal Framework for Software Measurement: Classifying software measures, Determining what to measure, Applying the framework Empirical Investigation & Data Collection: Four Principles of Investigation, Planning formal experiments, What is good data, How to define the data, How to collect data, When to collect data.

UNIT III
Analyzing Software Measurement Data: Analyzing the results of experiments, Analysis Techniques, Overview of statistical tests. Measuring Internal Product Attributes, Size and Structure: Aspects of Software Size, Length, Reuse, Functionality, Complexity, Types of Structural Measures, Modularity and information flow attributes, Object Oriented Metrics

UNIT IV
Measuring External Product Attributes: Modeling Software Quality, Measuring aspects of quality Measurement and Management: Planning a measurement program, Measurement in practice, empirical research in software engineering.

Text Books:
1. Norman E. Fenton & Shari Lawrence Pfeiffer, “Software Metrics”, Thomson Computer Press, 1996.

Reference Books:
1. Norman E. Fenton, “Software Metrics: A Rigorous and Practical Approach”, International Thomson Computer Press, 1996.
2. B. Henderson-Sellers, “Object-Oriented Metrics, Measures of Complexity”, Prentice Hall, 1996.
3. Kishore, Swapna, “Software Requirement and Estimation”, Tata McGraw Hill, 2001

Paper Code: MEEC-618 | **L** | **T** | **C**
Paper: ESD using ARM Microcontroller | **4** | **0** | **4**
INSTRUCTIONS TO PAPER SETTERS: | **Maximum Marks : 60**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT & EMPLOYABILITY

Unit – I
Introduction to Embedded System Design, Embedded System Architecture, Embedded System model, an overview of Programming Languages and examples of their standards, Embedded Processor: ISA Architecture Models, Application-specific ISA models, FSMD model, JVM model, CISC & RISC model, Instruction – Level Parallelism ISA model, Von Neumann & Harvard Architectures.

Unit – II
ARM Embedded System, ARM Processor Fundamentals: Registers, Pipeline, Exceptions, Interrupts and vector tables, ARM Processor family, ARM Instruction Set, Thumb Instruction Set

Unit –III
Overview of C compiler and Optimization: Register allocation, Functions Calls, Pointer aliasing, Structure arrangement, Portability issues, writing and optimizing ARM assembly code

Unit –IV
Interrupts and interrupt handling Scheme, firmware and Boot loader, Real-Time operating Systems: Context Switching, task tables and kernels, Time Slice, Scheduler algorithms: RMS, Deadline monotonic Scheduling; Priority Inversion, Tasks, Threads and process, Exceptions, Exception handling

Text books:
1. Embedded Systems Architecture by Tammy Overgaard; Elsevier Publisher; 2005
2. ARM System Developer's Guide by A.N. Sloss, D. Symes and C. Wright; Elsevier Publisher;2006

Reference books:
1. Embedded System Design by Steve Heath, Elsveir Publisher; 2006
2. Embedded Systems by Raj Kamal, TMH; 2006
3. Embedded Microcomputer Systems, Thomson Publisher; 2005
4. Embedded system Design, Kluwer Academic Publisher; 2005
5. An Introduction to the design of small-scale embedded Systems by T. Wilmshurst, Palgrav publisher; 2001

Paper Code: MECS – 620 **L T C**
Subject: Distributed Computing **4 0 4**
INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**
Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

UNIT I
Fundamentals of Distributed & Parallel Computing: Architectural models for distributed and mobile computing systems, Basic concepts in distributed computing,.Classification of Parallel Computers, Parallel Computer Architecture,
Distributed Operating Systems: Overview, network operating systems, Distributed file systems, Middleware,client/server model for computing.

UNIT II
Communication: Layered protocols, RPC, RMI, Remote objects.Basic Algorithms in Message PassingSystems, Leader Election in Rings, and Mutual Exclusion in Shared Memory,Message Passing, PVM and MPI.
Process Concepts: Threads, Clients and Servers, Code migration, Agent based systems, Distributedobjects, CORBA, Distributed COM.

UNIT III
Synchronization: Clock synchronization, Logical clocks, Election algorithms, Mutual exclusion,Distributed transactions, Naming concepts, Security in distributed systems.
Consistency, Replication and Fault Tolerance: Introduction,Data-centric consistency models, Client-centric consistency models,Distribution Protocols,Consistency Protocols,Examples. Introduction to Fault Tolerance,Process Resilience,Reliable Client Server Communication,Reliable Group Communication Distributed Commit,Recovery.

UNIT IV
Parallel Systems: Basic Concepts: Introduction to parallel processing, Parallel processing terminology,Design of parallel algorithms, Design of Parallel Databases, Parallel Query evaluation.OperatingSystem for Parallel Computers.

Text Books:
1. Tannenbaum, A, Maarten Van Steen. Distributed Systems, Principles and Paradigm, Prentice Hall India, 2002
2. Michael J. Quinn, “Parallel Computing – Theory and Practice, 2nd Edition, McGraw Hill, 1994

Reference Books:
1. Tanenbaum, A, “Modern Operating Systems”, 2nd Edition, Prentice HallIndia, 2001.
2. Singhal and Shivaratri, “Advanced Concepts in Operating Systems”, McGrawHill, 1994
3. Attiya, Welch, “Distributed Computing”, Wiley India, 2006
4. Coulouris, Dollimore and Kindberg, “Distributed Systems”, Pearson, 2009.
5. Kai Hwang and Zhi.WeiXu, “Scalable Parallel Computing”, Tata McGraw-Hill, New Delhi, 2003.

Paper Code: MEEC-620 **L T C**
Paper: Instrumentation and Control Engineering **4 0 4**
INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

Unit-I
Generalized Instrumentation system, Measurement systems, control system, Features of personal computers, PC_Based Instrumentation Systems, Data Acquisition systems, PC interfaces. Signal Conditioning and Op Amp circuits.

Unit-II
Principles of Data acquisition and Interfacing
Sampling concepts, D/A converter, A/D converters, Data Acquisition Configurations, Expansion, Buses. Parallel port, Plug-in Boards, Data Acquisition using GPIB, Data Acquisition serial interfaces, Network Data Acquisition.

Unit-III
Application Examples in Measurement and Control PC based data - Acquisition systems - Industrial process measurements, like flow temperature, pressure, and level PC based instruments development system. Sensors and ActuatorsTemperature sensor, Displacement Sensors, Pressure Sensors, Flow sensors, Actuators.

Unit-IV
Introduction to LabVIEW: Software environment, front panel, block diagram, palettes, loops, structures and tunnels, arrays, clusters, plotting data. Modular Programming: Modular programming in LabVIEW, creating an icon, building a connector pane, displaying subVIs and express Vis as icons or expandable nodes,creating subVIs from sections of VIs,opening and editing subVIs, placing subVIs on block diagrams, creating stand alone applications.

Text Book:
1. Ahson, S.I. “Microprocessors with applications in process control”, Tata McGraw-Hill Publishing Company Limited,1984
2. Jerome, PHI Virtual Instrumentation using LabVIEW, Jovitha, ISBN 978-81-203-40305, 2010.

References:
1. George Barney C. “Intelligent Instrumentation”, Prentice Hall of India Pvt. Ltd., 1998
2. Krishna Kanth “Computer based industrial control”, Prentice Hall. 1997
3. Sergio Franco, “Design with operational amplifiers and analog integrated circutis”, TATA McGraw-Hill2002
4. S. K. Singh, “Industrial Instrumentation and Control”, TATA McGraw-Hill. 2004
5. N. Mathivanan, “PC-Based Instrumentation”, PHI, 2009

Paper Code: MECS – 624 **L T C**
Subject: Advanced Computer Graphics **4 0 4**
INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**
Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT & EMPLOYABILITY

UNIT I
Raster graphics, Vector graphics, Basic raster graphics algorithms for drawing 2 D Primitives line, circles, ellipses, arcs etc., Anti aliasing and its techniques. Clipping: clipping points, line and area clipping. & polygon filling algorithm.

UNIT II
Geometric Transformation: 2D transformations like translation, rotation, scaling, reflection and shearing etc., composite transformation and homogeneous coordinate system in transformation. 3D transformations, window to viewport transformations, projection: Types of projection methods, perspective projection with different location of centre of projection.
Graphics Hardware: Hardcopy & display techniques, Input devices, image scanners etc.,

UNIT III
Modeling: parametric and non parametric. Curves and its blending methods. Uniform, non uniformcurvs, rational and non rational curves, NURBS, Surfaces and its generation techniques. Hardware and software color models and its applications in different fields. Wireframe, surface and solid modeling, Polygon meshes and its need of approximation , Shading Techniques : Lambert, gouraud and phong methods. Illumination models: Global and local illumination model, Transparency, Shadows, Visible surface determination techniques for visible determination like Z-buffer algorithm, A buffer algorithm, scan line algorithm, area subdivision algorithm for implementation of visible surface detection. Visible surfaces ray-tracing, recursive ray tracing, radiosity methods.

UNIT IV
Procedural modeling, fractals and its generation techniques, grammar-based models, multi-particle system, concepts of hardware and software rendering. Animation: introduction to 2D and 3D animation. Dynamics and role of dynamics in animation

Text Books:
1. Foley et. al., “Computer Graphics Principles & practice”, Addison Wesley Ltd., 2003.

Reference Books:
1. R.H. Bartels, J.C. Beatty and B.A. Barsky, “An Introduction to Splines for use in Computer Graphics and Geometric Modeling”, Morgan Kaufmann Publishers Inc., 1987.
2. D. Hearn and P. Baker, “Computer Graphics”, Prentice Hall, 2003.
3. W. Newman and R. Sproul, “Principles of Interactive Computer Graphics, McGraw-Hill, 1973.
4. R. Plastock and G. Kalley, “Theory and Problems of Computer Graphics”, Schaum’s Series, McGraw Hill, 2001.
5. F.P. Preparata and M.I. Shamos, “Computational Geometry: An Introduction”, Springer-Verlag New York Inc., 1985.
6. D. Rogers and J. Adams, “Mathematical Elements for Computer Graphics”, MacGraw-Hill International Edition, 1989.
7. David F. Rogers, “Procedural Elements for Computer Graphics”, McGraw Hill Book Company, 1985.
8. Alan Watt and Mark Watt, “Advanced Animation and Rendering Techniques”, Addison-Wesley, 2002

Paper Code: MEEC-626	**L**	**T**	**C**
Paper: Fuzzy Logic & Design	**4**	**-**	**4**

INSTRUCTIONS TO PAPER SETTERS: Maximum Marks : 60

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.

2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT & EMPLOYABILITY

Unit-I

Fuzzy Arithmetic: Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations.

Unit-II

Fuzzy Relations: Crisp & Fuzzy Relations, Projections & Cylindric Extensions, Binary Fuzzy Relations, Binary Relations on single set, Equivalence, Compatibility & Ordering Relations, Morphisms, Fuzzy Relation Equations.

Unit-III

Possibility Theory: Fuzzy Measures, Evidence & Possibility Theory, Possibility versus Probability Theory.
Fuzzy Logic: Classical Logic, Multivalued Logics, Fuzzy Propositions, Fuzzy Qualifiers, Linguistic Hedges.

Unit-IV

Uncertainty based Information: Information & Uncertainty, Nonspecificity of Fuzzy & Crisp sets, Fuzziness of Fuzzy Sets.
Applications of Fuzzy Logic:

Text Book:

1. G.J.Klir , Yuan,"Fuzzy Sets and fuzzy logic, Theory and applications", Prentice Hall India, 1995.

Reference Books:

1. John Yen, Reza Langari, "Fuzzy Logic Intelligence, Control and Information", Pearson Education, 2006.
2. Ross, "Fuzzy Logic with Engineering Applications", 2nd Edition, John Wiley, 2004.
3. H. Zimmermann, "Fuzzy Set Theory and its application

Paper Code: MECS – 701 **L T C**
Subject: Advanced Data Warehousing &Data Mining **4 0 4**
INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**
Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT, EMPLOYABILITY & ENTERPRENEURSHIP

UNIT I
Review of Data Warehousing: Introduction to Data Warehousing: Evolution of Data Warehousing, Data Warehousing concepts, Benefits of Data Warehousing, Comparison of OLTP and Data Warehousing, Why Have a Separate Data Warehouse, Problems of Data Warehousing.
Data Warehousing Architecture: Architecture: Operational Data and Data store, Load Manager, Warehouse Manager, Query Manager, Detailed Data, Lightly and Highly summarised Data, Archive/Backup Data, Meta-Data, 2-tier, 3-tier and 4-tier data warehouse architecture

UNIT II
Multidimensional Data Modeling: Principles of dimensional modeling: From Tables and Spreadsheets to Data Cubes, the STAR schema, STAR Schema Keys, Advantages of the STAR Schema Dimensional Modeling: Updates to the Dimension tables, miscellaneous dimensions, the snowflake schema, Fact Constellations, aggregate fact tables, families of STARS, Measures: Their Categorization and Computation, Concept Hierarchies, OLAP Operations in the Multidimensional Data Model, A Starnet Query Model for Querying Multidimensional Databases

UNIT III
Data Warehouse Implementation, Efficient Computation of Data Cubes, Indexing OLAP Data, Efficient Processing of OLAP Queries, Metadata repository, Data warehouse back-end tools and utilities
Data Preprocessing Why preprocess the data? Data cleaning, Missing values, Noisy data, Inconsistent data, Data integration and transformation, Data reduction: Data cube aggregation, Dimensionality reduction, Data compression, Numerosity reduction Discretization and concept hierarchy generation for numeric data and categorical data

UNIT IV
Data Mining Basics: What is Data Mining, The knowledge discovery process, OLAP versus data mining, data mining and the data warehouse, Major Data Mining Techniques, Cluster detection, decision trees, memory-based reasoning, link analysis, neural networks, genetic algorithms, moving into data mining, Data Mining Applications, Benefits of data mining, applications in retail industry, applications in telecommunications industry, applications in banking and finance.

