PROPOSED SYLLABUS
FOR
MASTER DEGREE COURSE IN ELECTRICAL POWER SYSTEMS
OF ELECTRICAL ENGINEERING

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With effect from Academic Year 2013-2014

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Faculty of Engineering & Technology

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

- **What is a credit system**

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

- **Advantages of the Credit System**

  Represents a much-required shift in focus from teacher-centric to learner-centric education since the work load estimated is based on the investment of time in learning, not in teaching.

  Helps to record course work and to document learner work load realistically since all activities are taken into account-not only the time learners spend in lectures or seminars but also the time they need for individual learning and the preparation of examinations etc.

  Segments learning experience into calibrated units, which can be accumulated in order to gain and academic award.

  Helps self-paced learning. Learners may undertake as many credits as they can cope with without having to repeat all the courses in a given semester if they fail in one or more courses. Alternatively, they can choose other courses and continue their studies.

- **What is Grading?**

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

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

CURRICULUM:

1.1 Curriculum:

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

1.2 Semesters:

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

1.3 Course Credit:

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

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

credit requirement and a pattern of credit distribution over courses of different categories.

1.4 Course credits assignment

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

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

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

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

The credits indicated for this course are computed as follows: 3 hours/week lectures = 3 credits

1 hours/week tutorial = 1 credit

2 hours/week practical = 2 x 0.5 = 1 credit 2 hours/week seminar = 2 x 0.5 = 1 credit Dissertation seminar = 2 x 1= 2 credit(3-1-2) 3 credit course = (**3** h Lectures + **1** h Tutorial + **2** h Practical) per week = 6 Contact hours per week

1.5 Earning Credits

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

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

1.6 Evaluation System

1. Semester Grade Point Average (SGPA) =

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

   SUM (Course credits in registered courses)

2. Cumulative Grade Point Average (CGPA) =

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

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   SUM (Course credits in registered courses) of all Semester

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

   I^{st} Division with distinction : CGPA $\geq$ 8.25 and above

   I^{st} Division : CGPA $\geq$ 6.75 and < 8.25

   II^{nd} Division : CGPA $\geq$ 6.75 and < 6.25

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

Table 1

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

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

Percentage marks = (CGPA X10) – 7.5

An example of these calculations is given below:

Typically one example for academic performance calculations of semester -I

Table 2

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

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

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

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

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

System Evaluation Table

Table 3

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

Grade Awards:

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

Table 4: Ten point grades and grade description

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

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

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

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

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

Six Digit Code for a subject (PG Course)

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

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

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

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

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

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

Semester II

Course Code	Name of the Subject	Teaching Scheme Contact hours per week				Examination scheme Marks					Duration of Theory Exam	Credit
		L	T	P	Total hrs	Theory	Class Test	Term Work	Viva Voce	Total		
MEP651	Advanced Power Electronics (APE)	3	1	--	4	80	20	--	--	100	3 Hrs	4
MEP652	Digital Protection of Power System (DPPS)	3	1	--	4	80	20	--	--	100	3 Hrs	4
MEP653	H.V.D.C. Transmission	3	1	--	4	80	20	--	--	100	3 Hrs	4
MEP654	Flexible AC Transmission	3	1	--	4	80	20	--	--	100	3 Hrs	4
MEP691	Elective II	3	1	--	4	80	20	--	--	100	3 Hrs	4
MEP671	DPPS Lab	--	--	4	4	--	--	--	50	50	--	2
MEP672	APE Lab	--	--	2	2	--	--	50	--	50	--	1
MEP673	Seminar-II	--	--	2	2	--	--	--	50	50	--	1
	Total	**15**	**5**	**8**	**28**	**400**	**100**	**50**	**100**	**650**	**15Hrs**	**24**

Semester III

Course Code	Name of the Subject	Teaching Scheme hours per week			Examination scheme Marks				Credit
		L	CH	Total hrs	Theory	Term Work	Viva Voce	Total	
MEP731	Dissertation Phase I	---	12	12	---	50	50	100	12
	Total	**---**	**12**	**12**	**---**	**50**	**50**	**100**	**12**

Semester IV

Course Code	Name of the Subject	Teaching Scheme hours per week			Examination scheme Marks				Credit
		L	CH	Total hrs	Theory	Term Work	Viva Voce	Total	
MEP781	Dissertation Phase II	---	20	20	---	100	200	300	20
	Total	---	20	20	---	100	200	300	20
	Grand Total							**1700**	**80**

Elective - I
Modern Electric Drives
Energy Audit And Conservation
EHV Transmission

