Baba Ghulam Shah Badshah University
Rajouri (J&K)-185234

Syllabus I to VIII Semester
B. Tech. Degree Course

Department of Electrical Engineering
School of Engineering& Technology
Baba Ghulam Shah Badshah University
Rajouri (J&K)-18523

Mr. S. N. Mughal **(Head E.E.)**
Mr. Tasaduq Hussain **(A.P., EE)**
Mr. Ahmed Riyaz **(A.P., EE)**
Prof. Asif Husain **(Dean, SOET)**

Electrical Engineering Course structure 2018 onwards

Syllabus Content

Semester-I									
Theory Courses									
Course Code	**Title**	**Scheme of Exam**				**Hrs./Week**			**Credits**
		Duration (Hrs.)	**IA**	**UE**	**Total Marks**	**L**	**T**	**P**	
BSC-EE-101	Mathematics-I	3	40	60	100	3	1	0	4
ESC-EE-101	Basic Electrical Engineering	3	40	60	100	2	1	0	3
HSMC-EE-101	Communication Skills	3	40	60	100	2	0	0	2
ESC-EE-102	Engineering Mechanics	3	40	60	100	2	1	0	3
ESC-EE-103	Computer Fundamentals & Programming	3	40	60	100	3	1	0	4
MC-EE-101	Indian Constitution*	3	40	60	100	2	0	0	0
Total			**200**	**300**	**500**				**16**
Laboratory Courses									
ESC-EE-111	Basic Electrical Engineering Lab.	2	25	25	50	0	0	2	1
HSMC-EE-111	Communication Skills Lab.	2	25	25	50	0	0	2	1
ESC-EE-112	Engineering Mechanics Lab.	2	25	25	50	0	0	2	1
ESC-EE-113	Computer Fundamentals & Programming Lab.	2	25	25	50	0	0	2	1
ESC-EE-114	Workshop Practices	2	50	-	50	0	0	2	2
MC-EE-111	Induction Program**	-	-	-	-	0	0	0	0
Total			**150**	**100**	**250**				**6**
Total (Theory + Lab)			**350**	**400**	**750**	**Total Credits**			**22**

N.B: 1. * Indian constitution course is non-credits and the student has to get at-least minimum pass marks to qualify the subject. Non-credits course marks are not included in total marks

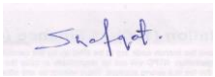
**2. ****Induction training is also non-credits and the student has to get at-least minimum pass marks to qualify the subject. The student has to qualify this course by attending the training which will be verified by concerned teacher.

Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Semester-II									
Theory Courses									
Course Code	**Title**	**Scheme of Exam**				**Hrs./Week**			**Credits**
		Duration (Hrs.)	**IA**	**UE**	**Total Marks**	**L**	**T**	**P**	
BSC-EE-201	Mathematics-II	3	40	60	100	3	1	0	4
ESC-EE-201	Basic Electronics Engineering	3	40	60	100	2	1	0	3
BSC-EE-202	Engineering Physics	3	40	60	100	3	1	0	4
BSC-EE-203	Engineering Chemistry	3	40	60	100	3	1	0	4
MC-EE-201	Environmental Science*	3	40	60	100	2	0	0	0
Total			**160**	**240**	**400**				**15**
Laboratory Courses									
ESC-EE-211	Basic Electronics Lab.	2	25	25	50	0	0	2	1
BSC-EE-211	Engineering Physics Lab.	2	25	25	50	0	0	2	1
BSC-EE-212	Engineering Chemistry Lab.	2	25	25	50	0	0	2	1
ESC-EE-212	Engineering Graphics**	3	40	60	100	1	0	4	3
Total			**115**	**135**	**250**				**6**
Total (Theory + Lab)			**275**	**375**	**650**	**Total Credits**			**21**

**N.B: 1. ***Environmental science course is non-credits and the student has to get at-least minimum pass marks to qualify the subject. Non-credits course marks are not included in total marks

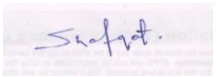
2. ** The examination pattern of engineering graphics shall be same as of other theory courses.



Semester-III									
Theory Courses									
Course Code	**Title**	**Scheme of Exam**				**Hrs./Week**			**Credits**
		Duration (Hrs.)	**IA**	**UE**	**Total Marks**	**L**	**T**	**P**	
BSC-EE-301	Mathematics-III	3	40	60	100	3	1	0	4
PCC-EE-301	E. M. Wave Theory	3	40	60	100	3	0	0	3
PCC-EE-302	Electrical Machines-I	3	40	60	100	3	1	0	4
PCC-EE-303	Network Analysis & Synthesis	3	40	60	100	2	1	0	3
BSC-EE-302	Bio-Sciences	3	40	60	100	2	1	0	3
PCC-EE-304	Analog Electronics	3	40	60	100	3	0	0	3
Total			**240**	**360**	**600**				**20**
Laboratory Courses									
PCC-EE-311	Electrical Machines-I Lab.	2	25	25	50	0	0	2	1
PCC-EE-312	Network Analysis & Synthesis Lab.	2	25	25	50	0	0	2	1
PCC-EE-313	Analog Electronics Lab.	2	25	25	50	0	0	2	1
Total			**75**	**75**	**150**				**3**
Total (Theory + Lab)			**315**	**435**	**750**	**Total Credits**			**23**

Semester-IV									
Theory Courses									
Course Code	**Title**	**Scheme of Exam**				**Hrs./Week**			**Credits**
		Duration (Hrs.)	**IA**	**UE**	**Total Marks**	**L**	**T**	**P**	
BSC-EE-401	Numerical Techniques	3	40	60	100	3	1	0	4
PCC-EE-401	Renewable Energy Sources	3	40	60	100	3	0	0	3
PCC-EE-402	Digital Electronics	3	40	60	100	3	0	0	3
PCC-EE-403	Power System-I	3	40	60	100	3	0	0	3
PCC-EE-404	Electrical Machines-II	3	40	60	100	3	1	0	4
PCC-EE-405	Electrical Measurements-I	3	40	60	100	3	0	0	3
Total			**240**	**360**	**600**				**20**
Laboratory Courses									
PCC-EE-411	Digital Electronics Lab.	2	25	25	50	0	0	2	1
PCC-EE-412	Electrical Machines-II Lab.	2	25	25	50	0	0	2	1
PCC-EE-413	Renewable Energy Sources Lab.	2	25	25	50	0	0	2	1
Total			**75**	**75**	**150**				**3**
Total (Theory + Lab)			**315**	**435**	**750**	**Total Credits**			**23**

At the end of semester IV, students are required to attend an Industrial Training for 6 weeks duration, during summer vacations. After the completion of training every student is required to prepare a detailed report of the training work which he/she has attended in an Organization/Industry/Company. Industrial Training shall be an essential component of curriculum to fulfill the eligibility criteria for appearing in semester V University Exam. Evaluation of Industrial Training shall be conducted during semester V.



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Semester-V									
Theory Courses									
Course Code	**Title**	**Scheme of Exam**				**Hrs./Week**			**Credits**
		Duration (Hrs.)	**IA**	**UE**	**Total Marks**	**L**	**T**	**P**	
PCC-EE-501	Power System-II	3	40	60	100	3	0	0	3
PCC-EE-502	Signals & Systems	3	40	60	100	3	0	0	3
PCC-EE-503	Design of Power Apparatus	3	40	60	100	3	0	0	3
PCC-EE-504	Electrical Measurement-II	3	40	60	100	3	0	0	3
PEC-EE-(---)	Professional Elective courses-I	3	40	60	100	3	0	0	3
OEC-EE-(---)	Open Elective courses-I	3	40	60	100	3	0	0	3
Total			**240**	**360**	**600**				**18**
Laboratory Courses									
PCC-EE-511	Power System Lab.	2	25	25	50	0	0	2	1
PCC-EE-512	Electrical & Electronic Measurement Lab.	2	25	25	50	0	0	2	1
PCC-EE-513	MATLAB & Machine Design Lab.	2	25	25	50	0	0	2	1
PROJ-EE-511	Industrial Training-I		25		25				1
Total			**100**	**75**	**175**				**4**
Total (Theory + Lab)			**340**	**435**	**775**	**Total Credits**			**22**

Professional Elective Course

S. No.	Course Code	Title
1.	PEC-EE-501	Power Engineering
2.	PEC-EE-502	Electrical Substation Design
3.	PEC-EE-503	Engineering Material Science

Open Elective Courses

S. No.	Code	Title
1.	OEC-EE-501/PCC-CSE-301	Data Structure using C
2.	OEC-EE-502/PCC-CSE-503	Java Programming
3.	OEC-EE-503/PCC-CE-502	Environmental Engineering
4.	OEC-EE-504/PCC-CE-305	Disaster Preparedness & Planning

Semester-VI									
Theory Courses									
Course Code	**Title**	**Scheme of Exam**				**Hrs./Week**			**Credits**
		Duration (Hrs.)	**IA**	**UE**	**Total Marks**	**L**	**T**	**P**	
PCC-EE-601	Power Electronics	3	40	60	100	3	1	0	4
PCC-EE-602	Microprocessors& Interfacing	3	40	60	100	3	1	0	4
PCC-EE-603	Control System	3	40	60	100	3	0	0	3
PEC-EE-(---)	Professional Elective courses-II	3	40	60	100	3	0	0	3
PEC-EE-(---)	Professional Elective courses-III	3	40	60	100	3	0	0	3
OEC-EE-(---)	Open Elective courses-II	3	40	60	100	3	0	0	3
Total			**240**	**360**	**600**				**20**
Laboratory Courses									
PCC-EE-611	Power Electronics Lab.	2	25	25	50	0	0	2	1
PCC-EE-612	Control System Lab.	2	25	25	50	0	0	2	1
PCC-EE-613	Microprocessor & Interfacing Lab.	2	25	25	50	0	0	2	1
Total			75	75	150				**3**
Total(Theory+Lab)			315	435	750	**Total Credits**			**23**

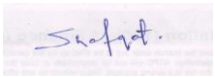
At the end of semester VI students are required to attend an Industrial Training for 6 weeks duration, during summer vacations. After the completion of training every student is required to prepare a detailed report of the training work which he/she has attended in an Organization/Industry/Company. Industrial Training shall be an essential component of curriculum to fulfill the eligibility criteria for appearing in semester VII University Exam. Evaluation of Industrial Training shall be conducted during semester VII.

Professional Elective Course

S. No.	Course Code	Title
1.	PEC-EE-601	Communication System
2.	PEC-EE-602	Computers in Medicine
3.	PEC-EE-603	Energy Audit and Management
4.	PEC-EE-604	Industrial Electrical Systems
5.	PEC-EE-605	Restructuring of Power systems
6.	PEC-EE-606	High voltage Engineering

Open Elective Courses

S. No.	Course Code	Title
1.	OEC-EE-601/PCC-CSE-402	Python Programming
2.	OEC-EE-602/PEC-CSE-608	Cyber-crime and Laws
3.	OEC-EE-603/PEC-ECE-601	Mobile and wireless communication
4.	OEC-EE-604/PCC-ECE-602	Micro-controller and Embedded Systems



Semester-VII									
Theory Courses									
Course Code	**Title**	**Scheme of Exam**				**Hrs./Week**			**Credits**
		Duration (Hrs.)	**IA**	**UE**	**Total Marks**	**L**	**T**	**P**	
HSMC-EE-701	Entrepreneurship Development & Management	3	40	60	100	3	0	0	3
PCC-EE-701	Power System Protection	3	40	60	100	3	0	0	3
PROJ-EE-701	Minor Project		100		100				3
PEC-EE-(---)	Professional Elective courses-IV	3	40	60	100	3	1	0	3
PEC-EE-(---)	Professional Elective courses-V	3	40	60	100	3	1	0	3
OEC-EE-(---)	Open Elective courses-III	3	40	60	100	3	0	0	3
Total			**300**	**300**	**600**				**18**
Laboratory Courses									
PCC-EE-711	Power System Protection Lab.	2	25	25	50	0	0	2	1
PCC-EE-712	Electrical Drives Lab	2	25	25	50	0	0	2	1
PROJ-EE-711	Seminar & Industrial Training-II		25		25				1
Total			**75**	**50**	**125**				**3**
Total(Theory + Lab)			**375**	**350**	**725**	**Total Credits**			**21**

At the start of VII semester every student shall be allotted a Minor Project under the supervision of an allotted mentor. Students are required to do preliminary exercise of survey of literature and preparation of a road map of the selected Major Project under the supervision of their allotted mentor. Students are required to complete the Minor Project during semester VII. Minor Project shall be evaluated internally as per university statutes by a committee consisting of:

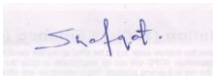
1. Head of the Department
2. One member nominated by Principal
3. Coordinator(s)/Supervisor(s) of minor project/training

Professional Elective Course

S. No.	Course Code	Title
1.	PEC-EE-701	Wind and Solar Energy systems
2.	PEC-EE-702	Line commutated active rectifiers
3.	PEC-EE-703	EHV AC and DC transmission
4.	PEC-EE-704	Control System Design
5.	PEC-EE-705	Electrical Drives
6.	PEC-EE-706	Energy Economics and Planning

Open Elective Courses

S. No.	Course Code	Title
1.	OEC-EE-701/PEC-ECE-708	Analog and Mixed Signal Design
2.	OEC-EE-702/PCC-CSE-702	Artificial Intelligence
3.	OEC-EE-703/PEC-CSE-702	Internet of Things
4.	OEC-EE-704/PCC-CE-702	Energy Management in Buildings



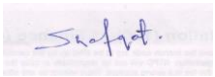
Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Semester-VIII									
Theory Courses									
Course Code	**Title**	**Scheme of Exam**				**Hrs./Week**			**Credits**
		Duration (Hrs.)	**IA**	**UE**	**Total Marks**	**L**	**T**	**P**	
PROJ-EE-801	Major Project		250	200	450	0	0	0	9
PEC-EE-(---)	Professional Elective courses-VI	3	40	60	100	3	0	0	3
PEC-EE-(---)	Professional Elective courses-VII	3	40	60	100	3	0	0	3
Total			**330**	**320**	**650**	**Total Credits**			**15**

After the university Exam of semester VII every student shall be allotted a Major Project pertaining to his/her stream under the supervision of an allotted mentor. Students are required to report in their respective departments to do preliminary exercise of survey of literature and preparation of a road map of the selected Major Project under the supervision of an allotted mentor. Students are required to complete the Major Project during semester VIII. Depending upon the infrastructure, Computing and other laboratories facilities the students shall be offered in house project on campus are they can complete their project work in any organization/industry outside the campus. Major Project shall be evaluated internally as well as externally as per university statues.

Professional Elective Course

S. No.	Course Code	Title
1.	PEC-EE-801	Electrical and Hybrid Vehicles
2.	PEC-EE-802	Power Quality and FACTS
3.	PEC-EE-803	Virtual Instrumentation
4.	PEC-EE-804	Neural Networks and Fuzzy systems
5.	PEC-EE-805	Optimization Techniques
6.	PEC-EE-806	Power System Transients



Summary of Credits

Basic Science Course

S. No.	Course Code	Subject	Semester	Credits
1	BSC-EE-101	Mathematics-I	I	4
2	BSC-EE-201	Mathematics-II	II	4
3	BSC-EE-202	Engineering Physics	II	4
4	BSC-EE-211	Engineering Physics Lab.	II	1
5	BSC-EE-203	Engineering Chemistry	II	4
6	BSC-EE-212	Engineering Chemistry Lab.	II	1
7	BSC-EE-301	Mathematics-III	III	4
8	BSC-EE-302	Bio-Sciences	III	3
9	BSC-EE-401	Numerical Techniques	IV	4
Total Credits:				**29**

Engineering Science Course

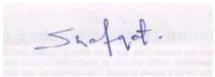
S. No.	Course Code	Subject	Semester	Credits
1	ESC-EE-101	Basic Electrical Engineering	I	3
2	ESC-EE-111	Basic Electrical Engineering Lab.	I	1
3	ESC-EE-102	Engineering Mechanics	I	3
4	ESC-EE-112	Engineering Mechanics Lab.	I	1
5	ESC-EE-103	Computer Fundamentals & Programming	I	4
6	ESC-EE-113	Computer Fundamentals & Programming Lab.	I	1
7	ESC-EE-114	Workshop Practices	I	2
8	ESC-EE-201	Basic Electronics Engineering	II	3
9	ESC-EE-211	Basic Electronics Lab.	II	1
10	ESC-EE-212	Engineering Graphics	II	3
			Total Credits:	**22**

Humanities & Social Sciences Including Management Courses

S. No.	Course Code	Subject	Semester	Credits
1	HSMC-EE-101	Communication Skills	I	2
2	HSMC-EE-111	Communication Skills Lab.	I	1
3	HSMC-EE-701	Entrepreneurship Development & Management	VII	3
			Total Credits:	**6**

Mandatory Courses

S. No.	Course Code	Subject	Semester	Credits
1	MC-EE-101	Indian Constitution	I	0
2	MC-EE-111	Induction Program	I	0
3	MC-EE-103	Environmental Science	II	0
			Total Credits:	**0**



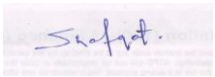
Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Program Core Courses

S. No.	Course Code	Subject	Semester	Credits
1	PCC-EE-301	E. M. Wave Theory	III	3
2	PCC-EE-302	Electrical Machines-I	III	4
3	PCC-EE-311	Electrical Machines-I Lab.	III	1
4	PCC-EE-303	Network Analysis & Synthesis	III	3
5	PCC-EE-312	Network Analysis & Synthesis Lab.	III	1
6	PCC-EE-304	Analog Electronics	III	3
7	PCC-EE-313	Analog Electronics Lab.	III	1
8	PCC-EE-401	Renewable Energy Sources	IV	3
9	PCC-EE-413	Renewable Energy Sources Lab.	IV	1
10	PCC-EE-402	Digital Electronics	IV	3
11	PCC-EE-411	Digital Electronics Lab.	IV	1
12	PCC-EE-403	Power System-I	IV	3
13	PCC-EE-404	Electrical Machines-II	IV	4
14	PCC-EE-412	Electrical Machines-II Lab.	IV	1
15	PCC-EE-405	Electrical Measurements-I	IV	3
16	PCC-EE-501	Power System-II	V	3
17	PCC-EE-511	Power System Lab.	V	1
18	PCC-EE-502	Signals & Systems	V	3
19	PCC-EE-503	Design of Power Apparatus	V	3
20	PCC-EE-513	MATLAB & Machine Design Lab.	V	1
21	PCC-EE-504	Electrical Measurement-II	V	3
22	PCC-EE-512	Electrical & Electronic Measurement Lab.	V	1
23	PCC-EE-601	Power Electronics	VI	4
24	PCC-EE-611	Power Electronics Lab.	VI	1
25	PCC-EE-602	Microprocessors & Interfacing	VI	4
26	PCC-EE-613	Microprocessors & Interfacing Lab.	VI	1
27	PCC-EE-603	Control System	VI	3
28	PCC-EE-612	Control System Lab.	VI	1
29	PCC-EE-701	Power System Protection	VII	3
31	PCC-EE-711	Power System Protection Lab	VII	1
32	PCC-EE-712	Electrical Drives Lab.	VII	1
			Total Credits:	**69**

Professional Elective Courses

S. No.	Course Code	Subject	Semester	Credits
1	PEC-EE-(---)	Professional Elective courses-I	V	3
2	PEC-EE-(---)	Professional Elective courses-II	VI	3
3	PEC-EE-(---)	Professional Elective courses-III	VI	3
4	PEC-EE-(---)	Professional Elective courses-IV	VII	3
5	PEC-EE-(---)	Professional Elective courses-V	VII	3
6	PEC-EE-(---)	Professional Elective courses-VI	VIII	3
7	PEC-EE-(---)	Professional Elective courses-VII	VIII	3
			Total Credits:	**21**



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Open Elective Courses

S. No.	Course Code	Subject	Semester	Credits
1	OEC-EE-(---)	Open Elective courses-I	V	3
2	OEC-EE-(---)	Open Elective courses-II	VI	3
3	OEC-EE-(---)	Open Elective courses-III	VII	3
			Total Credits:	**9***

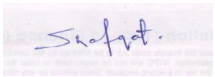
Project/Internship/ Seminar

S. No.	Course Code	Subject	Semester	Credits
1	PROJ-EE-511	Industrial Training-I	V	1
2	PROJ-EE-701	Minor Project	VII	3
3	PROJ-EE-711	Seminar & Industrial Training-II	VII	1
5	PROJ-EE-801	Major Project	VIII	9
			Total Credits:	**14**

Total Credits=170*

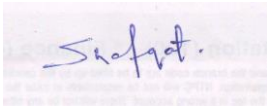
Note

***subjected to the condition if all the open electives chosen by the student are of 3 credits.**



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Semester I



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Mathematics-I **Max. Marks: 100**
Course Code: BSC-EE-101 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 4 [3-1-0]

Course Objective: The course is designed to impart elementary knowledge of theory of calculus, linear algebra and sequence & series to engineering students that will serve them to solve various engineering problems.

Detailed Contents:

Unit-I

Differential Calculus: Rolle's Theorem, Mean value theorems, indeterminate forms and L'Hospital's rule; Successive differentiation and Leibnitz's theorem, Taylor's and Maclaurin's series of function of single variable, Expansion of functions of single variable.

Unit-II

Multivariable Calculus (Differentiation): Limit, continuity and partial derivatives, physical significance of partial derivative, total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, directional derivatives, curl and divergence.

Unit-III

Integral Calculus: Evolutes and involutes; Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.

Unit-IV

Sequences and series: Convergence of sequence and series, tests for convergence; Power series, Taylor's series, series for exponential, trigonometric and logarithm functions; Fourier series: Half range sine and cosine series, Parseval's theorem.

Unit-V

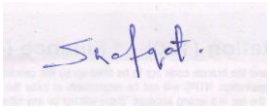
Matrices: Inverse and rank of a matrix, rank-nullity theorem; System of linear equations; Symmetric, skew-symmetric and orthogonal matrices; Determinants; Eigenvalues and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem, and Orthogonal transformation.

Course Outcome:

Upon the successful completion of the course, the student will be able to:

CO1. Understand the significance of Rolle's Theorem, Mean Value theorem, Taylor's and Maclaurin's series for differentiable functions.

CO2. Identify the extrema of a function on an interval and classify them as minima, maxima or saddles using the first derivative test.



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

CO3. Use basic the integral rules to evaluate both definite and indefinite integrals and apply the same to find areas and volume of revolutions. Apart from these, they have a basic understanding of Beta and Gamma functions.

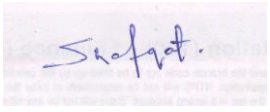
CO4. Apply the tools of power series and Fourier series to deal with functions of several variables that are essentials in most branches of engineering.

CO5. Learn the essential tools of matrices and linear algebra in a comprehensive manner.

Text Books/References:

1. **Erwin kreyszig**, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. **D. Zill,** Advanced Engineering Mathematics, Jones & Bartlett.
3. **Jain &Iyengar**, Advanced Engineering Mathematics, Narosa Publishers.
4. **N. Piskunov**, Differential & Integral calculus, Vol-I & II
5. **G.B. Thomas and R.L. Finney**, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
6. **Erwin kreyszig**, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
7. **Veerarajan T.**, Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
8. **Ramana B.V.**, Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
9. **D. Poole**, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.

Note for Paper Setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one from each unit.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Basic Electrical Engineering **Max. Marks: 100**
Course Code: ESC-EE-101 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [2-1-0]

Course Objective: The course has been designed to provide basic knowledge to the students about the principles of electric circuit analysis, electromagnetism and transformers.

Detailed Contents:

Unit-I

Review of Electric Circuits: Basic Electrical circuit terminology, concept of charge and energy, circuit parameters (resistance, inductance. Capacitance), ohm's law, Kirchhoff's current law (KCL), Kirchhoff's voltage law (KVL), series and parallel combinations of resistance, inductance & capacitance. Ideal and practical voltage & current sources and their transformations, dependent voltage and current sources.

Unit-II

D.C Circuit Analysis: Power & energy relations, analysis of series parallel DC circuits, Star-Delta transformations (ΔY), Loop & Nodal methods, Network Theorems: Thevenin's, Norton's, Maximum Power Transfer and Superposition Theorems (D.D Analysis only).

Unit-III

A.C. Circuit Analysis: Basic terminology and definitions, phasor and complex number representations, power energy relations in AC circuits, application of Network Theorems to AC circuits ,Resonance in series and parallel circuits, Concepts of active & reactive powers, Introduction to 3 phase circuits.

Unit-IV

Electromagnetism: Review of Fundamentals of Electromagnetism, Ampere's Law, analogies between electric circuits and magnetic circuits, Faraday's laws of electromagnetic induction, direction of induced emf, Lenz's law, magnetic saturation and leakage fluxes.

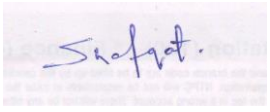
Unit-V

Basic Electrical Installations: Transformers: Concept of Inductance, Self & Mutual Inductance, Conventions for magnetically coupled circuits, Transformers: introduction, classification & construction of single phase transformer, emf equation and phasor diagrams.

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing.

Course Outcome:

At the end of this course, students will demonstrate the ability



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

CO1. To understand the concepts and applications of different laws used in the networks and circuits.

CO2. To study and analyze the D.C. Circuit and A.C. Circuit with different theorem.

CO3. To study the concepts related to electromagnetism.

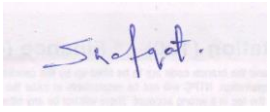
CO4. To understand the principle and working of transformers.

CO5. To study and understand different types of electrical installations.

Text Books/ References:

1. **V. D. Toro**, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.
2. **L. S. Bobrow**, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
3. **E. Hughes**, "Electrical and Electronics Technology", Pearson, 2010.
4. **D. P. Kothari and I. J. Nagrath**, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
5. **D. C. Kulshreshtha**, "Basic Electrical Engineering", McGraw Hill, 2009.

Note for Paper Setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one from each unit.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Communication Skills **Max. Marks: 100**
Course Code: HSMC-EE-101 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 2 [2-0-0]

Course Objective: This subject is designed to attain the general proficiency in English for the engineering students.

Detailed Contents:

Unit-I

Vocabulary Building: The concept of Word Formation**,** Root words from foreign languages and their use in English**,** Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives.**,** Synonyms, antonyms, and standard abbreviations.

Unit-II

Basic Writing Skills: Use of phrases and clauses in sentences, Importance of proper punctuation, Creating coherence, Organizing principles of paragraphs in documents, Techniques for writing precisely.

Unit-III

Identifying Common Errors in writing: Subject-verb agreement**,** Noun-pronoun agreement**,** Articles**,** Prepositions**,** Redundancies and Clichés.

Unit-IV

Nature and Style of sensible Writing: Describing**,** Defining**,** Classifying**,** Providing examples or evidence**,** writing introduction and conclusion.

Unit-V

Writing Practices: Comprehension**,** Précis Writing**,** Essay Writing

Course Outcome:

Upon the completion of the course, the students will be able:

CO1. To acquire basic proficiency in English including reading, listening comprehension, writing and speaking skills.

CO2. To make the students authoritative in self-expression in their day to day life in this fast-changing world.

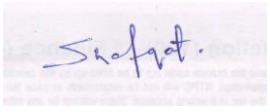
CO3. To identify the common errors involved in writing.

CO4. To understand the nature and style of sensible writing.

CO5. To write effective and coherent paragraphs.

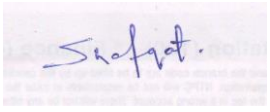
Text Books/References:

1. **Michael Swan,** Practical English Usage. OUP. 1995.
2. Remedial English Grammar. **F.T. Wood. Macmillan**.2007



3. On Writing **Well. William Zinsser**. Harper Resource Book. 2001
4. Study Writing**. Liz Hamp-Lyons and Ben Heasly**. Cambridge University Press, 2006.
5. **Communication Skills**. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
6. **Exercises in Spoken English**. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

Note for Paper Setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one from each unit.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Engineering Mechanics **Max. Marks: 100**
Course Code: ESC-EE-102 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [2-1-0]

Course Objective: This course has been designed to make the students acquainted about forces and its effects, kinematics and statics.

Detailed Contents:

Unit-I

Two Dimensional force System: Basic Concepts, principal of transmissibility, resultant of a force System, Free body Diagrams, Equilibrium and equation of equilibrium Applications. Moment of a force about a point, Varrigon theorem, friction, law of friction, equilibrium of body lying on horizontal and inclined plane, Static and Dynamic Friction, wedge friction, Ladder friction applications.

Unit -II

Centroid and Centre of gravity: Centroid and moment of inertia; centroid of plane area and solid bodies. Moment of inertia of plane area. Theorem of parallel axis, Theorem of perpendicular axis, radius of gyration composite ideas. Mass moment inertia of circular plate, Cylinder, Sphere.

Unit -III

Member forces in Trusses: Planer truss structure, trust joint identification, strategy for planer truss analysis, Statistical determinacy and stability of planer trusses. Numerical truss analysis (Method of joints and method of sections).

Unit -IV

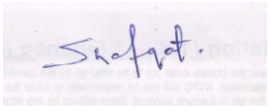
Kinematics of Particles: Velocity and acceleration in rectilinear motion along a plane and curved path. Tangential and normal components of velocity and acceleration motion curves. Kinematics of rigid bodies rotation, absolute motion, relative motion. Newton's 2nd law (rectangular, path, and polar coordinates).Work-kinetic energy, power, potential energy. Impulse-momentum (linear, angular); Impact (Direct and oblique).

Unit -V

Virtual Work and Energy Method: Virtual displacements, principle of virtual work for particle and ideal system of rigid bodies, degrees of freedom. Active force diagram, systems with friction, mechanical efficiency. Conservative forces and potential energy (elastic and gravitational), energy equation for equilibrium. Applications of energy method for equilibrium. Stability of equilibrium.

Course Outcome:

Upon successful completion of the course, student should be able to:



CO1. Use scalar and vector analytical techniques for analyzing forces in statically determinate structures

CO2. Understand basic kinematics concepts – displacement, velocity and acceleration (and their angular counterparts);

CO3. Understand basic dynamics concepts – force, momentum, work and energy;

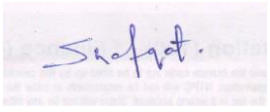
CO4. Understand and be able to apply Newton's laws of motion;

CO5. Learn to solve dynamics problems. Appraise given information and determine which concepts apply, and choose an appropriate solution strategy;

Text Books/References:

1. **Bansal R.K.** (2010), A Text Book of Engineering Mechanics, Laxmi Publications
2. **Khurmi R.S.** (2010), Engineering Mechanics, S. Chand & Co.
3. **Irving H. Shames** (2006), Engineering Mechanics, 4th Edition, Prentice Hall
4. **F. P. Beer and E. R. Johnston** (2011), Vector Mechanics for Engineers, Vol I - Statics, Vol II, – Dynamics, 9th Ed, Tata McGraw Hill
5. **R. C. Hibbler** (2006), Engineering Mechanics: Principles of Statics and Dynamics, Pearson Press.
6. **Andy Ruina and RudraPratap** (2011), Introduction to Statics and Dynamics, Oxford University Press
7. **Shanes and Rao** (2006), Engineering Mechanics, Pearson Education,
8. **Hibler and Gupta** (2010), Engineering Mechanics (Statics, Dynamics) by Pearson Education
9. **Reddy Vijaykumar K. and K. Suresh Kumar** (2010), Singer's Engineering Mechanics

Note for Paper Setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one from each unit.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Computer Fundamentals and Programming **Max. Marks: 100**
Course Code: ESC-EE-103 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 4 [3-1-0]

Course Objective: This subject is provided aiming to achieve a common knowledge of programming among engineering students.