Text Books:
1. Morgan Kaufmann - Data Mining - Concepts and Technique
2. Paul Raj Poonia, “Fundamentals of Data Warehousing”, John Wiley & Sons, 2003.

Reference Books:
1. W. H. Inmon, “Building the operational data store”, 2nd Ed., John Wiley, 1999
2. Sam Anahony, “Data Warehousing in the real world: A practical guide for building decision support systems”, John Wiley, 2004

Paper Code: MEEC-701 **L T C**
Paper: Adhoc Sensor Networks **4 - 4**
INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT & EMPLOYABILITY

Unit I
Introduction to Mobile Ad Hoc Networks, Technologies for Ad Hoc Network, Issues in Ad hoc wireless Networks, Ad Hoc network applications, Fundamentals of WLANs, IEEE 802.11 Architecture , protocols ,performance and open issues. Introduction to IEEE 802.15.4, MAC Protocols for Ad Hoc Wireless Networks: Issues, design goals and classification of MAC protocol, MACA and MACAW, Routing Protocols for Ad hoc wireless networks: Issues and classifications of routing protocols, AODV, DSR, DSDV, Multicasting Routing: Issues, Architecture reference model, and classifications of multicasting routing protocols.

Unit II
Transport layer & Security protocols Issues and design goals in designing transport layer protocols, TCP over Ad Hoc Wireless Networks: Traditional TCP, Feedback-Based TCP, TCP-BuS, Ad Hoc and Split TCP, Security in Ad hoc wireless networks: Network security requirements, Issues and challenges, Types of Network Security Attacks, and Key management, Secure routing in Ad hoc wireless networks.

Unit III
Wire Sensor Networks: Introduction and overview of WSN, Applications of Sensor Networks, Sensor network architecture, Architecture of WSNs Hardware components, Energy consumption of sensor nodes, Operating systems and execution environments, some examples of sensor nodes, Network Architecture: Sensor networks scenarios, Optimization goals and figures of merit, Design principles for WSNs, Service interfaces of WSNs, Gateway concepts.

Unit IV
Communication Protocols: Physical Layer and Transceiver design considerations in WSNs, Fundamentals of (wireless) MAC protocol: Low duty cycle protocols and wakeup concepts, Contention-based protocols, Schedule-based protocols, The IEEE 802.15.4 MAC protocol, Address and name management in wireless sensor networks, Localization and positioning, Routing protocols: Data Dissemination and Gathering, Routing Challenges and Design Issues in WSN, QoS in wireless sensor networks, Coverage and deployment, Advanced Application Support.

Text Book:
1. Ad HOC Wireless Networks: Architectures & Protocols , By C Siva Ram Murty & BS Manoj 2nd Ed, Pearson Education.
2. Protocols and Architectures for Wireless Sensor Networks, By Holger Karl and Andreas Willig Wiley Publisher (2014).

Reference:
1. Wireless Sensor Networks Technology, Protocols, and applications by Kazem Sohraby, Daniel Minoli, Taieb Znati, John Wiley & Sons.
2. Handbook of Ad Hoc Wireless Network, By Mohmad Illayas, CRC press

Paper Code: MECS – 703 **L T C**
Subject: Advanced Software Testing **4 0 4**
INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**
Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT,& EMPLOYABILITY

UNIT I
Introduction: Testing Process, Terminologies: Error, Fault, Failure, Test Cases, Testing Process, Limitations of Testing, Graph Theory: Graph, Matrix representation, Paths and Independent paths, Generation of graph from program, Identification of independent paths.
Functional Testing: Boundary Value Analysis, Equivalence Class Testing, Decision Table Based Testing, Cause Effect Graphing Technique.

Unit - II
Structural Testing: Control flow testing, Path testing, Data Flow Testing, Slice based testing, Mutation Testing
Software Verification: Verification methods, SRS verification, SDD verification, Source code reviews, User documentation verification, Software project audit,

Unit- III
Creating Test Cases from Requirements and use cases:
Use case diagram and use cases, Generation of Test cases from use cases, Guidelines forgenerating validity checks, Strategies for data validating, Database testing, Regression Testing:What is Regression Testing?, Regression test cases selection, Reducing the number of test cases, Risk analysis, Code coverage prioritization technique
Software Testing Activities: Levels of Testing, Debugging, Software Testing Tools, and Software test Plan

Unit- IV
Object oriented Testing: What is Object orientation?, What is Object Oriented testing?, Path Testing, State Based Testing, Class Testing,Testing Web Applications: What is Web testing?, Functional Testing, User interface Testing, Usability Testing, Configuration and Compatibility Testing, Security Testing, Performance Testing, Database testing, Post Deployment Testing , Web Metrics Automated Test Data Generation: What is automated test data generation? Approaches to test data generation, Test data generation, using genetic algorithm, Test Data Generation Tools.

Text Books:
1. Yogesh Singh, “Software Testing”, Cambridge University Press, New York, 2012
2. CemKaner, Jack Falk, Nguyen Quoc, “Testing Computer Software”, Second Edition, Van Nostrand Reinhold, New York, 1993.

Reference Books:
1. William Perry, “Effective Methods for Software Testing”, John Wiley & Sons, New York, 1995.
2. K.K. Aggarwal&Yogesh Singh, “Software Engineering”, New Age International Publishers, New Delhi, 2005
3. Louise Tamres, “Software Testing”, Pearson Education Asia, 2002
4. Roger S. Pressman, “Software Engineering – A Practitioner’s Approach”, Fifth Edition, McGraw-Hill International Edition, New Delhi, 2001.
5. Boris Beizer, “Black-Box Testing – Techniques for Functional Testing of Software and Systems”, John Wiley & Sons Inc., New York, 1995.
6. Marc Roper, “Software Testing”, McGraw-Hill Book Co., London, 1994.
7. Gordon Schulmeyer, “Zero Defect Software”, McGraw-Hill, New York, 1990.
8. Watts Humphrey, “Managing the Software Process”, Addison Wesley Pub. Co. Inc., Massachusetts, 1989.
9. Boris Beizer, “Software System Testing and Quality Assurance”, Van Nostrand Reinhold, New York, 1984.
10. Glenford Myers, “The Art of Software Testing”, John Wiley & Sons Inc., New York, 1979.
11. Boris Beizer, “Software Testing Techniques”, Second Volume, Second Edition, Van Nostrand Reinhold, New York, 1990.
12. Louise Tamres, “Software Testing”, Pearson Education Asia, 2002

Paper Code: MEIT – 703 **L T C**
Subject: Information Theory & Coding **4 0 4**
INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**

Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

UNIT I
Introduction: Uncertainty and information, measure of information, Entropy, properties of entropy, information rate, entropy of binary memory less source, extension of DMS, information measure for continuous random variables, sources with finite memory, Markov sources.
Source coding: source coding theorem, prefix coding, kraft McMillan inequality, Huffman coding, Shannon-Fano coding, Arithmetic coding, Lempel-Ziv algorithm, run length encoding and PCX format

UNIT II
Channel models: channel matrix, loss less, noise less, deterministic, binary symmetric channels, conditional and joint entropy, mutual information, properties of mutual information, channel capacity, channel coding theorem, channel coding theorem to BSC, Channel capacity theorem, Shannon limit.

UNIT III
Channel coding: Linear block codes, generator and parity check matrix, perfect codes, Hamming codes, repetition codes, decoding of linear block codes, syndrome decoding, Properties of syndrome, minimum distance consideration, error detection & correction capabilities
Cyclic codes, polynomial, division algorithm, matrix description, encoder for cyclic code, syndrome calculator, cyclic redundancy check codes, Maximum length codes, Golay codes, BCH codes, Reed Solomon codes.

UNIT IV
Convolution codes, convolution code encoder, code tree, trellis and state diagram, impulse response and polynomial description of convolution codes, maximum likelihood decoding, Viterbi algorithm, distance properties of convolution code, sequential decoding, turbo codes, turbo decoding. Trellis coded modulation, Secure coding, Introduction to cryptography

Text Books:
1. S. Haykin, Digital Communication, John Wiley & sons. 2002.
2. Ranjan Bose, Information theory, coding and Cryptography, MaGraw-hill, 2nded.

Reference Books:
1. T M Gover, J M Thomos, Elements of Information Theory, Wiley, 1991
2. J. H. van Lint, Introduction to coding theory, Springer, 3rded
3. Gravano S., Introduction to error control codes, Oxford university press, 2011
4. H. P. Hsu, Analog & Digital Communications, Schaum's outlines, The McGraw hill companies, 2nded.

Paper Code: MECS – 705 **L T C**
Subject: Cloud Computing **4 0 4**
INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**

Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT & EMPLOYABILITY

UNIT I
Introduction to Cloud Computing, Definition, Characteristics, Components, Cloud provider, SAAS, PAAS, IAAS and Others, Organizational scenarios of clouds, Administering &Monitoring cloud services, benefits and limitations, Deploy application over cloud, Comparison among SAAS, PAAS, IAAS, Cloud computing platforms: Infrastructure as service: Amazon EC2,Platform as Service: Google App Engine, Microsoft Azure.

UNIT II
Introduction to Cloud Technologies, Study of Hypervisors, SOAP, REST, Compare SOAP and REST, Webservices, AJAX and mashups-Web services, Mashups: user interface services, Virtual machine technology, virtualization applications in enterprises, Pitfalls of virtualization, Multi-entity support, Multi-schema approach, Multi-tenance using cloud data stores, Data access control for enterprise applications.

UNIT III
Data in the cloud: Relational databases, Cloud file systems: GFS and HDFS, BigTable, HBase and Dynamo, Map-Reduce and extensions: Parallel computing, The map-Reduce model, Parallel efficiency of Map-Reduce, Relational operations using Map-Reduce, Introduction to cloud development, Monitoring in Cloud, A grid of clouds, Mobile Cloud Computing, Sky computing, Utility Computing, Elastic Computing.

UNIT IV
Cloud security fundamentals, Vulnerability assessment tool for cloud, Privacy and Security in cloud, Cloud computing security architecture, Cloud computing security challenges, Issues in cloud computing, Implementing real time application over cloud platform, Issues in Intercloud environments, QoS Issues in Cloud, Dependability, data migration, streaming in Cloud. Quality of Service (QoS) monitoring in a Cloud computing environment, , Inter Cloud issues, load balancing, resource optimization.

Text Books:
1. Cloud Computing : A Practical Approach, Antohy T Velte, et.al McGraw Hill,
2. Cloud Computing for Dummies by Judith Hurwitz, R.Bloor, M.Kanfman, F.Halper (Wiley India Edition)
3. Cloud Security & Privacy by Tim Malhar, S.Kumaraswammy, S.Latif (SPD,O'REILLY)
Reference Books:
1. Cloud Computing Bible by Barrie Sosinsky, Wiley India
2. Cloud Applications by George Reese, O'REILLY Publication
3. Cloud Security by Ronald Krutz and Russell Dean Vines, Wiley-India

Paper Code: MEEC-705 | **L** | **T** | **C**
Paper: Embedded Systems & RTOS | **4** | **-** | **4**
INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT, EMPLOYABILITY & ENTERPRENEURSHIP

Unit – I
Introduction to an embedded systems design (ESD), Role of Real-Time Operating System, Issues in Real-time Computing:Architecture issues and Operating system issues, Structure of Real-Time system, Task Classes, Performance measures for realtime systems, Properties of performance measures, traditional performance measure, Performability, Cost function and hard deadlines, Estimating program run times, Accounting for pipelining

Unit – II
Real-Time Scheduling: Clock-Driven Approach: Static, Timer-Driven Scheduler, General structure of Cyclic schedules, Cyclic Executives, Improving the average response time for aperiodic jobs, Scheduling sporadic jobs, Practical consideration and generalizations, Algorithm for constructing static schedules, Pros and Cons of clock-driven scheduling Priority-Driven Scheduling of Periodic Tasks: Static assumption, Fixed-priority versus dynamic-priority algorithm, Rate-Monotonic and Deadline-Monotonic Algorithms, EDF algorithm, Relative merits, Schedulable utilizations of the EDF algorithm, Schedulability test for the EDF algorithm, Optimality of the RM and DM algorithm, A Schedulability test for fixedpriority tasks with short response times, Schedulability test for fixed-priority tasks with arbitrary response times, Sufficient Schedulability conditions for the RM and DM algorithms

Unit – III
Scheduling Aperiodic and Sporadic Jobs in Priority-Driven systems: Assumptions and approaches, Deferrable servers, Schedulability of deadline-driven systems in the presence of deferrable server, Sporadic server, Constant utilization, total bandwidth and weighted fair-queuing servers, Slack stealing in deadline-driven systems, Slack stealing in fixed-priority systems, Scheduling of sporadic jobs, Real time performance for jobs with soft timing constraints, A two level scheme for integrating scheduling

Unit - IV
Resource and Resource Access Control: Assumption on resources and their usage, Effects of resources contention and Resource access control, Non preemptive critical sections, basic priority-inheritance protocol, basic priority-ceiling protocol, stack based, priority-ceiling protocol, use of priority-ceiling protocol in dynamic-priority systems, preemption ceiling protocol, controlling accesses to multiple-unit resources. Multiprocessor scheduling, resource access control and synchronization: Model of multiprocessor and distributed systems, task management, multiprocessor priority-ceiling protocol, elements of scheduling algorithm for end-to-end periodic tasks, Schedulability of fixed-priority end-to-end periodic tasks, end-to-end tasks in heterogeneous systems, predictability and validation of dynamic multiprocessor systems

Text Books:
1. Real-Time systems by Jane W. S. Liu, Pearson Education India, 2007
2. Real-Time Systems by Rajib Mall, Pearson Education India, 2011
References:
1. Real-Time Systems by C. M. Krishna and Kang G. Shin, The McGraw-Hill Companies, 2007
2. Programming Microsoft windows CE, .Net, Douglas Boling, WP publishers & Distributors.
3. Real-Time Concepts for Embedded Systems by Qing Li and Caroline Yao, CMP Books, 2005
4. Mobile Development Handbook by Andy Wigley, Daniel Moth and Peter Foot, Microsoft Press, WP Publisher, 200
5. Embedded Programming with the Microsoft .NET Micro Framework by Donald Thompson and Rob S. Miles, WP Publisher, 2007

Paper Code: MEIT – 705 **L T C**
Subject: Reliability Engineering 4 0 4
INSTRUCTIONS TO PAPER SETTERS: Maximum Marks : 60
Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

UNIT I
Concepts of Reliability: Failure of systems and its modes: Measure of Reliability, Reliability Function, Hazard Rate MTBF and their interrelations.
Reliability Data Analysis: Data Sources, Data Collection, Use of Reliability data, Reliability Analysis, Performance Parameters, Calculation of Failure Rate, Application of Weibull distribution.