Elective - II
Power System Design
Special Topics in Power system
Optimization Techniques

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

Total Credits = SEM 1 + SEM 2 + SEM 3 + SEM 4 = 24+24+12+20 = 80
Total Marks = SEM 1 + SEM 2 + SEM 3 + SEM 4 = 650+650+100+ 300 = 1700

MEP651 : ADVANCED POWER ELECTRONICS

Teaching Scheme:
Lecture : 3 Hrs/week
Pract./Tutorials : 1 Hrs/week

Examination Scheme:
Theory Paper : 80 Marks (3 Hrs.)
Class Test : 20 Marks

Unit 1 : Review of Power Semiconductor Devices:
Operating Characteristics and gate drive requirements of power devices SCRs, BJT, MOSFET, IGBT and GTOs, Device Comparison, Smart Power Control Chips.

Unit 2 : Controller rectifiers and AC voltage controllers:
Single and Three phase semi and full converters for various kinds of loads, dual converters, power factor improvement of converters, series converters, principle of phase control, single phase and three phase half and full wave ac voltage controllers with various loads, design of converter and ac voltage controller, effect of load and source inductances on performance.

Unit 3 : DC-DC converters:
Principle of operation of buck, boost, buck-boost, cuk, fly-back, forward, push-pull, half bridge, full bridge and isolated cuk converters, input and output filter design.

Unit 4 : Inverters:
Voltage source inverters, single phase and six step inverters, voltage control and PWM strategies and implementation aspects, SPWM, Third harmonic injected PWM, Delta PWM, Staircase & Other advanced modulation techniques, space vector modulation, open and closed loop control schemes for PWM controls, Current Source Inverters: single phase and three phase power circuit configurations and analysis, Load commutated inverters, principle of operation.

Unit 5 : Resonant inverters:
DC link inverters, modified circuit topologies for DC link voltage clamping, voltage control-PWM techniques, quasi resonant inverters, DC-DC converters series resonant and parallel resonant, application of zero voltage and zero current switching for DC-DC converters (buck and boost)

References:

1. Ned Mohan, T.M. Undeland and W. P. Robbins. 'Power Electronic Converters, Application and Design', John Wiley and sons 1989
2. M. H. Rashid, 'Power Electronics', Prentice Hall of India, 1994
3. B. K. Bose, 'Power Electronics and AC Drives' , Prentice Hall, 1986
4. B. K. Bose, ' Power Electronics and Variable Frequency Drive', IEEE Press, 2000

MEP652 : DIGITAL PROTECTION OF POWER SYSTEM

Teaching Scheme:	Examination Scheme:
Lecture : 3 Hrs/week	Theory Paper : 80 Marks (3 Hrs.)
Pract./Tutorials : 1 Hrs/week	Class Test : 20 Marks

Unit 1 : Review of technological trends in power system protection

Review of basics of electromagnetic and solid state protection, study of various amplitude and phase comparators, configurations of various solid state protection schemes, solid state protection of generators, transformers, feeders,busbars,substation, transmissions linesetc.

Unit 2: Digital protection

Evoluation of microprocessor, advantages of digital protection, use of microprocessor and microcontroller in protection,study of 8 bit microprocessor, data aquition, configuration of microprocessorbased controls for overcurrent, overvoltage, unvdervoltage,underfrequecncy, loadshedding,distance protection schemes.

Unit 3: DSP and its use in power systems

Introduction of DSP,study of Texas DSP 320XX. Review of DSP technioques,sampling,carrier,discrete fourier and FFT. Numerical algorithms.CT/PT modeling and standards, simulation of transients, electromagnetic transients program (EMTP)

Reference Books:

1. L.P.Singh “Digital Protection”, Wiley Eastern Publictions.
2. A.G.Phadke and Thorpe “Power System Protection ”
3. Y.P. Paithankar “Power System Protection”
4. T.S. Madhavrao “Power system Protection : static relays with microprocessors applications”, Tata Mc Graw Hill Pub.
5. Crussell Mason “The art and Science of protective relaying ” Wiley Eastern Publictions
6. A.R. Warrington “Protective Relays – Their Theory and Practice” Chapman and Hall

MEP653 : HVDC TRANSMISSION

Teaching Scheme:
Lecture : 3 Hrs/week
Pract./Tutorials : 1 Hrs/week

Examination Scheme:
Theory Paper : 80 Marks (3 Hrs.)
Class Test : 20 Marks

Unit 1 : Introduction: Principles of HVDC transmission, terminal equipments and their controls, reactive power control.