Detailed Contents:

Unit I

Introduction: History and Generations of Computers, Classification and Applications of Computers. **Computer Hardware:** Components of a computer system, Input and Output devices, Memory Hierarchy, Primary and Secondary memory.

Software and Languages: Computer Software, System and Application Software, Operating systems, Booting Process.

Programming Languages: Generations and types of Languages, Compilers, Interpreter, Assemblers, Introduction to algorithm and Flow chart.

Unit II

Introduction to C Programming: History of C, Structure of a C Program, Compiling & Executing a C program. Constants, Variables and Data Types, Storage classes, Operators and Expressions, Data Input and Output.

Control Statements: Decision making and branching, IF statement, IF-ELSE statement, nested IF-ELSE statement, Switch statement, break statement, continue statement. Looping: while statement, do-while statement, for statement.

Unit III

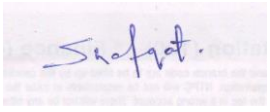
Introduction to arrays: One dimensional arrays, two dimensional arrays and Multidimensional arrays, basic operations on arrays, strings, basic string operations**.**

Functions: Introduction to Function, Types of functions, function declaration, calling a function, passing arguments to functions, passing arrays to functions, Recursion.

Unit IV

User defined data types: Structure, Defining structures, Array of Structures, Introduction to Union and enumerated data types.

Introduction to Pointers & Files: Operations on pointer, pointers & multidimensional arrays, pointers & character strings. Dynamic Memory Allocation in C: malloc, calloc, realloc and free functions. Introduction to File, Operations on files: open, close, read and write.



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Unit V

Networking: Introduction to networking, Applications, types of computer networks, Network Topology, LAN, MAN, WAN. Networking devices: Hub, switch, router, repeater, and gateway. History of internet, internet, extranet and intranet, WWW.E-mail, ISPs, surfing, phishing.

Course Outcome:

The student will be able:

CO1. To assemble a computer system and formulate simple algorithms for arithmetic and logical problems.

CO2. To translate the algorithms to programs (in C language) for execution and usage of various control statements for problem solving.

CO3. To decompose a problem into functions and usage of arrays to synthesize a complete program.

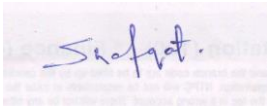
CO4. To use pointers, files and user defined data types to formulate algorithms and programs.

CO5. To be familiar with the concept of computer networking.

Text Books/References:

1. **Pradeep K. Sinha and PreetiSinha,** "Computer Fundamentals", Fourth Edition, BPB Publication.
2. **Yashavant P. Kanetkar ,** Let Us C, BPB Publication, 15th Edition.
3. **DeepaliSrivastava, S. K. Srivastava**, "C in Depth", third edition, BPB Publication.
4. **B Ram and Sanjay Kumar,** "Computer Fundamentals: Architecture and organization", New age international publication.
5. **Preter Norton**, Introduction to Computers, TMH.
6. **Byron Gottfried, Schaum's,** "Outline of Programming with C", McGraw-Hill.
7. **Brian W. Kernighan and Dennis M. Ritchie**, The C Programming Language, Prentice Hall of India
8. **E. Balaguruswamy**, Programming in ANSI C, Tata McGraw-Hill.

Note for Paper Setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one from each unit.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Indian Constitution **Max. Marks: 100**
Course Code: MC-EE-101 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 2 [2-0-0]

Course Objective: The basic purpose of this subject is to make a general awareness about our constitution.

Detailed Contents:

Unit I

Constitutional Framework : Historical Background, Making of the constitution, Salient features of the Indian Constitution, Preamble to the Constitution, Union and its territory, Citizenship, Fundamental rights, Directive principles of state policy, Fundamental duties, Amendment of the constitution, Basic structure of the constitution.

Unit II

System of Government: Parliamentary system, Federal System, Centre-state relations, Inter-state relations, Emergency provisions

Unit III

Central government: President, Vice-President, Prime Minister, Central Council of Ministers, Cabinet committees, Parliament, Parliamentary committees, Parliamentary forums, Supreme Court
State Government: Governor, Chief Minister, State Council of Ministers, State legislature, High court, Subordinate Courts, Special status of Jammu and Kashmir, Special provision for some states
Local Government: Panchayati raj, Municipalities.

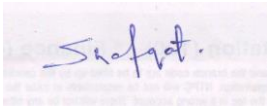
Unit IV

Constitutional Bodies: Election commission, Union Public service commission, State Public service Commission, Finance Commission, National Commission for SC's, National Commission for ST's, Special officer for Linguistic minorities, Comptroller and auditor general of India, Attorney General of India, Advocate General of India.

Unit V

Non-Constitutional Bodies: Planning Commission, National Development Council, National Human Rights Commission, State Human Rights Commission, Central Information Commission, State Information Commission, Central vigilance Commission, Central Bureau of Investigation, Lokpal and Lokayuktas
Other Constitutional Dimensions: Co-operative societies, Official Language, Public services, Tribunals, Rights and Liabilities of the Government, Authoritative text of the Constitution in Hindi Language, Special Provision relating to certain classes.

Course Outcome:
Upon the completion of this, the students will able to know:
CO1. About the constitutional framework.
CO2. About the government system



CO3. Various type of government

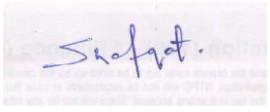
CO4. About Constitutional bodies: Election commission, UPSC, SPSC, Commission for ST/SC and many others.

CO5. Non-constitutional bodies: Planning Commission, NDC, NHRC, SHRC, CBI, Vigilance Commission and other dimensions of constitution.

Text Books/ References:

1. Indian Constitutional Law, M.P. Jain, 7th Edition.
2. Introduction to the Constitution of India, B. K. Sharma, PHI.

Note for Paper Setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one from each unit.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Basic Electrical Engineering Lab. **Max. Marks: 50**
Course Code: ESC-EE-111 **University Exam: 25**
Duration of Exam: 2 Hours **Internal Assessment: 25**
Credits: 1 [0-0-2]

Laboratory Objective: The lab has been designed to provide and implement basic knowledge about the principles of electric circuit analysis, electromagnetism and transformers to the students.

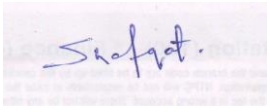
List of experiments:

1. Introduction to Circuit Elements.
2. Verification of Ohms Law.
3. Verification of Kirchhoff's Current and Voltage Law (KCL & KVL)
4. Verification of Thevenin's Theorem & Norton's Theorem.
5. Transformation of Star & Delta Networks.
6. Measurement of Power using 2-Wattmeter method.
7. Verification of Superposition Theorem.
8. Verification of reciprocity theorem.
9. To plot the Resonance curve for a Series & Parallel Resonance.
10. Determination of resonance frequency using LCR Meter.

Laboratory Outcome:

CO1. To study and analyze different circuit elements.
CO2. To study and implements different laws and theorems of electrical circuits.
CO3. To make the students aware about the principles and applications of basic electrical laws.
CO4. To measure the power using two wattmeter method.
CO5. To study and analyze the phenomenon of Resonance in Series and Parallel circuits.

Note: These are only the suggested list of experiments. Instructor may add or change some experiments relevant to the course contents.



Course Title: Communication Skills Lab. **Max. Marks: 50**
Course Code: HSMC-EE-111 **University Exam: 25**
Duration of Exam: 2 Hours **Internal Assessment: 25**
Credits: 1 [0-0-2]

Laboratory Objective: The Language Lab focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations and contexts.

List of Laboratory Sessions:

1. Introduction to the Sounds of English- Vowels, Diphthongs & Consonants.
2. Introduction to Stress and Intonation.
3. Situational Dialogues / Role Play.
4. Oral Presentations- Prepared and Extempore.
5. 'Just A Minute' Sessions (JAM).
6. Describing Objects / Situations / People.
7. Information Transfer
8. Debate
9. Telephoning Skills.
10. Giving Directions.

Laboratory Outcome:

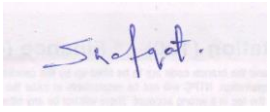
Upon the completion of the lab, the students will be able to:

CO1. Developing intellectual, personal and professional abilities.

CO2. On completion of the course, the students will be accurate in communication.

CO3. The students will be able to communicate effectively on complex engineering activities with the engineering activities with the engineering community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations and give and receive clear instructions.

Note: These are only the suggested list of experiments. Instructor may add or change some experiments relevant to the course contents.



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Course Title: Engineering Mechanics Lab. **Max. Marks: 50**
Course Code: ESC-EE-112 **University Exam: 25**
Duration of Exam: 2 Hours **Internal Assessment: 25**
Credits: 1 [0-0-2]

Laboratory Objective: The objective of the Engineering mechanics Lab is to perform experiments which are related to Statics and Dynamics Loading in order to understand the behaviour of different mechanical equipment's which students study in theory.

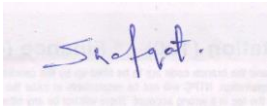
List of Experiments:

1. To conduct tensile test and determine the ultimate tensile strength, percentage elongation and reduction.
2. To conduct the compression test and determine the ultimate compressive strength for a specimen.
3. To determine centroid of Lamina.
4. To determine the hardness of a given specimen using vicker/brinel/Rockwell hardness testing machine.
5. To very Lami's theorem.
6. To verify polygon law of forces.
7. Friction experiment on inclined plane.
8. Experiment on screw Jack.
9. To verify reactions at the supports of a simply supported beam.
10. To determine moment of inertia of various shapes.

Laboratory Outcome:
After the completion of lab course students will be-

CO1. Able to understand different engineering mechanics apparatus.
CO2. Able to understand the mechanical properties of materials.
CO3. Able to understand the moment of inertia of various shapes.
CO4. Get the practical idea of frictional forces.
CO5. Get working principle of screw jack.

Note: These are only the suggested list of experiments. Instructor may add or change some experiments relevant to the course contents.



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Course Title: Computer Fundamentals & Programming Lab. **Max. Marks: 50**
Course Code: ESC-EE-113 **University Exam: 25**
Duration of Exam: 2 Hours **Internal Assessment: 25**
Credits: 1 [0-0-2]

Laboratory Objective: The course is designed to provide practical foundation for the computer programming and to familiarize students with components of computer and its troubleshooting.

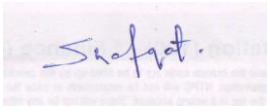
List of Experiments:

1. Assembling and Troubleshooting of computer system.
2. Introduction and working on MS office Packages like word, power point, excel etc.
3. Familiarization with programming environment.
4. Simple computational problems using arithmetic expressions.
5. Problems involving if-then-else structures.
6. Iterative problems e.g., sum of series.
7. Performing operations on 1D Array.
8. Performing operations on 2D Array.
9. Performing operations on String.
10. Function declaration and calling.
11. Implementation of Mathematical function
12. Programming for solving Numerical methods problems.
13. Recursive functions.
14. Pointers and structures.
15. File operations.

Laboratory Outcome:

CO1. To understand the working and troubleshooting of computer system.
CO2. To formulate the algorithms for simple problems
CO3. To be able to correct syntax and logical errors as reported by the compilers and run time.
CO4. To be able to write iterative as well as recursive programs
CO5. To be able to represent data in arrays, strings and structures and manipulate through a program
CO6. To be able to declare pointers of different types and use them in defining self-referential structures.
CO7. To be able to create, read and write to and from simple text files.

Note: These are only the suggested list of experiments. Instructor may add or change some experiments relevant to the course contents.



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Course Title: Workshop Practice **Max. Marks: 50**
Course Code: ESC-EE-114 **University Exam: 0**
Duration of Exam: 2 Hours **Internal Assessment: 50**
Credits: 2 [0-0-2]

Laboratory Objective: In this course the students will gain knowledge of the different manufacturing processes which are commonly employed in the industry, to fabricate components using different materials. It includes

1. Machine shop
2. Fitting shop
3. Carpentry
4. Welding shop
5. Smithy

Detailed Contents:

1. Manufacturing Methods- casting, forming, machining, joining, advanced manufacturing methods
2. Fitting operations & power tools
3. Electrical & Electronics
4. Carpentry
5. Plastic moulding, glass cutting
6. Metal casting
7. Welding (arc welding & gas welding), brazing

Laboratory Outcome:

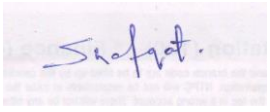
CO1. Upon completion of this laboratory course, students will be able to fabricate components with their own hands.

CO2. They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.

CO3. By assembling different components, they will be able to produce small devices of their interest.

Text Books/References:

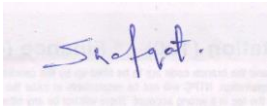
1. **Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., —**Elements of Workshop Technology‖, Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.
2. **Kalpakjian S. And Steven S. Schmid**, **—**Manufacturing Engineering and Technology‖,
3. 4th edition, Pearson Education India Edition, 2002.
4. **Gowri P. Hariharan and A. Suresh Babu**, Manufacturing Technology – I‖ Pearson Education, 2008.
5. **Roy A. Lindberg**, **—**Processes and Materials of Manufacture‖, 4th edition, Prentice Hall India, 1998.



Mr. S. N. Mughal (Head E.E.) | Mr. Tasaduq Hussain (A.P., EE) | Mr. Ahmed Riyaz (A.P., EE) | Prof. Asif Husain (Dean, SOET)

6. **Rao P.N**., ―Manufacturing Technology‖, Vol. I and Vol. II, Tata McGraw Hill House.

Note: Examinations could involve the actual fabrication of simple components, utilizing one or more of the techniques covered above.

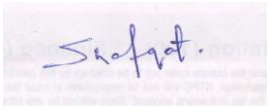


Course Title: Induction Program **Max. Marks: 0**
Course Code: MC-EE-111 **University Exam: 0**
Duration of Exam: 0 Hours **Internal Assessment: 0**
Credits: 0 [0-0-0]

Induction program

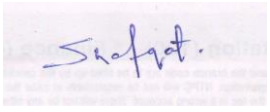
Induction program for students to be offered right at the start of the first year. It should include but not limited to following Activities

1. Physical activity
2. Creative Arts
3. Universal Human Values
4. Literary
5. Proficiency Modules
6. Lectures by Eminent People
7. Visits to local Areas
8. Familiarization to Dept./Branch & Innovations



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Semester II



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Mathematics-II **Max. Marks: 100**
Course Code: BSC-EE-201 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 4 [3-1-0]

Course Objective: This course is designed to impart advanced knowledge of multivariable integration, theory of differential equations and complex variable to engineering students that will serve them to solve real life engineering problems.

Detailed Contents:

Unit-I

Multivariable Integration: Double integrals (Cartesian), change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volumes, Triple integrals (Cartesian), orthogonal curvilinear coordinates, Simple applications involving cubes, sphere and rectangular parallelepipeds; Scalar line integrals, vector line integrals, scalar surface integrals, vector surface integrals, Theorems of Green, Gauss and Stokes' (without proofs).

Unit- II

First order ordinary differential equations: Exact, linear and Bernoulli's equations, Euler's equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type, Second order linear differential equations with variable coefficients, method of variation of parameters.

Unit- III

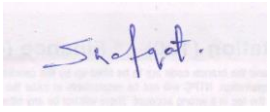
Partial Differential Equations: Partial differential equations and its formation, Linear and non-linear partial differential equations of first order and their solutions, Charpit's method, Lagrange's method, Homogenous and non-homogenous linear partial differential equations with constant coefficients and their solutions, Applications of Partial Differential Equations with initial and boundary conditions, Solution by the method of separation of variables.

Unit- IV

Complex Variable – Differentiation: Differentiation, Cauchy-Riemann equations, analytic functions, elementary analytic functions (exponential, trigonometric, logarithm) and their properties; Conformal mappings, Mobius transformations and their properties.

Unit- V

Complex Variable – Integration: Contour integrals, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof), Liouville's theorem (without proof) and Taylor's series, zeros of analytic functions, singularities, Laurent's series; Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine.



Course Outcome:

Upon the completion of this course, the students will be able to:

CO1. Compute double and triple integrals over rectangular and spherical domains and memorize important theorems: Green, Gauss divergence and Stokes with their applications in various engineering problems.

CO2. Distinguish between linear and non-linear equations. Recognize and solve equations of Bernoulli, Euler and Clairaut.

CO3. Solve partial differential equations of various kinds and apply the same to solve problems of real world.

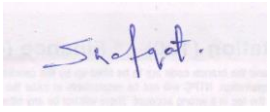
CO4. Understand the significance of differentiability for complex functions and be familiar with the Cauchy-Riemann equations and conformal mapping.

CO5. Apply the Cauchy Residue theorem to evaluate definite integrals, compute the Taylor and Laurent expansions of simple functions and determine the nature of the singularities and calculating residues.

Text Books/References:

1. **Erwin kreyszig**, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. **D. Zill,** Advanced Engineering Mathematics, Jones & Bartlett.
3. **Jain &Iyengar**, Advanced Engineering Mathematics, Narosa Publishers
4. **N. Piskunov**, Differential & Integral calculus, Vol-I & II
5. **G. B. Thomas and R.L. Finney**, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
6. **S. L. Ross**, Differential Equations, 3rd Ed., Wiley India, 1984.
7. **E. A. Coddington**, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.
8. **E. L. Ince**, Ordinary Differential Equations, Dover Publications, 1958.
9. **J. W. Brown and R. V. Churchill**, Complex Variables and Applications, 7th Ed., Mc- Graw Hill, 2004.

Note for Paper Setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one from each unit.



Course Title: Basic Electronics Engineering **Max. Marks: 100**
Course Code: ESC-EE-201 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]

Course Objective: This course aims to provide students with solid background of semiconductors and some basic solid state electronic devices used in circuits.

Detailed Contents:

Unit-I

Semiconductors: Classification of materials and energy band diagram, Semiconductor types, Energy band diagram for Semiconductors, Drift and Diffusion Current, Mass Action Law, Charge Neutrality equations, Current density and Conductivity, Hall Effect.

Unit-II

P-N Junction and applications: Basic structure, PN junction Diode and Characteristics, Current components in p-n junction, temperature dependence, equivalent circuits. Rectifiers, half wave, full wave rectifiers, bridged rectifiers (efficiency, ripple factor). Clipping and clamping circuits. Basic operations of Zener, Avalanche and Photo Diodes.

Unit-III

Transistors: Types of transistors, operation& characteristics, CE, CB and CC configurations, Input output characteristics, biasing and bias stability, use of transistor as an amplifier and switch.

Unit-IV

Junction Field Effect Transistors: Operation and characteristics.JFET configurations and biasing. JFET as amplifier

Unit-V

MOSFET: Types (Depletion and Enhancement), Operation and Characteristics (no derivation), Introduction to MOSFET Scaling and types, Introduction to Short-Channel Effects (V_{TH} roll-off, DIBL, Hot-carrier injection)

Course Outcome:

At the end of the course, the student will be able to

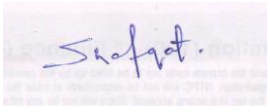
CO1. Describe the energy bands and the scientific principles behind controlled conductivity in semiconductors.

CO2. Analyze the working of PN junction diode and apply diode in various applications such as rectifiers and other wave shaping circuits.

CO3. Analyze the working of the traditional transistor BJT and as well as the concept of biasing.

CO4. Understand the operation of MOSFET and various issues of scaling in MOSFET.

CO5. Design basic analog circuits

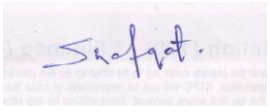


Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Text Books/ References:

1. **Millman&Halkias**, Integrated Electronics, TMH
2. **BoylestadandNashelky,** Electronic Devices & Circuits, PHI.
3. **Floyd T. L.,** Electronic Devices, Pearson Education.
4. **Mehta V. K.**, Electronic Devices, S. Chand and Sons, New Delhi
5. **Sedra& Smith,** Microelectronic Circuits, Oxford Printing Press.

Note for Paper Setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one from each unit.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Engineering Physics **Max. Marks: 100**
Course Code: BSC-EE-202 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 4 [3-1-0]

Course Objective:

1. To understand the importance of applications of Applied Physics in daily life
2. To provide the students with a basic understanding of Physics that may be required by engineers in the course of their careers
3. To acquaint students with the fundamentals of vibrations, acoustics and ultrasonic and how they help in mankind by using engineering skills.
4. To enhance knowledge related to principle working of Lasers and its different components to make it suitable for various purposes
5. To introduce the learners to the basics of Quantum Mechanics

Detailed Contents:

Unit-I

Waves, Oscillations and Introduction to Acoustics: Wave motion, its types, Equations of wave motion, Energy and Intensity of a progressive wave, Introduction to ultrasonic waves, magnetostriction and piezoelectric effect, productions of ultrasonic waves, their detections and applications. A brief introduction to the acoustics of a hall, factors affecting the acoustics of the buildings, Reverberation Period, Sabine's Formula for calculating Reverberation Time.

Unit-II

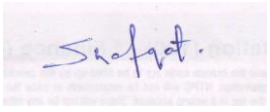
Electrostatics in a linear dielectric medium & Magnetostatics: Electrostatic field and potential of a dipole. Bound charges due to electric polarization; Electric displacement; boundary conditions on displacement; solving simple electrostatics problems in presence of dielectrics – Point charge at the Centre of a dielectric sphere, charge in front of a dielectric slab, dielectric slab and dielectric sphere in uniform electric field. Magnetostatics: Bio-Savart law, Divergence and curl of static magnetic field; vector potential and calculating it for a given magnetic field using Stokes' theorem; the equation for the vector potential and its solution for given current densities.

Unit -III

Quantum Mechanics for Engineers: Introduction to Quantum mechanics, Wave nature of Particles, Time-dependent and time independent Schrodinger equation for wave function, Born interpretation, probability current, Expectation values, Free-particle wave function and wave-packets.

Unit-IV

Applying the Schrodinger equation: Solution of stationary-state Schrodinger equation for one dimensional problems– particle in a box, particle in attractive delta-function potential, square-well potential, linear harmonic oscillator.



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Unit-V

Optics: Interference: Introduction, Interference due to division of wave front: Fresnel's Biprism, Interference due to division of amplitude: wedge shaped film, Newton's rings. Diffraction: Introduction, Difference between Fresnel and Fraunhofer diffraction, Single slit diffraction, Transmission diffraction grating, absent spectra. Spontaneous and stimulated emissions, Einstein's coefficients, Laser and its principle, He-Ne laser.

Course Outcomes:

After completing of the course, the students will:

CO1. Understand the importance of Applied Physics in describing the technology we are using today in different engineering fields

CO2. Acquired knowledge of Waves, Vibration and acoustics, helps the students to develop the acoustically good hall.

CO3. Knowledge of basic Quantum Mechanics can help the students for further research applications as they can be applied to any quantum, mechanical situation to find energy, momentum etc.

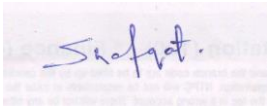
CO4. Acquired knowledge of Optics help the students to

a) Know more about propagation of light and wave optics.
b) Describe the requirements for a system to act as a laser.
c) Differentiate the various types of lasers and their means of excitation.
d) Able to explain, which laser would best meet the need for a industrial or research task.
e) Demonstrate an awareness of the safety responsibilities involved in working with lasers.

Text Books/ References:

1. **Pathania K. S. &Khera S. K.,** Waves and Vibration,
2. **Beiser**, **Arthur**, Concepts of Modern physics, TMH.
3. **Rangwala** and **Mahajan**, "Electricity and Magnetism", Tata McGraw Hill, 1998
4. **Ghatak A. K., Dass P.,** Laser theory & application of ultrasonic waves,
5. **David J. & Cheek**, Fundamentals and application of ultrasonic waves,
6. **Avadhanulu M. N. &Khsirsagar P. G.,** Engineering Physics (S. Chand & Co.)
7. **Vijaya K. K., Chandralingam S.,** Modern Physics, S. Chand & Co. Ltd, New Delhi
8. **Mani and Mehta**, G.K. "Modern Physics", Affiliated East-West Press Pvt. Ltd., 1998.
9. **Arora C.L**, Refresher Course in Physics, S. Chand & Company Ltd.
10. **Grifiths David J.,** Introduction to Quantum Mechanics, 2nd Edition 2016, Cambridge University Press
11. **Sharma K. K.**, Optics: Principles and Applications 2017, Elsevier
12. **Shankar R.**, Principles of Quantum Mechanics 2011, Springer
13. **Jenkins & White H E**, Fundamentals of Optics 4 edition 2017, McGraw Hill Education

Note for Paper Setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one from each unit.



Course Title: Engineering Chemistry **Max. Marks: 100**
Course Code: BSC-EE-203 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 4 [3-1-0]

Course Objective: The course is designed to familiarizing the students of engineering with Water treatment, polymerization, photochemistry, corrosion and transition metal chemistry.

Detailed Contents:

Unit-I

Water Treatment: Water quality measurement, Hardness of water, Estimation of hardness of water ,Disadvantages of hard water ,Scale and sludge formation; disadvantages, prevention and treatment, Desalination method, reverse osmosis ,Electro dialysis, Domestic water treatment.

Unit-II

Polymerization

Basic concept of polymerization, Broad classification and industrial applications (Buna-N, Buna-S, Polyester, Polyethene, Polypropene, Polystyrene,), Thermosetting plastic and its softening, Biodegradable and non-biodegradable wastes.

Unit- III

Photochemistry: Photo excitation, Luminescence and types, Norrish-I and Norrish-II reactions, Application examples of photolysis, Photosynthesis Z –Diagram, Chemistry of vision, MRI equipment and procedure of working.

Unit-IV

Transition Metal Chemistry: Structure of organic compounds up to coordination no 6, Isomerism (geometrical, optical, ionization, linkage and coordination isomerism, bonding in coordination compounds by CFT, VBT. Application of coordination compounds in organic synthesis and Medical fields.

Unit-V

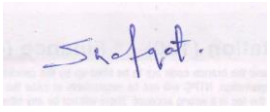
Cement and Lime: Introduction and types of cement, Manufacture of Portland cement, Setting and hardening of cement, Introduction and properties of Lime, Setting and hardening of lime.

Course Outcome:

At the end of course, the student will be able to

CO1. Apply the methods to produce soft water for industrial use and potable water at cheaper cost.

CO2. Substitute metals with conducting polymers and also produce cheaper bio-degradable polymers to reduce environmental pollution,



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

CO3. Apply knowledge about photochemical and photo physical processes and the reactivity of excited states to explain applications in photochemical energy conversion.

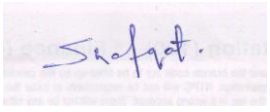
CO4. Understand structure of organic compounds and transition metal compound synthesis,

CO5. Understand the manufacturing process of cement and lime.

Text Books/References:

1. **Odion G.G**-Principles of Polymerisation, John Wiley and sons.
2. **S.S Dara**-A Text Book of Engg. Chemistry.
3. **B.Sivasankar**-Engineering Chemistry, Tata McGraw Hill Publication.
4. **S.Chand**-Practical Manual for Engineering Chemistry.

Note for Paper Setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one from each unit.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Environmental Science **Max. Marks: 100**
Course Code: MC-EE-201 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 0 [2-0-0]

Course Objective: This course is designed to make the engineering students to understand the significance of environment and ecology in human survival and growth. It also aims to connect the budding engineers to nature.

Detailed Contents:

Unit-I

Elements of Ecology: Definition, Scope and basic principles of ecology and environment. Biological levels of organization, population, community, ecosystem and biosphere. Climatic factors - Solar radiations, temperature, water and precipitation.

Unit-II

Environmental pollution: Types of pollution, Air pollution, Noise pollution, Water pollution, Soil pollution, Thermal pollution, Radiation pollution

Unit-III

Biogeochemical Cycles: Importance, gaseous and sedimentary cycles. Carbon, Nitrogen, Phosphorus and Sulphur Cycles. Global Oxygen Cycles. Hydrological cycles.

Unit-IV

Succession: Concepts of succession, Types of Succession, Trends in succession, Climax and stability, Co-evolution and group selection.

Unit-V

Major biomes of the world, Characteristics of terrestrial fresh water and marine ecosystems; Forests, grasslands, lake, river and marine ecosystems of India.

Course Outcome:

Upon the completion of the course, students will able to:

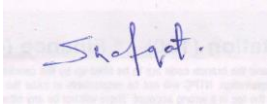
CO1. Learn about the environment and ecology.

CO2. Understand different types of pollution. Air, Noise, Water, Soil, Thermal and Radiation pollution.

CO3. Understand biogeochemical cycles and human contribution in it.

CO4. Learn succession and various types of succession.

CO5. Demonstrate the ability to understand the biomes of world and its importance in human survival.

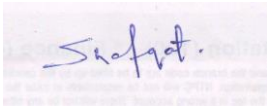


Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Text Books/References:

1. **J.S.Singh, S.P. Singh and S.R. Gupta.** 2008. Ecology, Environment and Resource Conservation. Anamaya Publications (New Delhi).
2. **S.C. Santra.** 2011. Environmental Science. New Central Book Agency.
3. **M.H. Rao and H.V.H. Rao.** 1998. Air Pollution. Tata McGraw Hill Publication.
4. **V.P. Kudesia.** 1997. Air Pollution. Pragati Prakashan.

Note for Paper Setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one from each unit.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Basic Electronics Lab. **Max. Marks: 50**
Course Code: ESC-EE-211 **University Exam: 25**
Duration of Exam: 2 Hours **Internal Assessment: 25**
Credits: 1 [0-0-2]

Laboratory Objective: The course is designed to provide experimental foundation for the theoretical concepts and to familiarize students with basic electronic devices, their applications and characteristics.

List of Experiments:

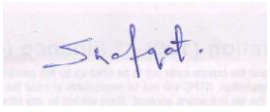
1. To plot the Resonance curve for a series & parallel resonance.
2. To determine and plot operating characteristics of a PN junction diode.
3. To study the input / output waveforms of half wave and bridge wave rectifiers.
4. To suppress the ripple in rectifiers using RC filters.
5. To study the clipper and clamper circuits.
6. To study the Zener characteristics and its application as voltage regulator
7. To plot characteristics of transistor in CE/CB configuration.
8. To plot characteristics of a BJT.
9. To plot MOSFET characteristics.
10. To study frequency response of RC Coupled Oscillators.

Laboratory Outcome:

Upon the completion of course, the students will be able to:

CO1. Determine the characteristics of PN Junction and Zener diode.
CO2. Design various rectifiers configuration and evaluate its various performance parameters.
CO3. Design and analyze various wave shaping circuits.
CO4. Determine the characteristics of a BJT and MOSFET
CO5. Design and analyze the frequency response of RC Coupled Oscillators

Note: These are only the suggested list of experiments. Instructor may add or change some experiments relevant to the course contents.



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Course Title: Engineering Physics Lab. **Max. Marks: 50**
Course Code: BSC-EE-211 **University Exam: 25**
Duration of Exam: 2 Hours **Internal Assessment: 25**
Credits: 1 [0-0-2]

Laboratory Objective: The Laboratory is designed to provide experimental foundation for the theoretical concepts and to familiarize students with experimental apparatus, the scientific method and method of data analysis.

List of Experiments:

1. Measurement of Resistance.
2. Measurement of e/m by helical method/Thomson's method.
3. Determination of Resistivity of a given wire.
4. Determination of Band Gap of a semiconductor.
7. To determine the refractive index of the prism material using spectrometer.
8. To determine Young's modulus of a bar.
9. To determine the wavelength using Fresnel's bi-prism/diffraction grating.
10. To Determine Plank's Constant.
11. Verify the Stefan's law by incandescent lamp
12. To determine the susceptibility of a ferromagnetic material
13. Study of Nano TiO2 solar cell
14. Ultrasound measurement a given liquid
15 Joule's constant experiment
16. Determination of unknown capacitance of a capacitor by de-Sauty bridge method.
17. Refractive index of a glass slab/ water by travelling microscope
18. To determine the frequency of an ac supply by using electrical vibrator
19. To find the inner and outer diameter of a hollow cylinder by using Vernier caliper.
20. To determine the diameter of a thin wire by using screw gauge and its area of cross-section.
21. Measurement of 'g' and Time period by using compound pendulum.
22. To find the viscosity of a liquid using stoke's method.