UNIT II
System Reliability and Modeling Series Systems, Parallel systems, Series Parallel systems, Time dependence. Reliability determination, Standby systems, r out of n configurations, Methods of tie set and cut sets of or reliability evaluation, Simulation and Reliability Prediction, Monte Carlo Method.

UNIT III
Maintainability and Availability: Maintainability and its equation, Factors affecting maintainability, Measures of maintainability, Mean Down Time, Availability intrinsic availability equipment availability & Mission availability, Replacement Process and Policies.

UNIT IV
Life Testing of Equipment:
Nondestructive tests, Destruction tests and their mathematic modeling, Quality and Reliability, Measurement & Prediction of Human Reliability, Reliability and safety, Safety margins in critical devices, Case studies.
Value Engineering:
Techniques in value Engineering, Structures of Engineering. Reliability Management.

Text Books:
1. K.K.Aggarwal, “Reliability Engineering”, Springer, 1993
2. A.K.Govil, “Reliability Engineering”, Tata McGraw Hill, 1993

Reference Books:
1. L.S.Srinath, “Reliability Engineering”, East West Press, 2005

Paper Code: MEEC-707 **L T C**
Paper: Artificial Neural Networks **4 - 4**
INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT,& EMPLOYABILITY

Unit-I
Biological analogy, Architecture classification, Neural Models, Learning Paradigm and Rule, single unit mapping and the perception.

Unit-II
Feed forward networks – Review of optimization methods, back propagation, variation on Backpropagation, FFANN mapping capability, properties of FFANN's Generalization.

Unit-III
PCA, SOM, LVQ, Adaptive Resonance Networks.

Unit-IV
Hopfield Networks, Associative Memories, RBF Networks.Applications of Artificial Neural Networks: Regression, applications to function approximation, Classification, Blind Source Separation.

Text Book:
1. Haykin S., "Neural Networks-A Comprehensive Foundations", Prentice-Hall International, New Jersey, 1999.

References:
1. Anderson J.A., "An Introduction to Neural Networks", PHI, 1999.
2. Hertz J, Krogh A, R.G. Palmer, "Introduction to the Theory of Neural Computation",
3. Addison-Wesley, California, 1991.
4. Hertz J, Krogh A, R.G. Palmer, "Introduction to the Theory of Neural Computation", Addison-Wesley, California, 1991.
5. Freeman J.A., D.M. Skapura, "Neural Networks: Algorithms, Applications and Programming Techniques", Addison-Wesley, Reading, Mass, (1992).
6. Golden R.M., "Mathematical Methods for Neural Network Analysis and Design", MIT Press, Cambridge, MA, 1996.

Paper Code: MECS – 707 **L T C**
Subject: E – Commerce & Applications **4 0 4**
INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**
Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT, EMPLOYABILITY & ENTERPRENEURSHIP

UNIT I
Introduction to e-Commerce: Framework, Architecture, Benefits and Impact of e-Commerce, The Anatomy of e-Commerce applications, e-Commerce Consumer applications, e-Commerce Organisation Applications, e-commerce in India, Prospects of ecommerce.. Network Infrastructure for e-commerce Intranet, Extranet, & Internet, Internet Backbone in India, ISP and services in India, OSI Model, Standards & Overview of TCP/IP, Internet Security, e-commerce & Internet.

UNIT II
E-commerce Models: Business-to-Business-Hubs, Market Places, Business-to-Business Exchange, Business-to-Consumer, Consumerto-consumer, Business-to-Government, Government-to-Government., e-Advertising& Marketing, The new age of information-based Marketing, Emergence of internet as a competitive advertising media, Market Research, Weakness in Internet Advertising, e-Advertising & Marketing in India.

UNIT III
Electronic Payment Systems: Introduction to Payment Systems, On-Line Payment Systems, Pre-Paid e-Payment System, Post-Paid e-Payment System, Requirements Metrics of a Payment System. Electronic Data Exchange EDI- Definitions & Applications, Standardisation and EDI, EDI- Legal Security and Privacy Issues, Advantages & Limitations of EDI.

UNIT IV
E-Security: Securing the Business on Internet- Security Policy, Procedures and Practices, Transaction Security, Cryptology, Digital Signatures, Security Protocols for Web Commerce, e-CRM, CRM, what is e-CRM, it's Applications, The e-CRM Marketing in India, Major Trends, Global Scenario for e-CRM, CRM utility in India.

Text Books:
1. Jeffrey F.Rayport& Bernard J.Jaworski: Introduction to E-commerce, TMH, 2003.
Reference Books:
1. Kalakota& Winston: Frontiers of E-commerce, Pearson Education, Mumbai, 2002.
2. David Whiteley: E-Commerce- Strategy technologies and Applications, Tata Mac-Graw Hill, New Delhi, 2000.

Paper code: MERF-707 **L** **T/P** **C**
Paper: Smart Antennas for Mobile Communications **4** **0** **4**
INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**
1. Question No. 1 should be compulsory and cover the entire syllabus and will be of 20 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT & EMPLOYABILITY

Unit I
Statistical signal processing concepts, Basics of mobile wireless communications.

Unit II:
Radio-frequency signal modeling and channel characterization.

Unit III:
Smart antennas and generalized array signal processing. Source localization problem, Joint angle and delay estimation.

Unit IV:
Smart antenna array configurations, Mobile communication systems with smart antennas.

TEXT BOOKS:
1. Smart Anteena for Wireless Communications: With MATLAB by Frank Gross, Mc Graw Hill,Sept 2005.
2. Smart Anteena Engineering by Ahmed El- Zooghby, Artech House, July 2005.

REFERENCE BOOKS:
1. Smart Anteena for Mobile Communications by Mohamed El-Said Shaban, BSD License, Sept 2009.

Paper code: MEDC-707 | **L** | **T/P** | **C**
Paper: Spread Spectrum Techniques. | **4** | **0** | **4**

INSTRUCTIONS TO PAPER SETTERS: Maximum Marks : 60

1. Question No. 1 should be compulsory and cover the entire syllabus and will be of 20 marks.

2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

UNIT I

INTRODUCTION: Origin of Spread Spectrum – Spreading the Spectrum – Progress Gain – Jamming Margin – Direct Sequence System – Direct Sequence Signal Characteristics – Direct Sequence Code – Spectrum relationship – Frequency Hopping Signal Characteristics – Frequency Hopping Rate and No. of frequencies – Time Hopping – Chirp System – Hybrid Forms

UNIT II

CODE GENERATION: Coding – Maximal sequences – Linear Code Generator – Auto Correlation and Cross Correlation of codes– Composite codes – Chip rate and code length – Choosing a linear code – Generating high rate codes –Code selection and Signal spectra – Initial Synchronization – Tracking

UNIT III

MODULATION – CORRELATION AND DEMODULATION: Modulation – Balanced Modulation – Frequency Synthesis – Sending the Information – Remapping the Spread Spectrum – Effect of non synchronous input signal – Base band recovery.

UNIT IV

SYNCHRONISATION: Noise figure and Cochannel users - Dynamic range and AGC - Propagation Medium - Overall Receiver-Transmitter Design – Ranging Techniques – Direction finding – Special Antennas.
APPLICATIONS OF SPREAD SPECTRUM METHODS: Space Systems – Avionics Systems – Test Systems and Equipment – Message Protection – Position Location – Test and Evaluation of Spread Spectrum Systems – Sensitivity, Selectivity, Jamming Margin, Synchronous acquisition, loss of Synchronization – Signal to noise ratio Vs Interference level – Process gain – FCC Method – Cross Correlation – Transmitter Measurements.

TEXT BOOKS:

1. R.C. Dixon, “Spread Spectrum Systems with commercial appications”, Wiley Interscience, 3rd Edition,1994
2. George Cooper & Clare. D. Mc Gillen, “Modern Communications and Spread Spectrum”, Mc Graw Hill, 1985.

REFERENCE BOOKS:

1. M.K. Simon, J.K. Omura, R.A. Scholtz , “Spread Spectrum Communications Handbook, Elctronic Edition”, McGraw Hill, 1st Edition, 2001.
2. Rodger E. Ziemer, Roger L. Peterson, David E. Borth, “Introduction to Spread Spectrum Communications”, Prentice Hall Inc., 1995.

Paper Code: MECS – 709 **L T C**
Subject: Information Storage & Management **4 0 4**
INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**
Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT & EMPLOYABILITY

UNIT I
Complexity of Information Management: Proliferation of Data, Data Center Evolution, Managing Complexity, I/O and the five pillars of technology, Storage Infrastructure, Evolution of Storage. Storage Systems Architecture: Modern Storage Systems, Storage Systems, Intelligent Disk Subsystems , Physical Disks , Back End ,Cache ,Front End , Host Environment

UNIT II
Introduction to Networked Storage: Storage Networking Overview, Direct Attached Storage, Storage Area Networks, Case study – Applying SAN concepts, Network Attached Storage, Case study – Applying NAS concepts, IP SAN, CAS, Hybrid Network Storage Based Solutions/ Emerging Technologies, Case study – Applying SAN, NAS, IP SAN concepts

UNIT III
Introduction to Information Availability: Business Continuity Overview, Data Availability, Business Continuity – Local, Case study – Applying local information availability strategies, Business Continuity – Remote, Case study – Applying remote information availability strategies, Disaster Recovery

UNIT IV
Managing and Monitoring: Monitoring in the Data Center, Case study – Monitoring exercise, Management in the Data Center, Case study – Managing exercise Case Studies must be supported by laboratory

Text Books:
1. Marc Farley Osborne, "Building Storage Networks", Tata McGrawHill, 2001
2. Robert Spalding, "Storage Networks: The Complete Reference", Tata Mcgraw Hill, 2003

Reference Books:
1. NIIT, "Introduction to Information Security Risk Management" , Prentice-Hall of India, 2000

Paper Code: MEEC-709 | **L** | **T** | **C**
Paper: Multimedia Communication | **4** | **-** | **4**
INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT & EMPLOYABILITY

Unit-I
Multimedia Communication: Multimedia information representation. Multimedia Networks, Multimedia applications, Network QoS and application QoS.

Unit-II
Information Representation: text, image, audio and video, text and image compression, compression principles, text compression, image compression. Audio and Video compression. Audio compression. Video compression. Video compression Principles, video compression standards: H.261. H.263.PI.323, MPEG 1, MPEG 2, Other coding formats for text, speech, image and video.

Unit-III
Detailed study of MPEG 4: coding of audiovisual objects, MPEG 4 systems. MPEG 4 audio and video, profile and levels. MPEG 7 standardization process of multimedia content description, MPEG 21 multimedia framework, Significant features of JPEG 2000, MPEG 4 transport across the internet Synchronization: notion of synchronization, presentation requirements, reference model for synchronization

Unit-IV
Introduction to SMIL: Multimedia operating System, Resource management and process management techniques.
Multimedia communication across networks: Layered video coding, error relevant video coding techniques, multimedia transport across IP networks and relevant products such as RSVP, RTP, RTCP, DVMRP, multimedia in mobile networks, multimedia broadcast networks, and content based retrieval in digital libraries.

Text Book:
1. Ze-Nian Li & Mark S. Drew, "Fundamentals of Multimedia", Pearson Education
Reference Book:
1. J.R. Ohm. "Multimedia Communication Technology", Springer International Edition, 2005.
2. K.Sayood. "Introduction to Data Compressiojn", 2nd Ed, Morgan Kauffman. Indian Edition, 2000.
3. V.Bhaskaran and K. Konstantinedes. "Image and Video Compression Standards. Algorithms and Architecture." 2nd ed, Kluwer publication, 1997.
4. Fred Halsall, "Multimedia communication", Pearson Education, 2001.

Paper Code: MECS – 711 **L T C**
Subject: Software Quality Management **4 0 4**
INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**

Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

UNIT I
Concepts and Overview: Concepts of Software Quality, Quality Attributes, Software Quality Control and Software Quality Assurance, Evolution of SQA, Major SQA activities, Major SQA issues, Zero defect Software.
Software Quality Assurance: The Philosophy of Assurance, The Meaning of Quality, The Relationship of Assurance to the Software Life-Cycle, SQA Techniques.