Unit 2 : Analysis of HVDC Converters: Choice of converter configuration, analysis of Graetz circuit, converters bridge characteristics, twelve pulse converters, detailed analysis of converter.

Unit 3 : HVDC System Control: DC link control, converter control characteristics, control of firing angle, current, extinction angle and power.

Unit 4 :Harmonics and Filters: Generation of Harmonics, design of ac and dc filters, carrier frequency and RI noise.

Unit 5 : Multiterminal dc systems: Introduction, potential applications, types, control and protection

Unit 6 : Analysis of AC/DC systems: Converter model and control, modeling of AC and DC networks, modeling of DC links, solution of DC load flow, per unit system for DC quantities, solution of AC-DC power flow.

Unit 7 : Protection: Converter faults, protection against over currents, over voltages, HVDC Circuit breakers, protection by dc reactors, insulation coordination

Unit 8 : Earth return: Use of earth and sea return, advantages and problems.

Unit 9 : Simulation of HVDC systems: HVDC system simulation, digital dynamic simulation of converters and DC systems, some case study of HVDC installation.

Reference Books:

1. Adams and Hingorani, 'HVDC Transmission', Grraway Ltd.
2. E.W.Kimbark,'DC transmission Vol. I and II
3. K. R. Padiyar,' HVDC Power transmission systems – Technology and System Ineractions', New Age International Ltd.
4. S.S.Rao,'EHV-AC & HVDC transmission engg. & practice', khanna publisher.

MEP654 : FLEXIBLE AC TRANSMISSION

Teaching Scheme:
Lecture : 3 Hrs/week
Pract./Tutorials : 1 Hrs/week

Examination Scheme:
Theory Paper : 80 Marks (3 Hrs.)
Class Test : 20 Marks

Unit 1 : FACTS Concept and General System Considerations:
Transmission Interconnections, Flow of Power in an AC System, Loading Capability, Power Flow and Dynamic Stability Considerations of a Transmission Interconnections, Relative importance of controllable parameters, Basic Types of FACTS Controllers, Brief description and definition of FACTS controllers, Benefits from FACTS technology, HVDC vs. FACTS

Unit 2 : Static Shunt Compensators:
SVC and STATCOM: Objectives of shunt compensation, Methods of controllable VAR generation, Static VAR compensators: SVC and STATCOM, Comparison between SVC and STATCOM, Static Var systems.

Unit 3 : Static series compensators:
GCSC, TSSC,TCSC and SSSC: Objectives of Series compensation, Variable Impedance Type series compensators, Switching converter type series compensators, External(System) control for series reactive compensators, Summary of characteristics and features.

Unit 4 : Static Voltage and Phase angle regulators:
TCVR and TCPAR: Objectives of voltage and phase angle regulators, Approaches to thyristor controlled voltage and phase angle regulators(TCVRs and TCPARs) Switching converter-based voltage and phase angle regulators, Hybrid phase angle regulators.

Unit 5 : Combined Compensators:
Unified Power Flow Controller(UPFC) and Interline Power Flow Controller(IPFC), Introduction, The unified power flow controller, The interline power flow controller, Generalized and multifunctional FACTS controllers.

Unit 6 : Special purpose FACTS controllers:
NGH-SSR Damping scheme and Thyristor-Controlled braking resistor, Subsynchronous resonance, NGH-SSR Damping scheme, Thyristor Controlled braking resistor(TCBR)

Reference Books:

1. N.G. Hingorani, 'Understanding FACTS', IEEE Press, 1999
2. Yong Hua Song, ' Flexible AC Transmission systems (FACTS)' ,IEEE Press, 1999

Elective – II: SPECIAL TOPICS IN POWER SYSTEM

Teaching Scheme:
Lecture : 3 Hrs/week
Pract./Tutorials : 1 Hrs/week

Examination Scheme:
Theory Paper: 80 Marks (3 Hrs.)
Class Test : 20 Marks

Any three topics of the following will be covered in the semester.

Unit 1: Power Quality: Power quality problems in distribution systems, factors defining power quality, harmonics, harmonics creating loads, modeling, harmonic propagation, series and parallel resonance, harmonic power flow, mitigation of harmonics and power quality problems using power electronics conditioner.

Unit 2: Power System Reliability:
Basic reliability concept, general reliability function, Marko process, Recursive techniques, generation reliability, transmission and distribution system reliability.

Unit 3: Expert system applications
Fault diagnosis, short termload forecasting, expert system in high voltage engineering

Unit 4: Artificial neural networks in power system
Short term load forecasting, ANN based transient stability assessment, load forecastinf static security assessment, voltage stability, economic load dispatch.