Laboratory Outcome:

On Completion of this course, students are able to –

CO1. Develop skills to impart practical knowledge in real time solution.

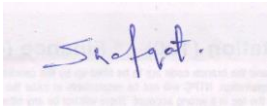
CO2. Understand principle, concept, working and application of new technology and comparison of results with theoretical calculations.

CO3. Design new instruments with practical knowledge.

CO4. Gain knowledge of new concept in the solution of practical oriented problems and to understand more deep knowledge about the solution to theoretical problems.

CO5. Understand measurement technology, usage of new instruments and real time applications in engineering studies.

Note: These are only the suggested list of experiments. Instructor may add or change some experiments relevant to the course contents.



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Course Title: Engineering Chemistry Lab. **Max. Marks: 50**
Course Code: BSC-EE-212 **University Exam: 25**
Duration of Exam: 2 Hours **Internal Assessment: 25**
Credits: 1 [0-0-2]

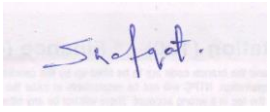
Laboratory Objective: The course is designed to provide experimental foundation for the scientific method for analysis, synthesis and determination of various chemicals

List of Experiments:

1. Acid Base Titrations.
2. Viscosity of Solutions, Determination of composition of sugar solutions from Viscosity.
3. Synthesis of Aspirin.
4. Determination of Functional Groups in Organic Compounds.
5. Synthesis pf p-Nitro Aniline from Acetanilide.
6. Conduct metric Titrations.
7. Determination of Proteins in given sample of Food.
8. Determination of Flash and Fire Point of a Lubricant.

Laboratory Outcome:
At the end of practical course the students will be familiarized about
CO1. Titrations,
CO2. Synthesis of organic compounds,
CO3. protein determination and viscosity of solutions and
CO4. temperature dependent properties of lubricant.

Note: These are only the suggested list of experiments. Instructor may add or change some experiments relevant to the course contents.



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Course Title: Engineering Graphics **Max. Marks: 100**
Course Code: ESC-EE-212 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [1-0-4]

Laboratory Objective: The course is designed to develop the ability to visualize and communicate three-dimensional shapes and train the students to create drawings following the engineering graphics conventions.

Detailed Contents:

Unit-I

Introduction to Engineering Graphics: Engineering drawing as language of Engineers. Drawing instruments and their uses. Projections: The planes of projections, first and third angle projections, projection of points lying in any quadrant. Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scale: needs and importance, to find representative factor of a scale, drawing of simple and diagonal scales.

Unit-II

Projection of Straight line and their Traces: Projection of planes. Planes parallel to reference plane; plane perpendicular to both reference planes; planes perpendicular to one and inclined to other reference plane. Projection of solids with their axes perpendicular or inclined to one reference plane but parallel to other.

Unit-III

Section of Solids & Development of Surfaces: Definition of sectioning and its purpose, Procedure of sectioning, Illustration through examples, types of sectional planes. Sectional orthographic views of geometrical solids, Purpose of development, Development of prism, cylinder, cone and pyramid surface

Unit-IV

Orthographic Projections: Theory of orthographic projections (Elaborate theoretical instructions) Drawing 3 views of given objects (Non-symmetrical objects and blocks may be selected for this exercise) Exercises on both first angle are third angle.

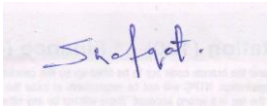
Unit-V

Isometric Projection: Classification of pictorial views, Basic Principle of Isometric projection, Isometric Views of lines, Planes, Simple and compound Solids; Difference between isometric projection and Isometric view, Isometric projection of solids such as cube, prism, pyramid and cylinder. Introduction to computer aided drafting (CAD)

Laboratory Outcome:

On completion of course students must be able

CO1. To read Engineering Drawing and execute the construction work with the help of available drawing



CO2. To represent three dimensional objects by two dimensional views.

CO3. Students must be in a position to show hidden details of objects or underground constructions work by drawing sectional views.

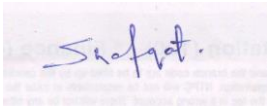
CO4. Exposure to creating working drawings

CO5. Exposure to the visual aspects of engineering design.

Text Books/ References:

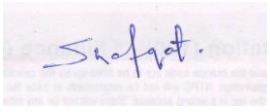
1. **Bhat, N. D. and Panchal, V. M**., Engineering Drawing, Charotar Publishers, Anand.
2. **Narayana, K. L. and Kannaiah, P**.,Engineering Graphics, Tata McGraw Hill, New Delhi.
3. **Gill P. S.**, Engineering Graphics and Drafting, Katria and Sons, Delhi.
4. **Luzzadde Warren J.,** Fundamentals of Engineering Drawing, PHI.
5. **Shah, M.B. &Rana B.C.** (2008), Engineering Drawing and Computer Graphics,Pearson Education

Note for Paper Setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one from each unit.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Semester III



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Mathematics-III **Max. Marks: 100**
Course Code: BSC-EE–301 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 4 [3-1-0]

Course Objective: The objective of this course is to familiarize the students with various transform. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling various problems in the discipline.

Detailed Contents:

Unit-I

Integral Transform-I: Introduction, Laplace transform, Existence theorem, Properties and theorem of Laplace transform, Laplace transform of Unit-step function, impulse function, periodic function and error functions, Inverse Laplace transform, Convolution theorem. Applications of Laplace transform in solving differential and integro-differential equations.

Unit-II

Integral Transform-II: Fourier integral, Fourier Sine and Cosine integrals, Complex form of Fourier integral, Fourier transform, Inverse Fourier transform, Fourier Sine and Cosine transforms, Properties of Fourier transform, Inverse Fourier transform, Convolution theorem, Parseval's identities for Fourier transforms, Fourier transform of the derivatives of a function, Applications of F-transform to Boundary Value Problems.

Unit-III

Z-Transform: Introduction and definition of z-transform, some standard forms, Linearity property, Damping rule Some standard results, shifting un to the right and to the left, Multiplication by n. Two basic theorems, Inverse Z-Transform, Convolution theorem, Application to difference equations.

Unit-IV

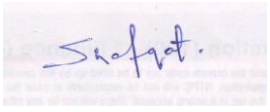
Basic Probability: Probability spaces, conditional probability, independence; Discrete random variables, Independent random variables, the multinomial distribution, Poisson approximation to the binomial distribution, infinite sequences of Bernoulli trials, sums of independent random variables; Expectation of Discrete Random Variables,

Unit-V

Basic Statistics: Measures of Central tendency: Moments, skewness and Kurtosis - Probability distributions: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions, Correlation and regression – Rank correlation. Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas.

Course Outcome:

After the completion of this course, the students will be able to:



CO1. Understand the basic concepts and techniques to solve Laplace transform and also learn to apply the same to solve various problems of engineering which are modelled through differential equations

CO2. Demonstrate the ability to understand the basic concepts and techniques to solve Fourier's transform and also learn to apply the same to find solutions of boundary value problems (BVP).

CO3. Apply the concepts of the z-transform in solving difference equations and other discreet signal system.

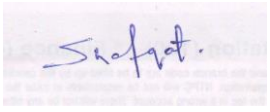
CO4. Learn the ideas of probability and random variables and various discrete and continuous probability distributions and their properties.

CO5. Understand the basic ideas of statistics including measures of central tendency, correlation and regression and apply various statistical methods in engineering problems.

Text Books/References:

1. **Erwin kreyszig**, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. **Ross, A:** First Course in Probability, 6th Ed., Pearson Education India, 2002.
3. **Ramana B.V.,** Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010
4. **Veerarajan T.,** Engineering Mathematics, Tata McGraw-Hill, New Delhi, 2010.
5. **W. Feller,**An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley, 1968.
6. **David A. Santos,** Probability: An Introduction, Jones &Bratlett

Note for Paper Setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one from each unit. Use of calculator is allowed in the examination.



Course Title: Electromagnetic Wave Theory **Max. Marks: 100**
Course Code: PCC-EE–301 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]

Course Objective: The objective of this course is to understand the student with different aspect of electrical and magnetic Field.

Detailed Contents:

Unit-I

Vector Calculus: Review of vector analysis, Scalar & vector products, gradient, divergence and curl of a vector, Rectangular, Cylindrical and Spherical co-ordinate system, Transformation amongst rectangular, cylindrical and spherical co-ordinate system.

Unit-II

Electrostatics: Coulomb's law, application of coulombs law, electric field intensity from point charges, field due to continuous distribution of charges, gauss's law, application of gauss's law, Electric displacement and displacement density potential function, potential field of a point charge, Laplace's and Poison's equations, Divergence Theorem.

Unit-III

Magnetostatics: Magnetic field intensity and magneto motive force, Ampere's Circuital law, applications of ampere's circuital law, Biot-savart law and its application, vector potential, magnetic dipole. Ampere's work law in differential vector form, continuity of currents, conduction and displacement current, Strokes Theorem.

Unit-IV

Time Varying Fields: Faradays law, Maxwell's equations (Differential, Integral and Phasor forms). Uniform plane waves. Representation of wave motion in free space, perfect dielectrics and Lossy dielectrics (Wave equations). Pointing Theorem and Power density. Propagation in good conductor and Skin effect. Reflection of Uniform plane waves.

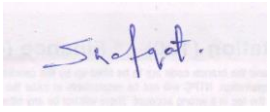
Unit-V

Introduction To Transmission Line and Wave Guides: Introduction, Circuit representation of parallel plane transmission lines, Transmission lines with losses, Characteristic impedance, Characteristic impedance at radio frequencies, Propagation constant, Attenuation constant and phase constant, Waves between parallel plane, Transverse Electric wave, Transverse magnetic waves; characteristics of TE & TM waves; velocity of propagation; Attenuation in parallel plane guides; wave impedance.

Course Outcome:

At the end of the course, students will demonstrate the ability.

CO1. Apply vector calculus to static electric-magnetic fields in different engineering situations.



CO2. Analyze Maxwell's equation in different forms (differential and integral) and apply them to diverse engineering problems.

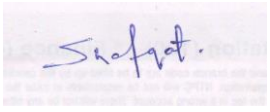
CO3. Examine the phenomena of wave propagation in different media and its interfaces.

CO4. Analyze the nature of electromagnetic wave propagation in guided medium.

Text Books/References:

1. **M. N. O. Sadiku**, "Elements of Electromagnetics", Oxford University Publication, 2014.
2. **A. Pramanik**, "Electromagnetism - Theory and applications", PHI Learning Pvt. Ltd, New Delhi, 2009.
3. **A. Pramanik**, "Electromagnetism-Problems with solution", Prentice Hall India, 2012.
4. **G. W. Carter**, "The electromagnetic field in its engineering aspects", Longmans, 1954.
5. **W. J. Duffin**, "Electricity and Magnetism", McGraw Hill Publication, 1980.
6. **W. J. Duffin**, "Advanced Electricity and Magnetism", McGraw Hill, 1968.
7. **E. G. Cullwick**, "The Fundamentals of Electromagnetism", Cambridge University Press, 1966.
8. **B. D. Popovic**, "Introductory Engineering Electromagnetics", Addison-Wesley Educational Publishers, International Edition, 1971.
9. **W. Hayt**, "Engineering Electromagnetics", McGraw Hill Education, 2012.

Note for paper setter: The Question paper shall comprise of 10 questions. Two questions will be set from each unit .The student has to attempt five questions at least one from each unit.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Electrical Machine I **Max. Marks: 100**
Course Code: PCC-EE-302 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 4 [3-1-0]

Course Objective: The student will be able to understand the basic concept and analyze the characteristics of electrical machines and transformer.

Detailed Contents:

Unit-I

Magnetic fields and magnetic circuits: Review of magnetic circuits - MMF, flux, reluctance, inductance; review of Ampere Law and Biot Savart Law; Visualization of magnetic fields produced by a bar magnet and a current carrying coil - through air and through a combination of iron and air; influence of highly permeable materials on the magnetic flux lines.

Unit-II

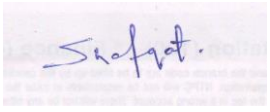
Electromagnetic force and torque: B-H curve of magnetic materials; flux-linkage vs current characteristic of magnetic circuits; linear and nonlinear magnetic circuits; energy stored in the magnetic circuit; force as a partial derivative of stored energy with respect to position of a moving element; torque as a partial derivative of stored energy with respect to angular position of a rotating element. Examples - galvanometer coil, relay contact, lifting magnet, rotating element with eccentricity or saliency

Unit-III

Transformers: Principle, construction and operation of single-phase transformers, equivalent circuit, phasor diagram, voltage regulation, losses and efficiency Testing - open circuit and short circuit tests, polarity test, back-to-back test, separation of hysteresis and eddy current losses Three-phase transformer - construction, types of connection and their comparative features, Parallel operation of single-phase and three-phase transformers, Autotransformers - construction, principle, applications and comparison with two winding transformer, Magnetizing current, effect of nonlinear B-H curve of magnetic core material, harmonics in magnetization current, Phase conversion - Scott connection, three-phase to six-phase conversion, Tap-changing transformers - No-load and on-load tap-changing of transformers, Three-winding transformers. Cooling of transformers.

Unit-IV

DC machines: Basic construction of a DC machine, magnetic structure - stator yoke, stator poles, pole-faces or shoes, air gap and armature core, visualization of magnetic field produced by the field winding excitation with armature winding open, air gap flux density distribution, flux per pole, induced EMF in an armature coil. Armature winding and commutation - Elementary armature coil and commutator, lap and wave windings, construction of commutator, linear commutation Derivation of back EMF equation, armature MMF wave, derivation of torque equation, armature reaction, air gap flux density distribution with armature reaction.



Unit-V

DC machine - motoring and generation: Armature circuit equation for motoring and generation, Types of field excitations - separately excited, shunt and series. Open circuit characteristic of separately excited DC generator, back EMF with armature reaction, voltage build-up in a shunt generator, critical field resistance and critical speed. V-I characteristics and torque-speed characteristics of separately excited,
Shunt and series motors. Speed control through armature voltage. Losses, load testing and back-to-back testing of DC machines

Course Outcome:

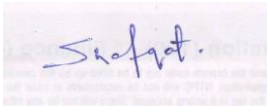
At the end of this course, students will demonstrate the ability to

CO1. Understand the basic concepts of magnetic circuits.
CO2. Able to explain the concept behind Electromagnetic force and torque.
CO3. Analyze single phase and three phase transformers circuits.
CO4. Understand the operation of dc machines.
CO5. Analyze the differences in operation of different dc machine configurations.

Text Books/References:

1. **A. E. Fitzgerald and C. Kingsley**, "Electric Machinery", New York, McGraw Hill Education, 2013.
2. **A. E. Clayton and N. N. Hancock**, "Performance and design of DC machines", CBS Publishers, 2004.
3. **M. G. Say**, "Performance and design of AC machines", CBS Publishers, 2002.
4. **P. S. Bimbhra**, "Electrical Machinery", Khanna Publishers, 2011.
5. **I. J. Nagrath and D. P. Kothari**, "Electric Machines", McGraw Hill Education, 2010.

Note for paper setter: The Question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one from each unit.



Course Title: Network Analysis & Synthesis **Max. Marks: 100**
Course Code: PCC-EE-303 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [2-1-0]

Course Objective: The course has been designed to get student acquainted with basic concepts, principles and applications of electrical networks and their synthesis.

Detailed Contents:

Unit-I

Network Theorems & Network Topology; Network Theorems Superposition, Reciprocity and Millman's, theorems, Thevenin's and Norton's theorems; Maximum Power transfer theorem (A.C Analysis only)

Network Topology: Graph of a network, Concept of tree and co-tree, incidence matrix, tie-set, and cut-set schedules, Formulation of equilibrium equations in matrix form, Solution of resistive networks, Principle of duality.

Unit-II

Capacitive, Inductive Transients & First Order Circuits: Capacitive Transients, Inductive Transients, Combination of Capacitance & Inductance, Initial and Final Conditions, Exponential Functions, Timing Intervals of First and 2^{nd} Order Circuits. Laplace Transform application to solve differential equations and analysis of electric circuits.

Unit-III

Two Port Networks Parameters: Z Parameter, Y parameter, h – parameter, ABCD parameter, Equivalent circuit using these parameters. Condition for reciprocity and symmetry of two port network in different parameters. Interconnection of two port networks. Cascade connection of two port networks parallel connection of two port networks. Series and series parallel connections. Inter conversion of parameters.

Unit-IV

Network Synthesis: Transfer Functions, Natural and Forced Responses, Poles and Zeros of Transfer Functions, Foster and Caure's Forms, Stability, Hurwitz's Polynomials.

Unit-V

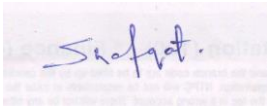
Filter Synthesis: Introduction, Classifications of filters, Characteristic Impedance and propagation constant of pure reactive Networks, Ladder Network, T–Section, Pie Section, Terminating Half Section, Pass Bands and Stop Bands, Design of constant K, n – Derived Filters, Composite Filters.

Course Outcome:

At the end of this course, students will demonstrate the ability to

CO1. Apply network theorems for the analysis of electrical circuits.

CO2. Provide solution for First and second order networks and obtain the transient and steady-state response of electrical circuits.

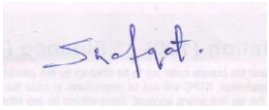


CO3. Analyze two-port circuit behavior.
CO4. To synthesize various networks using different synthesis techniques.
CO5. To understand and synthesize different types of filters.

Text Books/References:

1. **M. E. Van Valkenburg**, "Network Analysis", Prentice Hall, 2006.
2. **D. Roy Choudhury**, "Networks and Systems", New Age International Publications, 1998.
3. **W. H. Hayt and J. E. Kemmerly**, "Engineering Circuit Analysis", McGraw Hill Education, 2013.
4. **C. K. Alexander and M. N. O. Sadiku**, "Electric Circuits", McGraw Hill Education, 2004.
5. **K. V. V. Murthy and M. S. Kamath**, "Basic Circuit Analysis", Jaico Publishers, 1999.

Note for paper setter: The Question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one from each unit.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Bio-Sciences **Max. Marks: 100**
Course Code: BSC-EE-302 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [2-1-0]

Course Objective: The purpose of this course is to provide a basic understanding of biological mechanisms of living organisms from the perspective of engineers. In addition, the course is expected to encourage engineering students to think about solving biological problems with engineering tools.

Detailed Contents:

Unit-I

Basic Cell Biology: Introduction: Methods of Science-Living Organisms: Cells and Cell theory Cell Structure and Function, Genetic information, protein synthesis, and protein structure, Cell metabolism-Homoeostasis- Cell growth, reproduction, and differentiation.

Unit-II

Biochemistry and Molecular Aspects of Life: Biological Diversity --Chemistry of life: chemical bonds--Biochemistry and Human biology--Protein synthesis—Stem cells and Tissue engineering.

Unit-III

Enzymes and Industrial Applications: Enzymes: Biological catalysts, Proteases, Carbonic anhydrase, Restriction enzymes, and Nucleoside monophosphate kinases—Photosynthesis

Unit-IV

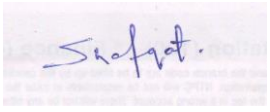
Mechanochemistry: Molecular Machines/Motors—Cytoskeleton—Bioremediation—Biosensors

Unit-V

Nervous System, Immune System, and Cell Signaling: Nervous system--Immune system-General principles of cell signaling

Course Outcome:

CO1. Students will understand the Basic of Cell.
CO2. To familiarize the students with the basic organization of organisms and subsequent building to a living being.
CO3. To impart an understanding about the machinery of the cell functions that is ultimately responsible for various daily activities.
CO4. To provide knowledge about biological problems that requires engineering expertise to solve them.
CO5. To provide knowledge Nervous System, Immune System, and Cell Signaling

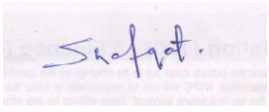


Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Text Books/References:

1. **S. ThyagaRajan, N. Selvamurugan, M. P. Rajesh, R. A. Nazeer, Richard W. Thilagaraj, S. Barathi, and M. K. Jaganathan**, "Biology for Engineers," Tata McGraw-Hill, New Delhi, 2012.
2. **Jeremy M. Berg, John L. Tymoczko and LubertStryer**, "Biochemistry," W.H. Freeman and Co. Ltd., 6th Ed., 2006.
3. **Robert Weaver**, "Molecular Biology," MCGraw-Hill, 5th Edition, 2012.
4. **Jon Cooper**, "Biosensors A Practical Approach" Bellwether Books, 2004.
5. **Martin Alexander**, "Biodegradation and Bioremediation," Academic Press, 1994.
6. **Kenneth Murphy**, "Janeway'sImmunobiology," Garland Science; 8th edition, 2011.
7. **Eric R. Kandel, James H. Schwartz, Thomas M. Jessell**, "Principles of Neural Science, McGraw-Hill, 5th Edition, 2012.

Note for paper setter: The Question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one from each unit.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Analog Electronics **Max. Marks: 100**
Course Code: PCC-EE-304 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]

Course Objective: The course is designed to introduce the students with advance electronic circuits and applications in fabrications of various devices.

Detailed Contents:

Unit-I

Low frequency transistor amplifier and multistage amplifier: Equivalent circuit of BJT using h parameter for CB, CE and CC &configuration, calculation of transistor parameter for CB, CE, & CC using h parameter, comparison of transistor amplifier configuration.

Unit-II

Multistage & Power Amplifier: Multistage Amplifier: General cascaded system, RC coupled amplifier and its frequency response merits and demerits cascade amplifier, Darlington compound configuration multistage frequency effect.

Class A Power Amplifier, Maximum value of efficiency of class A Amplifier ,Transformer coupled Amplifier, Transformer coupled Audio Amplifier , Push pull Amplifier, Complimentary symmetry circuits (Transformer less class B power amplifier).

Unit-III

Operational Amplifier fundamentals: Dc analysis of dual input balanced output configuration, Properties of other differential amplifier configuration (dual input unbalanced output), single ended input-balanced /unbalanced output), DC coupling and cascade differential amplifier stages, level translator.

Basis Op-Amp circuit ,Op-Amp parameters-Input and output voltage ,CMRR AND PSRR, offset voltages and currents ,input and output impedances ,slew rate and frequency limitations; biasing of Op -Amps.

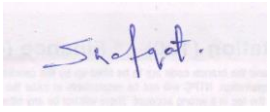
Unit-IV

Linear &Non Inverting Application of OP Amps: Voltage followers, Non Inverter Amplifiers, Inverting, Summing Amplifiers, Integrator and differentiator, Difference amplifier.

Comparators, inverting Schmitt trigger circuits, Monostable and Astable multivibrator, Triangular and Square wave generators.

Unit V

Active Filters, Timers & Phase locked loops: Butter worth filters first order, second order LPF, HPF filter, band pass, Band Reject and all pass filter. Introduction to 555 timer, function diagram, Monostable and Astable operation and applications, Schmitt trigger. PLL– introduction, block



schematic, principal and description of individual block, 565 PLL, Application of PLL- Frequency multiplication, frequency translation.

Course Outcome:

At the end of this course, students will demonstrate the ability to

CO1. Analyze BJT amplifiers in different configurations at low frequency.

CO2. Classify power amplifier and analyze performance of different power amplifiers. Also understand the concept of multistage amplifiers.

CO3. Understand the Operational amplifier fundamentals.

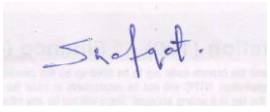
CO4. Design and analyze various circuits using operational amplifier.

CO5. Understand the concept of 555 timer and phase locked loop.

Text Books/References:

1. **A. S. Sedra and K. C. Smith**, "Microelectronic Circuits", New York, Oxford UniversityPress, 1998.
2. **J. V. Wait, L. P. Huelsman and G. A. Korn**, "Introduction to Operational Amplifier theory and applications", McGraw Hill U. S., 1992.
3. **J. Millman and A. Grabel**, "Microelectronics", McGraw Hill Education, 1988.
4. **P. Horowitz and W. Hill**, "The Art of Electronics", Cambridge University Press, 1989.
5. **P. R. Gray, R. G. Meyer and S. Lewis**, "Analysis and Design of Analog Integrated Circuits", John Wiley & Sons, 2001.

Note: - For paper setter: the question paper shall comprise of ten questions. Two questions will be set each unit. The student has to attempt five questions. Select one question for each unit.



Course Title: Electrical Machine-I Lab. **Max. Marks: 50**
Course Code: PCC-EE-311 **University Exam: 25**
Duration of Exam: 2 Hours **Internal Assessment: 25**
Credits: 1 [0-0-2]

Laboratory Objective: The student will be able to perform various operations to understand the nature and characteristics of different type dc machines and transformer.

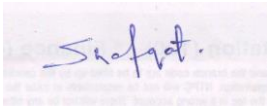
List of Experiments:

1. To obtain magnetization characteristics of a d.c. shunt generator.
2. To obtain load characteristics of a d.c. shunt generator and compound generator (a) Cumulatively compounded (b) Differentially compounded.
3. To obtain efficiency of a dc shunt machine using Swinburne's test.
4. To perform Hopkinson's test and determine losses and efficiency of DC machine.
5. To obtain speed-torque characteristics of a dc shunt motor.
6. To obtain speed control of dc shunt motor using (a) armature resistance control (b) field control.
7. To obtain speed control of dc separately excited motor using Conventional Ward-Leonard/Static Ward –Leonard method.
8. To study polarity and ratio test of single phase and 3-phase transformers.
9. To obtain equivalent circuit, efficiency and voltage regulation of a single-phase transformer using C.C. and S.C. tests.
10. To obtain efficiency and voltage regulation of a single-phase transformer by Sumpner's test.
11. To obtain 3-phase to 2-phase conversion by Scott connection.
12. To determine excitation phenomenon (B.H. loop) of single-phase transformer using C.R.O.

Laboratory Outcome:
At the end of this laboratory student

CO1. Get an exposure to common electrical machines and their ratings.
CO2. Understand the basic characteristics of transformers and D.C. machines.
CO3. Student will be able to control speed of DC machine with different means.
CO4. Understand the usage of transformers and D.C. machines.
CO5. Get an exposure to the working of transformers and D.C. Machines.

Note: These are only the suggested list of experiments. Instructor may add or change some experiments relevant to the course contents.



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Course Title: Network Analysis & Synthesis Lab. **Max. Marks: 50**
Course Code: PCC-EE-312 **University Exam: 25**
Duration of Exam: 2 Hours **Internal Assessment: 25**
Credits: 1 [0-0-2]

Laboratory Objective: The student will be able to verify different fundamental theorem. Also student will be able to analyze & synthesize network.

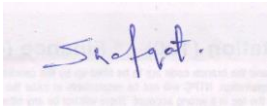
List of Experiments:

1. Verification of Thevenin's theorem, Norton's theorem.
2. Verification of Maximum power transfer theorem, Superposition theorem.
3. Verification of Reciprocity theorem.
4. Design and implementation of T and Π passive filters.
5. Determination of h-parameters of a network.
6. Study of sinusoidal steady state response of a network.
7. Study of transient response of a network.
8. Study of passive integrator and differentiator.
9. Syntheses of RC-network for a given network function.
10. Verification of equivalence of star and delta transformation.

Laboratory Outcome:
The student's will be

CO1. Knowing about various networks.
CO2. Able to analysis various theorems.
CO3. Able to design and implement passive filters.
CO4. Able to evaluate steady and transient state of a network.
CO5. Able to finds many performance indices in the circuit.

Note: These are only the suggested list of experiments. Instructor may add or change some experiments relevant to the course contents.



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Course Title: Analog Electronics Lab. **Max. Marks: 50**
Course Code: PCC-EE-313 **University Exam: 25**
Duration of Exam: 2 Hours **Internal Assessment: 25**
Credits: 1 [0-0-2]

Laboratory Objective: The student will be able to understand the functionality and characteristics of different types of Electronics devices.

List of Experiments:

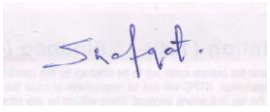
1. To study bipolar transistor as a switch.
2. To plot a load line for a CE amplifier and show effect of input signal on Q-point.
3. To demonstrate use of a BJT in a CE amplifier circuit configuration and study its frequency response.
4. To study the characteristics of Class- AB amplifier.
5. To study the characteristics of Class- B push-pull amplifier.
6. Study of OP AMPs – IC 841, IC 555, – Functioning, Parameters and Specifications.
7. To demonstrate the relationship between input and output for the inverting and non-inverting configuration of the Op-Amp 841
8. To perform the Application operation – Adder, Subtractor, Comparator Circuits using IC 841.
9. To design a square wave and triangular wave generator using Op-amp's.
10. Active Filter Applications – LPF, HPF (first order & 2^{nd} order)
11. Active Filter Applications – BPF, Band Reject (Wideband) and Notch Filters.
12. IC 555 Timer – Monostable Operation Circuit.
13. IC 555 Timer – Astable Operation Circuit.
14. Schmitt Trigger Circuits – using IC 841 and IC 555.

Laboratory Outcome:

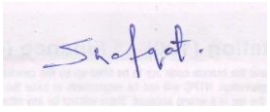
The students should be

CO1. Able to devise simple circuit using BJTs, Op-Amp etc.
CO2. Able to understand characteristics of different electronics devices.
CO3. Able to perform different operations on devices.
CO4. Able to understand the applications of different types of filters and timer.
CO5. Able to finds many performance indices in the circuit.

Note: These are only the suggested list of experiments. Instructor may add or change some experiments relevant to the course contents.



Semester IV



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Numerical Techniques **Max. Marks: 100**
Course Code: BSC-EE-401 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 4 [3-1-0]

Course Objective: This Course aims at providing the necessary basic concepts of a numerical techniques and give procedures for solving numerically different Kinds of problems occurring in engineering and technology.

Detailed Contents:

Unit-I

Solutions to Algebraic and Transcendental Equations: Solutions to algebraic and transcendental equations by iterative, Bisection, Regula-Falsi, Newton-Raphson methods and Secant Methods.

Unit-II

Interpolation: Finite-differences and operators, Relation between operators, Interpolation With Equal Intervals – Newton's Forward And Backward Difference Formulae, Interpolation With Unequal Intervals – Lagrange's Interpolation – Newton's Divided Difference Interpolation .

Unit-III

Numerical Differentiation & Integration: Introduction to Numerical differentiation and integration, Errors in Numerical differentiation, Trapezoidal rule, Simpson's one-third rule, Simpson's third-eight rule, Boole's rule and Weddle's rule, Newton-Cote integration formula.

Unit-IV

Matrix and Linear System of Equations: Direct Methods: Gauss and Gauss-Jorden method, Crout's Triangularization method, Iterative methods: Gauss –Jacobi and Gauss Seidel method, Newton method for nonlinear simultaneous equations

Unit-V

Numerical Solutions to Ordinary Differential Equations: Numerical solution of ordinary differential equations by Taylor's Series, Picard's method, Euler's method, Modified Euler's method and Runge-Kutta method of 4^{th} order, Finite-difference method for Boundary value problems

Course Outcome:

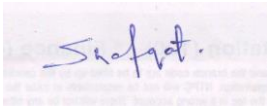
Upon the completion of this course, the students will:

CO1. Comprehend of the Power of Numerical Techniques, and Ideas.

CO2. Apply these techniques to problems drawn from Industry, Management and other engineering fields.

CO3. Demonstrate the ability to solve linear system of equations.

CO4. Solve various problems of linear and nonlinear differential equations by using numerical methods.