UNIT II
Tailoring the Software Quality Assurance Program: Reviews, Walkthrough, Inspection, and Configuration Audits. Evaluation: Software Requirements, Preliminary design, Detailed design, Coding and Unit Test, Integration and Testing, System Testing, types of Evaluations.
Configuration Management: Maintaining Product Integrity, Change Management, Version Control, Metrics, Configuration Management Planning.

UNIT III
Error Reporting: Identification of Defect, Analysis of Defect, Correction of Defect, Implementation of Correction.
Regression Testing, Categorization of Defect, Relationship of Development Phases.
Trend Analysis: Error Quality, Error Frequency, Program Unit Complexity, Compilation Frequency.

UNIT IV
Corrective Action as to Cause: Identifying the Requirement for Corrective Action, Determining the Action to be Taken, Implementing the Correcting the corrective Action, Periodic Review of Actions Taken. Traceability, Records, Software Quality Program Planning, Social Factors: Accuracy, Authority, Benefit, Communication, Consistency, and Retaliation.

Text Books:
1. Robert Dunn, “Software Quality Concepts and Plans”, Prentice-Hall, 2003.
2. Alan Gillies, “Software Quality, Theory and Management”, Chapman and Hall, 2004.

Reference Books:
1. Michael Dyer, “The Cleanroom approach to Quality Software Engineering”, Wiley & Sons, 1992.
2. Daniel Freedman, Gerald Weinberg, “Handbook of Walkthroughts, Inspections and Technical Reviews”, Dorset House Publishing, 1990.
3. Tom Gilb, “Principles of Software Engineering Management”, Addison-Wesley, 1988.
4. Tom Gilb, Dorothy Graham, “Software Inspection” Addison-Wesley, 1993.
5. Watts Humphrey, “Managing the Software Process”, Addison-Wesley, 1990.
6. Watts Humphrey, “A Discipline for Software Engineering”, Addison-Wesley, 1995.
7. Arthur Lowell, “Improving Software Quality An Insider’s guide to TQM”, 1993, Wiley & Sons

Paper Code: MEEC-711 | **L** | **T** | **C**
Paper: Cryptography & Coding | **4** | **-** | **4**

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.

2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

Unit-I

Fundamental Principles of Cryptology; Classical Cryptosystems and Their Analysis , Modern Private Key Cryptosystems: Data Encryption Standard; Advanced Encryption Standard (Rijndael)

Unit-II

Public Key Encryption (e.g., RSA, discrete log based systems) Applications of Cryptography (e.g., digital signatures, security protocols, zero-knowledge identification, games)

Unit-III

Coding Theory (error correcting codes and cryptographic applications) Techniques from Number theory, Finite fields, Elliptic curves, Probability, Complexity Theory

Unit-IV

Information Theory, Quantum Computers

Text Book:

1. Introduction to CRYPTOGRAPHY with CODING THEORY (2nd edition) - by Trappe & Washington. Prentice Hall, 2006.

Paper Code: MECS – 713 **L T C**
Subject: Advanced Digital Signal Processing **4 0 4**
INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**
Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT & EMPLOYABILITY

UNIT I
Overview of the signal processing of Deterministic signals: Time domain and frequency domain response of the linear-shift invariant systems.

UNIT II
IIR Filter Design: Filter Approximation, Impulse Invariant Method, Bi-linear Transformation method filter structures, Finite word length effects, limitations of IIR filters. FIR Filter Design: Linear phase response, Windowing technique, Gibb's Phenomenon, Frequency Sampling Method, FIR Filter structures.

UNIT III
Power Spectrum Estimation, Classical Spectral Estimation, Non parametric methods for power spectrum estimation: Bartlet method, Welch method, Blackman and Tuckey method, performance analysis of various techniques

UNIT IV
Parametric Modeling - AR, MA, ARMA methods, Minimum variance spectral estimations. Filter Bank methods.

Text Books:
1. G. J. Proakis and D. G. Manolakis, "Digital Signal Processing, Principles, algorithms and applications", 4th ed. Pearson Education.
2. S. K. Mitra, " Digital Signal Processing" 3rd ed. TMH.

Reference Books:
1. A.V. Oppenheim and R.W. Schafer "Discrete Time Signal Processing", PHI 1992.
2. Steven M. Kay "Modern Spectral Estimation", PHI 1988.
3. Clark Cory.L, "Lab view DSP and Digital comm.", TMH 2005.
4. Roman Kuc "Introduction to Digital Signal Processing", McGraw Hill 1988.

Paper Code: MEEC-713 | **L** | **T** | **C**
Paper: MEMS and Sensor Technology | **4** | **-** | **4**
INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT & EMPLOYABILITY

Unit-1
Sensors types and classification – mechanical, acoustic, magnetic, thermal, chemical, radiation and biosensors.

Unit-2
Micro sensors.
Sensors based on surface-acoustic wave devices.

Unit-3
Micromachining techniques
MEMS for automotive, communication and signal processing applications.

Unit-4
Modeling and simulation of microsensors and actuators. Sensors and smart structures.
Micro-opto-electro-mechanical sensors and system.

Text Books:
1. Ristic L "Sensor Technology and Devices", Artech House, London, 1994.
2. Sze S.M "Semiconductor Sensors", John Wiley, New York, 1994 Wise

Reference Book:
1. K.D. (Guest Editor) "Integrated Sensors, Microp-actuators and micro-systems (MEMS)", Special Issue of proceedings of IEEE, Vol. 86, No.8, August 1998.

Paper Code: MECS – 715 **L T C**
Subject: Advanced Multimedia **4 0 4**
INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**

Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

UNIT I
Introduction: Concept of Multimedia, Media & data stream, main properties of multimedia system, Data stream characteristics for continuous media Multimedia Applications, Hardware& Software requirements of multimedia product development. Basic concepts of Video & animation. Conventional animation system. Computer based animation, Authoring Tools, Categories of Authoring Tools.

UNIT II
Compression Techniques: Lossless and Lossy compression, Run length coding, Statistical Coding, Transform Coding, JPEG, MPEG, Text compression using static Huffmann technique, Dynamic Huffmann Technique, Arithmetic Technique. Modelling: NURBS modeling, NURBS curve generating techniques, Curve editing techniques, NURBS Surface generation methods and surface editing operations for creating models.

UNIT III
Animation: Introduction, Basics of animation techniques, tweaning& morphing, Motion Graphics 2D & 3D animation. Key frame animation, Reactive animation, Path animation, imparting non linearity in to the path of the animation, character animation: Forward kinematics & Inverse kinematics techniques to animate the skeletons. Skin binding methods, Deformers and animation editors.

UNIT IV
Dynamics: Role of Dynamics in creation of animation, concept of dynamic engine. Soft bodies &Rigid bodies. Rigid bodies types and its application in creating realistic scenes. Constrains. Rendering: Rendering types: Hardware and software rendering. Concepts of rendering globals.Interactive photo realistic rendering, Line rendering, Box rendering etc. Special Effects: Shading & Texturing Surfaces, Lighting, Special effects. Working with MEL: Basics & Programming

Text Books:
1. FredHalsall , " Multimedia communication" Addison wesley
2. David Hillman, "Multimedia Technology & Applications", Galgotia Publications

Reference Books:
1. Andleigh and Thakrar, "Multimedia system design", PHI Publications
2. Hern and Baker, "Computer Graphics", Pearson
3. Maya manuals.

Paper Code: MEEC-715 | **L** | **T** | **C**
Paper: Broadband Access Technology | **4** | **-** | **4**

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.

2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT, EMPLOYABILITY & ENTERPRENEURSHIP

Unit-I

Phone line modem-ISDN. Broadband technologies. Cable, DLS, fiber and wireless accesstechnologies.Digital subscriber lines.

Unit-II

ADSL. RADSL. IDSL. HDSL. SDSL. VDSL. Standards for XDSL andcomparison.Cable modem. DOCSIS.

Unit-III

Hub operation. Access control. Framing. Security, data link andhigher layers.Ethernet IEEE Standards and protocols ATM and IP-centric modem.Fiber access technologies and architectures. Hybrid fiber-coax systems. SDV. PON. FTTXcomparison.Broadband wireless systems, ATM, Protocols, QoS

Unit-IV

Direct broadcast satellite. MMDS. LMDS. WIDIS. 3G wireless systems . IMT2000.

Text Book:

1. N.Ransom & A.A. Azzam, Broadband Access Technologies, McGraw Hill, 1999.M.P. Clarke

References Book:

1. Wireless Access Network, Wiley, 2000.W.J. Woralski, ADSL and DSL Technologies, McGraw Hill, 1998.S. Mervana & C.Le,
2. Design and Implementation of DSL-based Access Solutions, Cisco Press,2001W. Vermillion, End-to-End DSL Architecture, Cisco

Paper Code: MECS – 717 **L T C**
Subject: Cyber Crime Investigations & Cyber Forensics **4 0 4**
INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**
Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT, EMPLOYABILITY & ENTERPRENEURSHIP

UNIT I
Introduction :Introduction to Cyber World, Types of cyber-attacks, Cyber Crime and Digital Fraud, Cyber-attacks and cyber security , Information warfare and cyber terrorism, Overview of Types of computer forensics i.e. Media Forensics, Network forensics (internet forensics), Machine forensic, Email forensic (e-mail tracing and investigations)

UNIT II
Under Standing Computer Investigations : Preparing a Computer Investigations, Taking a systematic approach, Understanding Data recovery workstations and software, Conducting an Investigation, Completing the case. , Processing Crime and Incident Response: Identifying Digital evidences, Collecting evidence, Preparing for a search, Seizing and Storing Digital evidences, Digital Hashing.

UNIT III
Windows and DOS systems based Investigations: File Systems, Examining File systems, Disk Encryption, Windows registry, startup tasks, Linux Boot processes and File systems, Digital signature and time stamping, cryptography, cell phone and mobile device forensics, Email investigations, Network Forensics, SQL Injections, Steganography.

UNIT IV
Computer Forensics Tools and Software: Helix, DTsearch, S-tools, Camouflage, Recovery of Deleted files in windows and Unix , Hardware forensic tools like Port scanning and vulnerability assessment tools like Nmap , Netscanetc . Password recovery e.g. Passware, Mobile forensic tools , DOS file systems and Forensic tools, Password encryption analyzer

Text Books:
1. Computer Forensics and Investigations, 2nd edition, Nelson, Phillips, Enfinger,Steuart , Cenage Learning 2008
2. Incident Response & Computer Forensics.Mandia, k., Prosise, c., Pepe, m. 2nd edition.Tata-McGraw Hill, 2003.

Reference Books:
1. Digital Evidence and Computer Crime, 2nd Edition , Eoghan Casey , academic Press File System Forensic Analysis by Brian Carrier , addition Wesley
2. Windows Forensic Analysis DVD Toolkit (Book with DVD-ROM), Harlan Carvey, syngress Publication
3. EnCE: The Official EnCase Certified Examiner Study Guide, 2nd Edition , Steve Bunting , sybex Publication

Paper Code: MEEC-717 | **L** | **T** | **C**
Paper: AVR Microcontroller and its Application | **4** | **-** | **4**
INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT & EMPLOYABILITY

UNIT – I
Microcontroller architecture, The AVR RISC Microcontroller Architecture: AVR family architecture, Register File, Memory access and instruction Execution, I/O Memory, I/O Ports.

UNIT – II
AVR Instruction Set: Program and data addressing modes, Arithmetic & Logic Instruction, Program Control Instruction, Data Transfer Instruction
AVR Hardware Design Issues: Power source, Operating clock sources, Reset circuit

UNIT – III
Hardware & Software Interfacing with AVR: Lights & switches, Stack operation in AVR Processors, Implementing Combinational Logic, Connecting the AVR to the PC serial port, Expanding I/O, Interfacing analog to Digital converters and DAC, Interfacing with LED/LCD displays, Stepper motor interface with AVR.

UNIT – IV
Communication links for the AVR Processor: RS-232 Link, RS-422/423 link, SPI and microwave bus, IrDA Data link, CAN
AVR System Development tool: Code assembler, Code simulator, Evaluation boards, AVR emulator, Device Programmer

TEXT BOOKS:
1. Dhananjay V. Gadre, “Programming and Customizing the AVR Microcontroller”, TMH 2003

Paper code: MESP-717 | **L** | **T/ P** | **C**
Paper: Biomedical Signal Processing | **4** | **0** | **4**
INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**

1. Question No. 1 should be compulsory and cover the entire syllabus and will be of 20 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT & EMPLOYABILITY

UNIT I
Biomedical signal processing, biomedical applications of the wavelet transform, Analog versus digital circuitry Biomedical Signals and Images ECG and evolution of pacemakers: Hear, Cardiac Signals, Cardiac electrophysiology, relation of ECG components to cardiac events, clinical applications, History and development of Cardiac pacing, new features in modern pacemakers. Speech Signals: The source-filter model of speech production, spectrographic analysis of speech. Speech Coding: Analysis-synthesis systems, channel vocoders, linear prediction of speech, linear prediction vocoders.Imaging Modalities: Survey of major modalities for medical imaging: ultrasound, X-ray, CT, MRI, PET, and SPECT.MRI: Physics and signal processing for magnetic resonance imaging. Surgical Applications: A survey of surgical applications of medical image processing.