Unit 5: Fuzzy logic applications to power system
Fuzzy logic based power system stabilizers, fuzzy logic control of static condenser for shunt reactive power compensation. A fuzzy expert system for daily average and peak load prediction.

Unit 6: Operation and Control of interconnected Power System:
Function of SCADA system, common features to all SCADA systems, alarm function, integration of measurement control & protection functions by SCADA system, SCADA configurations.

Reference Books:

1. G. T. Heydt, 'Power Quality', Stars in circle publications Indiana, 1991.
2. Roy Billinton, "Power system reliability"
3. Erdnyei, "Power System reliability"
4. A.S. Pabla, "Power System Planning"
5. "Emerging trends in power system" proceedings of 8th National Power System Conference VOL I & II
6. S. S. Rao, "Switchgear Protection", Khanna Publications
7. Recent publication on Power System & Power Delivery.
8. J. M. Zurada, "Introduction to artificial Neural Network", Jaico Publishers.

MEP671 LAB: DIGITAL PROTECTION OF POWER STSTEM

Teaching Scheme:
Pract./Tutorials : 4 Hrs/week

Examination Scheme:
Viva Voce : 50 Marks

Minimum Eight Practicals under this subject will be performed and will be based on the following topics. Simulations will be performed on Test panels and computer simulations using MATLAB/PSCAD/EMTDC/ETAB.

1. Simulation of Merz price protection of Alternator with relay.
2. Simulation of Merz price protection of Transmission Lines.
3. Simulation of Distance protection of Transmission Lines.
4. Simulation of Electromechanical overcurrent Relay.
5. Simulation of Electromechanical Overvoltage Relay.
6. Simulation of 8 Bit Microprocessor and its interfacing techniques.
7. Microprocessor based Control for Overcurrent protection schemes.
8. Microprocessor based Overvoltage protection schemes.
9. Microprocessor based Distance Protection Schemes.
10. Simulation on DSP 320XX and its interfacing.
11. Simulation of Transients or electromagnetic transient program using DSP.
12. CT/PT Modeling.

MEP672 LAB: ADVANCED POWER ELECTRONICS

Teaching Scheme:
Pract./Tutorials : 2 Hrs/week

Examination Scheme:
Term Work : 50 Marks

Minimum Eight Practicals under this subject will be performed and will be based on the following topics. Simulations will be performed on Test panels or computer simulations using MATLAB/PSPICE/PSCAD.

1. To perform single or three phase, semi or full converter operation for resistive load, inductive load.
2. To perform single or three phase, semi or full converter operation with the effect of source inductance.
3. To perform simulation on DC to DC convertor topologies by using buck converter
4. To perform simulation on DC to DC convertor topologies by using boost converter
5. To perform simulation on DC to DC convertor topologies by using buck-boost converter
6. To perform simulation on Inverter topologies by using VSI with or without PWM techniques.
7. To perform simulation on Inverter topologies by using CSI.
8. To perform simulation on Resonant inverter topologies using DC link voltage clamping.
9. To perform simulation on Resonant inverter topologies using PWM technique.
10. To perform zero voltage or zero current switching for DC to DC converter.
11. To perform simulation on advanced modulation techniques such as space vector modulation.

Seminar – II

The subject seminar I during the first semester in full time ME (EPS) course shall be based upon the technical essay or a report or analysis topics of dissertation chosen by the candidates. She/he shall submit short report on the topic and will deliver a talk there on, which along with the report, will be assessed by two internal examiners, one of whom will be the guide and the other being appointed by the principal of the institution.

DISSERTATION – I & SEMINAR III

Dissertation (Part – I) at the end of third semester of full time course in M.E. (Electrical Power Systems) will be based upon the dissertation chosen by the candidate. She/he will be deliver a talk there on, which along with the report, will be assessed by two internal examiners, one of whom will be the guide and the other being appointed by the principal of the institution.

DISSERTATION – II

The dissertation shall consist of a report on any research work done by the candidate or a detailed report of the project work consisting of a design and development work that the candidate has done.

The candidate shall submit the dissertation report in triplicate to the Head of the institution, duly certified that the work has been satisfactorily completed.

Term Work/ Internal Examination:

The dissertation will be assessed by two internal examiners, one of whom will be the guide and the other senior staff member of the respective department being appointed by the principal of the institution.

External Examination:

It shall consist of a defence presented by the examinee on his work in the presence of examiners, appointed by the University, one of whom will be the guide and other an external examiner.