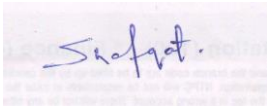


Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Text Books/References:

1. **Introductory Methods of Numerical Analysis,** S S Sastry, PHI
2. **Numerical Methods in Engineering and Science: (C, and C++, and MATLAB)**, B. S. Grewal, Khanna Publication
3. **Jain, M. K &Iyengar. S.R.K**, numerical method for scientific and engineering computation, 3rd edition, New Age Publishers
4. **Grasselli, M. &Pelinovsky, D**: Numerical Mathematics, Jones &Bratlett

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Renewable Energy Sources **Max. Marks: 100**
Course Code: PCC-EE-401 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]

Course Objective: The course is designed to give knowledge of various renewable energy sources, systems and applications in the present context and need.

Detailed Contents:

Unit-I

Energy Scenario in India, Renewable and Non-renewable Energy sources, Causes of Energy Scarcity, Solution to energy Scarcity, Need for Renewable Energy, Advantages and Disadvantages of Renewable energy, Renewable Energy statistics worldwide and India.

Unit-II

Solar energy, solar photovoltaic, PV Technologies-Amorphous, monocrystalline, polycrystalline, V-I characteristics of a PV cell, PV module, array, Maximum Power Point Tracking (MPPT) algorithms, Concentrated Solar Power, types of collectors, Parabolic trough, central receivers, parabolic dish, Fresnel, solar pond, Application of Solar Power, Economic Policies to Promote Solar Energy.

Unit-III

Introduction, Electricity Generation using Wind Energy Generators (WEG), Evaluating Wind Turbine Performance, Wind Potential, Wind Energy in India, Wind Turbine Size and Power Ratings, Advantages of Wind-Generated Electricity, Cost Issues, Environmental Concerns, Supply and Transport Issues.

Unit-IV

Bio energy, Types of Bio Gas Plants, tidal energy, classification of Tidal Plants, ocean thermal energy systems, Open OTEC Cycle, Closed OTEC Cycle. Introduction to Magneto Hydro Dynamics (MHD) Power & fuel cells.

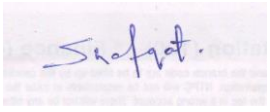
Unit-V

Energy storages: Introduction, characteristics of energy storage system, storage capacity, charging and discharging rate, storage efficiency, storage of mechanical energy, fly wall energy storage, compressed air storage, electro chemical energy storage system (Battery).

Course Outcome:

After learning the subject, student will be able to:

CO1. Appreciate the importance of energy crises and consequent growth of the power generation from the renewable energy sources



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

CO2. Demonstrate the knowledge of physics of solar power generation and the associated issues.

CO3. Demonstrate the knowledge of the physics of wind power generation and all associated issues.

CO4. Understand the utilization of Bio Gas Plants, Tidal, MHD, Fuel Cells by identifying the sites where their production is feasible.

CO5. Demonstrate the ways by which energy can be stored in different forms.

Text Books/ References:

1. Solar Energy: Principles of Thermal Collection and Storage, S. P. Sukhatme and J. K. Nayak, McGraw-Hill Education

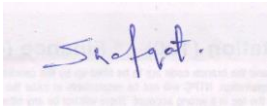
2. Solar Engineering of Thermal Processes, John A. Duffie, William A. Beckman, John Wiley, New York

3. Non-conventional energy resources, ShobhNath Singh, Pearson India

4. Solar Energy Engineering, Soteris Kalogirou, Elsevier/Academic Press.

5. Principles of Solar Energy, Frank Krieth& John F Kreider, John Wiley, New York

Note for Paper Setter: The Question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one from each unit.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Digital Electronics **Max. Marks: 100**
Course Code: PCC-EE-402 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]

Course Objective: The objective of this subject is to enable the students to know basic concepts of digital electronics design and build digital hardware.

Detailed Contents:

Unit-I

Review of number systems, BCD, Excess-3, Gray and Alphanumeric codes. Boolean algebra, Boolean Theorems, De-Morgan's Theorems, Standard Forms of Boolean Expressions, Simplification techniques and Minimization methods: K-MAPS, Q-M (Tabulation) method.

Unit-II

Combinational Logic Circuits: Design and Analysis of Basic Combinational Logic Circuits, Combinational Logic Using Universal Gates. Basic Adders, Subtractors, Parity-Checkers and Generators, Comparators, Decoders, Encoders, Code Converters, Multiplexer (Data Selector), De-multiplexers, seven segment display.

Unit-III

Sequential Circuits: Latches, Flip-flops (SR, JK, T, D, Master/Slave FF), Edge-Triggered Flip-Flops, characteristic tables and excitation tables, conversion of flip-flops, Design of Flip-Flops using state diagrams and state tables, state reduction and assignment.

Unit-IV

Basic Flip-Flop Applications: Shift registers and Functions, Serial In - Serial Out Shift Registers, Serial In - Parallel Out Shift Registers, Parallel In - Serial Out Shift Registers, Parallel In -Parallel Out Shift Registers, Bidirectional Shift Registers, Synchronous and Asynchronous Counter Operation, Mod-n Counters, Design of counters.

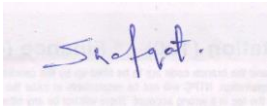
Unit-V

Basics of Semiconductor Memories: Random-Access Memories (RAM), Read Only Memories (ROMs), Programmable ROM's (PROMs and EPROM's), PAL, PLA, IEEE notations.
Introduction to digital logic families: brief background and comparison of various logic families-TTL, ECL, MOS, CMOS.

Course Outcome:

After completion of the course student will be able to:

CO1. Examine the structure of various number systems and its application in digital design.
CO2. Understand, analyze and design various combinational and sequential circuits.
CO3. Analyze different types of registers and design counter circuits.
CO4. Analyze different logic families, their characteristics and performances
CO5. Design solutions to real world problems.

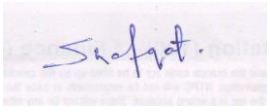


Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Text Books/References:

1. **R. P. Jain**, "Modern Digital Electronics", McGraw Hill Education, 2009.
2. **M. M. Mano**, "Digital logic and Computer design", Pearson Education India, 2016.
3. **A. Kumar**, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.
4. **Anil K Miani**, Digital Electronics, Wiley publications.
5. **Tocci R. J.** &**Widner**, Digital Systems: Principles and Applications, PHI.
6. **P. Malvino**, Digital principles and applications, Tata McGraw.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one from each unit.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Power System-I **Max. Marks: 100**
Course Code: PCC-EE-403 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]

Course Objective: The objective of this course is to develop an understanding of the diverse concepts of power system generation, transmission and distribution. It also involves the study of various power transfer methods and phenomenon associated with power system.

Detailed Contents:

Unit-I

Basic Concepts: Evolution of Power Systems and Present-Day Scenario. Structure of a power system: Bulk Power Grids and Micro-grids. Generation: Conventional and Renewable Energy Sources. Distributed Energy Resources. Energy Storage. Transmission and Distribution Systems: Line diagrams, transmission and distribution voltage levels and topologies (meshed and radial systems). Synchronous Grids and Asynchronous (DC) interconnections. Review of Three-phase systems. Analysis of simple three-phase circuits. Power Transfer in AC circuits and Reactive Power.

Unit-II

Power System Components: Overhead Transmission Lines and Cables: Electrical and Magnetic Fields around conductors, Corona. Parameters of lines and cables. Capacitance and Inductance calculations for simple configurations. Travelling-wave Equations. Sinusoidal Steady state representation of Lines: Short, medium and long lines. Power Transfer, Voltage profile and Reactive Power. Characteristics of transmission lines. Surge Impedance Loading. Series and Shunt Compensation of transmission lines. Per- Unit System and per- Unit calculations.

Unit-III

Over-voltages and Insulation Requirements: Generation of Over-voltages: Lightning and Switching Surges. Protection against Over-voltages, Insulation Coordination. Propagation of Surges. Voltages produced by traveling surges. Bewley Diagrams.

Unit-IV

Fault Analysis and Protection Systems: Method of Symmetrical Components (positive, negative and zero sequences). Balanced and Unbalanced Faults. Representation of generators, lines and transformers in sequence networks. Computation of Fault Currents. Neutral Grounding, their types, and neutral grounding transformer.

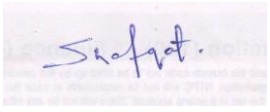
Unit-V

Introduction to DC Transmission: DC Transmission Systems: Line-Commutated Converters (LCC) and Voltage Source Converters (VSC). LCC and VSC based dc link, Real Power Flow control in a dc link. Comparison of ac and dc transmission.

Course Outcome:

At the end of this course, students will demonstrate the ability to

CO1. Understand the various concept of power system and realize its importance.



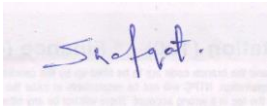
Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

CO2. Understand the various power system components.
CO3. Understand the generation of over-voltages and requirement of insulation coordination.
CO4. Evaluate fault currents and voltages for different types of faults.
CO5. Understand various DC transmission techniques.

Text Books/References:

1. **J. Grainger and W. D. Stevenson**, "Power System Analysis", McGraw Hill Education, 1994.
2. **O. I. Elgerd**, "Electric Energy Systems Theory", McGraw Hill Education, 1995.
3. **A. R. Bergen and V. Vittal,** "Power System Analysis", Pearson Education Inc., 1999.
4. **D. P. Kothari and I. J. Nagrath**, "Modern Power System Analysis", McGraw Hill Education, 2003.
5. **B. M. Weedy, B. J. Cory, N. Jenkins, J. Ekanayake and G. Strbac**, "Electric Power Systems", Wiley, 2012.

Note for Paper Setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one from each unit.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Electrical Machine-II **Max. Marks: 100**
Course Code: PCC-EE-404 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 4 [3-1-0]

Course Objective: The course has been designed to get student acquainted with basic concepts, principles and applications of AC Machines. Emphasis is given to latest technologies.

Detailed Contents:

Unit-I

Fundamentals of AC machine windings: Physical arrangement of windings in stator and cylindrical rotor; slots for windings; single-turn coil - active portion and overhang; full-pitch coils, concentrated winding, distributed winding, winding axis, 3D visualization of the above winding types, Air-gap MMF distribution with fixed current through winding - concentrated and distributed, Sinusoidaly distributed winding, winding distribution factor.

Unit-II

Pulsating and revolving magnetic fields: Constant magnetic field, pulsating magnetic field - alternating current in windings with spatial displacement, Magnetic field produced by a single winding - fixed current and alternating current Pulsating fields produced by spatially displaced windings, Windings spatially shifted by 90 degrees, Addition of pulsating magnetic fields, Three windings spatially shifted by 120 degrees (carrying three-phase balanced currents), revolving magnetic field.

Unit-III

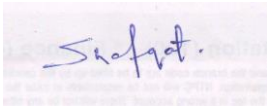
Induction Machines: Construction, Types (squirrel cage and slip-ring), Torque Slip Characteristics, Starting and Maximum Torque. Equivalent circuit. Phasor Diagram, Losses and Efficiency. Effect of parameter variation on torque speed characteristics (variation of rotor and stator resistances, stator voltage, frequency). Methods of starting, braking and speed control for induction motors.
Generator operation. Self-excitation. Doubly-Fed Induction Machines.

Unit-IV

Synchronous machines: Constructional features, cylindrical rotor synchronous machine-generated EMF, equivalent circuit and phasor diagram, armature reaction, synchronous impedance, voltage regulation. Operating characteristics of synchronous machines, V-curves. Salient pole machine - two reaction theory, analysis of phasor diagram, power angle characteristics. Parallel operation of alternators - synchronization and load division.

Unit-V

Single-phase induction motors & Special Machines: Constructional features, double revolving field theory, equivalent circuit, determination of parameters. Split-phase starting methods and



applications. Introduction to: Universal motors, reluctance motors, Stepper motors and its types, BLDC motors.

Course Outcome:

At the end of this course, students will demonstrate the ability to

CO1. Understand the fundaments of ac machine winding.

CO2. Understand the concepts of rotating magnetic fields.

CO3. Understand the operation and characteristics of 3-phase Induction machines.

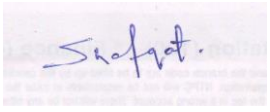
CO4. Understand the operation and characteristics of 1-phase Induction machines.

CO5. Understand the constructional features, operation and characteristics of Synchronous machines.

Text Books/References:

1. **A. E. Fitzgerald and C. Kingsley**, "Electric Machinery", McGraw Hill Education, 2013.
2. **M. G. Say**, "Performance and design of AC machines", CBS Publishers, 2002.
3. **P. S. Bimbhra**, "Electrical Machinery", Khanna Publishers, 2011.
4. **I. J. Nagrath and D. P. Kothari**, "Electric Machines", McGraw Hill Education, 2010.
5. **A. S. Langsdorf**, "Alternating current machines", McGraw Hill Education, 1984.
6. **P. C. Sen**, "Principles of Electric Machines and Power Electronics", John Wiley & Sons, 2007.

Note for Paper Setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one from each unit.



Course Title: Electrical Measurement-I **Max. Marks: 100**
Course Code: PCC-EE–405 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]

Course Objective: The objective of this course is to expose the students to a broad knowledge of experimental methods and measurement techniques.

Detailed Contents:

Unit-I

Measurement System & Characteristics of Instruments: Introduction, significance of measurements, methods of measurements, Instruments & measurement system, Classification of instruments – mechanical, electrical & electronic instruments, deflection & null type instruments, Comparison of Analog & digital modes of operation. Application of measurement systems, errors in measurements, types of errors. Accuracy, Precision, Resolution, loading effects. Units-Absolute, Fundamental & derived.

Unit-II

Bridge Circuits: Wheatstone Bridge- galvanometer sensitivity, current through galvanometer & limitations, Kelvin Double Bridge, Maxwell Inductance Bridge, Maxwell inductance–capacitance Bridge, Anderson's bridge, Schering Bridge, Hay Bridge & Wien's Bridge. Measurement of effective resistance, inductance & capacitance at high frequency Meter.

Unit-III

Eectro-mechanical Indicating Instruments: D Arsonval Galvanometer- construction & theory, Torque equation, Dynamic behavior & Galvanometer constants. Ballistic galvanometer-construction & theory. Introduction to PMMC Instruments and Moving Iron Instruments.

Unit-IV

Ammeters, Voltmeters: DC Ammeter, Multi-range Ammeter, RF Ammeter. DC Voltmeter, Multi-range Voltmeter, Extending ammeter & Voltmeter Ranges- Multipliers & shunts, The Aryton Shunt or Universal Shunt, Requirements of a Shunt, Introduction to Instrument Transformers & their application to extension of Instrument range.

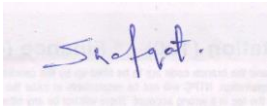
Unit-V

Measurement of Energy & Power: Measurement of power in three phase AC circuits using single phase & three phase wattmeter, Measurement of reactive power (single phase & three phase), Measurement of energy using Induction type meter, Energy meter testing, Power factor meter.

Course Outcome:

The student will learn:

CO1. Introduction to Measurement System & Characteristics of Instruments.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

CO2. Exposure to the Bridge Circuits and to learn various measurements techniques used for the measurement of capacitance and inductance.

CO3. Exposure to Electromechanical Indicating Instruments.

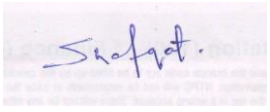
CO4. Exposure to various types of Ammeters and Voltmeters.

CO5. Exposure to different methods used in the measurements of Energy & Power.

Text Books/References:

1. **Albert D.Helfrick and William D. Cooper**, "Modern Electronic Instrumentation and Measurement Techniques", Prentice Hall of India, 2007.
2. **Ernest o Doebelin and dhanesh N manik**, "Measurement systems" ,5th edition ,McGraw-Hill, 2007.
3. **John P. Bentley**, "Principles of Measurement Systems", Fourth edition, Pearson Education Limited, 2005.
4. **A. K. Sawhney**, "Course In Electrical And Electronic Measurement And Instrumentation", DhanpatRai Publisher, 2000.
5. **Bouwens,A.J**, "Digital Instrumentation", Tata Mc-Graw Hill, 1986.
6. **David A.Bell**, "Electronic Instrumentation and Measurements", Second edition, Prentice Hall of India, 2007.

Note for Paper Setter: -The Question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting one from each unit.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Digital Electronics Lab. **Max. Marks: 50**
Course Code: PCC-EE-411 **University Exam: 25**
Duration of Exam: 2 Hours **Internal Assessment: 25**
Credits: 1 [0-0-2]

Laboratory Objective: The objective of this laboratory is to give thorough knowledge about the fundamental concepts and techniques used in digital electronics lab.

List of Experiments:

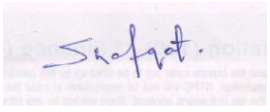
1. Study of pin diagram of various ICs and to test the logic gates and verify their truth tables.
2. Implementation of following combinational circuits using Logic Gates.
   a. Half Adder.
   b. Full Adder.
   c. Half Subtractor.
   d. Full Subtractor.
3. Implementation of Multiplex, De-multiplexer, Decoder and Encoder.
4. Implementation of Boolean functions using MUX.
5. To add two 4-bit binary numbers using IC 7483.
6. To verify the operation of different modes of shift register using IC 7495.
7. Design of BCD to 7 segment display using logical gates.
8. Implementation of different Flip-Flops.
9. Implementation of Shift registers and Counters using Flip-Flops.
10. Simulations
    a. Introduction to circuit maker and electronic work bench.
    b. Implementation of experiments from Serial No. 1 to 9 through simulations.

Laboratory Outcome:

At the end of this laboratory

CO1. Test and verify logic gates with its truth.
CO2. Implement basic arithmetic circuits.
CO3. Implement Multiplexer, De-Multiplexer, Encoder & Decoder circuits.
CO4. Use modern engineering and IT tools for circuit simulations.
CO5. Function effectively as a team.

Note: This is only the suggested list of experiments. Instructor may add or change some experiments relevant to the course contents.



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Course Title: Electrical Machine-II Lab. **Max. Marks: 50**
Course Code: PCC-EE–412 **University Exam: 25**
Duration of Exam: 2 Hours **Internal Assessment: 25**
Credits: 1 [0-0-2]

Laboratory Objective: The objective of the laboratory is to equip the students with the exposure to the working operation and characteristics of the A.C. Machines.

List of Experiments:

1. To perform no load and blocked rotor tests on a three-phase squirrel cage induction motor and determine equivalent circuit.
2. To perform no load and blocked rotor tests on a single-phase induction motor and determine equivalent circuit.
3. To study speed control of three phase induction motor by varying supply voltage and by keeping V/f ratio constant.
4. To perform open circuit and short circuit tests on a three-phase alternator and determine voltage regulation at full load and at Unity, 0.8 lagging and leading power factors by (i) EMF method, (ii) MMF method.
5. To determine V-curves and inverted V-curves of a three-phase synchronous motor.
6. To study synchronization of an alternator with the infinite bus by using: (i) Dark lamp method, (ii) Two bright and one dark lamp method.
7. To study speed control of switched reluctance motor.
8. To study speed control of BLDC Motor.

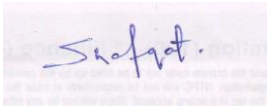
Software based experiments (Develop Computer Program in 'C' language or use MATLAB or Equivalent software)

9. To determine speed-torque characteristics of three-phase slip ring induction motor and study the effect of including resistance, or capacitance in the rotor circuit.
10. To determine speed-torque characteristics of single-phase induction motor and study the effect of voltage variation.
11. To determine speed-torque characteristics of a three-phase induction motor by (i) keeping v/f ratio constant (ii) increasing frequency at the rated voltage.
12. To draw O.C. and S.C. characteristics of a three-phase alternator from the experimental data and determine voltage regulation at full load, and Unity, 0.8 lagging and leading power factors.
13. To determine steady state performance of a three-phase induction motor using equivalent circuit.

Laboratory Outcome:

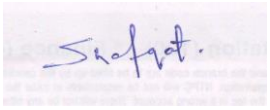
At the end of this laboratory the

CO1. Get an exposure to common electrical machines and their ratings.
CO2. Understand the basic characteristics of various A.C. machines.
CO3. Understand the usage of different type of A.C. machines.
CO4. Get an exposure to the working of general purpose A.C. Machines.
CO5. Can be able to formulate the model on software package for simulation purpose.



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Note: This is only the suggested list of experiments. Instructor may add or change some experiments relevant to the course contents.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Renewable Energy Sources Lab. **Max. Marks: 50**
Course Code: PCC-EE-413 **University Exam: 25**
Duration of Exam: 2 Hours **Internal Assessment: 25**
Credits: 1 [0-0-2]

Laboratory Objective: To understand the working of various renewable energy resources.

List of Experiments:

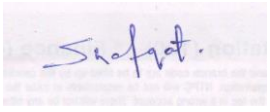
1. Study of the voltage and current of solar cells.
2. Study of voltage and current of the solar cells in series and parallel calculation.
3. Study of both I-V characteristics and the power curve to find the MMP and efficiency.
4. To calculate the efficiency of solar cell.
5. Study of the application of solar cells of charging Ni-Cd battery so that the loads can be used while the module is unexposed to light.
6. Study of the application of solar cells of providing electrical energy to the domestic appliances such as lamp, fan and radio.
7. Installation of wind turbine set up and measurements of wind energy based DC voltage and current.
8. Measurement of voltage and current of wind energy based DC supply with the change in angle of blades.
9. Measurement of V-I (voltage and current) of wind energy based DC supply with change in direction of wind.
10. Measurement of V-I (voltage and current) of wind energy based DC supply with change in speed of wind imposed on the blade.
11. Study of the application of wind energy based DC supply of changing the Ni-Cd battery so that the load can be used even while the module is unexposed to wind.
12. Study of the application of wind energy based DC supply of providing electrical energy to the domestic application such as lamp, fan FM receiver etc.

Laboratory Outcome:

Student will

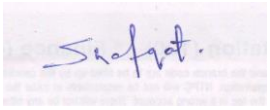
CO1. Understand the V-I characteristics of Solar cell.
CO2. Able to evaluate MMP and efficiency.
CO3. Able to understand the installation of wind turbine.
CO4. Able to measure V-I of wind energy based DC supply but changing various means.
CO5. Able to understand the application of wind energy based DC supply system.

Note: These are only the suggested list of experiments. Instructor may add or change some experiments relevant to the course contents.



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Semester V



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Power System-II **Max. Marks: 100**
Course Code: PCC-EE-501 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]

Course Objective: This subject familiarizes a student with the system behavior and performance during normal and abnormal conditions.

Detailed Contents:

Unit-I

Power Flow Analysis: Review of the structure of a Power System and its components. Analysis of Power Flows: Formation of Bus Admittance Matrix. Real and reactive power balance equations at a node. Load and Generator Specifications. Application of numerical methods for solution of non-linear algebraic equations – Gauss Seidel and Newton-Raphson methods for the solution of the power flow equations. Computational Issues in Large-scale Power Systems.

Unit-II

Stability Constraints in synchronous grids: Swing Equations of a synchronous machine connected to an infinite bus. Power angle curve. Description of the phenomena of loss of synchronism in a single-machine infinite bus system following a disturbance like a three--phase fault. Analysis using numerical integration of swing equations (using methods like Forward Euler, Runge-Kutta 4^{th} order methods), as well as the Equal Area Criterion. Impact of stability constraints on Power System Operation. Effect of generation rescheduling and series compensation of transmission lines on stability.

Unit-III

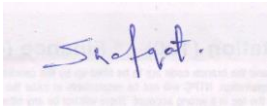
Control of Frequency and Voltage: Turbines and Speed-Governors, Frequency dependence of loads, Droop Control and Power Sharing. Automatic Generation Control. Generation and absorption of reactive power by various components of a Power System. Excitation System Control in synchronous generators, Automatic Voltage Regulators. Shunt Compensators, Static VAR compensators and STATCOMs. Tap Changing Transformers.
Power flow control using embedded dc links, phase shifters.

Unit-IV

Monitoring and Control: Overview of Energy Control Centre Functions: SCADA systems. Phasor Measurement Units and Wide-Area Measurement Systems. State-estimation. System Security Assessment. Normal, Alert, Emergency, Extremis states of a Power System. Contingency Analysis. Preventive Control and Emergency Control.

Unit-V

Power System Economics and Management: Basic Pricing Principles: Generator Cost Curves, Utility Functions, Power Exchanges, Spot Pricing. Electricity Market Models (Vertically Integrated,



Purchasing Agency, Whole-sale competition, Retail Competition), Demand Side-management, Transmission and Distributions charges, Ancillary Services. Regulatory framework.

Course Outcome:

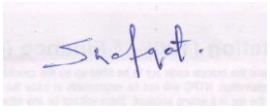
At the end of this course, students will demonstrate the ability to

CO1. Use numerical methods to analyze a power system in steady state.
CO2. Understand stability constraints in a synchronous grid.
CO3. Understand methods to control the voltage, frequency and power flow.
CO4. Understand the monitoring and control of a power system.
CO5. Understand the basics of power system economics.

Text Books/References:

1. **J. Grainger and W. D. Stevenson**, "Power System Analysis", McGraw Hill Education, 1994.
2. **O. I. Elgerd**, "Electric Energy Systems Theory", McGraw Hill Education, 1995.
3. **A. R. Bergen and V. Vittal**, "Power System Analysis", Pearson Education Inc., 1999.
4. **D. P. Kothari and I. J. Nagrath**, "Modern Power System Analysis", McGraw Hill Education, 2003.
5. **B. M. Weedy,B. J. Cory, N. Jenkins**, J. Ekanayake and G. Strbac, "Electric Power Systems", Wiley, 2012.

Note for Paper Setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one from each unit.



Course Title: Signals & Systems **Max. Marks: 100**
Course Code: PCC-EE-502 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]

Course Objective: The objective of this course is to study and analyze the characteristics of continuous, discrete signals and systems**.**

Detailed contents:

Unit-I

Introduction: Definitions of a signal and a system, classification of signals, elementary signals, and basic Operations on signals, Systems viewed as Interconnections of operations, properties of systems.

Unit-II

Time-domain representations for LTI systems–1: Convolution and its significance, impulse response representation, Convolution Sum and Convolution Integral. Relationship between LTI system properties and the impulse response i.e., Causality, Stability, Step response.

Unit-III

Fourier representation for signals: Fourier representation for signals, Continuous -time Fourier series and their properties, Application of Fourier Series to LTI systems, Continuous –time Fourier Transform & its properties, Applications of Fourier Transform to LTI systems, Fourier transform of periodic signals, Discrete-time Fourier Transform and its properties, Relationship of Fourier Transform to other transforms.

Unit-IV

Laplace Transforms-1: Introduction, Laplace transform, ROC and its properties, properties of Laplace transforms, inverse Laplace transform using partial fraction method. Transform analysis of LTI Systems, unilateral Laplace Transform and its application to solve differential equations. Initial and final value theorems, Poles and Zeros of a system.

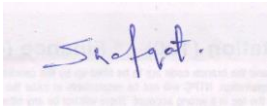
Unit-V

The Z Transform: Z-Transform- Unilateral and Bilateral, Region of convergence; Properties of the Z-transform; inverse Laplace transforms using long division and partial fraction method. Transform analysis of LTI Systems, Unilateral Z-transform and its application to difference equations with zero and non-zero initial condition. Block diagram representation in Z-Domain.

Course Outcome:

At the end of this course, students will demonstrate the ability to

CO1. Understand the concepts of continuous time systems.
CO2. Understand the time domain representation of LTI system using convolution.
CO3. Analyze systems in complex frequency domain.



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

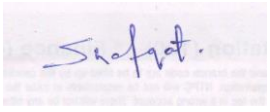
CO4. Understand s-domain representations of systems and its applications to analyze electrical circuit.

CO5. Understand Z-transform in context with digital signals.

Text Books/References:

1. **V. Oppenheim, A. S. Willsky and S. H. Nawab**, "Signals and systems", Prentice Hall India, 1997.
2. **J. G. Proakis and D. G. Manolakis**, "Digital Signal Processing: Principles, Algorithms, and Applications", Pearson, 2006.
3. **H. P. Hsu**, "Signals and systems", Schaum's series, McGraw Hill Education, 2010.
4. **S. Haykin and B. V. Veen**, "Signals and Systems", John Wiley and Sons, 2007.
5. **A. V. Oppenheim and R. W. Schafer**, "Discrete-Time Signal Processing", Prentice Hall, 2009.
6. **M. J. Robert** "Fundamentals of Signals and Systems", McGraw Hill Education, 2007.
7. **B. P. Lathi**, "Linear Systems and Signals", Oxford University Press, 2009.

Note for Paper Setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one from each unit.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Design of Power Apparatus **Max. Marks: 100**
Course Code: PCC-EE-503 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]

Course Objective: The objective of this course is to make students familiar with various designing procedures involved in designing electrical machines.

Detailed Contents:

Unit-I

Introduction: Major considerations in electrical machine design, electrical engineering materials, space factor, choice of specific electrical and magnetic loadings, thermal considerations, heat flow, temperature rise, rating of machines.

Unit-II

Transformers: Sizing of a transformer, main dimensions, kVA output for single- and three-phase transformers, window space factor, overall dimensions, operating characteristics, regulation, no load current, temperature rise in transformers, design of cooling tank, methods for cooling of transformers.

Unit-III

Induction Motors: Sizing of an induction motor, main dimensions, length of air gap, rules for selecting rotor slots of squirrel cage machines, design of rotor bars & slots, design of end rings, design of wound rotor, magnetic leakage calculations, leakage reactance of poly-phase machines, magnetizing current, short circuit current, circle diagram, operating characteristics.

Unit-IV

Synchronous Machines: Sizing of a synchronous machine, main dimensions, design of salient pole machines, short circuit ratio, shape of pole face, armature design, armature parameters, estimation of air gap length, design of rotor, design of damper winding, determination of full load field mmf, design of field winding, design of turbo alternators, rotor design.

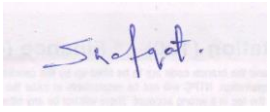
Unit-V

Computer aided Design (CAD): Limitations (assumptions) of traditional designs, need for CAD analysis, synthesis and hybrid methods, design optimization methods, variables, constraints and objective function, problem formulation. Introduction to FEM based machine design. Introduction to **c**omplex structures of modern machines-PMSMs, BLDCs, SRM and claw-pole machines.

Course Outcomes:

At the end of this course, students will demonstrate the ability to

CO1. Understand the construction and performance characteristics of electrical machines.



CO2. Understand the various factors which influence the design: electrical, magnetic and thermal loading of Transformer.

CO3. Understand the various factors which influence the design: electrical and magnetic loading of Induction motor and synchronous machine.

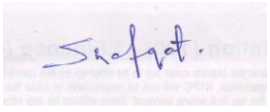
CO4. Understand the principles of electrical machine design and carry out a basic design of synchronous machines.

CO5. Use software tools to do design calculations.

Text Books/References:

1. **A. K. Sawhney**, A Course in Electrical Machine Design, Dhanpat Rai Publication.
2. **V. N. Mittle**, Design of Electrical Machines, Standard Publishers Distributors.
3. **R. K. Agarwal**, Principles of Electrical machine Designs. K. Kataria & Sons
4. **S. K. Sen**, Principles of Electrical machine Design, Oxford & Ibh Publishing Co. Pvt Ltd

Note for Paper Setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one from each unit.



Course Title: Electrical Measurement-II **Max. Marks: 100**
Course Code: PCC-EE-504 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]

Course Objective: The objective of this course is to expose the students to a broad knowledge of experimental methods and measurement techniques.

Detailed contents:

Unit-I

Potentiometers: Introduction, DC potentiometer-principle of operation, standardization of potentiometer, Crompton's & Duo range potentiometer, Applications of DC Potentiometer.