UNIT II
Sampling Revisited: Sampling and aliasing in time and frequency, spectral analysis. Image processing I: Extension of filtering and Fourier methods to 2-D signals and systems. Image processing II: Interpolation, noise reduction methods, edge detection, homomorphic filtering.Wavelet versus Fourier Analysis: Fourier transform, Windowing function, Wavelet transform (continuous-time and complex continuous-time), Signal processing with the wavelet transform (Singularity detection, denoising and compression).

UNIT III
Analog wavelet filters: The need for approximation; complex first order, Pade approximation, L2 approximation, Bessel-Thomson, Filanovsky's, Fourier series methods Optimal state-space description: State-space description, dynamic range optimization, Sparsity; Orthogonal transformations, Canonical form, Biquad structure, Sensitivity Ultra Low-power integrator design: Gm-C filters; nA/V CMOS triode transconductor, pA/V Delta-Gm transconductor Translinear (log-domain) filters; Class-A log domain filter designs Low-power class-AB sinh integrators; state-space formulation for class-AB log-domain integrators, companding sinh integrartor Ultra lowpower biomedical system design: Dynamic translinear cardiac sense amplifier for pacemakers QRS-complex wavelet detection using CFOS, Wavelet filter design, Morlet wavelet filter.

UNIT IV
Probability and Random Signals:Estimating PDFs: Practical techniques for estimating PDFs from real data: Random signals I: Time averages, ensemble averages, autocorrelation functions, crosscorrelation functions, Random signals II: Random signals and linear systems, power spectra, cross spectra, Wiener filters. Blind source separation: Use of principal component analysis (PCA) and independent component analysis (ICA) for filtering. Image Segmentation and Registration: Image Segmentation: statistical classification, morphological operators, connected components. Image Registration I: Rigid and non-rigid transformations, objective functions. Image Registration II: Joint entropy, optimization methods.

Text books/ References:
1) Ultra low-power biomedical Signal Processing, S. A. P. Haddad and W. A. Serdijn, Springer
2) Clifford, G., F. Azuajae, and P. McSharry. Advanced Methods and Tools for ECG Data Analysis. Norwood, MA: 9780201180756.
3) Rabiner, L. R., and R. W. Schafer. Digital Processing of Speech Signals. Upper Saddle River, NJ: Prentice-Hall, 1978. ISBN: 9780132136037.

Paper Code: MECS – 719 **L T C**
Subject: Distributed Databases **4 0 4**
INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**

Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

UNIT I
Features of Distributed and Centralized Databases, Principles Of Distributed Databases Levels Of Distribution Transparency, Reference Architecture for Distributed Databases , Types of Data Fragmentation, Integrity Constraints in Distributed Databases, Alternative Client/Server Architectures.

UNIT II
Translation of Global Queries to Fragment Queries, Equivalence Transformations for Queries, Transforming Global Queries into Fragment Queries, Distributed Grouping and Aggregate Function Evaluation, Parametric Queries. Optimization of Access Strategies, A Framework for Query Optimization, Join Queries, General Queries.

UNIT III
The Management of Distributed Transactions, A Framework for Transaction Management , Supporting Atomicity of Distributed Transactions, Concurrency Control for Distributed Transactions, Architectural Aspects of Distributed Transactions. Concurrency Control, Foundation of Distributed Concurrency Control, Distributed Deadlocks, Concurrency Control based on Timestamps, Optimistic Methods for Distributed Concurrency Control.

UNIT IV
Reliability, Basic Concepts, Non-blocking Commitment Protocols, Reliability and concurrency Control, Determining a Consistent View of the Network, Detection and Resolution of Inconsistency, Checkpoints and Cold Restart, Distributed Database Administration, Catalog Management in Distributed Databases, Authorization and Protection, Object Management, Object Identifier Management, Object Migration, Distributed Object Storage, Object Query Processing, Object Query Processor Architectures, Query Processing Issues, Query Execution , Transaction Management, Transaction Management in Object DBMSs , Transactions as Objects.

Text Books:
1. Distributed Database Principles & Systems, Stefano Ceri, Giuseppe Pelagatti , McGraw-Hill

Reference Books:
1. Principles of Distributed Database Systems, M.TamerOzsu, Patrick Valduriez, Pearson Education.
2. Elmarsi, Navathe, Somayajulu, Gupta, “Fundamentals of Database Systems”, 4th Edition, Pearson Education, 2007
3. Garcia, Ullman, Widom, “Database Systems, The complete book”, Pearson Education, 2007

Paper Code: MEEC-719 | **L** | **T** | **C**
Paper: Robotics Engineering | **4** | **-** | **4**

INSTRUCTIONS TO PAPER SETTERS: Maximum Marks : 60

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.

2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

Unit-I

Matrix algebra, Inversion of Matrices, Rotational groups, matrix representation of co-ordinate transformation. Manipulator kinematics: kinematics: Introduction, solvability, algebraic solution by reduction to polynomial, standard frames, repeatability and accuracy, computational considerations.

Unit-II

Manipulator dynamics: introduction, acceleration of rigid body, mass distribution, Newton's equation, Euler's equation, Iterative Newton-Euler dynamic formulation, closed dynamic equation, Lagrangian formulation of manipulator dynamics, dynamic simulation, computational consideration.

Trajectory Generation: Introduction, general considerations in path description and generation, joint space schemes, Cartesian space schemes, Path generation in runtime, Planning path using dynamic model.

Unit-III

Linear control of manipulators: Introduction, feedback and closed loop control, second order linear systems, control of second-order systems, Trajectory following control, modeling and control of a single joint.

Unit-IV

Robot Programming languages & systems: Introduction, the three level of robot programming, requirements of a robot programming language, problems peculiar to robot programming languages.

Off-line programming systems: Introduction, central issues in OLP system, cimstation, automating subtasks in OLP systems.

Text Books:

1. John J. Craig, "Introduction to Robotics", Addison Wesley publication, 2003
2. Richard D. Klafter, Thomas A. Chmielewski, Michael Negin, "Robotic Engineering – An integrated approach", PHI Publication, 2001
3. Tsuneo Yoshikawa, "Foundations of Robotics", PHI Publication, 2003

Paper Code: MECS – 721 | **L** | **T** | **C**
Subject: Network Management | **4** | **0** | **4**

INSTRUCTIONS TO PAPER SETTERS: Maximum Marks : 60

Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.

Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT, EMPLOYABILITY & ENTERPRENEURSHIP

UNIT I

Data communications and Network Management Overview : Analogy of Telephone Network Management, Communications protocols and Standards, Case Histories of Networking and Management, Challenges of Information Technology Managers, Network Management: Goals, Organization, and Functions, Network and System Management, Network Management System Platform, Current Status and future of Network Management.

UNIT II

SNMPV1 Network Management : Organization and Information and Information Models. Managed network: Case Histories and Examples, The History of SNMP Management, The SNMP Model, The Organization Model, System Overview, The Information Model. SNMPv1 Network Management : Communication and Functional Models.

The SNMP Communication Model, Functional model SNMP Management: SNMPv2 : Major Changes in SNMPv2, SNMPv2 System Architecture, SNMPv2 Structure of Management Information, The SNMPv2 Management Information Base, SNMPv2 Protocol, Compatibility With SNMPv1 SNMP Management: RMON: What is Remote Monitoring? , RMON SMI and MIB, RMON1, RMON2, ATM Remote Monitoring, A Case Study of Internet Traffic Using RMON

UNIT III

Telecommunications Management Network : Why TMN?, Operations Systems, TMN Conceptual Model, TMN Standards, TMN Architecture, TMN Management Service Architecture, An Integrated View of TMN, Implementation Issues.

UNIT IV

Network Management Tools and Systems : Network Management Tools, Network Statistics Measurement Systems, History of Enterprise Management, Network Management systems, Commercial Network management Systems, System Management, Enterprise Management Solutions. Web-Based Management : NMS with Web Interface and Web-Based Management, Web Interface to SNMP Management, Embedded Web-Based Management, Desktop management Interface, Web-Based Enterprise Management, WBEM: Windows Management Instrumentation, Java management Extensions, Management of a Storage Area Network: , Future Directions

Text Books:

1. Mani Subrahmanian , “Network Management, Principles and Practice”, Pearson Education. Reference Books:
2. Morris, “Network Management”, Pearson Education.
3. Mark Burges, “Principles of Network System Administration”, Wiley Dreamtech.
4. Paul, “Distributed Network Management”, John Wiley.

Paper Code: MEEC-721 **L T C**
Paper: Microwave Planner Transmission Lines & circuits **4 - 4**
INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT, EMPLOYABILITY & ENTERPRENEURSHIP

Unit I:
Review of parallel plate wave-guide: analysis of TEM mode, TE Modes and TM Modes, Surface Waves on grounded dielectric slab: analysis of TE Modes, TM Modes
Strip line: study of different Modes, electrostatic solution, propagation constant, characteristic impedance, attenuation

Unit II:
Microstrip lines: properties, Quasi static and frequency dependant closed form models, modes in microstrip line. Variational method, conformal transformation, numerical analysis Analysis for effective relative permittivity, dispersion, propagation constant, characteristic impedance, surface waves, resonance Losses in microstrip lines. Effect of conductor thickness and shielding on propagation characteristic of microstrip.

Unit III:
Microstrip discontinuities: open end, corners, bends, steps, junctions, and gaps.
Microstrip Passive components: branch line coupler, hybrid ring coupler, power dividers, resonators, filters

Unit IV:
Introduction to slotlines, coupled lines, Coplanar lines, defective ground structure, surface integrated waveguide structure

Text Books
1. Microwave Engineering using Microstrip Circuits – E H Fooks, R A Zakarevicius- Prentice Hall
2. Microwave Microwave Engineering By D.M.Pozar,

Reference Books:
1. Microstrip Lines and Slotlines – K C Gupta-Artech Publishing
2. Foundations for microstrip design – T C Edward-John Wiley &Sons

Paper Code: MEEC-725 | **L** | **T** | **C**
Paper: Active Networks & Filter Design | **4** | **-** | **4**
INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

SKILL DEVELOPMENT & EMPLOYABILITY

Unit-I
Description: Active lowpass filter design. Gain-tuning and passive-tuning, immittance calculations, and high-frequency lowpass filters. Frequency and time domain analysis of lowpass, highpass, bandpass, and bandstop filters. Classical filters. Active filter classification including gain-sensitivity limitations.

Unit-II
Frequency Domain Analysis: Bode magnitude and phase response of lowpass, highpass, bandpass, bandstop, and allpass filters. Delay analysis. Dominant pole-zero analysis. Time Domain Analysis: Impulse and step response of lowpass, highpass, bandpass, bandstop, and allpass filters. Time domain approximations using Elmore's results, dominant pole-zeros, and Valley and Wallman results.

Unit-III
Classical Filter Responses: MFM, Butterworth, Chebyshev, ultraspherical and Legendre, Papoulis, inverse Chebyshev, elliptic, MFD, Bessel, equiripple delay, Gaussian, synchrously tuned, parabolic, catenary, elliptic contour, and transitional filters. Noise response of filters.

Unit-IV
Active Filter Classification: Signal flow graphs, 2nd order RC active filters, first and second order decompositions, Class A, A_, B, C, C_, D, and E filters. Lowpass Filters: Lowpass filter classes, filter design sheets, lowpass filter compilations, component selection, lowpass filter design examples, gain-tuned lowpass filters, passive-tuned lowpass filters, immittance calculations, high- frequency filters, alternatives to cascade design.

Textbook:
1. C.S. Lindquist, Active Network Design, Steward & Sons, CA 1977.

PRACTICAL PAPERS

ALL PAPERS LEAD TO SKILL DEVELOPMENT & EMPLOYABILITY

Master of Technology (Computer Science & Engineering)
(Regular Programme)

Semester 1:

Paper Code: MECS – 651
Subject: Lab 1
This Lab Course will be based on Advanced Data Structures (MECS 601). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.

Paper Code: MECS – 653
Subject: Lab II
This Lab Course will be based on Advanced Software Engineering (MECS 603). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.

Paper Code: MECS – 655
Subject: Lab III
This Lab Course will be based on Advances in Data & Computer Communications (MECS 605). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.

Paper Code: MECS – 657
Subject: Term paper I
Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The term paper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by the dean shall evaluate the student.

Semester 2:

Paper Code: MECS – 652
Subject: Lab IV
This Lab Course will be based on Object Oriented Analysis and Design (MECS 602). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.

Paper Code: MECS – 654
Subject: Lab V
This Lab Course will be based on Advanced DataBase Management System (MECS 604). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.

Paper Code: MECS – 656
Subject: Lab VI
This Lab Course will be based on Advanced Algorithm Analysis & Design (MECS 606). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.

Paper Code: MECS – 658
Subject: Term paper II
Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The term paper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by the dean shall evaluate the student.

Semester 3:
Paper Code: MECS – 751
Subject: Lab VII
This Lab Course will be based on Advanced Data Warehousing & Data Mining (MECS 701). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.

Paper Code: MECS – 753
Subject: Lab VIII
This Lab Course will be based on Advanced Software Testing(MECS 703). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.

Paper Code: MECS – 755
Subject: Term Paper III
Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The term paper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by the dean shall evaluate the student.

Paper Code: MECS – 757
Subject: Minor Project
For the minor project a supervisor shall be allocated by the school, in the area of interest of the student. The student has to submit a report at the end duly approved by the supervisor for evaluation.

Semester 4:
Paper Code: MECS – 752
Subject: Dissertation
For the Dissertation, a supervisor shall be allocated by the school, in the area of interest of the student. The student has to submit a report at the end duly approved by the supervisor for evaluation.