AC Potentiometer: Polar type & Co-ordinate type AC potentiometers, application of AC Potentiometers in electrical measurement

Unit-II

Transducers: Principe of operation, classification of transducers, Summary of factors influencing the choice of transducer. Qualitative treatment of Strain Gauge, Linear Variable Differential Transformer (LVDT), Thermocouple, Piezoelectric crystal & photoelectric transducers.

Unit-III

Phase & Frequency Measurement: Frequency meters – vibrating reed type, electrical resonance type & Weston type frequency meters, Digital frequency meter, Analog & digital phase meters & their comparison.

Unit-IV

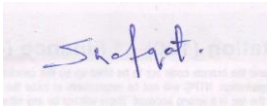
Digital Instruments: Digital Voltmeters – Millimeters – automation in Voltmeter – Accuracy and Resolution in DVM - Guarding techniques – Frequency counter- Data Loggers – Introduction to IEEE 488/GPIB Buses.

Unit-V

Data Display & Recording Systems: Introduction to cathode ray tube, block Diagram of CRO. Measurement of voltage, current, phase & frequency using CRO, Dual Beam Oscilloscope, Dual Trace Oscilloscope. Analog and Digital Recorders, Measurement systems applied to Micro and Nanotechnology.

Course Outcome:

The fundamentals developed in this study will expose the students to a broad knowledge of experimental methods and measurement techniques. After completion of this subject the student will be able to:



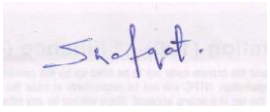
Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

CO1. Understand the principal, standardization and application of AC and DC potentiometer.
CO2. Analyze different types and applications of transducers.
CO3. Understand basic concepts of phase and frequency measurements.
CO4. Analyze digital instruments.
CO5. Analyze data recording systems.

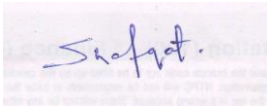
Text Books/References:

1. **Albert D.Helfrick and William D. Cooper**, "Modern Electronic Instrumentation and Measurement Techniques", Prentice Hall of India, 2007.
2. **Ernest o Doebelin and dhanesh N manik**, "Measurement systems", 5thedition, McGraw-Hill, 2007.
3. **John P. Bentley**, "Principles of Measurement Systems", Fourth edition, pearson Education Limited, 2005.
4. **A. K. Sawhney**, "Course in Electrical and Electronic Measurement and Instrumentation", Dhanpat Rai Publisher, 2000.
5. **Bouwens, A.J**, "Digital Instrumentation", Tata Mc-Graw Hill, 1986.
6. **David A. Bell**, "Electronic Instrumentation and Measurements", Second edition, Prentice Hall of India, 2007.

Note for Paper Setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting one from each unit.

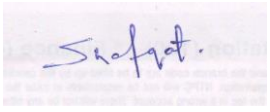


Course Title: Professional Elective courses-I **Max. Marks: 100**
Course Code: PEC-EE-(---) **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Course Title: Open Elective courses-I **Max. Marks: 100**
Course Code: OEC-EE-(---) **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: _____



Mr. S. N. Mughal **(Head E.E.)**
Mr. Tasaduq Hussain **(A.P., EE)**
Mr. Ahmed Riyaz **(A.P., EE)**
Prof. Asif Husain **(Dean, SOET)**

Course Title: Power System Lab. **Max. Marks: 50**
Course Code: PCC-EE-511 **University Exam: 25**
Duration of Exam: 2 Hours **Internal Assessment: 25**
Credits: 1 [0-0-2]

Laboratory Objective: The objective of performing this laboratory course is to give broader idea about power system transmission and distribution.

List of Experiments:

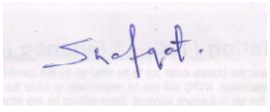
1. To study the performance of an artificial DC distributor.
2. Study the performance of an AC distributor.
3. Determination of regulation, efficiency and A, B, C, and D constants of an artificial transmission line.
4. Determine the string efficiency of suspensions insulators.
5. Study various types of insulators.
6. MATLAB Application in transmission line analysis.
7. Study of cables and finding of charging current.

Laboratory Outcome:

Students will

CO1. Get an exposure to common power system equipment's and their ratings.
CO2. Understand the basic performance of an artificial DC distributor.
CO3. Understand the basic characteristics of various A.C. transmissions systems.
CO4. Understand the usage of different type of A.C. machines.
CO5. Able to perform simulations for transmission on software package.

Note: These are only the suggested list of experiments. Instructor may add or change some experiments relevant to the course contents.



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Course Title: Electrical & Electronic Measurement Lab. **Max. Marks: 50**
Course Code: PCC-EE-512 **University Exam: 25**
Duration of Exam: 2 Hours **Internal Assessment: 25**
Credits: 1 [0-0-2]

Laboratory Objective: The objective of performing this laboratory is to provide knowledge about various types of bridge and transducer for practical problems.

List of Experiments:

1. To measure frequency and phase of a signal from a Lissajous Pattern using CRO.
2. Measurement of Inductance by Maxwell's Bridge.
3. Measurement of small resistance by Kelvin's Bridge.
4. Measurement of Capacitance by Schering Bridge.
5. Measurement of medium resistance by Wheat Stone's Bridge.
6. To measure a Strain using a Strain Gauge Transducer.
7. To measure a Displacement using LVDT Transducer.
8. To measure a Temperature using Thermocouple Transducer.
9. To measure a Temperature using Thermistor Transducer.

Laboratory Outcome:

Students will

CO1. Get an exposure to common electrical and electronic measurements instruments systems and their ratings.

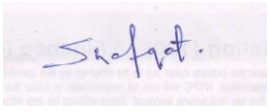
CO2. Able to measure frequency and phase of signal using CRO.

CO3. Understand the basic characteristics of various bridges to know the different network parameter.

CO4. Understand the usage of different type of transducers.

CO5. Able to measure different quantities using transducers.

Note: These are only the suggested list of experiments. Instructor may add or change some experiments relevant to the course contents.



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Course Title: MATLAB & Machine Design Lab. **Max. Marks: 50**
Course Code: PCC-EE-513 **University Exam: 25**
Duration of Exam: 2 Hours **Internal Assessment: 25**
Credits: 1 [0-0-2]

Laboratory Objective: The laboratory is all about the modeling and design of various aspect of Electrical engineering.

List of Experiments:

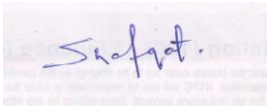
1. Introduction to MATLAB, Coding and Simulation.
2. Computation of parameters and modeling of transmission lines
3. Formation of bus admittance and impedance matrices.
4. Solution of power flow using gauss-seidel method.
5. Short circuit analysis.
6. Solution of power flow using newton-raphson method.
7. Load – frequency dynamics of single area power systems.
8. Load – frequency dynamics of two area power systems.
9. Transient and small signal stability analysis–single machine infinite bus system.
10. Transient stability analysis – multi machine infinite bus system.
11. Economic dispatch in power systems.
12. To learn the design algorithms of electrical machines
13. Design of transformer, its windings and core.
14. Design of DC Series machine.
15. Design of DC Shunt machine.
16. Design of wound rotor induction machine.
17. Design of squirrel cage induction machine.
18. Design of single phase induction machine.
19. Design of synchronous machine.

Laboratory Outcome:

The students will be

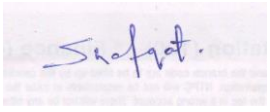
CO1. Able to model and compute transmission line parameter.
CO2. Perform load flow for line flows.
CO3. Stability analysis.
CO4. Economical Load dispatch.
CO5. Able to design various types machine on MATLAB.

Note: These are only the suggested list of experiments. Instructor may add or change some experiments relevant to the course contents.



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Course Title: Industrial Training-I **Max. Marks: 25**
Course Code: PROJ-EE-511 **University Exam: 0**
Internal Assessment: 25
Credits: 1 [0-0-0]



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Professional Elective Courses

Course Title: Power Engineering **Max. Marks: 100**
Course Code: PEC-EE-501 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]

Course Objective: The objective of this course is to allow the students to grasp various methods of power generation, tariff calculations.

Detailed Contents:

Unit-I

Economic Aspects and Power Factor Improvement: Economics of generation, factors affecting the cost of generation, reduction of costs by interconnection of stations, curves useful in system operation, choice of size and number of generating units. Power factor disadvantages of low power factor, methods of improving power factor, location of power factor improvement apparatus, economics of power factor improvement.

Unit-II

Power Tariff: Cost of generating station, fixed capital, running capital annual cost running charges, fixed charges, methods of depreciation, factors influencing the rate of tariff, designing tariff, different types of tariff, flat rate tariff, block rate tariff, two part tariff maximum demand tariff, power factor tariff.

Unit-III

Thermal and Nuclear Power Plants: General layout, choice of site, super heater, air pre heater, economizer, coal handling plant, cooling towers, electrostatic precipitator, advantage and disadvantages. Introduction to nuclear energy, choice of site of the plant, advantages and disadvantages, main components of the plant and type of reactors.
Introduction to Diesel power stations and gas turbine plants.

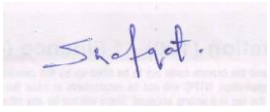
Unit-IV

Hydroelectric power plants: Hydrology, load flow duration curve, hydro graph, mass curve, choice of site of the plant, advantages and disadvantages of the plant, layout of the plant, classification of the hydroelectric plant, introduction to mini & micro hydro.

Unit-V

Substations and Grounding: Neutral grounding, solid grounding resistance grounding, reactance grounding, are suppression coil grounding Earthing transformers, choice of methods of neutral grounding equipment, grounding for safety. Introduction to substations and substation equipment.

Course Outcome:
This subject exposes. After the completion of this course student will be able to:



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

CO1. Understand economic aspects of power generation, transmission & transmission along with the advantages of power factor improvement.

CO2. Analyze different costs associated with power systems and ways to reduce it analyze various tariffs schemes.

CO3. Understand the layout and design considerations of thermal and nuclear plants.

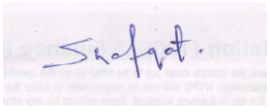
CO4. Understand the layout and design considerations of hydroelectric plants.

CO5. Understand various types of substation groundings.

Text Books/References:

1. **Deshpande M.V**., Elements of power station design, TMH.
2. **H. Pratab**, The art and Science of Utilisation of Electric energy, PHI.
3. **Satnam**, Substation Design and Equipment.

Note for Paper Setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one from each unit.



Course Title: Electrical Substation Design **Max. Marks: 100**
Course Code: PEC-EE-502 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]

Course Objective: The objective of this course is to allow the students to grasp design and operation of sub-station and bus-bar systems.

Detailed Contents:

Unit-I
Sub-Station Design: General aspects of sub-station design, Site consideration, design consideration and environmental consideration of substation, layout with all equipments.

Unit-II
Bus-Bar Design: Bus bar arrangement with detailed layout-single bus-bar arrangement, single sectionalized bus-bar scheme, main and transfer bus-bar scheme, ring bus scheme, breaker and half scheme, double bus bar arrangement, double bus and transfer bus arrangement.

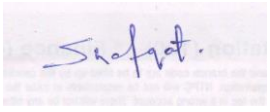
Unit-III
Switch Operation: Isolating switches, location, rating, selection, operation and control. Interlocking-mechanical and electrical, rating and selection of isolators.

Unit-IV
Transformers and Circuit Breakers: Voltage & Current Transformers. Governing specifications, rating & selection requirement of CT's & PT's for different protection schemes. Standard ratings & selection. Restricting voltage & recovery voltage, particular performance & testing of circuit breaker.

Unit-V
Control & Relay panels: Design of control & relay panels. Planning of control circuit. Voltage selection scheme. General Earthing of a substation. Complete design of Earthing grid.

Course Outcome:
By the end of this course, the student should be able to:
CO1. Explain the principles of design and operation of electric Sub-Station Design
CO2. Apply analytic techniques pertaining to primary Bus-Bar Design systems.
CO3. Use basic design principles for Switch Operation and facilities.
CO4. Examine primary Transformers and Circuit Breakers systems using computer-based modeling.
CO5. Discuss computational algorithms of Control & Relay panels' system analysis and operation.

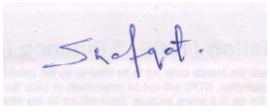
Text Books/ References:
1. **P.S Satnam**, Substation Design.



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

2. **P.V Gupta**, Substation Design and Equipments. DhanpatRai Publications.
3. **John D. McDonald**Electric Power Substations Engineering, Third Edition, May 16, 2012.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Engineering Material Science **Max. Marks: 100**
Course Code: PEC-EE-503 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]

Course Objective: The course has been designed to get student acquainted with the properties of various engineering materials and their applications in Engineering Sciences.

Detailed Contents:

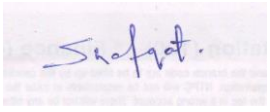
Unit-I
Crystal Structure of Solids: Atomic packing, crystal lattice, Different type of crystal Bands, structure of silicon & Germanium, Energy Bands in solids, one dimensional lattice, Electron in periodic potential, concept of hole, Three dimensional Lattice and Brullioun Zones Elastic Wave and Photons (Elementary Ideas).

Unit-II
Insulating Materials: Introduction to Insulators, dielectric behavior, Properties of Insulating Materials, Insulators in Static & Alternating fields, classification as per temperature rise, Practical Dielectrics, Liquid: Solid and Gaseous and their applications.

Unit-III
Dielectric Materials: Polarization, Quantitative and qualitative discussion of dielectric constants of polyatomic molecules, Internal fields in solids and Liquids. Ferroelectrics & Piezoelectric Materials, spontaneous polarization, Frequency dependence of polarizabilities, complex dielectric constant of non-dipolar solids, Dipolar relaxation, dielectric losses, Dielectric Break downs.

Unit-IV
Magnetic Materials: Review of magnetic field concepts, Orbital dipole, and angular momentum of simple atomic models, classification of magnetic materials, spontaneous magnetism, Curie- Weiss Law, coercive forces; antiferro magnetic materials, ferromagnetic materials, Properties & applications of ferrites.

Unit-V
Conductivity of Metals: Ohm's Law, Relaxation time, collision time and mean free path, resistivity of conductors, temperature dependence of resistivity, super conductivity.
Semiconductor Materials: classifying materials as semiconductors, chemical bond in Si and Ge & its consequences, density of carriers in intrinsic semiconductors, the energy gap, the conductivity of intrinsic semiconductors, Carrier densities in n-type semiconductors & p-type semi-conductors, Hall Effect and Carrier Density.



Course Outcome:

CO1. Given a type of material, the students will be able to qualitatively describe the bonding scheme and its general physical properties, as well as possible applications in electrical engineering.

CO2. This will be helpful for the students to understand about the insulating properties of the materials.

CO3. This will be helpful for the students to understand about the Dielectric properties of the materials.

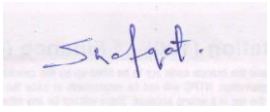
CO4. Students will be able to do comparative analysis of magnetic materials based upon their properties.

CO5. Students will be able to differentiate among various materials such as conductor and semiconductor based upon the internal composition and conductivities.

Text Books/References:

1. **Dekker**, Electrical Engineering Materials.
2. **Allison**, Materials & Electronics Engineering & Devices.
3. **Raghvan**, Electrical Engineering Materials.
4. **S.P. Seth and P. V. Gupta**, Electrical Engineering Materials.

Note for Paper Setter: The Question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one from each unit.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Open Elective Courses

Course Title: Data Structures Using C **Max. Marks: 100**
Course Code: OEC-EE-501/PCC-CSE-301 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 4 [3-1-0]

Course Objective:

1. To impart the basic concepts of data structures and algorithms.
2. To understand concepts about searching and sorting techniques
3. To understand basic concepts about stacks, queues, lists, trees and graphs.
4. To enable them to write algorithms for solving problems with the help of fundamental data structures.

Detailed Contents:

Unit-I

Review of Data Types and Concepts: Review of data types, Scalar types, Primitive types, Structures, Unions, Enumerated types, Records, Sparse Matrices, Recursion and its importance.

Unit-II

Expression and Linear Data Structure: Definition of a Data structure, ADT, Linear Data structures.

Stack**:** Operations, Applications, implementation using linked list as well as arrays, Expressions and their conversions, Infix, Postfix & Prefix.

Queue**:** Types, Operations, Applications, implementation using linked list as well as arrays. Linked List**:** Types, Operations, Applications, Implementation.

Unit-III

Trees: Preliminaries, Trees, Forest, Binary Trees, Binary Search Tree ADT, Binary Search Trees, Conversion of Forest to Binary Tree, Binary Search Tree, AVL Trees, Tree Traversals, Priority Queues (Heaps), Model, Simple implementations, Binary Heap.

Unit-IV

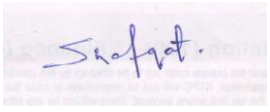
Graphs: Definitions, Representation of Graphs, Adjacency Matrix, Path Matrix, Operations on Graphs, Traversing a graph: BFS and DFS, Shortest Path Algorithms:

Dijkstra`s Algorithm and Warshall`s Algorithm, Minimum Spanning Tree, Kruskal`s Algorithm and Prim`s Algorithm.

Unit-V

Searching and Sorting: Searching: Sequential search, Binary search, Hashing, General Idea for Hash Function, Separate Chaining, Open Addressing, Linear Probing.

Sorting: Bubble sort, Insertion Sort, Selection sort, Heap sort, Merge sort, Quick sort, External Sorting.



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Course Outcome:

At the end of this course, the student will able to do the following:

CO1. For a given algorithm student will able to analyze the algorithms to determine the time and computation complexity and justify the correctness.

CO2. For a given Search problem (Linear Search and Binary Search) student will able to implement it.

CO3. For a given problem of Stacks, Queues and linked list student will able to implement it and analyze the same to determine the time and computation complexity.

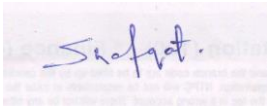
CO4. Student will able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.

CO5. Student will able to implement Graph search and traversal algorithms and determine the time and computation complexity.

Text Books/ References:

1. **Tanenbaum A. S.**, Data Structure Using C, Dorling Kindersley Publisher.
2. **Ellis Horowitz and Satraj Sahni**, An Introduction to Data Structures, Computer Science Press, Rockville MA 1984.
3. **M. A. Weiss**, "Data Structures and Algorithm Analysis in C", 2nd ed, Pearson Education Asia.
4. **E. Horowitz & S. Shani** Fundamentals of Data Structures in C, Galgotia Pub. 1999.
5. **Richard F. Gilberg, Behrouz A. Forouzan**, Data Structures: A Pseudocode Approach with C, Thomson Cole, 1998.
6. **Hopcroft A. J. E. & Ullman J. D.,** Data Structures and Algorithms, Pearson Education Asia, 1983.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one question from each unit.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Java Programming **Max. Marks: 100**
Course Code: OEC-EE-502/PCC-CSE-503 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]

Course Objective: To enhance skills of student with the ever demanding programming language Core Java.

Detailed Contents:

Unit-I

Overview of Java: Introduction to Java, Features of Java, Object Oriented Concepts, Lexical Issues, Data Types, Variables, Arrays, Operators, Java Virtual Machine, Byte code, Control Statements: Selection, Iteration and Jump Statements, Java Bean Standards.

Unit-II

Classes and Inheritance: Classes, Objects, Constructors, Overloading Method, Access Control, Static and Final Keywords, Nested and Inner Classes, Abstract Class, Object Class, Inheritance, Overriding Methods, Using Super, Dynamic method Dispatch. Packages, Access Protection, Importing Packages, Interfaces.

Unit-III

Exception Handling and Multithreading: Exception Handling, Multiple Catch Clauses, Nested Try and Throw. Multithreading: Thread, Creating a Thread, Creating Multiple Threads, Synchronization, Inter Thread Communication, Deadlock, Suspending, Resuming and Stopping Threads, Multithreading.

Unit-IV

I/O, Applets and String Handing Files: Files, Stream Classes, Serialization, Reading Console Input, Writing Console Output, Print Writer Class, Reading and Writing Files, Transient And Volatile Modifiers, Instance Of, Strictfp, Native Methods. Applets: Introduction: Applet Fundamentals, Applet Architecture. Strings: String Constructors, String Operations, String Buffer, String Builder, Sting Tokenizer.

Unit-V

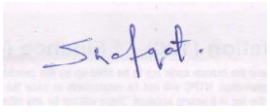
Collections Framework: Collections Overview, Collection Interfaces, Collection Classes, Accessing a Collection via Iterator, Map Classes and Map Interfaces, Comparators, Arrays, Legacy Classes and Interfaces, Wrapper Classes.

Course Outcome:

At the end of the course, the student will be able to:

CO1. Identify classes, objects, members of a class and relationships among them needed for a specific problem.

CO2. Write Java application programs using OOP principles and proper program structuring.



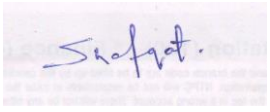
Mr. S. N. Mughal (Head E.E.) | Mr. Tasaduq Hussain (A.P., EE) | Mr. Ahmed Riyaz (A.P., EE) | Prof. Asif Husain (Dean, SOET)

CO3. Demonstrate the concepts of polymorphism and inheritance.
CO4. Write Java programs to implement error handling techniques using exception handling.
CO5. Use collections Framework to solve problems

Text Books/References:

1. **P. Naughton & H. Schildt**, Java2 (The Complete Reference), 3rd Edn, TMH 1999.
2. **K. Arnold & J. Gosling**, the Java Programming Language, 2nd Edn, Addison Wesley, 1996.
3. **Cay S. Horstmann, Gary Cornell**, Core Java 2 Volume I Fundamentals, 5th Edn. PHI, 4000.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Environmental Engineering **Max. Marks: 100**
Course Code: OEC-EE-503/PCC-CE-502 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [2-1-0]

Course Objective: This course aims to make students understand the various aspects of environment and to understand the impact of humans on environment.

Detailed Contents:

Unit I

Water quality and treatment: Water demand Residential, Commercial, Institutional, industrial and agricultural, Sources of Water, water quality parameters, Water quality standards, Water Treatment*:* aeration, sedimentation, coagulation flocculation, filtration, disinfection, advanced treatments like adsorption, ion exchange, membrane processes, Water Supply systems, Components of water supply system, Distribution system, Plumbing and various valves used in water supply systems.

Unit II

Sewage Characteristics and treatment: Quantity of Sewage, Sewage flow variations, Characteristics and composition of sewage, Pollution due to improper disposal of sewage, Sewerage system and its components, Design of Sewerage system primary, secondary and tertiary treatment of sewage- description of various unit operation and processes, aerobic and anaerobic treatment systems, suspended and attached growth systems, quality requirements (Regulatory standards) for various usages.

Unit III

Air Pollution and control – Definition of Air pollution, major pollutants- sources and impacts, Air Quality standards, Air pollution meteorology, Plum rise and plum behaviour, Introduction to air quality models and their applications, Monitoring of air pollutants, Control measures.

Unit IV

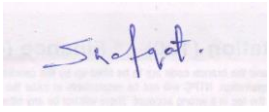
Solid waste management- Solid waste, Municipal, industrial and hazardous solid waste, Characteristics and Composition of solid waste, Impact of improper disposal of solid waste, solid waste management, Elements of solid waste management system- generation, collection, transfer and transport, segregation, recycling, reuse, disposal, composting, vermicomposting and landfills.

Unit V

Noise pollution and control: Noise pollution, sources (Indoor and outdoor) and impacts, Permissible limits, measurement of noise, Addition of Noise, Noise propagation, control of noise pollution- at source, during transmission and at receptor end.

Course Outcome:

After successfully studying this course, students will:



CO1. Understand the impact of humans on environment and environment on humans.

CO2. Be able to identify and value the effect of the pollutants on the environment: atmosphere, water and soil.

CO3. Be able to plan strategies to control, reduce and monitor pollution.

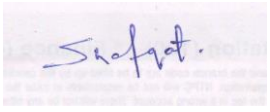
CO4. Be able to select the most appropriate technique for the treatment of water, waste water solid waste and contaminated air.

CO5. Be conversant with basic environmental legislation.

Text Books/References:

1. **Peavy, H.s, Rowe, D.R, Tchobanoglous**, G. *Environmental Engineering*, Mc-Graw-Hill International Editions, New York
2. Metcalf and Eddy Inc.: Wastewater Engineering
3. **Garg S.K:** Water Supply Engineering (Environmental Engineering Vol.–I)
4. **Garg S.K:** Sewage Disposal and Air Pollution Engineering (Environmental Engineering Vol. – II).
5. **Modi, P. N**;Water supply Engineering. Volume-I
6. Introduction to Environmental Engineering and Science by **Gilbert Masters**, PrenticeHall, New Jersey.
7. Introduction to Environmental Engineering by **P. AarneVesilind, Susan M. Morgan**, Thompson /Brooks/Cole.

Note for Paper Setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one from each unit.



Course Title: Disaster Preparedness & Planning **Max. Marks: 100**
Course Code: OEC-EE-504/PCC-CE-305 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [2-1-0]

Course Objective: To increase the knowledge and understanding of the disaster phenomenon, its different contextual aspects, impacts and public health consequences and to ensure skills and abilities to analyse potential effects of disasters and of the strategies and met to deliver public health response to avert these effects.

Detailed Contents:

Unit I

Disaster-historical overview, disaster and hazards, definition of basic terms such as-vulnerability, risk, capacity, impact, prevention, mitigation. ecological fragility, Factors affecting vulnerability such as impact of developmental projects and environmental modifications (including of dams, land-use changes, urbanization etc.), sustainable and environmental friendly recovery; reconstruction and development.

Unit II

Classification of Disaster: natural disasters (floods, draught, cyclones, volcanoes, earthquakes, tsunami, landslides, coastal erosion, soil erosion, forest fires etc.), Causes and concern of natural disasters, manmade disasters (industrial pollution, artificial flooding in urban areas, nuclear radiation, chemical spills etc.), Causes and concern of manmade disasters

Unit III

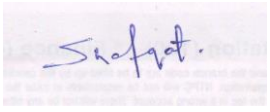
Disaster Impacts: Disaster impacts- Global (Climate change), regional (urban disasters) and local-environmental impacts (physical, social, ecological, economical, political, etc.), health impacts, psycho-social issues; demographic aspects (gender, age, special needs), Impact evaluation and analysis.

Unit IV

Disaster Risk Reduction: Disaster management cycle phases; prevention, mitigation, preparedness, relief and recovery; structural and nonstructural measures; risk analysis, vulnerability and capacity assessment; early warning systems, Post-disaster environmental response, Roles and responsibilities of government, community, local institutions, NGOs and other stakeholders; Policies and legislation for disaster risk reduction, DRR programmes in India and the activities of National Disaster Management Authority.

Unit V

Disasters management and control: Management of natural disasters (Earthquake, flood and drought), various components and their functions, Man-made disasters (Industrial and nuclear disaster)-management and control, preventives measures, regulatory aspects.



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Course Outcome:

At the end of completion of subject students will able to understand:

CO1. Capacity to integrate knowledge and to analyze, evaluate and manage the different public health aspects of disaster events at a local and global levels, even when limited information is available.

CO2. Capacity to describe, analyze and evaluate the environmental, social, cultural, economic, legal and organizational aspects influencing vulnerabilities and capacities to face disasters.

CO3. Capacity to work theoretically and practically in the processes of disaster management (disaster risk reduction, response, and recovery) and relate their interconnections, particularly in the field of the Public Health aspects of the disasters.

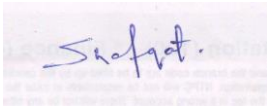
CO4. Capacity to manage the Public Health aspects of the disasters.

CO5. Capacity to obtain, analyze, and communicate information on risks, relief needs and lessons learned from earlier disasters in order to formulate strategies for mitigation in future scenarios with the ability to clearly present and discuss their conclusions and the knowledge and arguments behind them.

Text Books/References:

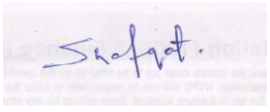
1. http://ndma.gov.in/ (Home page of National Disaster Management Authority). 64
2. http://www.ndmindia.nic.in/ (National Disaster management in India, Ministry of Home Affairs).
3. **Pradeep Sahni,** 2004, Disaster Risk Reduction in South Asia, Prentice Hall.
4. **Singh B.K.,** 2008, Handbook of Disaster Management: techniques & Guidelines, Rajat Publication.
5. **Ghosh G.K**., 2006, Disaster Management, APH Publishing Corporation.

Note for Paper Setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one from each unit.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Semester VI



Course Title: Power Electronics **Max. Marks: 100**
Course Code: PCC-EE-601 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 4 [3-1-0]

Course Objective: The objective of this course is to have knowledge of basic concepts of power electronics devices and their operational and performance characteristics, along with converters.

Detailed Contents:

Unit I

Power Semiconductor Devices & their Characteristics: Application of power electronics, classification of power semiconductor devices, ideal switch, power diodes & thyristor with characteristics, two transistor model of thyristor, di/dt, dv/dt limitations and snubber circuits, other power semiconductor devices (DIAC, TRIAC, IGBT, MOSFET) with their characteristics.

Unit II

AC to DC Converters : Types of AC to DC converters, single phase half-wave and full-wave controlled rectifiers with resistive load, inductive load and freewheeling diode, detailed derivation of RMS, average value, harmonic factor, displacement factor, THD, crest factor. Introduction to three phase full and semi controlled rectifiers, dual converters.

Unit III

DC to DC Converters: Principle of chopper, control techniques of chopper (TRC and CLC), switching regulators: Buck, Boost, Buck-Boost, basic principles of SMPS and UPS, Introduction to resonant converters.

Unit IV

DC to AC Converters: Voltage-driven inverter, current-driven inverter, Single-phase inverter with resistive load, inductive load, Sinusoidal PWM Inverter, Introduction to resonant inverters, three phase inverter, 120-180 degree conduction.

Unit V

AC to AC Converters: AC Voltage Controllers: Single and three phase AC voltage controllers. Cycloconverters: Single phase to single-phase, three-phase to single-phase, three-phase to three-phase cycloconverter circuit and their operation.

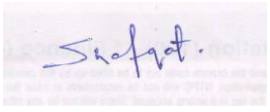
Course Outcome:

At the end of the course the students will be able to

CO1. Articulate the basics of power electronic devices and characteristics of SCR, DIAC, TRIAC, MOSFET and IGBT.

CO2. Express the design and control of converters.

CO3. Design of power electronic converters in power control applications.



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

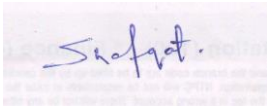
CO4. Ability to design AC voltage controller, Chopper circuit, Inverter circuit and Cyclo-Converter.

CO5. Analyze the operation of DC-DC choppers and voltage source inverters.

Text Books/References:

1. **M. H. Rashid**, "Power electronics: circuits, devices, and applications", Pearson Education India, 2009.
2. **N. Mohan and T. M. Undeland**, "Power Electronics: Converters, Applications and Design", John Wiley & Sons, 2007.
3. **R. W. Erickson and D. Maksimovic**, "Fundamentals of Power Electronics", Springer Science & Business Media, 2007.
4. **L. Umanand**, "Power Electronics: Essentials and Applications", Wiley India, 2009.

Note for Paper Setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting one from each unit.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Microprocessors & Interfacing **Max. Marks: 100**
Course Code: PCC-EE-602 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 4 [3-1-0]

Course Objective: The course objective is to introduce the basic concepts of microprocessors and to develop the assembly language programming skills and real time applications of Microprocessors, in students.

Detailed Contents:

Unit-I
Introduction to Microprocessors: Introduction to Microprocessor and Microcontroller, Architecture. Comparison of Microprocessor and microcontrollers of 8-bit, 16-bit and 32-bit. 8085/8086 microprocessor: Instruction set, Types of instructions, Addressing modes, Bus organizations, interrupt set, interrupt handling with RIM and SIM instruction.