Paper Code: MECS – 754
Subject: Seminar & Progress Report
Seminar shall be given by the student at scheduled times together with the progress report of the dissertation. The evaluation shall be held by a committee constituted by the dean of the school. The paper is a NUES paper.

Paper Code: MECS – 756
Subject: Term Paper IV
Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The term paper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by the dean shall evaluate the student.

Master of Technology(Information Technology)
(Regular Programme)

Semester 1:

Paper Code: MEIT – 651
Subject: Lab 1
This Lab Course will be based on Advanced Data Structures (MECS 601). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.

Paper Code: MEIT – 653
Subject: Lab II
This Lab Course will be based on Advanced Software Engineering (MECS 603). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.

Paper Code: MEIT – 655
Subject: Lab III
This Lab Course will be based on Advances in Data & Computer Communications (MECS 605). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.

Paper Code: MEIT – 657
Subject: Term paper I
Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The term paper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by the dean shall evaluate the student.

Semester 2:

Paper Code: MEIT – 652
Subject: Lab IV
This Lab Course will be based on Advanced Mobile Computing (MEIT 602). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.

Paper Code: MEIT – 654
Subject: Lab V
This Lab Course will be based on Advanced Software Project Management (MEIT 604). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.

Paper Code: MEIT – 656
Subject: Lab VI
This Lab Course will be based on Computer Graphics and animation (MEIT 606). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.

Paper Code: MEIT – 658
Subject: Term paper II
Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The term paper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by the dean shall evaluate the student.

Semester 3:

Paper Code: MEIT – 751
Subject: Lab VII
This Lab Course will be based on Advanced Data Warehousing & Data Mining (MECS 701). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.

Paper Code: MEIT – 753
Subject: Lab VIII
This Lab Course will be based on Information theory & coding (MEIT 703). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.

Paper Code: MEIT – 755
Subject: Term Paper III
Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The term paper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by the dean shall evaluate the student.

Paper Code: MEIT – 757
Subject: Minor Project
Term Paper: For the minor project a supervisor shall be allocated by the school, in the area of interest of the student. The student has to submit a report at the end duly approved by the supervisor for evaluation.

Semester 4:

Paper Code: MEIT – 752
Subject: Dissertation
For the Dissertation, a supervisor shall be allocated by the school, in the area of interest of the student. The student has to submit a report at the end duly approved by the supervisor for evaluation.

Paper Code: MEIT – 754
Subject: Seminar & Progress Report
Seminar shall be given by the student at scheduled times together with the progress report of the dissertation. The evaluation shall be held by a committee constituted by the dean of the school. The paper is a NUES paper.

Paper Code: MEIT – 756
Subject: Term Paper IV
Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The term paper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by the dean shall evaluate the student.

Master of Technology(Electronics & Communication Engineering)

(Regular Programme)

Semester 1:

Paper Code: MEEC – 651
Subject: Lab 1 (OOFC Lab)
This Lab Course will be based on Optoelectronics and Optical fibre communication (MEEC 601). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.

Paper Code: MEEC – 653
Subject: Lab 2 (ADCS Lab)
This Lab Course will be based on Advanced Digital Communication systems (MEDC 601). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.

Paper Code: MEEC – 655
Subject: Lab 3 (VLSI Lab)
This Lab Course will be based on VLSI Technology(MEVS 603). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.

Paper Code: MEEC – 657
Subject: Term paper I
Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The term paper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by the dean shall evaluate the student.

Semester 2:

Paper Code: MEEC – 652
Subject: Lab 4 (AMC Lab)
This Lab Course will be based on Advanced Mobile Computing (MEIT 602). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.

Paper Code: MEEC – 654
Subject: Lab 5 (ASP Lab)
This Lab Course will be based on Advanced Signal Processing(MEEC 604). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.

Paper Code: MEEC – 656
Subject: Lab 6 (Ad. VLSI Lab)
This Lab Course will be based on Advanced VLSI Design (MEEC 606). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.

Paper Code: MEEC – 658
Subject: Term paper II
Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The term paper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by the dean shall evaluate the student.

Semester 3:

Paper Code: MEEC – 751
Subject: Lab 7 (ASN Lab)
This Lab Course will be based on Adhoc Sensor Networks (MEEC 701). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.

Paper Code: MEEC – 753
Subject: Lab. 8 (A EME Lab)
This Lab Course will be based on Advance Electromagnetic Engineering (MERF 601). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.

Paper Code: MEEC – 755
Subject: Term paper III
Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The term paper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by the dean shall evaluate the student.

Paper Code: MEEC – 757
Subject: Minor Project
Term Paper: For the minor project a supervisor shall be allocated by the school, in the area of interest of the student. The student has to submit a report at the end duly approved by the supervisor for evaluation.

Semester 4:

Paper Code: MEEC – 752
Subject: Dissertation
Term Paper: For the Dissertation, a supervisor shall be allocated by the school, in the area of interest of the student. The student has to submit a report at the end duly approved by the supervisor for evaluation.

Paper Code: MEEC – 754
Subject: Seminar & Progress Report
Seminar shall be given by the student at scheduled times together with the progress report of the dissertation. The evaluation shall be held by a committee constituted by the dean of the school. The paper is a NUES paper.

Paper Code: MEEC – 756
Subject: Term Paper IV
Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The term paper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by the dean shall evaluate the student.

Master of Technology (Computer Science and Engineering)
(Weekend Programme)

Semester 1:

Paper Code: MECS – 671
Subject: ADS Lab
This Lab Course will be based on Advanced Data Structures (MECS 601). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.

Paper Code: MECS – 673
Subject: ASE Lab
This Lab Course will be based on Advanced Software Engineering (MECS 603). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.

Paper Code: MECS – 675
Subject: Term Paper I
Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The term paper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by the dean shall evaluate the student.

Semester 2:

Paper Code: MECS – 672
Subject: ADBMS Lab
This Lab Course will be based on Advanced DataBase Management System (MECS 604). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.

Paper Code: MECS – 674
Subject: AAAD Lab
This Lab Course will be based on Advanced Algorithm Analysis & Design (MECS 606). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.

Paper Code: MECS – 676
Subject: Term Paper II
Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The term paper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by the dean shall evaluate the student.

Semester 3:

Paper Code: MECS – 771
Subject: Adv. Data Warehousing & Data Mining Lab
This Lab Course will be based on Advanced Data Warehousing & Data Mining (MECS 701). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper

Paper Code: MECS – 773
Subject: Ad. In Data & Computer Communication Lab
This Lab Course will be based on Advances in Data & Computer Communications (MECS 605). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.
Paper Code: MECS – 775
Subject: Term Paper III
Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The term paper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by the dean shall evaluate the student.

Semester 4:
Paper Code: MECS – 772
Subject: OOAD Lab
This Lab Course will be based on Object Oriented Analysis and Design (MECS 602). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.
Paper Code: MECS – 774
Subject: Term Paper IV
Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The term paper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by the dean shall evaluate the student.

Semester 5:
Paper Code: MECS – 871
Subject: Ad. Software Testing Lab
This Lab Course will be based on Advanced Software Testing(MECS 703). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.
Paper Code: MECS – 873
Subject: Minor Project
For the minor project a supervisor shall be allocated by the school, in the area of interest of the student. The student has to submit a report at the end duly approved by the supervisor for evaluation.

Semester 6:
Paper Code: MECS – 872
Subject: Dissertation
For the Dissertation, a supervisor shall be allocated by the school, in the area of interest of the student. The student has to submit a report at the end duly approved by the supervisor for evaluation.
Paper Code: MECS – 874
Subject: Seminar & Progress Report
Seminar shall be given by the student at scheduled times together with the progress report of the dissertation. The evaluation shall be held by a committee constituted by the dean of the school. The paper is a NUES paper.

Master of Technology (Information Technology)
(Weekend Programme)

Semester 1:

Paper Code: MEIT – 671
Subject: ADS Lab
This Lab Course will be based on Advanced Data Structures (MECS 601). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.

Paper Code: MEIT – 673
Subject: ASE Lab
This Lab Course will be based on Advanced Software Engineering (MECS 603). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.

Paper Code: MEIT – 675
Subject: Term Paper I
Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The term paper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by the dean shall evaluate the student.

Semester 2:

Paper Code: MEIT – 672
Subject: AMC Lab
This Lab Course will be based on Advanced Mobile Computing (MEIT 602).The concerned teacher shall announce the list of practicals in the first week of teaching.
Atleast ten practicals have to be performed by the student studying for this paper.

Paper Code: MEIT – 674
Subject: CG & A Lab
This Lab Course will be based on Computer Graphics & Animation (MEIT 606). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.

Paper Code: MEIT – 676
Subject: Term Paper II
Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The term paper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by the dean shall evaluate the student.

Semester 3:

Paper Code: MEIT–771
Subject: Advanced in Data & Computer Communication Lab
This Lab Course will be based on Advances in Data & Computer Communications (MECS 605).The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper

Paper Code: MEIT–773
Subject: Advanced Data Warehousing & Data Mining Lab
This Lab Course will be based on Advanced Data Warehousing & Data Mining (MECS 701). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.
Paper Code: MEIT– 775
Subject: Term Paper III
Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The term paper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by the dean shall evaluate the student.

Semester 4:
Paper Code: MEIT–772
Subject: Advanced Software Project Management Lab
This Lab Course will be based on Advanced Software Project Management (MEIT 604). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.
Paper Code: MECS – 774
Subject: Term Paper IV
Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The term paper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by the dean shall evaluate the student.

Semester 5:
Paper Code: MEIT–871
Subject: Information Theory & coding Lab
This Lab Course will be based on Information Theory & Coding (MEIT 703). The concernedteacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.
Paper Code: MECS – 873
Subject: Minor Project
For the minor project a supervisor shall be allocated by the school, in the area of interest of the student. The student has to submit a report at the end duly approved by the supervisor for evaluation.

Semester 6:
Paper Code: MEIT–872
Subject: Dissertation
For the Dissertation, a supervisor shall be allocated by the school, in the area of interest of the student. The student has to submit a report at the end duly approved by the supervisor for evaluation.
Paper Code: MEIT–874
Subject: Seminar & Progress Report
Seminar shall be given by the student at scheduled times together with the progress report of the dissertation. The evaluation shall be held by a committee constituted by the dean of the school. The paper is a NUES paper.

Master of Technology(Electronics & Communication Engineering)
(Weekend Programme)

Semester 1:

Paper Code: MEEC – 671
Subject: OOFC Lab
This Lab Course will be based on Optoelectronics and Optical fibre communication (MEEC 601). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.

Paper Code: MEEC – 673
Subject: ADCS Lab
This Lab Course will be based on Advanced Digital Communication systems (MEDC 601). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.

Paper Code: MEEC – 675
Subject: Term Paper I
Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The term paper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by the dean shall evaluate the student.

Semester 2:

Paper Code: MEEC – 672
Subject: AMC Lab
This Lab Course will be based on Advanced Mobile Computing (MEIT 602). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.

Paper Code: MEEC – 674
Subject: ASP Lab
This Lab Course will be based on Advanced Signal Processing(MEEC 604). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.

Paper Code: MEEC – 676
Subject: Term Paper II
Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The term paper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by the dean shall evaluate the student.

Semester 3:

Paper Code: MEEC – 771
Subject: ASN Lab
This Lab Course will be based on Adhoc Sensor Networks (MEEC 701). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.

Paper Code: MEEC – 773
Subject: VLSI Lab
This Lab Course will be based on VLSI Technology(MEVS 603). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.
Paper Code: MEEC – 775
Subject: Term Paper III
Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The term paper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by the dean shall evaluate the student.

Semester 4:
Paper Code: MEEC – 772
Subject: Ad. VLSI Lab
This Lab Course will be based on Advanced VLSI Design (MEEC 606). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.
Paper Code: MEEC – 774
Subject: Term Paper IV
Term Paper: For the term paper supervisor shall be allocated in the area of interest of the student by the school. The term paper is NUES mode evaluation. The student has to submit a report on the topic selected. A committee constituted by the dean shall evaluate the student.

Semester 5:
Paper Code: MEEC – 871
Subject: Ad. EM Lab
This Lab Course will be based on Advance Electromagnetic Engineering (MERF 601). The concerned teacher shall announce the list of practicals in the first week of teaching. Atleast ten practicals have to be performed by the student studying for this paper.
Paper Code: MEEC – 873
Subject: Minor Project
For the minor project a supervisor shall be allocated by the school, in the area of interest of the student. The student has to submit a report at the end duly approved by the supervisor for evaluation.

Semester 6:
Paper Code: MECS – 872
Subject: Dissertation
For the Dissertation, a supervisor shall be allocated by the school, in the area of interest of the student. The student has to submit a report at the end duly approved by the supervisor for evaluation.
Paper Code: MEEC – 874
Subject: Seminar & Progress Report
Seminar shall be given by the student at scheduled times together with the progress report of the dissertation. The evaluation shall be held by a committee constituted by the dean of the school. The paper is a NUES paper.

Table 1: Course Outcomes for (Theory and associated practical courses).

Sr.No.	Paper Code	Paper Name	Course Outcomes
1	MECS-601	Advanced Data Structures	1. Ability to understand the concept and implement Sparse Matrices, AVL, Red Black trees Heap etc. 2. Learn implementation and application of Data Structures for Disjoint sets used in Graph Algorithms 3. Understand concept and requirement of external searching and sorting. 4. Understand concept and requirement of Search Trees and Tries.
2	MEVS-601	Digital System Design with Verilog	1. Understand the hardware design flow and the constructs of Verilog language. 2. Design and analyze the simulation process of combinational and sequential circuits using Verilog. 3. Design and testing of the digital circuits using Verilog language. 4. Design of data paths and control system for a micro programmed processors.
3	MEIT-601	Introduction to Computer Security	1. Ability of students to understand the risk and issues of cyber-crime. 2. Ability of students to understand the cyber-crime types 3. Ability of students to understand about tools to be used in Cyber Forensics. 4. Ability of students to understand network security and privacy ethics.
4	MEEC-601	Optoelectronics and Optical Fibre Communication	1. Understand concept of light propagation inside the fiber and its various types and structures 2. Discuss the channel impairments like losses and dispersion. 3. Explain state-of art of optical sources & detectors used for OFC 4. Acquaint with optical amplifiers and various multiplexing optical multiplexing techniques
5	MEDC-601	Advance Digital Communication	1. Acquire and develop the necessary skills for analysis & design of wired & wireless electrical communication systems. 2. Rationalize the placement of specific techniques in particular scenarios 3. Acquaint with theoretical models/schemes as deployed in current Worldwide standards 4. Aptly parameterize & work out an optimal signal design scheme to meet the needs & constraints specified

Sr.No.	Paper Code	Paper Name	Course Outcomes
6	MERF-601	Advanced Electromagnetic Engineering	1. To explain different types of theorem which relates sources and their fields in free space and different types of medium 2. To explain the plane waves functions and analyze the various rectangular shaped microwave components and their properties for different modes in rectangular coordinate system. 3. To develop an ability to analyze the cylinder wave functions and various cylindrical shaped microwave components and their properties for different modes in cylindrical coordinate systems 4. To develop an ability to evaluate the spherical wave functions and various spherical shaped microwave components and their properties for different modes in spherical coordinate systems.
7	MEVS-603	VLSI Technology	1. To understand the silicon crystal growth mechanism, epitaxial growth and processing considerations. To learn the vapour phase, molecular beam epitaxy process and applications 2. Understand the diffusion, ion implantation and oxidation and their applications in IC fabrication. To understand the oxidation and diffusion rate dependence. 3. Understanding the process of lithography with its different variants for MOS device fabrication. To learn about resist type and printing techniques 4. To learn various etching techniques and their comparison and applications. To understand the metallization process in IC fabrication
8	MEIT-603	Cellular and Mobile Communication	1. Ability of students to understand frequency reuse, interference reduction factor, cell splitting and antenna parameters 2. Ability of students to understand near distance, long distance propagation, frequency management, handoff analysis and evaluation 3. Ability of students to understand block coding, convolution coding, Turbo coding, cellular CDMA 4. Ability of students to understand GSM mobility, network signalling, mobile IP, WLAN, routing protocols in MANETs
9	MECS -603	Advanced Software Engineering	1. Identify requirements, analyze and prepare models. 2. Select a suitable architecture for the project. Also plan, schedule and track the progress of the project. 3. Design and develop software project and understand the maintenance concept. 4. Apply testing principles on software project and understand the methods to determine reliability in software.

Sr.No.	Paper Code	Paper Name	Course Outcomes
10	MECS -605	Advances in Data & Computer Communications	1. To demonstrate understanding of the state-of-the-art in network protocols, architectures and applications. Able to understand traffic engineering aspects and QOS parameters of computer networks 2. Analyze existing network protocols stack of TCP/IP at physical, data link, network and transport level. To be able to analyze different protocol stacks developed for different LAN, MAN and WAN applications. 3. To demonstrate understanding of application layer protocols for better human machine interface. To understand the advancements in networking and research for developing new protocols for mobile applications such as IOT, Cloud etc.,. 4. Demonstrate an ability to understand existing security features and fire walls and further design new security protocols at each OSI layers particularly at the Application layer for addressing new challenges such as in mobile, IOT and Cloud. To investigate and propose novel ideas in the area of Networking via term-long research projects.
11	MECS -607	Advanced Computer Architecture	1. To be able to describe the various architectural concepts that may be applied to optimize and enhance the classical Von Neumann architecture into high performance computing hardware systems. 2. To be able to describe the design issues relating to the architectural options. 3. to describe the challenges faced in the implementation of these high performance system. 4. To Be able to identify, assess contemporary practical examples and contemporary application areas including multi processors and SIMD computers
12	MEEC-607	Advanced Computer Networks	**1.** To demonstrate understanding of the state-of-the-art in network protocols, architectures and applications. Able to understand traffic engineering aspects and QOS parameters of computer networks **2.** Analyze existing network protocols stack of TCP/IP at physical, data link, network and transport level. To be able to analyze different protocol stacks developed for different LAN, MAN and WAN applications. **3.** To demonstrate understanding of application layer protocols for better human machine interface. To understand the advancements in networking and research for developing new protocols for mobile applications such as IOT, Cloud etc. **4** Demonstrate an ability to understand existing security features and fire walls and further design new security protocols at each OSI layers particularly at the Application layer for addressing new challenges such as in mobile, IOT and Cloud. To investigate and propose novel ideas in the area of Networking via term-long research projects.

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13	MECS -609	Enterprise Computing using JAVA	1. After undergoing the course, student would able to understand the meaning and purpose of J2SE, J2ME and J2EE. 2. After undergoing the course students would be able to understand various Advanced Java Technologies and Programming Concepts 3. After undergoing the course, the students would be able to understand concept of Session, State and Persistence of J2EE Objects. 4. After undergoing the course, the students would be able to understand fundamentals of Web Services and MVC(Model View Control Architecture) to students.
14	MESP-609	Optimization Techniques	**1.** Solve integer and mixed integer problems. **2.** Solve non-linear unconstrained (continuous domain) non-linear optimization problems using first order and second order methods **3.** Solve constrained (continuous domain) non linear optimization problems **4** Solve single objective optimization problems using genetic algorithms.
15	MECS-611	Computational Techniques using MATLAB	1. The students shall learn the difference between Accuracy and Precision and types of errors. 2. Able to evaluate and apply various numerical methods 3. Able to program numerical differentiation and integration 4. Able to understand the need for optimized solutions
16	MEEC-611	Telecommunications System Modeling and Simulation	**1.** Understand the simulations of random variables and random process. **2.** Understand the modeling of different communication systems. **3.** Understand theestimation of performance measures for simulation. **4** Acquire and apply the simulation and modeling methodology.
17	MEEC-613	Mathematical Statistics & Data Analysis	1. Understand the concept of probability, probability density and distribution function and to calculate the first two moments for standard distributions. 2. Understand statistical sampling methods, and comparing sample statistics in the mean. 3. Understand and use tests for hypothesis testing using χ test, t-test.and f-test. 4. Fit linear regression (univariate/multivariate) relationships.
18	MECS- 613	Advanced Operating Systems	1. Students should be able to understand the fundamentals of Operating Systems including memory management 2. Students should be able to understand the process management module 3. To gain knowledge on Mutual exclusion algorithms, Deadlock detection algorithms and agreement protocols and storage management 4. To know the components and management aspects of file management.

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19	MEVS-613	Wireless Networks	1. To develop an understanding of various generations of wireless communications networks, 1G.,2G,3G,4G. 2. To understand the functioning of mobile networks, networks signaling and mobility management 3. To develop familiarity with latest wireless networks protocols for WPAN, WLAN, WMAN and WLL 4. To gain insights into case studies of global mobile satellite systems and wireless sensor networks
20	MECS- 615	Theory of Computation	1. Understand the design aspects of "abstract models" of computers like Turing machines and its variants. 2. Comprehend the recognisability (decidability) of grammar (language) with specific characteristics through these abstract models. 3. Decide what makes some problems computationally hard and others easy? 4. Deliberate the problems that can be solved by computers and the ones that cannot?
21	MECS-602	Object Oriented Analysis and Design	1. Ability of students to understand the development of a system by following object oriented life cycle. 2. Ability of students to understand Object oriented analysis and applications of analysis patterns. 3. Ability of students to understand object oriented design and applications of design patterns. 4. Ability of students to develop systems through object oriented methodology.
22	MEIT-602	Advanced Mobile Computing	1. Ability of students to understand the development of a system by following object oriented life cycle. 2. Ability of students to understand Object oriented analysis and applications of analysis patterns. 3. Ability of students to understand object oriented design and applications of design patterns. 4. Ability of students to develop systems through object oriented methodology.
23	MEDC-602	Advanced Information Theory & Coding	1 Ability of students to understand true meaning of Information and Entropy 2 Ability of students to understand three aspects of information i.e. compression, error control and security. 3 Ability of students to understand various coding and decoding techniques and implementation 4 Ability of students to understand fundamentals of convolutional coding
24	MESP-602	Detection and Estimation Theory	1. Understand the concepts of detection and estimation theory used in ECE. 2. Understand the Classical detection theory. 3. Understand the the various Classical Estimation theory. 4 Understand the Composite and non-parametric hypothesis testing.

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25	MECS-604	Advanced Data Base Management System	1. To review the basics of database management system along with database design and query languages 2. To introduce to the students the concepts of query processing and optimization and transaction processing 3. To introduce to the students the concepts of distributed databases, client server databases, object oriented and object relational databases 4. To introduce to the students to data warehousing, data mining, multimedia and web databases
26	MEIT-604	Advanced Software Project Management	1. The students would be able to understand the fundamental principles of Software Project management & will also have a good knowledge of responsibilities of project manager and how to handle these. 2. They would be familiar with the different methods and techniques used for project management including effort estimation and activity planning. 3. Students would have good knowledge of the issues and challenges faced while doing the Software project Management and will also be able to understand resource allocation and tracking. 4. They would be able to do the Project Scheduling, tracking, Risk analysis, and managing developers
27	MEEC-604	Advanced Signal Processing	1. Understand time domain and frequency domain representation and analysis of the Linear Shift Invariant Systems 2. Design and analyze FIR and IIR filter 3. Understand FFT algorithms, Multirate signal processing 4. Explain Parametric and non-parametric methods for Power Spectrum Analysis
28	MECS-606	Advanced Algorithm Analysis & Design	1. To understand the methodology of dynamic programming & Greedy Strategy and their comparison in terms of guaranteed optimized solutions. 2. To understand various graph theory concepts and computational geometry. 3. To understand various matrix operations, Polynomial and number–theoretic algorithms. 4. To understand NP-complete problems and approximation algorithm as a case study to solve NP complete problems.
29	MEIT-606	Computer Graphics & Animation	1. Ability to understand the basics of various inputs and output computer graphics hardware devices. Exploration of fundamental concepts in 2D and 3D computer graphics. 2. Able to perform geometric transformations in 2D and 3D space and be able to view 3d object on2D screen through viewing transformations. 3. Student should be able to understand and generate curves, surfaces using different techniques like Bezier, B spline etc. and show the surface realistic. 4. Student should be able to understand the principles and techniques used to create computer animations.

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30	MEEC-606	Advanced VLSI Design	1. Understand the operation, device structure, design equation and fabrication steps of MOS devices. Understanding of design rules and scaling issues in MOS devices 2. Understand and analyse the performance of CMOS Inverter circuit. To design any given combinational logic with CMOS, pseudo NMOS, PTL and Transmission gate. Understand the concept of transistor sizing. 3. To design and understand various sequential circuit with CMOS. Design the complex sequential circuit with transmission gate concept. Understanding the operation of advanced dynamic logic circuits and associated non ideal effects. 4. To study the design styles, design concept for efficient VLSI system design. Understand the clock generation and distribution for VLSI circuits. To understand the design and operation of SRAM /DRAM cells. Understand the design of adder and multiplier circuits
31	MECS-608	Software Requirement & Estimation	1. Gain knowledge about software requirements. 2. Analyze requirement elicitation techniques and prototyping. 3. Gain knowledge about requirement management, their principles and practices and analyze use case modeling and different data diagrams. 4. Estimating the software in terms of size, cost, effort and schedule.
32	MEIT-608	Web Semantics	1. To be able to understand the evolution of Semantic Web as next generation web. To describe and Analyze different layers of Semantic Web Architecture. 2. Illustrate various technologies and tools of Semantic Web. To be able to describe representation of semantic web data using RDF, RDFS. 3. To be able to describe the need and features of Ontology for incorporating semantics to develop Knowledge base along with various issues and tools of Ontology. 4. To be familiar with services and applications of web semantics in real world with different latest technologies
33	MEDC-608	Satellite Communication	1. Explain the basics of satellite communication 2. Explain and analyzes link budget of satellite signal for proper communication 3. Use the system for the benefit of society 4 Use the different application of satellite

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34	MEEC-610	Microwave Integrated Circuits	1. Gain knowledge of planar transmission line for MIC and Have an ability to analyze the method of conformal transformation for microstrip analysis. 2. Have an ability to understand the concept, types, applications and various analysis techniques for different microstrip lines, slot lines, coplanar waveguide apart from the various uses of lumped elements in microwave integrated circuits 3. Have an ability to analyse the structure, characteristics , operation, equivalent circuit, gain expression, output power efficiency and applications of various microwave solid state active devices such as; Parametric Amplifiers, PIN diode, TEDs, Avalanche Diodes, Microwave Transistors. 4. Demonstrate understanding on the Monolithic Microwave Integrated Circuits their applications, advantages, various fabrication techniques such as thin and thick films technologies, encapsulation and mounting of active devices and performance of microstrip on semiconductor substrate
35	MECS-610	Network Programming	1. Ability of students to understand file formats, I/O and inodes 2. Ability of students to understand polling, interrupts and message queues 3. Ability of students to understand client/server, concurrent and iterative servers Ability of students to understand the network programming for XDR and RPC
36	MESP-612	Digital Image Processing	1. Ability of students to understand concept of fundamental steps in digital image processing, image sampling, quantization, image compression and enhancement techniques. 2. Ability of students to understand the concept of image restoration and segmentation techniques. 3. Ability of students to understand various concepts of image techniques. 4. Ability of students to understand the concept of image morphological processing.
37	MECS-612	Soft Computing	1. Understand soft computing techniques like Neural Networks and their role in problem solving. 2. Conceptualize and parameterize various problems to be solved through basic soft computing techniques in Fuzzy systems 3. Analyze and integrate various Evolutionary algorithms in order to solve problems effectively and efficiently. 4. Understand use of Rough sets and Hybrid Systems in problem solving