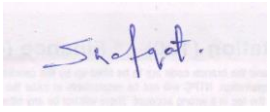
Unit-II
The 8086 microprocessor: Pin diagram and description of various signals, and details of sub-blocks such as EU, BIU; memory segmentation and physical address computations, program relocation, Microprocessor timing, and Timing diagram for different machine cycles. Brief assembly language programming.

Unit-III
Programming of 8086: Assembly language fundamentals, largest and smallest numbers in data array, sum of a series of 16 bit numbers, multi-bit addition, 16 bit multiplication, division by 8 bit and 16 bit divisor, square root determination, BCD to hex conversion, factorial of given number.

Unit-IV
Data transfer techniques: Serial and parallel I/O Chips (8251 and 8255), Programmable DMA Controller (8257), Programmable interrupt controller (8259), keyboard display controller (8279), Introduction to DMA process and DMA controller (8237), Data acquisition using A/D and D/C converters.

Unit-V
Memory and I/O Interfacing: Memory and I/O expansion buses, control signals, memory wait states. Interfacing of peripheral devices such as General Purpose I/O, ADC, DAC, timers, counters, memory devices, seven segment display and keyboard.

Course Outcome:
At the end of this course, students will demonstrate the ability to
CO1. Do understand the Fundamental of Microprocessors and microcontrollers.
CO2. The students will be able to understand the basics of 8086 microprocessor.



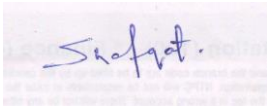
Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

CO3. Do assembly language programming.
CO4. Do understand the External Communication Interface and Applications.
CO5. Do understand interfacing design of peripherals like I/O, A/D, D/A, timer etc.

Text Books/ References:

1. **M. A.Mazidi**, J. G. Mazidi and R. D. McKinley, "The 8051 Microcontroller and Embedded Systems: Using Assembly and C",Pearson Education, 2007.
2. **K. J. Ayala**, "8051 Microcontroller", Delmar Cengage Learning, 2004.
3. **R. Kamal**, "Embedded System", McGraw Hill Education, 2009.
4. **R. S. Gaonkar**, ", Microprocessor Architecture: Programming and Applications with the 8085", Penram International Publishing, 1996

Note for Paper Setter: The Question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one from each unit.



Course Title: Control System **Max. Marks: 100**
Course Code: PCC-EE-603 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]

Course Objective: The course puts an emphasis on the basics of control systems and Controller Design.

Detailed Contents:

Unit-I

Introduction to control problem: Industrial Control examples. Mathematical models of physical systems. Control hardware and their models. Transfer function models of linear time-invariant systems. Feedback Control: Open-Loop and Closed-loop systems. Benefits of Feedback. Block diagram algebra.

Unit-II

Time Response Analysis: Standard test signals. Time response of first and second order systems for standard test inputs. Application of initial and final value theorem. Design specifications for second-order systems based on the time-response. Concept of Stability. Routh-Hurwitz Criteria. Relative Stability analysis. Root-Locus technique. Construction of Root-loci.

Unit-III

Frequency-response analysis: Relationship between time and frequency response, Polar plots, Bode plots. Nyquist stability criterion. Relative stability using Nyquist criterion – gain and phase margin. Closed-loop frequency response.

Unit-IV

Introduction to Controller Design: Stability, steady-state accuracy, transient accuracy, disturbance rejection, insensitivity and robustness of control systems. Root-loci method of feedback controller design. Design specifications in frequency-domain. Frequency-domain methods of design. Application of Proportional, Integral and Derivative Controllers, Lead and Lag compensation in designs. Analog and Digital implementation of controllers.

Unit-V

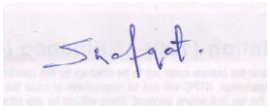
State variable Analysis: Concepts of state variables. State space model. Diagonalization of State Matrix. Solution of state equations. Eigenvalues and Stability Analysis. Concept of controllability and observability.

Pole-placement by state feedback. Discrete-time systems. Difference Equations. State-space models of linear discrete-time systems. Stability of linear discrete-time systems.

Course Outcome:

At the end of this course, students will demonstrate the ability to

CO1. Understand the basics of control systems.



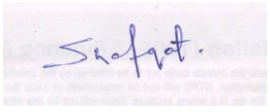
Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

CO2. Understand the modeling of linear-time-invariant systems using transfer function.
CO3. Know the frequency response for stability analysis.
CO4. Design the controller.
CO5. Perform state-space representations for stability, controllability and observability.

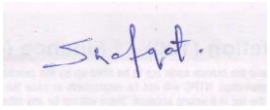
Text Books/References:

1. **M. Gopal**, "Control Systems: Principles and Design", McGraw Hill Education, 1997.
2. **B. C. Kuo**, "Automatic Control System", Prentice Hall, 1995.
3. **K. Ogata**, "Modern Control Engineering", Prentice Hall, 1991.
4. **I. J. Nagrath and M. Gopal**, "Control Systems Engineering", New Age International, 2009

Note for paper setter: The Question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one from each unit.

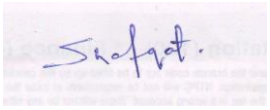


Course Title: Professional Elective courses-II **Max. Marks: 100**
Course Code: PEC-EE – (---) **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]



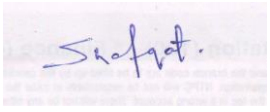
Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Professional Elective courses-III **Max. Marks: 100**
Course Code: PEC-EE – (---) **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Course Title: Open Elective courses-II **Max. Marks: 100**
Course Code: OEC-EE –(---) **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]



Mr. S. N. Mughal **(Head E.E.)**
Mr. Tasaduq Hussain **(A.P., EE)**
Mr. Ahmed Riyaz **(A.P., EE)**
Prof. Asif Husain **(Dean, SOET)**

Course Title: Power Electronics Lab. **Max. Marks: 50**
Course Code: PCC-EE-611 **University Exam: 25**
Duration of Exam: 2 Hours **Internal Assessment: 25**
Credits: 1 [0-0-2]

Laboratory Objectives: Objective of this course is to analyze the characteristics after designing and implementation the various power electronics circuits and devices.

List of Experiments:

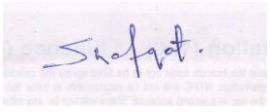
1. To develop R & RC firing circuit for SCR.
2. To develop UJT triggering circuit for SCR.
3. To obtain SCR characteristics.
4. To perform AC phase control using SCR.
5. To obtain TRIAC characteristics.
6. To perform full wave AC phase control using TRIAC.
7. To obtain MOSFET characteristics.
8. To perform AC phase control using MOSFET.
9. To obtain IGBT characteristics.
10. To perform AC phase control using IGBT.
11. To analyze voltage commutated DC chopper.
12. To analyze the performance of series Inverter circuit.
13. To analyze the performance of Cyclo-Converter.

Laboratory Outcome:

At the end of the laboratory the students will be able to:

CO1. Obtain the characteristics of SCR, TRIAC, MOSFET and IGBT.
CO2. Implement the phase controlled switching using TRIAC.
CO3. To realize different type of triggering circuits for particular application.
CO4. To use UJT as a relaxation oscillator and for triggering circuits.
CO5. To implement different types of converters for various applications.

Note: These are only the suggested list of experiments. Instructor may add or change some experiments relevant to the course contents.



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Course Title: Control system Lab. **Max. Marks: 50**
Course Code: PCC-EE-612 **University Exam: 25**
Duration of Exam: 2 Hours **Internal Assessment: 25**
Credits: 1 [0-0-2]

Laboratory Objective: The objective of this laboratory is to understand different control scheme.

List of Experiments:

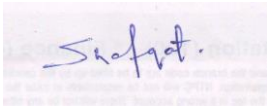
1. To study the performance of Relay control Combination of P,I and D control schemes in a typical thermal system.(oven)
2. To study the torque-speed characteristics of an AC servomotor.
3. To study the time response of a variety of simulated linear systems.
4. To study the role of feedback in a DC speed control system.
5. To study the role of feedback in a DC position control system.
6. To study the role of a combination of P, I and D control actions in a variety of simulated linear systems.
7. To study the computer simulation of a number of systems.
8. Use of MATLAB / SIMULINK /Control System tool boxes.

Laboratory Outcome:

The students should know about various control systems and able to

CO1. Analysis various open loop and close loop control systems.
CO2. Understand performance characteristics of servo motors.
CO3. Check the response of various performance indices of various controllers used in the digital control system.
CO4. Able to understand DC speed and position control.
CO5. Learn about MATLAB Simulink.

Note: These are only the suggested list of experiments. Instructor may add or change some experiments relevant to the course contents.



Course Title: Microprocessor & Interfacing Lab. **Max. Marks: 50**
Course Code: PCC-EE-613 **University Exam: 25**
Duration of Exam: 2 Hours **Internal Assessment: 25**
Credits: 1 [0-0-2]

Laboratory Objective: The objective of this laboratory is to Understand and apply various operations using assembly level programming on microprocessors.

List of Experiments:

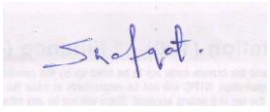
1. Write a program to control the operation of Stepper Motor using 8085 Microprocessor (μp) and 8255 Programmable Peripheral Interface (PPI)
2. Write a program to ADD two 8-bit numbers & SUBTRACT two 8-bit numbers using 8085 Microprocessor (μp).
3. Write a program to control the Traffic Light System using 8085 Microprocessor (μp) and 8255 Programmable Peripheral Interface (PPI)
4. Write a program to ADD two 16-bit numbers & SUBTRACT two 16-bit numbers using 8085 Microprocessor (μp).
5. Write a program to Multiply two 8-bit numbers by Repetitive Method & Rotation Method using 8085 Microprocessor (μp)
6. Write a program to control of DC Motor using 8085 Microprocessor (μp) and 8255 Programmable Peripheral Interface (PPI)
7. Write a program to find one's complement of an 8-bit & 16-bit number and two's complement of 8-bit & 16-bit number using 8085 Microprocessor (μp)
8. Write a program to control of the Temperature using 8085 Microprocessor (μp) and 8255 Programmable Peripheral Interface (PPI).
9. Write a program to shift an 8-bit number & 16-bit number left side by one Bit and 8-bit number & 16-bit number left side by Two Bit using 8085 Microprocessor (μp).
10. Write a program to find Larger as well as Smaller of two number and Mask off Least significant 4-bit (LSB) Mask off Most significant 4-bit (MSB) of an 8-bit number using 8085 Microprocessor (μp).

Laboratory Outcome:

On completion of this lab course the students will be able to:

CO1. Understand and apply the fundamentals of assembly level programming of microprocessors.
CO2. Word with standard microprocessor real time interfaces including GPIO, serial ports, digital-to-analog converters and analog-to-digital converters;
CO3. Trouble shoot inter actions between software and hardware;
CO4. Analyze abstract problems and apply a combination of hardware and software to address the problem.
CO5. Use standard test and measurement equipment to evaluate digital interfaces.

Note: These are only the suggested list of experiments. Instructor may add or change some experiments relevant to the course contents.



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Professional Elective Course

Course Title: Communication System **Max. Marks: 100**
Course Code: PEC-EE-601 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]

Course Objective: The outcome of this course is to provide students with a working knowledge of the basic principles underlying the Communication Systems.

Detailed Contents:

Unit-I

Modulation Techniques: Introduction to Amplitude modulation, Frequency spectrum of AM Waves, Representations of AM waves, Power relation in AM waves, Need and description of SSB, suppression of carrier, suppression of unwanted side bands, vestigial side band system, frequency modulation (FM), Mathematical representation of FM, frequency spectrum & Band width of FM waves, Carson's rule.

Unit-II

AM Transmitters and Receivers: AM Transmitters: Generation of AM, low level and high level modulation, comparison of levels, AM transmitter block diagram, collector class C modulator, Base modulator.

AM Receivers: Tuned radio frequency (TRF) receiver. Super heterodyne receiver, RF section and characteristics, mixers, frequency changing and tracking, IF rejection and IF amplifiers, AM receiver characteristics.

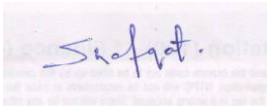
Unit-III

FM Transmitters and Receivers: Basic requirements and generation of Frequency Modulation (FM), & methods, direct methods, variable capacitor modulator, varactor diode modulator, reactance modulators, disadvantages of direct method, indirect modulators, RC phase shift modulator, Armstrong FM systems.

FM Receivers: Limiters, balanced slope detector, foster seely or phase discriminator, block diagram of FM receiver, FM receiver characteristics.

Unit-IV

Pulse Digital Modulation: Elements of digital communication systems, advantages of digital communication systems, Elements of PCM: Sampling, Quantization & Coding, proof of sampling theorem, Quantization error, Companding in PCM systems. Differential PCM systems (DPCM).Bandwidth of PCM.



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Unit-V

Digital Modulation Techniques: Introduction, Generation & Demands of ASK, FSK, PSK, DPSK, QPSK, M-ary, ASK, similarity of BFSK and BPSK.

Course Outcome:

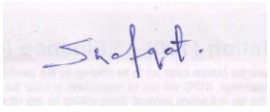
After the completion of this course student will be able to:

CO1. Understand different modulation techniques used in communication system.
CO2. Analyze configuration AM transmitters and receivers.
CO3. Understand working of FM transmitters and receivers.
CO4. Learn components of DCM and appreciate the working of DPCM.
CO5. Understand generation and demands of Digital Modulation Techniques.

Text Books/References:

1. **Taub& Schilling**, Principles of Communication, Tata McGraw Hill Publication, 1990.
2. **Simon Haykins**, Principles of Communication, PHI, 1990.
3. **B. P. Lathi**, Analog and Digital Communication Systems, PHI, 1992.
4. **Proakis**, Digital Communication, McGraw Hill, 1992.
5. **B. Carlson**, Communication Systems, McGraw Hill, 1992.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one question from each unit.



Course Title: Computers in medicine **Max. Marks: 100**
Course Code: PEC-EE-602 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]

Course Objective: Objective of this course is to get students aware with the importance and application of Computers in medicine.

Detailed Contents:

Unit-I

Introduction: Structure of Medical Informatics, Internet and Medicine, Security issues, Computer based medical information retrieval, Hospital management and information system, Functional capabilities of a computerized HIS, e-health services, Health Informatics, Medical Informatics, Bioinformatics.

Unit-II

Computerized Patient Record: History taking by computer, Dialogue with the computer, Components and functionality of CPR, Development tools, Intranet, CPR in Radiology, Application server provider, Clinical information system, Computerized prescriptions for patients.

Unit-III

Computers in Clinical Laboratory and Medical Imagining: Automated clinical laboratories-Automated methods in hematology, cytology and histology, Intelligent Laboratory Information System, Computerized ECG, EEG and EMG, Computer assisted medical imaging- nuclear medicine, ultrasound imaging ultrasonography-computed X-ray tomography, Radiation therapy and planning, Nuclear Magnetic Resonance

Unit-IV

Computer Assisted Medical Decision-Making: Neuro-computers and Artificial Neural Networks application, Expert system, General model of CMD, Computer-assisted decision support system, production rule, system cognitive model, semester networks , decisions analysis in clinical medicine, computers in the care of critically patients, computer assisted surgery, designing.

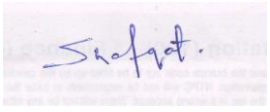
Unit-V

Recent Trends in Medical Informatics: Virtual reality applications in medicine, Computer assisted surgery, surgical simulation, Telemedicine, Tele surgery computer aids for the handicapped, computer assisted instrumentation in Medical Informatics, Computer assisted patient education and health, Medical education and health care information.

Course Outcome:

After completing subject, Students will be able to

CO1. Understand the informatics related to hospital management and security concerns.

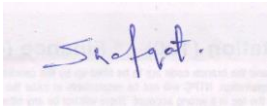


CO2. Understand the importance of Computerized Patient Record.
CO3. Understand the importance of computers in Clinical Laboratory and Medical Imagining.
CO4. Aware with the Recent Trends in Medical Informatics.

Text Books /References:

1. R.D. Lele Computers in medicine progress in medical informatics, Tata Mcgraw Hill Publishing computers Ltd, 2005, New Delhi.
2. Mohan Bansal, Medical informatics Tata Mcgraw Hill Publishing computers Ltd, 2003, New Delhi.

Note for Paper Setter: The Question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one from each unit.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Energy Audit and Management **Max. Marks: 100**
Course Code: PEC-EE-603 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]

Course Objective: This course gives an overview of various aspects of conservation, management & audit of electrical energy.

Detailed Contents:

Unit-I

Energy Scenario: Commercial and Non-commercial energy, primary energy resources, commercial energy production, final energy consumption, energy needs of growing economy, long term energy scenario, energy pricing, energy sector reforms, energy and environment, energy security, energy conservation and its importance, restructuring of the energy supply sector, energy strategy for the future, air pollution, climate change. Energy Conservation, Energy Conservation Act and its features.

Unit-II

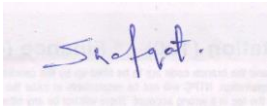
Energy Management & Audit: Definition, energy audit, need, types of energy audit. Energy management (audit) approach-understanding energy costs, bench marking, energy performance, matching energy use to requirement, maximizing system efficiencies, optimizing the input energy requirements, fuel energy substitution, energy audit instruments. Material and Energy balance: Facility as an energy system, methods for preparing process flow, material and energy balance diagrams.

Unit-III

Energy Efficiency in Electrical Systems: Electrical system: Electricity billing, electrical load management and maximum demand control, power factor improvement and its benefit, selection and location of capacitors, performance assessment of PF capacitors, distribution and transformer losses. Electric motors: Types, losses in induction motors, motor efficiency, factors affecting motor performance, rewinding and motor replacement issues, energy saving opportunities with energy efficient motors.

Unit-IV

Energy Efficiency in Industrial Systems: Compressed Air System: Types of air compressors, compressor efficiency, efficient compressor operation, Compressed air system components, capacity assessment, leakage test, factors affecting the performance and savings opportunities in HVAC, Fans and blowers: Types, performance evaluation, efficient system operation, flow control strategies and energy conservation opportunities. Pumps and Pumping System: Types, performance evaluation, efficient system operation, flow control strategies and energy conservation opportunities.
Cooling Tower: Types and performance evaluation, efficient system operation, flow control strategies and energy saving opportunities, assessment of cooling towers.



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Unit-V

Energy Efficient Technologies in Electrical Systems: Maximum demand controllers, automatic power factor controllers, energy efficient motors, soft starters with energy saver, variable speed drives, energy efficient transformers, electronic ballast, occupancy sensors, energy efficient lighting controls, energy saving potential of each technology.

Course Outcome:

At the end of this course, students will demonstrate the ability to

CO1. Understand the current energy scenario and realize the need for new reforms to efficiently manage the energy resources.

CO2. Learn various auditing techniques used for proper energy management.

CO3. Realize how energy conservation could be done in Electrical Systems by managing the energy losses and malpractices.

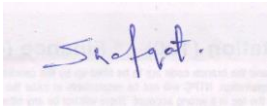
CO4. Realize how energy conservation could be done in Industrial Systems by finding out the factor affecting the performance of various industrial devices and mitigating the same.

CO5. How electrical energy management could be achieved using new energy efficient devices.

Text Books/Reference:

1. Guide books for National Certification Examination for Energy Manager / Energy Auditors Book-1, General Aspects (available online)
2. Guide books for National Certification Examination for Energy Manager / Energy Auditors Book-3, Electrical Utilities (available online)
3. **S. C. Tripathy**, "Utilization of Electrical Energy and Conservation", McGraw Hill, 1991.
4. Success stories of Energy Conservation by BEE, New Delhi (www.bee-india.org)

Note for Paper Setter: -The Question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one from each unit.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Industrial Electrical Systems **Max. Marks: 100**
Course Code: PEC-EE-604 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]

Course Objective: The course will give the fundamental knowledge about the Industrial Electrical Systems.

Detailed Contents:

Unit-I

Electrical System Components: LT system wiring components, selection of cables, wires, switches, distribution box, metering system, Tariff structure, protection components- Fuse, MCB, MCCB, ELCB, inverse current characteristics, symbols, single line diagram (SLD) of a wiring system, Contactor, Isolator, Relays, MPCB, Electric shock and Electrical safety practices

Unit-II

Residential and Commercial Electrical Systems: Types of residential and commercial wiring systems, general rules and guidelines for installation, load calculation and sizing of wire, rating of main switch, distribution board and protection devices, Earthing system calculations, requirements of commercial installation, deciding lighting scheme and number of lamps, Earthing of commercial installation, selection and sizing of components.

Unit-III

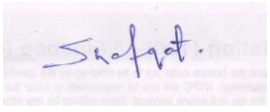
Illumination Systems: Understanding various terms regarding light, lumen, intensity, candle power, lamp efficiency, specific consumption, glare, space to height ratio, waste light factor, depreciation factor, various illumination schemes, Incandescent lamps and modern luminaries like CFL, LED and their operation, energy saving in illumination systems, design of a lighting scheme for a residential and commercial premises, flood lighting.

Unit-IV

Industrial Electrical Systems I: HT connection, industrial substation, Transformer selection, Industrial loads, motors, starting of motors, SLD, Cable and Switchgear selection, Lightning Protection, Earthing design, Power factor correction – kVAR calculations, type of compensation, Introduction to PCC, MCC panels. Specifications of LT Breakers, MCB and other LT panel components.

Unit-V

Industrial Electrical System Automation: Study of basic PLC, Role of in automation, advantages of process automation, PLC based control system design, Panel Metering and Introduction to SCADA system for distribution automation.



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Course Outcome:

At the end of this course, students will demonstrate the ability to

CO1. Understand various components of industrial electrical systems.

CO2. Understand the electrical wiring systems for residential, commercial and industrial consumers, representing the systems with standard symbols and drawings, SLD.

CO3. Understand illumination and various deign scheme for energy systems.

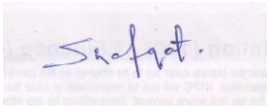
CO4. Analyze and select the proper size of various electrical system components.

CO5. Study the basics of PLCC and SCADA systems.

Text Books/References:

1. **S. L. Uppal and G. C. Garg**, "Electrical Wiring, Estimating &Costing", Khanna publishers, 2008.
2. **K. B. Raina**, "Electrical Design, Estimating & Costing", New age International, 2007.
3. **S. Singh and R. D. Singh**, "Electrical estimating and costing", Dhanpat Rai and Co., 1997.
4. Web site for IS Standards.
5. **H. Joshi**, "Residential Commercial and Industrial Systems", McGraw Hill Education, 2008.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one question from each unit.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Restructuring of Power System **Max. Marks: 100**
Course Code: PEC-EE-605 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]

Course Objective: The objective of this course is to allow the students to understand fundamental concepts of deregulated systems. This course also allows students to study deregulated models across the globe along with the cost mechanisms of transmitting power.

Detailed Contents:

Unit-I
Introduction: Basic concept and definitions, privatization, restructuring, transmission open access, wheeling, deregulation, components of deregulated system, advantages of competitive system.

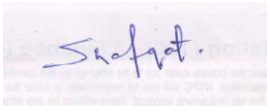
Unit-II
Power System Restructuring: An overview of the restructured power system, difference between integrated power system and restructured power system. Explanation with suitable practical examples. Restructuring reforms in India etc.

Unit-III
Deregulation of Power Sector: Separation of ownership and operation, Deregulated models, pool model, pool and bilateral trades model, multilateral trade model. Risk Analysis and Hedging.

Unit-IV
Competitive electricity market: Independent System Operator activities in pool market, wholesale electricity market characteristics, central auction, single auction power pool, double auction power pool, market clearing and pricing, Market Power and its Mitigation Techniques, Bilateral trading, Ancillary services.

Unit-V
Transmission Pricing: Marginal pricing of Electricity, nodal pricing, zonal pricing, embedded cost, postage stamp method, contract path method, boundary flow method, MW-mile method, MVA-mile method, comparison of different methods.

Course Outcome:
The restructuring and deregulation of the power utility industry is resulting in significant competitive, technological and regulatory changes. Independent power producers, power marketers and brokers have added a new and significant dimension to the task of maintaining a reliable electric system. This course been made to get students familiar with new ways of restructuring of power system. This course will enable student to:
CO1. Basic concept of deregulated system.
CO2. Differences between regulated and deregulated system.
CO3. Study various deregulated models present worldwide.

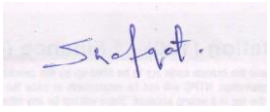


CO4. How demand and supply bids are auctioned.
CO5. Study various transmission pricing mechanisms.

Text Books/References:

1. **Loi Lei Lai**, Power System Restructuring and Deregulation, John Wiley & Sons. Ltd.
2. **Lorrin Philipson and H. Lee Wilis**, Understanding Electric Marcel Dekker Inc, New York Utilities and Deregulation.

Note for paper setter: The question paper shall comprise of ten questions. Two questions will be set from each unit. The student has to attempt five questions, selecting one question from each unit.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: High Voltage Engineering **Max. Marks: 100**
Course Code: PEC-EE-606 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]

Course Objective: This course familiarizes the students with working principles, operation, measurement and testing of high voltage systems and equipment.

Detailed Contents:

Unit-I
Conduction and Breakdown in Gases: Gases as insulators, ionization, current growth, Townsend's criterion for breakdown, electro-negative gases, Paschen's Law, Streamer breakdown mechanism, corona discharges, post breakdown phenomena, practical considerations in using gases for insulating materials.

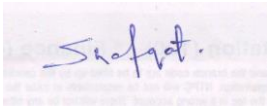
Unit-II
Conduction and Breakdown in Liquid Dielectrics: Classification of liquid dielectrics, conduction and breakdown in pure liquids and in commercial liquids.

Unit-III
Breakdown in Solid Dielectrics: Intrinsic breakdown, electromechanical breakdown, thermal breakdown, breakdown of solid dielectrics in practice, breakdown of composite insulation, solid dielectric used in practice.

Unit-IV
Applications of insulating materials in different electrical apparatus: Applications in power transformers, rotating machines, circuit breakers, cables, power capacitors, electronic equipment.

Unit-V
Generation & Measurement of High Voltages and Currents: Generation of high d.c. and a.c. voltages, generation of impulse voltages and currents.
Measurement of high d.c., a c. and impulse voltages, Measurement of high d.c, a.c and impulse currents.

Course Outcome:
At the end of this module students will be able to:
CO1. Understand different breakdown mechanisms in gases as well as post breakdown mechanisms.
CO2. Analyze different conduction and breakdown mechanisms in liquid dielectrics.
CO3. Analyze different conduction and breakdown mechanisms in solid dielectrics.
CO4. Foresee applications of different insulating materials in electrical apparatus.
CO5. Analyze the different techniques of generation and measurement of high voltage and current.

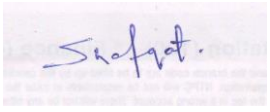


Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Text Books/ References:

1. **E. Kuffel, W.S Zaengl**, High Voltage Engineering Fundamentals, TMH.
2. **M.S. Naidu, V. Karamraju**, High Voltage Engineering, TMH.
3. **Dieter kind, Kurt Feser**, High voltage test techniques.
4. **Subir Ray**, An Introduction to High Voltage Engineering.

Note for paper setter: The question paper shall comprise of ten questions. Two questions will be set from each unit. The student has to attempt five questions, selecting one question from each unit.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Open Elective Courses

Course Title: Python Programming **Max. Marks: 100**
Course Code: OEC-EE-601/PCC-CSE-402 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]

Course Objective: Python is a modern language useful for writing compact code specifically for Programming in Server Side web Development, AI, data analytics and Game Programming. This course covers the basics and advanced python programming to harness its potential for modern computing requirements.

Detailed Contents:

Unit-I

Introduction to Python: Introduction to Python, History of python, Status of python, Installation and Working with Python, Understanding Python variables, Python basic Operators, Understanding python blocks.

Python Data Types: Declaring and using Numeric data types: int, float, complex, Using string data type and string operations, Defining list and list slicing, Use of Tuple data type, working with sequence.

Python Program Flow Control: Conditional blocks using if, else and else if, Simple for loops in python For loop using ranges, string, list and dictionaries, Use of while loops in python, Loop manipulation using pass, continue, break and else Programming, using Python conditional and loops block.

Unit-II

Python Functions, Modules and Packages: Organizing python codes using functions, organizing python projects into modules, Importing own module as well as external modules, Understanding Packages, Powerful Lamda function, Programming using functions, modules and external packages.

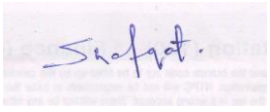
Python String, List and Dictionary Manipulations: Building blocks of python programs, Understanding string in build methods, List manipulation using in build methods, Dictionary manipulation, Programming using string, list and dictionary in build function.

Unit-III

Python Object Oriented Programming–Concept of class, object and instances, Constructor, class attributes and destructors, Real time use of class in live projects, Inheritance, overlapping and overloading operators, Adding and retrieving dynamic attributes of classes, Programming using Oops support.

Multithreading: Understanding threads, Forking threads, synchronizing the threads, Programming using multithreading.

Interfacing with the OS: Working with System (sys Module), Working with Operating System (os module).



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Unit-IV

Python File Operation: Reading config files in python, Writing log files in python, Understanding read functions, read(), readline() and readlines(), Understanding write functions, write() and writelines(), Manipulating file pointer using seek, Programming using file operations.

Python Regular Expression: Powerful pattern matching and searching, Power of pattern searching using regex in python, Real time parsing of networking or system data using regex, Password, email, url validation using regular expression, Pattern finding programs using regular expression.

Unit-V

Python Exception Handling: Avoiding code break using exception handling, Safe guarding file operation using exception handling, Handling and helping developer with error code, Programming using Exception handling, Built-in exception.

Python Database Interaction: SQL Database connection using python, creating and searching tables, Reading and storing config information on database, Programming using database connections.

Course Outcome:

At the end of this course, the students will able to do the following:

CO1. To Understand data types (like character strings, integers, and real numbers)and the Operations that can be applied to each data type

CO2. To write programs that get input, perform calculations, and provide output (using Conditional logic, loops, Functions).

CO3. To understand the OOPs concepts with respect to fourth generation language

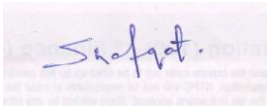
CO4. To write well designed and well documented programs that is easily maintainable.

CO5. To test and debug programs (find out what is wrong and fix it).

Text Books/References:

1. **R. Nageswara Rao,** "Core Python Programming", Dreamtech.
2. **Wesley J. Chun.,** "Core Python Programming", -2nd Edition Prentice Hall.
3. **Kenneth A. Lambert,**"The Fundamentals of Python: First Programs", 2011, Cengage Learning, ISBN: 978-1111822705.
4. **Luke Sneeringer, "Professional Python",** Wrox.
5. **John V Gutttag., "Introduction to Computation and Programming using Python",** Prentice Hall of India.
6. **Allen B. Downey, "Think Python", Green Tea Press, 2012.**
7. **CH Swaroop,** "A Byte of python," 2003.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit.



Course Title: Cyber-crime and Laws **Max. Marks: 100**
Course Code: OEC-EE-602/PEC-CSE-608 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]

Course Objectives: To maintain an appropriate level of awareness, knowledge and skill required to minimize the occurrence and severity of incidents related to cybercrimes, digital forensics and cyber law.

Detailed Contents:

Unit-I

Introduction to Cyber Crimes and Digital Forensics: Defining Cybercrime, Understanding the Importance of Jurisdictional Issues, Quantifying Cybercrime, Differentiating Crimes That Use the Net from Crimes That Depend on the Net, working toward a Standard Definition of Cybercrime, Categorizing Cybercrime, and Reasons for Cyber-crime. Ethical Hacking and its phases. Overview of computer forensics and Investigative Techniques.

Unit-II

Types and Categories of Cyber Crimes: Demystifying Computer/Cybercrime, Investigating Computer Crime and its categories, Ethical Hacking phases in details.

Unit-III

Computer Investigation Process: The concept of cyber security, meaning, scope and the frame work, Collecting and preserving Evidence.

Unit-IV

Constitutional & Human Rights Issues in Cyberspace: Freedom of Speech and Expression in Cyberspace Right to Access Cyberspace –Access to Internet, Right to Privacy, Right to Data Protection.

Unit-V

Need of Cyber ACT and Cyber Laws: The Indian Context, Need for a Cyber Act , Information Technology Act, Scope and further development, Information Technology Act(Amendment),Coverage of Cyber Security ad Cyber Crime Indian Cyber laws vs. Cyber laws of U.S.A. Similarities ,Scope and coverage, Effectiveness, Intellectual Property Rights(IPR).

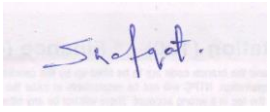
Course Outcome:

On successful completion of this course students will be able to

CO1. Understand basic concepts of cyber laws, ethical hacking and various investigation techniques

CO2. Understand the various types of cybercrime.

CO3. Understand the concept of cyber security and methods for Collecting and preserving Evidence.

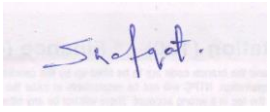


CO4. Understand the definition of Freedom of Speech and Expression in Cyberspace
CO5. Understand why the cyber acts and laws are required.

Text Books/References:

1. Computer Forensics: Cybercriminals, Laws, And Evidence, Marie - Helen Maras, Jones & Bartlett Learn, 1st Edition, 2011.
2. Computer Forensics: Investigating Network Intrusions and Cyber Crime, EC Council Press Series, Cengage Learning, 2010.
3. Hacking Exposed: Network Security Secrets & Solutions, Stuart McClure, Joel Seatnbra V and George Kurtz, McGraw-hill, 2005
4. Justice Yatindra Singh, Cyber Laws, Universal Law Publishing Co, New Delhi, (2012).
5. Cyber Forensics: from Data to Digital Evidence , Albert J. Marcella Jr., Wiley,1st Edition, 2012.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit .The student has to attempt five questions at least one from each unit.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Mobile and Wireless Communication **Max. Marks: 100**
Course Code: OEC-EE-603/PEC-ECE-601 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]

Course Objective: The course has been designed for explaining the basic concepts and principles to the students. Applied and Industrial Aspects have been taken care of in an appropriate manner.

Detailed Contents:

Unit-I
Signals and Systems: Basic elements of DSP, Concept of frequency in Analog and Digital Signals, Sampling theorem, Discrete time signals, Systems, Analysis of discrete time LTI systems.

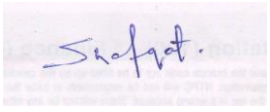
Unit-II
The Discrete Fourier Transform: Discrete Fourier transform (DFT), Properties of DFT: Periodicity, Linearity and Symmetry, Multiplication of two DFT's and Circular Convolution, Efficient Computation of the DFT: Computational complexity, FFT algorithms: Decimation-in-time and decimation-in-frequency.

Unit-III
Design of Digital IIR Filters: Discrete time IIR Filter from Analog Filter, IIR Filter Design: by Impulse Invariance, Bilinear Transformation, Approximation of derivatives (LPF, HPF, BPF), Structure for IIR Systems: Direct-Form Structures, Signal Flow Graphs and Transposed Structures, Cascade-Form Structures, Structures, Parallel-Form Structures.

Unit-IV
Design of Digital FIR Filters: Design of FIR Filters, Symmetric and Antisymmetric FIR Filters, Design of Linear-Phase FIR Filters: Using Windows (Rectangular Window, Hamming Window, Hanning Window) and by the Frequency-Sampling Method. Structures for FIR Systems: Direct-form structures, Cascade-form Structures.

Unit-V
Finite Word Length Effects in Digital Filters: Binary fixed point and floating point number representations. Quantization noise, Truncation and rounding, Quantization noise power, Input quantization error, Coefficient quantization error.

Course Outcome:
After completion of the course student will be able to:
CO1. Understand the basic concepts of Discrete Fourier transform and its application to linear filtering.
CO2. Understand and explain FFT algorithms and their computational efficiency in comparison to DFT.



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

CO3. Understand and explain the design of IIR filters by approximation of derivatives, impulse invariance and bilinear transformation.

CO4. Understand and explain the design of FIR filters by windowing and frequency sampling technique and provide a basic overview of special type of FIR filters.

CO5. Understand and explain the realization of filters using cascade and parallel structures as well as signal flow graphs and provide brief overview of the application areas of DSP.

Text Books/References:

1. J. G. Proakis and D. G. Manolakis: DSP, 3rd Edition, Pearson Education, 2007.

2. Johnny Johnson: Digital Signal Processing, 3rd Edition, PHI.

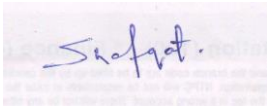
3. Emmanuel C. Ifeachor, and Barrie. W. Jervis, "Digital Signal Processing", 2nd Edition, Pearson Education, Prentice Hall, 2002.

4. Sanjit K. Mitra, "Digital Signal Processing-A Computer Based Approach" TMH, 2007.

5. A. Oppenheim, R.W. Schafer and J.R. Buck, Discrete-Time Signal Processing, 8th Indian Reprint, Person, 2004.

6. Andreas Antoniou, "Digital Signal Processing", Tata McGraw Hill, 2006.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit .The student has to attempt five questions at least one from each unit.



Course Title: Micro-Controller and Embedded Systems **Max. Marks: 100**
Course Code: OEC-EE-604/PCC-ECE-602 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]

Course Objective: The course has been designed for explaining the concept of Micro-Controller and Embedded systems by means of studying the architecture and real time operating systems.

Detailed Contents:

Unit-I
Introduction to Embedded Systems: Overview of Embedded System Architecture, Application areas, Categories of embedded systems, specialties of embedded systems. Recent trends in embedded systems. Brief introduction to embedded microcontroller cores CISC, RISC, ARM, DSP and SoC.

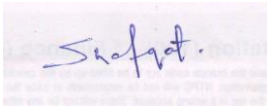
Unit-II
The Microcontroller Architecture: Introduction to 8051 Microcontroller, Architecture, Pin configuration, Memory organization, Input /Output Ports, Counter and Timers, Serial communication, interrupts.

Unit-III
Assembly Language Programming of 8051: Instruction set, Addressing modes, Development tools, Assembler Directives, Programming based on Arithmetic & Logical operations, I/O parallel and serial ports, Timers & Counters, and ISR.

Unit-IV
ARM 7 architecture: Architectural inheritance, Detailed study of Programmer's model, ARM Development tools, Instruction set: Data processing, Data transfer, Control flow. Addressing modes. Writing simple assembly language programs. Pipelining, Brief introduction to exceptions and interrupts handling.

Unit-V
Embedded / Real Time Operating System: Architecture of kernel, Task and Task scheduler, Interrupt service routines, Semaphores, Mutex, Mailboxes, Message queues, Event registers, Pipes, Signals, Timers, Memory management, Priority inversion problem. Off-the-Shelf Operating Systems, Embedded Operating Systems, Real Time Operating System (RTOS) and Handheld Operating Systems.

Course Outcome:
After completion of the course student will be able to:
CO1. Ability to understand basic structure embedded systems

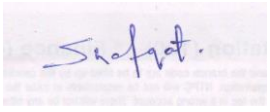


CO2. Ability to understand basic structure microcontroller.
CO3. Ability to understand basic concepts used in embedded system.
CO4. Ability to program microcontroller.
CO5. Ability to design conceptual embedded system.

Text Books/References:

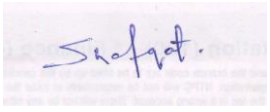
1. M. A. Mazidi, J. G. Mazidi, R. D. McKinlay The 8051 microcontroller & Embedded systems, Pearson.
2. Steve FurberARM System on chip Architecture, Pearson, 2nd edition.
3. Dr. K. V. K. K. Prasad, Embedded / real – time systems: concepts, design & programming, Black Book, Dreamtech press, Reprint edition 2013.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit .The student has to attempt five questions at least one from each unit.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Semester VII



Course Title: Entrepreneurship Development & Management **Max. Marks: 100**
Course Code: HSMC-EE-701 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]

Course Objective: Course is designed to acquaint the students with the skills required to become entrepreneurs and to create an awareness of the need for systematic management of projects.

Detailed Contents:

Unit-I
Entrepreneurship Development: Meaning, objectives, type of entrepreneurs, importance of entrepreneurship training, factors affecting entrepreneurship, linkage between entrepreneurship and economic development, problem of increasing unemployment, balanced regional growth, harnessing locally available resources, New Industrial Policy and innovation in enterprises.

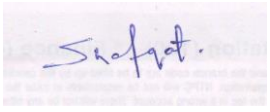
Unit-II
Entrepreneurship Support System: Small Industries Development Bank of India, Small Industries service Institute, State Small Industries and Export Corporation, District Industrial Centre's and other supporting agencies.

Unit-III
Project Report Preparation: Identifying business opportunities, Project report and its importance, various contents of project report: managerial and entrepreneurial capabilities, socio-economic benefits, Demand analysis, technical feasibility and financial viability.

Unit-IV
Introduction to Marketing Management: Brief introduction to various types of product strategies, pricing strategies, Channel strategies and Promotional strategies.
Introduction to Production Management: Types of production systems, production planning and control, functions of Production Manager and Materials Management.

Unit-V
Introduction To Human Resource Management: Manpower Planning, Recruitment, selection, placement and induction, training and development, compensation.
Introduction to Financial Management: source of finance and Working Capital management.

Course Outcome:
After completion of this subject student will be able to:
CO1. Understand the meaning, objectives and types of entrepreneurs.
CO2. Understand the Entrepreneurship Support System.



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

CO3. Prepare to Project Report.

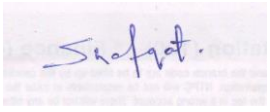
CO4. Analyze business opportunities, technical feasibility and financial viability in context to entrepreneurship.

CO5. Plan the business.

Text Books/References:

1. **Holt David H**, Entrepreneurship: New Venture Creation, PHI (4000).
2. **Saini Jasmer Singh**, Entrepreneurship Development Programmes and Practices, Deep and Deep Publications, New Delhi (1998).
3. **Dollinger**, Entrepreneurship Strategies and Resources, Pearson Education (4003).
4. **Jose Paul & Kumar Ajith N**, Entrepreneurship Development and Management, Himalaya Publishers, New Delhi (4000).
5. **Hisrich Robert D and Micheal Peters P**, Entrepreneurship, TMH, (4002).

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Power System Protection **Max. Marks: 100**
Course Code: PCC-EE-701 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]

Course Objective: This course makes the student familiar with various types of protection schemes & equipment's used for protection of electrical power system.

Detailed Contents:

Unit-I

Relays: Function of protective relaying, fundamental principles, primary and backup relaying, functional characteristics. Operating principles and characteristics of the following electromechanical relays: Current, voltage, directional, current balance, voltage balance, differential relays, and distance relays.

Unit-II

Protection of Generators & Transformers: Short-circuit protection of stator windings, Overheating protection, Overvoltage protection, Protection against vibration, protection against motoring over speed.

Short circuit protection, over current and earth-fault protection differential protection. Use of biased relay for differential protection, self-balance system protection, differential magnetic balance protection, Buchholz relay, protection of parallel transformer banks.

Unit-III

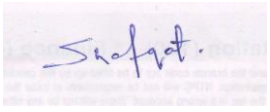
Protection of Feeders, Bus-bars and Transmission Lines: Protection of feeders, time limit fuse, over current protection for radial feeders, protection of parallel feeders, differential protection for parallel feeders, differential pilot wire protection, Circulating current protection, protection for bus-bars.

Unit-IV

Fuses: Fusing element, classification of fuses, current carrying capacity of fuses, high rupturing capacity (H.R.C.) cartridge fuses, characteristics of H.R.C. fuses, selection of HRC fuses. MCBs. Types of MCBs.

Unit-V

Circuit Breaker: Types of circuit breakers, basic principle of operation, phenomena of arc, initiation of a arc, maintenance of arc, arc extinction, d.c. circuit breaking, a.c. circuit breaking, arc voltage and current waveforms in a.c. circuit breaking, restricting and recovery voltages, de-ionization and current chopping, ratings of circuit breakers, oil circuit breakers, air blast circuit breakers, SF6 Circuit breakers, Vacuum breakers.



Course Outcome:

This course will enable student to:

CO1. Understand the importance of various types of relays.

CO2. Understand the protection scheme for generators and transformers.

CO3. Understand the protection scheme of feeder, bus-bar and transmission lines.

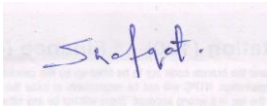
CO4. Understand the concept and use of fuses.

CO5. Understand the use of circuit breaker in protection schemes of various power system equipments.

Text Books/References:

1. **C.R Mason**, The Art and Science of Protective Relaying, John Wiley & Sons
2. **Badri Ram,** Power System Protection and switchgear, TMH
3. **J. L Black. Burn**, Protective relaying, Principles and Applications.

Note for Paper Setter: The Question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one from each unit.



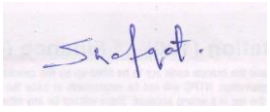
Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Minor Project **Max. Marks: 100**
Course Code: PROJ-EE-701 **University Exam: 0**
Internal Assessment: 100
Credits: 3 [3-0-0]

Detailed contents

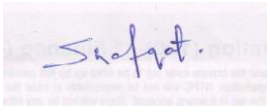
At the start of VII semester every student shall be allotted a Minor Project under the supervision of an allotted mentor. Students are required to do preliminary exercise of survey of literature and preparation of a road map of the selected Major Project under the supervision of their allotted mentor. Students are required to complete the Minor Project during semester VII. Minor Project shall be evaluated internally as per university statutes by a committee consisting of:

1. Head of the Department
2. One member nominated by Principal
3. Coordinator(s)/Supervisor(s) of minor project/training.



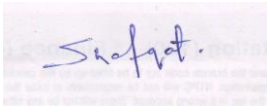
Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Course Title: Professional Elective Courses-IV **Max. Marks: 100**
Course Code: PEC-EE-(---) **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]



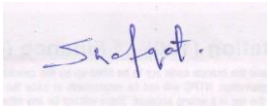
Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Course Title: Professional Elective courses-V **Max. Marks: 100**
Course Code: PEC-EE-(---) **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Open Elective courses-III **Max. Marks: 100**
Course Code: OEC-EE-(---) **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: _____



Mr. S. N. Mughal **(Head E.E.)**
Mr. Tasaduq Hussain **(A.P., EE)**
Mr. Ahmed Riyaz **(A.P., EE)**
Prof. Asif Husain **(Dean, SOET)**

Course Title: Power System Protection Lab. **Max. Marks: 50**
Course Code: PCC-EE-711 **University Exam: 25**
Duration of Exam: 2 Hours **Internal Assessment: 25**
Credits: 1 [0-0-2]

Laboratory Objective: The laboratory will give the overall idea about the protection scheme involve in power systems.

List of Experiments:

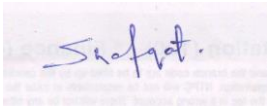
1. Study of various types of relays.
2. Characteristics of different relays, Directional over current relay
3. Characteristics of inverse time over current relays, under voltage relay.
4. Time graded protection using inverse time O/C relays
5. Study of circuit breakers.
6. Study of differential protection scheme. Percentage biased deferential relay.
7. Study of an oil circuit breaker.
8. Experiment on Digital Protection. Microprocessor based over voltage/ under voltage relay.

Laboratory Outcome:

Student will able

CO1. Get an exposure to different types of protecting relays.
CO2. Understand the basic characteristics of Time graded protection system.
CO3. Understand the usage of different type of circuit breaker.
CO4. To understand digital protection.
CO5. To understand microprocessor based over voltage/ under voltage relay.

Note: These are only the suggested list of experiments. Instructor may add or change some experiments relevant to the course contents.



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Course Title: Electrical Drives Lab. **Max. Marks: 50**
Course Code: PCC-EE-712 **University Exam: 25**
Duration of Exam: 2 Hours **Internal Assessment: 25**
Credits: 1 [0-0-2]

Laboratory Objective: The objective of this laboratory is to equip student with various characteristics of power electronics drives.

List of Experiments:

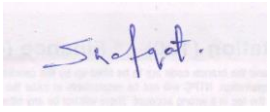
1. Speed control of DC motor using SCR converter.
2. Speed control of DC motor using IGBT voltage source Inverter.
3. V/f control of 3-phase induction motor using V/f controller.
4. V/f control of 3-phase induction motor using IGBT voltage source Inverter.
5. Speed control of BLDC motor using IGBT voltage source Inverter.
6. Speed control of Switched Reluctance motor using IGBT voltage source Inverter.
7. Speed control of Multiphase Inverter Drive.
8. To develop closed loop control of DC motor in MATLAB and analyze its performance.
9. To develop V/f control of Induction motor in MATLAB and analyze its performance.
10. To develop closed loop control of Induction motor in MATLAB and analyze its performance.

Laboratory Outcome:

At the end of the laboratory the students will be able to

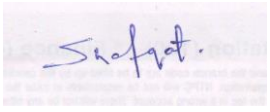
CO1. Control the speed of DC and BLDC motor.
CO2. Control the speed of Multiphase Inverter Drive.
CO3. Control the speed of Switched Reluctance motor.
CO4. Analyze V/f control of induction motor.
CO5. Develop and analyze the performance of DC motor and Induction motor in MATLAB.

Note: These are only the suggested list of experiments. Instructor may add or change some experiments relevant to the course contents.



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Course Title: Seminar & Industrial Training-II **Max. Marks: 25**
Course Code: PROJ-EE-711 **University Exam: 0**
Internal Assessment: 25
Credits: 1 [0-0-0]



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Professional Elective Courses

Course Title: Wind and Solar Energy Systems **Max. Marks: 100**
Course Code: PEC-EE-701 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]

Course Objective: The objective of this course is to have overall knowledge about the various technologies for wind and solar power generation.

Detailed Contents:

Unit-I
Physics of Wind Power: History of wind power, Indian and Global statistics, Wind physics, Betz limit, Tip speed ratio, stall and pitch control, Wind speed statistics-probability distributions, Wind speed and power-cumulative distribution functions.

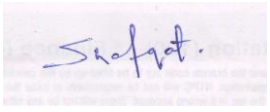
Unit-II
Wind generator topologies: Review of modern wind turbine technologies, Fixed and Variable speed wind turbines, Induction Generators, Doubly-Fed Induction Generators and their characteristics, Permanent-Magnet Synchronous Generators, Power electronics converters. Generator-Converter configurations, Converter Control.

Unit-III
The Solar Resource and Solar photovoltaic: Introduction, solar radiation spectra, solar geometry, Earth Sun angles, observer Sun angles, solar day length, Estimation of solar energy availability. Technologies-Amorphous, mono-crystalline, polycrystalline; V-I characteristics of a PV cell, PV Units, array, Power Electronic Converters for Solar Systems, Maximum Power Point Tracking (MPPT) algorithms. Converter Control.

Unit-IV
Network Integration Issues: Overview of grid code technical requirements. Fault ride-through for wind farms - real and reactive power regulation, voltage and frequency operating limits, solar PV and wind farm behavior during grid disturbances. Power quality issues. Power system interconnection experiences in the world. Hybrid and isolated operations of solar PV and wind systems.

Unit-V
Solar thermal power generation: Technologies, Parabolic trough, central receivers, parabolic dish, Fresnel, solar pond, elementary analysis.

Course Outcome:
At the end of this course, students will demonstrate the ability to



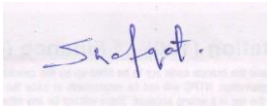
Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

CO1. Understand the basic physics of wind.
CO2. Understand the various wind generation topologies.
CO3. Understand the sun characteristics and solar photovoltaic systems.
CO4. Understand the power electronic interfaces for wind and solar generation.
CO5. Understand concentrated solar photo voltaic technology.

Text Books/ References:

1. **T. Ackermann**, "Wind Power in Power Systems", John Wiley and Sons Ltd., 2005.
2. **G. M. Masters**, "Renewable and Efficient Electric Power Systems", John Wiley and Sons, 2004.
3. **S. P. Sukhatme**, "Solar Energy: Principles of Thermal Collection and Storage", McGraw Hill, 1984.
4. **H. Siegfried and R. Waddington**, "Grid integration of wind energy conversion systems" John Wiley and Sons Ltd., 2006.
5. **G. N. Tiwari and M. K. Ghosal**, "Renewable Energy Applications", Narosa Publications, 2004.
6. **J. A. Duffie and W. A. Beckman**, "Solar Engineering of Thermal Processes", John Wiley & Sons, 1991.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one question from each unit.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Line-Commutated Active Rectifiers **Max. Marks: 100**
Course Code: PEC-EE-702 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]

Course Objective: The objective of this course to give Fundamental knowledge about the operations of PWM rectifier and Line commutated rectifier.

Detailed Contents:

Unit-I

Diode and Thyristor rectifiers with passive filtering: Half-wave diode rectifier with RL and RC loads; 1-phase full-wave diode rectifier with L, C and LC filter; 3-phase diode rectifier with L, C and LC filter; continuous and discontinuous conduction, input current wave shape, effect of source inductance; commutation overlap.

Half-wave thyristor rectifier with RL and RC loads; 1-phase thyristor rectifier with L and LC filter; 3-phase thyristor rectifier with L and LC filter; continuous and discontinuous conduction, input current wave shape.

Unit-II

Multi-Pulse converter: Review of transformer phase shifting, generation of 6-phase ac voltage from 3-phase ac, 6-pulse converter and 12-pulse converters with inductive loads, steady state analysis, commutation overlap, notches during commutation.

Unit-III

Single-phase ac-dc single-switch boost converter: Review of dc-dc boost converter, power circuit of single-switch ac-dc converter, steady state analysis, Unity power factor operation, closed-loop control structure.

Unit-IV

Ac-dc bidirectional boost converter: Review of 1-phase inverter and 3-phase inverter, power circuits of 1-phase and 3-phase ac-dc boost converter, steady state analysis, operation at leading, lagging and Unity power factors. Rectification and regenerating modes. Phasor diagrams, closed-loop control structure.

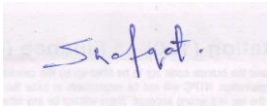
Unit-V

Isolated single-phase ac-dc fly back converter: Dc-dc fly back converter, output voltage as a function of duty ratio and transformer turns ratio. Power circuit of ac-dc fly back converter, steady state analysis, Unity power factor operation, closed loop control structure.

Course Outcome:

At the end of this course, students will demonstrate the ability to

CO1. Analyze different rectifier circuit with passive filter.

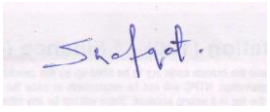


CO2. Express the design and control of 6 pulse and 12 pulse converter.
CO3. Analyze the operation of single phase AC/DC single switch converter.
CO4. Understand the working and control of AC/DC bi directional boost converter.
CO5. Analyze the operation of Isolated AC/DC fly back converter.

Text Books/ References:

1. **G. De**, "Principles of Thyristorised Converters", Oxford & IBH Publishing Co, 1988.
2. **J.G. Kassakian**, **M. F. Schlecht and G. C. Verghese**, "Principles of Power Electronics", Addison-Wesley, 1991.
3. **L. Umanand,** "Power Electronics: Essentials and Applications", Wiley India, 2009.
4. **N. Mohan** and **T. M. Undeland**, "Power Electronics: Converters, Applications and Design", John Wiley & Sons, 2007.
5. **R. W. Erickson and D. Maksimovic**, "Fundamentals of Power Electronics", Springer Science & Business Media, 2001.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one question from each unit.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: EHV AC and DC Transmission **Max. Marks: 100**
Course Code: PEC-EE-703 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]

Course Objective: The objective of this course is to provide in-depth knowledge of various electrical aspects associated with AC & DC transmission of power at Extra High Voltages.

Detailed contents:

Unit-I

Introduction: Historical background, Component of EHV-AC transmission network. Need of EHV transmission, comparison of EHV Ac & Dc transmission, mechanical considerations of transmission line, Overview of present transmission system in India, future plan in transmission.

Unit-II

EHV AC Transmission: Parameters of EHV line, over-voltage due to switching, Ferro-resonance, line insulator and clearance, corona, long distance transmission with series & shunt. Principle of half wave transmission. Flexible ac transmission. EHV AC transmission system, transmission planning and its correlation with generation. Compensations, principle of half wave transmission flexible ac transmission.

Unit-III

EHV DC Transmission: Types of dc links, terminal equipment and their operations, HVDC system control reactive power control, harmonics, multi-terminal dc (MTDC) system, ac/dc system analysis, protection of terminal equipments.

Unit-IV

Design of EHV transmission: Transmission network, selection of operating voltage and conductor, calculation of voltage gradient, corona loss, radio interference level.

Unit-V

Control of EHV system: Basic principle of control, control implementation, converter firing control system, value blocking and by passing, stopping and power flow reversal.

Course Outcome:

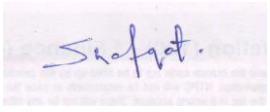
This course will allow the students to:

CO1. Understand the need of EHV transmission.

CO2. Analyze different parameters of EHV AC transmission systems and study of various compensation methods.

CO3. Understand different EHVDC transmission systems and various associated protection schemes.

CO4. Study and understand the design of EHV transmission system.



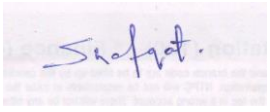
Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

CO5. Realize the need for control of EHV systems and implementing the corresponding control strategies.

Text Books/References:

1. **Rakesh Das Begmudre,** Extra High Voltage AC Transmission Engineering, Wiley Eastern Limited.
2. **Padiyar K.R.**, HVDC Power Transmission System? Wiley Eastern Limited.
3. **Kimbark E.W.**, EHV-AC and HVDC Transmission Engineering & Practice, Khanna. Publishers.

Note for paper setter: The question paper shall comprise of ten questions. Two questions will be set from each unit. The student has to attempt five questions, selecting one question from each unit.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Control Systems Design **Max. Marks: 100**
Course Code: PEC-EE-704 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]

Course Objective: The objective of this course is to study and analyze the design specifications of control systems in time domain and frequency domain along with the study of design in state space model.

Detailed contents:

Unit-I
Design Specifications: Introduction to design problem and philosophy. Introduction to time domain and frequency domain design specification and its physical relevance. Effect of gain on transient and steady state response. Effect of addition of pole on system performance. Effect of addition of zero on system response.

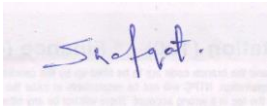
Unit-II
Design of Classical Control System in the time domain: Introduction to compensator. Design of Lag, lead lag-lead compensator in time domain. Feedback and Feed forward compensator design. Feedback compensation. Realization of compensators.

Unit-III
Design of Classical Control System in frequency domain: Compensator design in frequency domain to improve steady state and transient response.
Feedback and Feed forward compensator design using bode diagram.

Unit-IV
Design of PID controllers: Design of P, PI, PD and PID controllers in time domain and frequency domain for first, second and third order systems. Control loop with auxiliary feedback – Feed forward control.

Unit-V
Control System Design in state space: Review of state space representation. Concept of controllability & observability, effect of pole zero cancellation on the controllability & observability of the system, pole placement design through state feedback. Ackerman's Formula for feedback gain design. Design of Observer. Reduced order observer. Separation Principle.

Course Outcome:
At the end of this course
CO1. Students will demonstrate the ability to understand various design specifications.

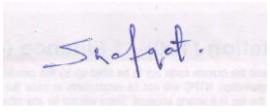


CO2. To understand the role of compensators in classical control system.
CO3. To study design of compensators in frequency domain using bode plot.
CO4. Design controllers to satisfy the desired design specifications using simple controller structures (P, PI, PID, compensators).Design controllers using the state-space approach.
CO5. To understand state space design of control system.

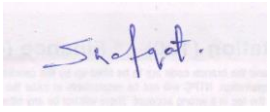
Text Books/References:

1. **N. Nise**, "Control system engineering", John Wiley, 2000.
2. **I. J. Nagrath and M. Gopal**, "Control system engineering", Wiley, 2000.
3. **M. Gopal**, "Digital Control Engineering", Wiley Eastern, 1988.
4. **K. Ogata**, "Modern Control Engineering", Prentice Hall, 2010.
5. **B. C. Kuo**, "Automatic Control system", Prentice Hall, 1995.
6. **J. J. D'Azzo and C. H. Houpis**, "Linear control system analysis and design (conventional and modern)", McGraw Hill, 1995.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one question from each unit.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Electrical Drives **Max. Marks: 100**
Course Code: PEC-EE-705 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]

Course Objective: The Objectives to introduce the basic concepts of DC electric drives and AC electric drives and their closed-loop operation including microprocessor based arrangements.

Detailed contents:

Unit-I

Types of Drives and Load: Introduction, advantages of electric drives, components of electric drives, modes of operation, characteristic of different types of mechanical load, steady state stability of motor load system, fluctuating loads and load equalization, thermal loading of motor, estimation of motor rating for continuous, intermittent and short time duty loads.

Unit-II

DC Drives I: Characteristics of DC motors. Conventional methods of speed control: rheostatic, field and armature control. Electric braking of DC drives: Regenerative braking, Plugging and dynamic braking. Phase control of fully controlled DC drives, continuous and discontinuous conduction modes of operation.

Unit-III

DC Drives II: Chopper controlled drives. Comparison of phase and chopper controlled drives. Review of feedback control, closed loop configurations in electric drives: current limit control, torque control, speed control of multi-motor drives and position control. Closed loop control of phase and chopper controlled dc drives. Microprocessor controlled electric drives.

Unit-IV

AC Drives I: Review of three phase induction motor characteristics. Electric braking of induction motor drives: Regenerative, Plugging, AC and DC dynamic braking. Methods of speed control of induction motors: stator voltage control, variable frequency control, and pole changing and pole amplitude modulation.

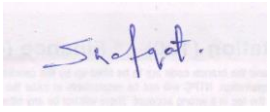
Unit-V

AC Drives II: Speed control of wound rotor induction motor: rotor resistance control (conventional and static), slip power recovery schemes. Closed loop control of induction motor drives: VSI control, static rotor resistance control, static Scherbius and Kramer drives, current regulated VSI drives. Introduction to vector control.

Course Outcome:

At the end of the course the students will be able to

CO1. Apply the knowledge of drives and use them effectively.



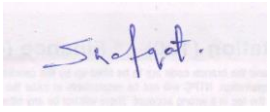
Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

CO2. Able to control the speed of DC motor and Induction motor.
CO3. Able to realize different braking methods in AC/ DC drive.
CO4. Suggest the particular type of AC/DC drive system for an application.
CO5. To apply close loop control in AC/DC Drive.

Text Books/References:

1. **G. K. Dubey**, Fundamentals of Electric Drives, Narosa Publications, New Delhi.
2. **B. K. Bose**, Power Electronics and variable frequency drives, PHI.
3. **R. Krishnan**, "Electric Motor Drives: Modeling, Analysis and Control", PHI.
4. **M. Ahmad**, High Performance AC Drives: Modelling, Analysis and Control, Springer.

Note for Paper Setter: The Question paper shall comprise of 10 questions. Two questions will be set from each unit .The student has to attempt five questions at least one from each unit.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Energy Economics and Planning **Max. Marks: 100**
Course Code: PEC-EE-706 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]

Course Objective: This course creates awareness among students about energy economics and planning. It familiarizes students about financial performance of renewable energy systems.