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38	MEEC-612	Cellular & Mobile Communication	1. Understand the basic cellular system concepts and evolution of different wireless communication systems 2. Have insight into propagation models for cell coverage and antenna structures. Learn frequency management strategies for interference mitigation. 3. Compare different technologies used for wireless communication systems. 4. To have complete knowledge of second generation mobile system architecture and specifications.
39	MEEC-614	Advanced Radiation Systems	1. Understand basic concepts of radiation system and various Antennas 2. Describe concepts and design parameters of various antenna types 3. Understand about antenna array and state-of-the-art of various patterns 4. Acquaint with measurement techniques of various Figure of merits of antenna
40	MECS-614	Modelling & Simulation	1. Understand the definition of System, models and its types 2. Students will understand the techniques of modeling and different types of simulation techniques 3. Understand the fundamental logic, structure, components and management of simulation modeling 4. Students will learn to simulate the models for the purpose of optimum control by using different software
41	MEEC-616	Telecommunication Switching and Tele-traffic Engineering	1. Understand the basic fundamentals of basic telecommunication multiplexing system and SONET 2. Understand the concept of digital switching and SS7 protocol 3. Understand Network Synchronization Control and Management 4 Understand traffic characterization and able to evaluate subscriber loops
42	MECS-616	Software Metrics	1. The students would acquire basic knowledge of measurement in Software engineering 2. The would also exemplify Quality measurement and metrics, Quality plan and implementation 3. They would articulate Quality control and reliability of quality process and software measurement and also articulate Complexity metrics and analyzing software measurement data They would be able to control and manage the project and processes, apply configuration management on the basis of collected metrics and aspects of quality
43	MEEC-618	ESD Using ARM microcontroller	1. Acquire knowledge about fundamental concepts of Embedded system design. 2. Understand ARM processor fundamentals. 3. Understand C compiler and optimization 4. Grasp an understanding of Interrupt handling schemes and Real-Time operating systems

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44	MECS- 620	Distributed Computing	1. The students would be able to define and explain the distributed parallel computing environment 2. The students would be able to demonstrate the access of remote objects for the service 3. The students would be able to organize processes in a distributed systems The students would be able to define and explain the functionalities of parallel systems
45	MEEC-620	Instrumentation and Control Engineering	1. Represent any system in any canonical form. 2. Design Lead, Lag and Lead – lag compensator using frequency domain method or time domain method. 3. Design , implement, and evaluate various Instrumentation and Control system 4 Design PID compensator.
46	MECS-624	Advanced Computer Graphics	1. Ability to understand the basics of various inputs and output computer graphics hardware devices. Exploration of fundamental concepts in 2D and 3D computer graphics. 2. Able to perform geometric transformations in 2D and 3D space and be able to view 3d object on2D screen through viewing transformations. 3. Student should be able to understand and generate curves, surfaces using different techniques like Bezier, B spline, NURBS etc. and show the surface realistic. Be exposed to different advanced modelling techniques and Student should be able to understand the basic principles and techniques used to create computer animations.
47	MEEC-626	Fuzzy Logic & Design	1. Perform arithmetic operations on fuzzy numbers. 2. Understand and formulate fuzzy relations. 3. Understand fuzzy measures and distinguish between evidence theory, possibility theory and probability theory. 4 Understand uncertainty based information.
48	MECS-701	Advanced Data Warehousing & Data Mining	1. Understanding Data Warehouse concepts and Data Warehousing architecture. 2. Design a Data Warehouse at Logical Level using multidimensional dimension modeling. 3. Implementing Data Warehouse through Data Cubes. 4. Evaluate and select appropriate data-mining algorithms and apply, interpret and report the output appropriately
49	MEEC-701	Adhoc Sensor Networks	1. Understand the concept of ad-hoc and sensor networks, their applications and typical node and network architectures 2. Explain data transmission technologies of the Adhoc and sensor devices with focus on channel access , routing and security 3. Design , implement, and evaluate various wireless sensor network protocols 4 Simulate new MAC and Routing protocol in WSN and Adhoc Networks

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50	MECS-703	Advanced Software Testing	1. To understand the key techniques and tools in software testing. 2. Ability to develop and execute the test plans. 3. To gain knowledge of how to lower the time and cost of software testing while increasing the software quality. 4. Ability to conduct object-oriented and web software testing. To study the fundamental principles and practices associated with agile testing.
51	MEIT-703	Information Theory & Coding	1. Ability of students to understand true meaning of Information and Entropy 2. Ability of students to understand three aspects of information i.e. compression, error control and security. 3. Ability of students to understand various coding techniques and implementation 4. Ability of students to understand fundamentals of cryptography
52	MECS- 705	Cloud Computing	1. Ability of students to understand the meaning and purpose of Cloud Computing. 2. Ability of students to understand Web Services, Mashups, SOAP 3. Ability of students to understand concept of Big Tables, File System and Map Reduce Model 4. Ability of students to understand QoS, Inter Cloud Issues and Security.
53	MEEC-705	Embedded Systems & RTOS	1. Get overview of embedded systems design (ESD) and Role of Real-Time Operating System and issues in Real-time Computing: Architecture, Structure, Properties and performance measures, 2. Understand Real-Time Scheduling & Priority-Driven Scheduling of Periodic Tasks 3. Understand Scheduling Aperiodic and Sporadic Jobs in Priority-Driven systems 4. Acquaint with Resource and Resource Access Control & Multiprocessor scheduling, resource access control and synchronization
54	MEIT-705	Reliability Engineering	1. Ability of students to understand the concepts of reliability and to perform reliability based data analysis. 2. Ability of students to evaluate and predict reliability of a system using different methods. 3. Ability of students to understand maintainability, its factors, and different kinds of availability 4. Ability of students to perform life testing of equipments, modelling and prediction of human reliability.
55	MEEC-707	Artificial Neural Networks	1. Understand Analogy of Biological neural Networks with ANN, Neural models and learning Paradigms and perceptrons 2. Explain Feed forward networks, Back propagation algorithm and its mapping capability 3. Acquaint with unsupervised learning approaches: PCA, SOM, and LVQ 4. Acquire knowledge about Hopfield networks, associative memories, hybrid networks, applications of neural networks

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56	MECS-707	E-Commerce & Applications	1. Ability of students to understand the meaning and purpose of ECOMMERCE transactions. 2. Ability of students to understand various Business Models like :- B2B,B2G,GTC etc. 3. Ability of students to understand concept of Payment Gateways 4. Ability of students to understand to understand fundamentals of Web Marketing and CRM.
57	MERF-707	Smart Antennas for Mobile Communications	1. Understand Statistical signal processing concepts and basics of mobile wireless communications 2. Learn Radio-frequency signal modelling and channel characterization 3. Acquaint with generalized array signal processing, Source localization problem, Joint angle and delay estimation related to smart antenna 4 Acquire knowledge about Smart antenna array configurations and Mobile communication systems with smart antennas
58	MEDC-707	Spread Spectrum Techniques	1. Explain various spread spectrum techniques like direct sequence and frequency hopping 2. Describe various coding generation schemes and their characteristics 3. Discuss modulation, correlation and demodulation techniques used for spread spectrum 4 Understand synchronization issues and applications of spread spectrum methods
59	MECS-709	Information Storage & Management	1. The students would be able to search, retrieve and synthesize information from a variety of systems and sources. 2. The students would be able to evaluate systems and technologies in terms of quality, functionality, cost-effectiveness and adherence to professional standards. 3. The students would be able to integrate emerging technologies into professional practice. 4. The students would be able to apply theory and principles to diverse information contexts.
60	MEEC-709	Multimedia Communication	1. Describe technical aspects of multimedia systems, their components and terminals. 2. Recognize the ideologies used in designing multimedia protocols& assess the performance on the basis of service quality. 3. Understand and examine the basic principles behind text, image, audio and video data representation, compression techniques and standards. 4 Evaluate the role of multimedia technologies in the web, online as well as mobile environments.

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61	MECS-711	Software Quality Management	1. Ability of students to understand software quality, Software quality assurance, SQA techniques and issues. 2. Ability of students to apply Software quality assurance program, evaluation types, and configuration management. 3. Ability of students to apply error reporting and trend analysis. 4. Ability of students to apply corrective actions, software quality programme planning, and social factors.
62	MEEC-711	Cryptography & Coding	1. Discuss how cryptography helps to achieve common security goals (data secrecy, message integrity, non-repudiation) and tasks (authentication).Performs analysis of Classical and Modern private key Cryptosystems. 2. Explain the notions of public-key encryption and describes the application of public key cryptosystems(security protocols, digital signature etc.) 3. Describe how coding theory is used in Cryptography. 4 Describe basics of quantum computing and quantum cryptography.
63	MECS-713	Advanced Digital Signal Processing	1. The students would know the analysis of discrete time signals. 2. The students would be able to study the modern digital signal processing algorithms and applications. 3. The students would have an in-depth knowledge of use of digital systems in real time applications and estimation of power spectrum 4. The students would be able to apply the algorithms for wide area of recent applications and parametric modeling methods
64	MEEC-713	MEMS and Sensor Technology	1. Compare physical, chemical, biological, and engineering principles involved in the design and operation of current and future micro devices 2. Gain a knowledge of Surface Acoustic Wave Devices 3. Understand state-of-the-art micromachining and packaging technologies 4 Gain a knowledge of basic approaches for various sensor and actuators design
65	MECS-715	Advanced Multimedia	1. Ability to understand the concept and applications of multimedia and its making. 2. Ability to understand and perform different compression techniques for Text, Image, Audio and Video. 3. Student should be able to understand and create models using NURBS and polygonal modeling and impart movements in it using different animation techniques. 4. Should be able to use dynamics in created model to make movements realistic and make the character appearance realistic.

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66	MEEC-715	Broadband Access Technology	1. Explain Basic concepts of Broadband technologies, fiber and wireless access technologies. 2. Acquaint with ADSL, RADSL, IDSL, HDSL, SDSL, VDSL, Standards for XDSL and comparison and Cable modem 3. Understand Ethernet IEEE Standards and protocols, ATM and IP-centric modem, Fiber access technologies and architectures, QOS. 4 Understand functioning of Direct broadcast satellite, MMDS, LMDS, WIDIS,3G wireless systems , IMT2000
67	MECS-717	Cyber Crime Investigations and Cyber Forensics	1. Ability of students to understand the risk and issues of cyber-crime. 2. Ability of students to understand the cyber-crime types 3. Ability of students to understand about tools to be used in Cyber Forensics. 4. Ability of students to understand fundamentals of cryptography, Incident Response and evidence seizing process.
68	MEEC-717	A V R Microcontroller and its Application	1. Acquire knowledge about fundamental concepts of AVR icrocontrollearchitecture. 2. Understand AVR instruction set and hardware design issues. 3. Understand and implement hardware/software interfacing with AVR. 4 Grasp an understanding of system development tool and communication links for the AVR processor.
69	MESP-717	Biomedical Signal Processing	1. Understand Basic concepts of Medical signals such as: ECG, MRI, etc. and characteristics of these signals. Medical imaging technologies, Speech signals, speech coding, analysis and synthesis of speech signals. 2. Acquaint with Sampling of continuous signals, sampling theorem, aliasing, Image processing techniques, Fourier and Wavelet transforms for image processing 3. Perform Analysis and design of Analog wavelet filters for medical image processing. 4 Understand Probability and Random Signals, Blind source separation, Use of principal component analysis (PCA) and independent component analysis (ICA) for filtering, Image Segmentation and Registration, Joint entropy, optimization methods.
70	MECS-719	Distributed Databases	1. The students would be able to identify the introductory distributed database concepts and its structures. 2. The students would be able to describe terms related to distributed query processing and optimization. 3. The students would be able to produce the transaction management and concurrency control techniques in DDBMS. 4. The students would be able to relate the importance and application of emerging database technology and reliable design.

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71	MEEC-719	Robotics Engineering	1. Ability to understand transformation and its application to solve problems of manipulating kinematics. 2. The student will be able to solve problems of robotics manipulation dynamics and path planning. 3. Ability to control the manipulator by controlling various joints. 4 The student will learn online and offline programming of robotics for a given set of conditions.
72	MECS-721	Network Management	1. Understand general concepts and architecture behind standards based network management 2. Understand concepts and terminology associated with SNMP and RMON 3. Understand theoretical and practical knowledge of Telecommunications Management Network 4. Understand Network Management Tools and Systems and Internet Technologies used for network management
73	MEEC-721	Microwave Planner Transmission Lines & circuits	1. Analysis of Various modes in Parallel plate waveguide and strip lines 2. Study, Design and Numerical analysis of Microstrip lines 3. Study of Microstrip Discontinuities and other passive components. 4 Study of other transmission lines-slot lines, coupled lines
74	MEEC-725	Active Networks & Filter Design	1. Get overview of active filters including classifications and characteristics 2. Grasp in-depth knowledge of frequency domain and time domain analysis 3. Explain filter response of various classical filters 4 Design higher order low pass filters and high frequency filters