Detailed contents:

Unit-I

Introduction: Basics in economics; Resources scarcity; Concept of opport Unity cost; Law of demand; Derivation of demand curve; Different elastic's of demand; Theory of firm; Production function, Output maximization, cost minimization and profit maximization principles; Input demand function; Different cost concept; Supply curve; Theory of market.

Unit-II

Energy Economics: Basic concept of energy economics; Calculation of Unit cost of power generation from different sources with examples; Eco-ground rules for investment in energy sector; Payback period, NPV, IRR, and benefit-c.ost analysis with example; Overview of national energy use, energy supply and renewable energy program during different plan period.

Unit-III

Modeling of energy systems and Policies: Basic concepts of Econometrics and statistical analysis; Econometric techniques used for energy analysis and forecasting with case studies from India; Operation of computer package Basic concept of Input-output analysis; Concept of energy multiplier; Optimization and simulation methods; Energy & development.

Unit-IV

Rural energy economics: Rural economic and social development considerations; Technologies, costs and choice of technology, Demand and benefits forecasting and program development; Economics, financial analysis, and bottlenecks of various decentralized renewable energy electrification program; Analysis of models controlled by local bodies.

Unit-V

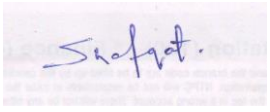
Financing of renewable energy systems: Financial performance; uncertainties and social cost-benefit analysis of renewable energy systems; financing mechanism of different renewable energy systems; case studies; renewable energy projects for reduction in CO2 emissions.

Course Outcome:

At the end of this course, students will be able to:

CO1. Understand the law of demand subject to resource scarcity.

CO2. Basic concepts of Energy economics subject to eco ground rules.



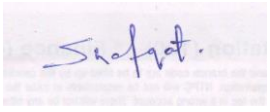
Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

CO3. Understand the econometric forecasting of energy resources.
CO4. Analyze economics sector of rural area.
CO5. Analyze financing performance of non-conventional energy systems.

Text Books/References:

1. **M. Munasinghe and P. Meier** (1993): Energy Policy Analysis and Modeling, Cambridge University Press.
2. **Dixon, et ai, Economic Analysis of Environmental Impacts**, Eartscan Publications ltd.,London,.
3. **T.e. Kandpal, H. P. Garg, Rnancial** Evaluation of Renewable Energy Technology, Macmilan India Ltd.New Delhi, 4003.
4. **White J. A**., et. aI.,Principles of Engineering of Economic Analysis, John Wiley and Sons. Inc. 1989.

Note for paper setter: The question paper shall comprise of ten questions. Two questions will be set from each unit. The student has to attempt five questions, selecting one question from each unit.



Open Elective Courses

Course Title: Analog and Mixed Signal Design **Max. Marks: 100**
Course Code: OEC-EE-701/PEC-ECE-708 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]

Course Objective: The principle objective of this subject is to introduce students to various analog and mixed signal design approaches.

Detailed Contents:

Unit-I

Mixed Design Introduction: Analog Design, Digital Design, Mixed Design, Introduction to analog VLSI and mixed signal issues in CMOS technologies.

Unit-II

MOS Models: Basic MOS models, SPICE Models and frequency dependent parameters. Basic NMOS/CMOS gain stage, cascade and cascade circuits. Frequency response, stability and noise issues in amplifiers.

Unit-III

CMOS analog blocks: Current Sources and Voltage references. Differential amplifier and OPAMP design. Frequency Synthesizers, Voltage Controlled Oscillators and Phased lock-loop.

Unit-IV

Non-linear analog blocks: Comparators, Charge-pump circuits and Multipliers. Data converters. Analog Interconnects. Analog Testing and Layout issues. Low Voltage and Low Power Circuits.

Unit-V

RF-Electronics: Introduction to RF Electronics. Basic concepts in RF design, Challenges and Applications

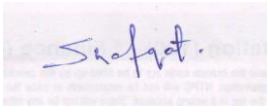
Course Outcome:

After completion of the course student will be able to:

CO1. Understand the basics of analog, digital and mixed signal design.
CO2. Design basic cascade and cascade circuits using MOS and extract their performance parameters.
CO3. Analyze various CMOS based analog designs.
CO4. Design low power and non-linear circuits.
CO5. Explain the basics of RF Design and its challenges.

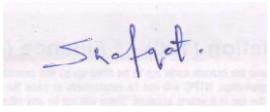
Text Books/References:

1. David Johns, "Analog Integrated Circuit Design", John Wiley and Sons 1997



2. M. Fakhfakh, “Analog/RF and Mixed signal circuit systematic design”, Springer, 2013
3. BehzadRazavi, “Design of Analog CMOS Integrated Circuits”, McGraw Hill 2000
4. Rudy van de Plassche, “Integrated Analog to digital and digital to analog converters”, Springer 2003

Note for paper setter: The question paper shall comprise of ten questions. Two questions will be set from each unit. The student has to attempt five questions, selecting one question from each unit.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Artificial Intelligence **Max. Marks: 100**
Course Code: OEC-EE-702/PCC-CSE-702 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]

Course Objective: The student should be made to Learn the various soft computing frame works be familiar with design of various neural networks be exposed to fuzzy logic Learn genetic programming.

Detailed Contents:

Unit-I

Artificial intelligence systems: Neural networks, fuzzy logic, genetic algorithms. Artificial neural networks: Biological neural networks, model of an artificial neuron, Activation functions, architectures, characteristics learning methods, brief history of ANN research- Early ANN architectures (basics only)-McCulloch & Pitts model, Perceptron, adaline, madaline**.**

Unit-II

Back propagation networks: architecture, multilayer perceptron, back propagation learning-input layer, hidden layer, output layer computations, calculation of error, training of ANN, BP algorithm, momentum and learning rate, Selection of various parameters in BP networks. Variations in standard BP algorithms- Adaptive learning rate BP, resilient BP, Levenberg-Marquardt, and conjugate gradient BP algorithms (basic principle only)-Applications of ANN.

Unit-III

Fuzzy logic: Crisp & fuzzy sets fuzzy relations fuzzy conditional statements fuzzy rules fuzzy algorithm. Fuzzy logic controller fuzzification interface knowledge base decision making logic defuzzification interface design of fuzzy logic controller case studies.

Unit-IV

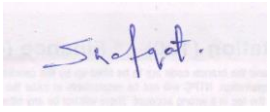
Genetic algorithms: Basic concepts, encoding, fitness function, Reproduction-Roulette wheel, Boltzmann, tournament, rank, and steady state selections, Elitism. Inheritance operators, Crossover-different types, Mutation, Bit-wise operators, Generational cycle, Convergence of GA, Applications of GA case studies. Introduction to genetic programming-basic concepts.

Unit-V

Hybrid soft computing techniques & applications: Neuro-fuzzy hybrid systems – genetic neuro hybrid systems – genetic fuzzy hybrid and fuzzy genetic hybrid systems simplified fuzzy ARTMAP, Applications: A fusion approach of multispectral images with SAR, optimization of traveling salesman problem using genetic algorithm approach, soft computing based hybrid fuzzy controllers.

Course Outcome:

CO1. Understand basics of artificial intelligence.



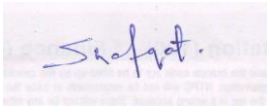
Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

CO2. Design of various neural networks
CO3. Use fuzzy logic to solve non crisp problems.
CO4. Understand genetic programming.
CO5. Apply various soft computing frameworks.

Text Books/References:

1. J.S.R.Jang, C.T. Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", PHI / Pearson Education 2004.
2. S.N.Sivanandam and S.N.Deepa, "Principles of Soft Computing", Wiley India Pvt Ltd, 2011.
3. Rajasekaran and G.A.VijayalakshmiPai, "Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis & Applications", Prentice-Hall of India Pvt. Ltd., 2006.
4. George J. Klir, Ute St. Clair, Bo Yuan, "Fuzzy Set Theory: Foundations and Applications" Prentice Hall, 1997.
5. David E. Goldberg, "Genetic Algorithm in Search Optimization and Machine Learning" Pearson Education India, 2013.
6. James A. Freeman, David M. Skapura, "Neural Networks Algorithms, Applications, and Programming Techniques, Pearson Education India, 1991.
7. Simon Haykin, "Neural Networks Comprehensive Foundation" Second Edition, Pearson Education, 2005

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Internet of Things **Max. Marks: 100**
Course Code: OEC-EE-703/PEC-CSE-702 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]

Course objectives:

The main objectives of this course are:

1. To assess the vision and introduction of IoT.
2. To Implement Data and Knowledge Management and use of Devices in IoT Technology.
3. To Understand State of the Art - IoT Architecture.
4. To classify Real World IoT Design Constraints, Industrial Automation in IoT.

Detailed Contents:

Unit-I

Introduction to Internet of Things (IoT): Genesis of IoT, IoT and Digitization, IoT Impact, Convergence of IT and IoT, IoT Challenges, IoT Network Architecture and Design, Drivers Behind New Network Architectures, Comparing IoT Architectures, A Simplified IoT Architecture, The Core IoT Functional Stack, IoT Data Management and Compute Stack.

Unit-II

Smart Objects: The "Things" in IoT, Sensors, Actuators, and Smart Objects, Sensor Networks, Connecting Smart Objects, Communications Criteria, IoT Access Technologies.

Unit-III

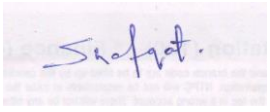
IP as the IoT Network Layer: The Business Case for IP, The need for Optimization, Optimizing IP for IoT, Profiles and Compliances, Application Protocols for IoT, The Transport Layer, IoT Application Transport Methods.

Unit-IV

Data and Analytics for IoT: An Introduction to Data Analytics for IoT, Machine Learning, Big Data Analytics Tools and Technology, Edge Streaming Analytics, Network Analytics, Securing IoT, A Brief History of OT Security, Common Challenges in IoT Security, How IT and IoT Security Practices and Systems Vary, Formal Risk Analysis Structures: OCTAVE and FAIR, The Phased Application of Security in an Operational Environment.

Unit-V

IoT Physical Devices and End-points: Arduino UNO: Introduction to Arduino, Arduino UNO, Installing the Software, Fundamentals of Arduino Programming. IoT Physical Devices and Endpoints – RaspberryPi: Introduction to RaspberryPi, Remote access to RaspberryPi, Smart and Connected Cities, An IoT Strategy for Smarter Cities, Smart City IoT Architecture. Smart City Security Architecture, Smart City Use-Case Examples.



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Course Outcome:

After completion of this course, the students will able to do following:

CO1. Interpret the vision of IoT from a global context.

CO2. Compare and contrast the use of Devices, Gateways and Data Management in IoT.

CO3. Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks.

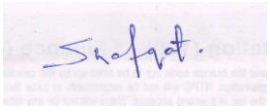
CO4. To study and analyze data and to understand the security issues in IoT.

CO5. To study IoT physical devices and end points and to understand the communications between components.

Text Books/References:

1. **Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle**, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence**",** 1st Edition, Academic Press, 2014.
2. **Vijay Madisetti and ArshdeepBahga,** "Internet of Things (A Hands-on-Approach)", 1stEdition, VPT, 2014.
3. **Francis daCosta,** "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Energy Management in Buildings **Max. Marks: 100**
Course Code: OEC-EE-704/PCC-CE-702 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [2-1-0]

Course Objective: The course has been designed to provide basic knowledge to the students about the principles of energy management in buildings

Detailed Contents:

Unit-I

Energy use in Buildings: Energy use in Buildings, Factors effecting Energy use, Energy Conservation options. External Factors – Climate, Climatic Zone, Building Orientation, Shading, Sizing of Shading Devises. Thermal Comfort: Criteria and various Parameters, Psychometric Chart, Indoor air quality; Requirements in residential, Commercial, Hospital Buildings.

Unit-II

Heat Transmission in Buildings: Heat Transmission in Buildings: Surface Coefficient, Air cavity, Internal and External Surface, Overall Thermal Transmittance Walls and Windows, and Packed Roof, Heat Transfer due to ventilation/ infiltration, Internal Heat gains, Solar Temperature, Steady State Method (for Trombe Wall, Water wall and Solarium),

Unit-III

Lighting Fundamentals & Day Lighting use: Lighting Fundamentals, Visual Performance, Calculations of Lighting Levels, Energy Efficient Lighting. Day Lighting Use: Estimation of available Daylight, Day lighting Systems, Advantages and Limitations of Day light Use.

Unit-IV

ASHRAE Methods and standards for estimates of Heating and cooling and Ventilation, Requirements of Different use Buildings, Air Quality control Equipments, Distribution Systems for Conditioned Air.

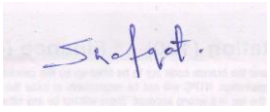
Unit-V

Typical Designs of Selected Buildings in various Climatic Zones, Thumb Rules for Design of Building systems; Building Codes.

Course Outcome:

Upon the completion of the course, the students will be able:

CO1. To understand the energy use and conservation options in buildings.
CO2. To understand the concepts of heat transmission in building
CO3. To learn the lightning fundamentals and day lightning use and estimation.
CO4. To understand the ASHRAE Methods and standards for estimates of Heating and cooling and Ventilation



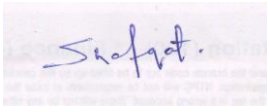
Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

CO5. To designs the Selected Buildings in various Climatic Zone

Text Books/References:

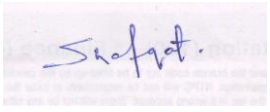
1. **M S Sodha, N.K. Banaal, P.K.Bansal, A.Rumaar and M.A.S. Malik, "**Solar Passive: Building Science and Design",Pergamon Press (1986).
2. **Jamee; L. Threlked,** Thermal Environment Engineering, Prentice Hall, INC-, Raglevood Cliffs, New Jersey (1970)
3. **T.A. Markus and R.N. Morris**, Building, Climate and Energy Spottwoode Ballantype Ltd-, London U.K. (1980)
4. **H. P. Garg et.al, D. Reidel** "Solar Thermal Energy Storage", Publishing Company (1985)
5. **V Alexiades & A.D. Solomon**," Mathematical Modeling of Melting and Freezing Process" , Hemisphere Publishing Corporation, Washington (1993)
6. "Energy storage technologies", a reading material prepared by **Dr. D. Buddhi**, School Of Energy And Environmental Studies, DAVV, Indore.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

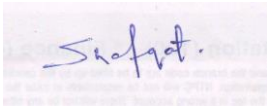
Semester VIII



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

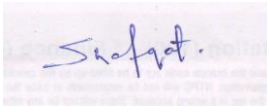
Course Title: Major Project **Max. Marks: 450**
Course Code: PROJ-EE–801 **University Exam: 200**
Internal Assessment: 250
Credits: 9 [0-0-0]

After the university Exam of semester VII every student shall be allotted a Major Project pertaining to his/her stream under the supervision of an allotted mentor. Students are required to report in their respective departments to do preliminary exercise of survey of literature and preparation of a road map of the selected Major Project under the supervision of an allotted mentor. Students are required to complete the Major Project during semester VIII. Depending upon the infrastructure, Computing and other laboratories facilities the students shall be offered in house project on campus are they can complete their project work in any organization/industry outside the campus. Major Project shall be evaluated internally as well as externally as per university statues.



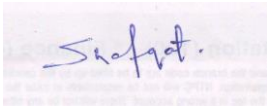
Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Course Title: Professional Elective courses -VI **Max. Marks: 100**
Course Code: PEC-EE-(---) **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Professional Elective courses-VII **Max. Marks: 100**
Course Code: PEC-EE-(---) **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Professional Elective Course

Course Title: Electrical and Hybrid Vehicles **Max. Marks: 100**
Course Code: PEC-EE-801 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]

Course Objective: The main objective of this course is to equip students with the knowledge of Electrical Hybrid Vehicles, their requirement with respect to changing energy needs.

Detailed Contents:

Unit-I

Introduction: Conventional Vehicles: Basics of vehicle performance, vehicle power source characterization, transmission characteristics, and mathematical models to describe vehicle performance.

Introduction to Hybrid Electric Vehicles: History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies.

Hybrid Electric Drive-trains: Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis.

Unit-II

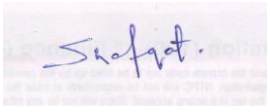
Electric Trains: Electric Drive-trains: Basic concept of electric traction, introduction to various electric drive-train topologies, power flow control in electric drive-train topologies, fuel efficiency analysis. Electric Propulsion Unit: Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Induction Motor drives, configuration and control of Permanent Magnet Motor drives, Configuration and control of Switch Reluctance Motor drives, drive system efficiency.

Unit-III

Energy Storage: Energy Storage: Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery based energy storage and its analysis, Fuel Cell based energy storage and its analysis, Super Capacitor based energy storage and its analysis, Flywheel based energy storage and its analysis, Hybridization of different energy storage devices. Sizing the drive system: Matching the electric machine and the internal combustion engine (ICE), Sizing the propulsion motor, sizing the power electronics, selecting the energy storage technology, Communications, supporting subsystems.

Unit-IV

Energy Management Strategies: Energy Management Strategies: Introduction to energy management strategies used in hybrid and electric vehicles, classification of different energy



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

management strategies, comparison of different energy management strategies, implementation issues of energy management strategies.

Unit-V

Case Studies: Design of a Hybrid Electric Vehicle (HEV), Design of a Battery Electric Vehicle (BEV).

Course Outcome:

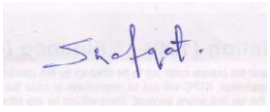
At the end of this course, students will demonstrate the ability to

CO1. Understand the models to describe hybrid vehicles and their performance.
CO2. Understand the suitability of particular drive for electrical traction.
CO3. Understand the different possible ways of energy storage.
CO4. Understand the different strategies related to energy storage systems.
CO5. Analyze various implemented case studies across globe.

Text Books/ References:

1. **C. Mi, M. A. Masrur and D. W. Gao**, "Hybrid Electric Vehicles: Principles and Applications with Practical Perspectives", John Wiley & Sons, 2011.
2. **S. Onori, L. Serrao and G. Rizzoni**, "Hybrid Electric Vehicles: Energy Management Strategies", Springer, 2015.
3. **M. Ehsani, Y. Gao, S. E. Gay and A. Emadi**, "Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals, Theory, and Design", CRC Press, 2004.
4. **T. Denton**, "Electric and Hybrid Vehicles", Routledge, 2016.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one question from each unit.



Course Title: Power Quality and FACTS **Max. Marks: 100**
Course Code: PEC-EE-802 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]

Course Objective: The objective of this course to equip students with power quality issues and their mitigation along the use of FACT devices.

Detailed Contents:

Unit-I

Power Quality Problems in Distribution Systems: Power Quality problems in distribution systems: Transient and Steady state variations in voltage and frequency. Unbalance, Sags, Swells, Interruptions, Wave-form Distortions: harmonics, noise, notching, dc-offsets, fluctuations. Flicker and its measurement. Tolerance of Equipment: CBEMA curve.

Unit-II

Thyristor-based Flexible AC Transmission Controllers (FACTS): Description and Characteristics of Thyristor-based FACTS devices: Static VAR Compensator (SVC), Thyristor Controlled Series Capacitor (TCSC), Thyristor Controlled Braking Resistor and Single Pole Single Throw (SPST) Switch. Configurations/Modes of Operation, Harmonics and control of SVC and TCSC. Fault Current Limiter.

Unit-III

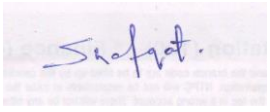
Voltage Source Converter based (FACTS) controllers: Voltage Source Converters (VSC): Six Pulse VSC, Multi-pulse and Multi-level Converters, Pulse-Width Modulation for VSCs. Selective Harmonic Elimination, Sinusoidal PWM and Space Vector Modulation. STATCOM: Principle of Operation, Reactive Power Control: Type I and Type II controllers, Static Synchronous Series Compensator (SSSC) and Unified Power Flow Controller (UPFC): Principle of Operation and Control. Working principle of Inter-phase Power Flow Controller. Other Devices: GTO Controlled Series Compensator. Fault Current Limiter.

Unit-IV

Application of FACTS: Application of FACTS devices for power-flow control and stability improvement. Simulation example of power swing damping in a single-machine infinite bus system using a TCSC. Simulation example of voltage regulation of transmission mid-point voltage using aSTATCOM.

Unit-V

DSTATCOM: Reactive Power Compensation, Harmonics and Unbalance mitigation in Distribution Systems using DSTATCOM and Shunt Active Filters. Synchronous Reference Frame Extraction of Reference Currents. Current Control Techniques in for DSTATCOM.



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Course Outcome:

At the end of this course, students will demonstrate the ability to

CO1. Understand the basic concepts of power quality.

CO2. Understand the characteristics of ac transmission and the effect of shunt and series reactive compensation.

CO3. Understand working of various VSC.

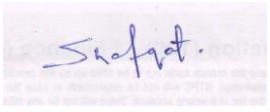
CO4. Study the applications of FACTs.

CO5. Understand the working of DSTATCOM along with its control.

Text Books/References:

1. **N. G. Hingorani and L. Gyugyi**, "Understanding FACTS: Concepts and Technology of FACTS Systems", Wiley-IEEE Press, 1999.
2. **K. R. Padiyar**, "FACTS Controllers in Power Transmission and Distribution", New Age International (P) Ltd. 2007.
3. **T. J. E. Miller**, "Reactive Power Control in Electric Systems", John Wiley and Sons, New York, 1983.
4. **R. C. Dugan**, "Electrical Power Systems Quality", McGraw Hill Education, 2012.
5. **G. T. Heydt**, "Electric Power Quality", Stars in a Circle Publications, 1991.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one question from each unit.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Virtual Instrumentation **Max. Marks: 100**
Course Code: PEC-EE-803 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]

Course Objective: In this course the student gets an in depth knowledge of Virtual Instruments and their applications in the field. The students will be familiarized to programming techniques and different applications of virtual instruments.

Detailed contents:

Unit-I
Virtual Instrumentation: Historical perspective, advantages, blocks diagram and architecture of a virtual instrument, data-flow techniques, graphical programming in data flow, comparison with conventional programming. Development of Virtual Instrument using GUI, Real-time systems, Embedded Controller, OPC, HMI / SCADA software, Active X programming.

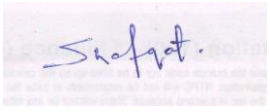
Unit-II
Programming Techniques: VIs and sub-VIs, loops and charts, arrays, dusters and graphs, case and sequence structures, formula nodes, local and global variables, string and file I/O, Instrument Drivers, Publishing measurement data in the web.

Unit-III
Data Acquisition Basics: Introduction to data acquisition on PC, Sampling fundamentals, Input/output techniques and buses. ADC, DAC, Digital I/O, counters and timers, DMA, Software and hardware installation, Calibration, Resolution, Data acquisition interface requirement.

Unit-IV
Chassis Requirements: Common Instrument Interfaces: Current loop, RS *232C/* RS485, GPIB. Bus Interfaces: USB, PCMCIA, VXI, SCSI, PCI, PXI, Fire wire. PXI system controllers, Ethemet control of PXI. Networking basics for office & Industrial applications, VISA and M.

Unit-V
Applications: Virtual instrumentation Toolsets, Distributed I/O Units. Application of Virtual Instrumentation: Instrument Control, Development of process database management system, Simulation of systems using VI, Development of Control system, Industrial Communication, Image acquisition and processing, Motion control.

Course outcome:
At the end of this course, the student will be able to:
CO1. Understand the historical perspective, architecture and data flow techniques involved in virtual instruments.

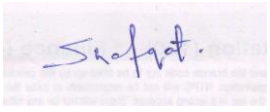


CO2. Analyze techniques of programming along with publishing measurement data in the web.
CO3. Understand sampling techniques, ADC and DAC in data acquisition systems.
CO4. Understand fundamental concepts of networking in addition with common instrument interfaces.
CO5. Analyze the importance and application of virtual instruments.

Text Books/ References:

1. **Gary Johnson**, "LabViEW Graphical Programming, 2nd Edition, McGraw Hill, New York, 1998.
2. **Usa K. Wells & Jeffrey Travis**, "LabViEW for everyone', Prentice Hall, New Jersey, 1998.
3. **Jane W. S. Liu**, "Real-time Systems~ Pearson Education India, 4001.
4. **Jean J. Labrosse**, "Embedded Systems Building Blocks: Complete and ready-to-use units in CN.

Note for paper setter: The question paper shall comprise of ten questions. Two questions will be set from each unit. The student has to attempt five questions, selecting one question from each unit.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**

Course Title: Neural Networks and Fuzzy Systems **Max. Marks: 100**
Course Code: PEC-EE-804 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]

Course Objective: This course familiarizes students with the introduction and application of neural networks and Fuzzy Systems.

Detailed Contents:

Unit-I

Introduction to neural networks: Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Characteristics of ANN, McCulloch- Pitts Model, Historical Developments, Potential Applications of ANN.

Unit- II

Essentials of artificial neural networks: Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN – Connectivity, Neural Dynamics (Activation and Synaptic), Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules.

Unit–III

Learning Paradigms: Introduction to various learning algorithms, back propagation algorithm, pattern classification, clustering, Kohonen self-organizing feature map, radial basis function network, support vector machines, Hopfield network, Associative memory and BAM, Applications of ANN models to engineering problems.

Unit –IV

Fuzzy systems: Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions and its types. Fuzzification, defuzzification. Methods of defuzzification. Fuzzy inference systems.

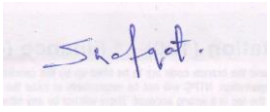
Unit –V

Hybrid Intelligent Systems: Genetic algorithms, neuro-fuzzy systems, adaptive neuro-fuzzy inference system, evolutionary neural networks, fuzzy evolutionary systems. Illustration of these systems with examples from power system etc.

Course Outcome:

The course is aimed to introduce students to neural networks and fuzzy theory from an engineering perspective and their application real world control problems. This course will enable student to learn:

CO1. Introduction to Neural networks and various neural network models
CO2. Various important concepts related with neural networks

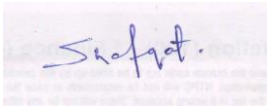


CO3. Various learning paradigms in artificial neural networks
CO4. How fuzzy systems are used to solve problems of uncertainties.
CO5. How various artificial intelligence methods are clubbed to introduce hybrid systems.

Text Books/References:

1. **Jacek M. Zurada**, Introduction to Artificial Neural Systems, PWS Publishing Company, (2001)
2. **S. S Haykin**, Neural Networks: A Comprehensive Foundation, Pearson Education.
3. **ValluruRao**, C++ Neural Networks and Fuzzy Logic, Honary Holt & Co *(1998)*
4. **Freeman**, Neural Networks, Pearson Publication (2003).
5. **Rajasekaran&Pai**, Genetic Algorithms; Synthesis and applications, Prentice Hall of India (2004).

Note for paper setter: The question paper shall comprise of ten questions. Two questions will be set from each unit. The student has to attempt five questions, selecting one question from each unit.



Course Title: Optimization Techniques **Max. Marks: 100**
Course Code: PEC-EE-805 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]

Course Objective: The course has been designed for explaining the various optimization techniques being used for solving various problems of engineering.

Detailed Contents:

Unit-I
Introduction: An overview of optimization problems, Need of Optimization, How to solve optimization problems with some illustrative examples.

Unit-II
Linear Programming: Introduction, graphical method, simplex method, method of artificial variables, alternate optima, redundancy in linear programming, degeneracy and cycling, the simplex tableau in condensed form.

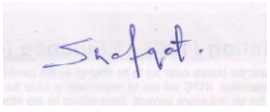
Unit-III
Nonlinear programming: Introduction, Lagrange multipliers, Karaush-Kuhn-Tucker (KKT) optimality conditions, convexity, sufficiency of the KKT conditions, Duality and convexity.

Unit-IV Approximation Techniques
Introduction, line search methods, gradient-based methods, approximation under constraints.

Unit-V
Dynamic Programming: Sequential optimization; Representation of multistage decision process; Types of multistage decision problems; Concept of sub optimization and the principle of optimality; Recursive equations – Forward and backward recursions; Computational procedure in dynamic programming (DP); Discrete versus continuous dynamic programming; Multiple state variables; curse of dimensionality in DP.

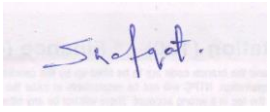
Course Outcome:
This will enable student to:
CO1. Learn the basics about optimization problem.
CO2. Solve linear problems using optimization.
CO3. Solve non-linear problem using optimization.
CO4. Use various approximation techniques for problem solving.
CO5. Use dynamic programming for problem solving.

Text Books/References:
1. **Pablo Pedregal** ,Introduction to optimization, Publisher: Springer



2. **Suresh Chandera, Jaydeva, and Aparna Mehta**, Numerical optimization with applications, Publisher: Narosa
3. **Edvin K.P. Chong, and Stanislaw H. Zak**, An Introduction to optimization, Publisher: John Wiley.
4. **Mohan C. Joshi and Kannan M Moudgalya**, Optimization theory and practice, Publisher: Narosa.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit.



Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Course Title: Power System Transients **Max. Marks: 100**
Course Code: PEC-EE-806 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**
Credits: 3 [3-0-0]

Course Objective: This course makes a student familiar with the transient phenomenon occurring in electrical power system-their origin, effects and control. It also familiarizes students with simulation of surge diverters in power system transients.

Detailed Contents:

Unit-I

Surges and Transients: Origin and nature of transients and surges, Surge parameters of plan. Equivalent circuit representations. Lumped and distributed circuit transients.

Unit-II

Transient Control: Line energization and de-energization transients. Earth and earth wire effects. Current chopping in circuit breakers. Short line fault condition and its relation to circuit breaker duty. Trapped charge effects. Effect of source and source representation in short line fault studies. Control of transients.

Unit-III

Wave Control: Lightening Phenomenon. Influence of tower footing resistance and earth resistance. Traveling waves in distributed parameter multi conductor lines, parameters as a function of frequency.

Unit-IV

Simulation: Simulation of surge diverters in transient analysis. Influence of pole opening and pole reclosing.

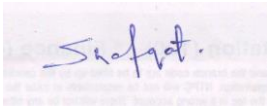
Unit-V

Insulation coordination: Insulation Co-ordination: Over voltage limiting devices, dielectric properties, breakdown of gaseous insulation, tracking and erosion of insulation, high current arces, and metallic contacts.

Course Outcome:

This course will enable students to:

CO6. Understand nature and origin of surges and transients in power system.
CO7. Analyze the effects of Earthing and controlling of power surges.
CO8. Understand lightning phenomenon and travelling waves in multi-conductor lines.
CO9. Understand breakdown phenomenon and dielectric properties of insulating materials.
CO10. Analyze various phenomenon involved in breakdown of gaseous insulation along with basics of over voltage limiting devices.

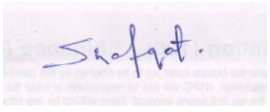


Mr. S. N. Mughal **(Head E.E.)** | Mr. Tasaduq Hussain **(A.P., EE)** | Mr. Ahmed Riyaz **(A.P., EE)** | Prof. Asif Husain **(Dean, SOET)**

Text Books/ References:

1. **Lou van der Sluis,** Transients in Power Systems John Wiley & Sons.
2. **Vanikov V. A.,** Transients in Power Systems by, Mir Publications, Moscow.
3. **Bewley L.V.,** Traveling Waves on Transmission Lines Dover Publications Inc., New York.
4. **RavinderaArora,WolfgangMosch**, High Voltage Insulation Engineering, New Age International Publishers Limited.
5. **Greenwood A.** Electrical Transients in Power Systems John Wiley & Sons.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit.



Mr. S. N. Mughal	Mr. Tasaduq Hussain	Mr. Ahmed Riyaz	Prof. Asif Husain
(Head E.E.)	**(A.P., EE)**	**(A.P., EE)**	**(Dean, SOET)**