Date bound

Most urgent

Chaudhary Devi Lal University
Sirsa, Haryana, Pin- 125055, (India)

Paper Assessment Scheme

For

Post Graduate Course,
For 2 Year(s) Master Degree Program in

Faculty of Physical Science

Master of Technology (with Credits)(M.Tech.)
(Credits System)

(w.e.f. 2017-18-Regular)

Electrical & Electronics Engineering

Course Code:-

May be forwarded to Dean, faculty of Engg. for unification please

Supdt. EDP

Dean (Engg)/ AR (Acad)

Paper Name: Electric Drives
Paper Code: EEL-201 Min: -- Max: 100

TLM	Hrs	Credits	AM	Min	Max	AT	Min	Max	Evaluation System
Lectures	4	4.00	Theory	-	100	EA	28	70	Marks System
						IA	12	30	Marks System

Paper Name: Power Apparatus and Machines
Paper Code: EEL-202 Min: -- Max: 100

TLM	Hrs	Credits	AM	Min	Max	AT	Min	Max	Evaluation System
Lectures	4	4.00	Theory	-	100	EA	28	70	Marks System
						IA	12	30	Marks System

Paper Name: AC Controllers
Paper Code: EEL-203 Min: -- Max: 100

TLM	Hrs	Credits	AM	Min	Max	AT	Min	Max	Evaluation System
Lectures	4	4.00	Theory	-	100	EA	28	70	Marks System
						IA	12	30	Marks System

Paper Name: Cryptography
Paper Code: EEL-204 Min: -- Max: 100

TLM	Hrs	Credits	AM	Min	Max	AT	Min	Max	Evaluation System
Lectures	4	4.00	Theory	-	100	EA	28	70	Marks System
						IA	12	30	Marks System

Paper Name: Electric Drives Lab
Paper Code: EEP-205 Min: -- Max: 100

TLM	Hrs	Credits	AM	Min	Max	AT	Min	Max	Evaluation System
Lab	4	2.00	Practical	-	100	EA	28	70	Marks System
						IA	12	30	Marks System

Paper Name: Seminar-II
Paper Code: EES-206 Min: -- Max: 100

TLM	Hrs	Credits	AM	Min	Max	AT	Min	Max	Evaluation System
Seminar	2	1.00	Presentation	-	100	IA	40	100	Marks System

Course Part: S.Y.M.Tech Separate Passing Head: No, Min: 0, Max: 1200, Total Credits: 44.00

Term: Sem III Separate Passing Head: No, Min Papers: 6, Max Papers: 6, Min: 0, Max: 600, Total Credits: 22.00

The papers under Sem III are as follows:

Paper Name: Dissertation Part-I with Seminar
Paper Code: EED-305 Min: -- Max: 100

TLM	Hrs	Credits	AM	Min	Max	AT	Min	Max	Evaluation System
Dissertation	6	4.00	Dissertation	40	100	IA	40	100	Marks System

Paper Name: System Modeling and Optimization
Paper Code: EEL-301 Min: -- Max: 100

TLM	Hrs	Credits	AM	Min	Max	AT	Min	Max	Evaluation System
Lectures	4	4.00	Theory	40	100	EA	28	70	Marks System
						IA	12	30	Marks System

Paper Name: Modeling and Analysis of Electric Machines Electrical
Paper Code: EEL-302 Min: -- Max: 100

TLM	Hrs	Credits	AM	Min	Max	AT	Min	Max	Evaluation System
Lectures	4	4.00	Theory	40	100	EA	28	70	Marks System
						IA	12	30	Marks System

-02-

Course Part: F.Y.M.Tech.

Term: Sem-I

The papers for F.Y.M.Tech. - Sem-I are classified into following groups:

1.Core Group (Min Papers: 6, Max Papers: 6,
Separate Passing Head: No, Max. Marks: 600)
Select minimum 6 paper(s)
Select maximum 6 paper(s)

Papers:

EEL-101	Power Electronics Devices
EEL-102	Advanced Power System Analysis
EEL-103	Digital Control Systems
EEL-104	Microprocessors and DSP
EEP-105	Power Electronics Lab
EES-106	Seminar-I

Term: Sem II

The papers for F.Y.M.Tech. - Sem II are classified into following groups:

1.Core Group (Min Papers: 6, Max Papers: 6,
Separate Passing Head: No, Max. Marks: 0)
Select minimum 6 paper(s)
Select maximum 6 paper(s)

Papers:

EEL-201	Electric Drives
EEL-202	Power Apparatus and Machines
EEL-203	AC Controllers
EEL-204	Cryptography
EEP-205	Electric Drives Lab
EES-206	Seminar-II

Course Part: S.Y.M.Tech

Term: Sem III

The papers for S.Y.M.Tech - Sem III are classified into following groups:

1.Core Group (Min Papers: 5, Max Papers: 5,
Separate Passing Head: No, Max. Marks: 0)
Select minimum 5 paper(s)
Select maximum 5 paper(s)

Papers:

EEL-301	System Modeling and Optimization
EEL-302	Modeling and Analysis of Electric Machines
EEL-303	Information Security
EEP-304	Simulation Lab
EED-305	Dissertation Part-I with Seminar

2.Elective Group (Min Papers: 1, Max Papers: 1,
Separate Passing Head: No, Max. Marks: 0)
Select minimum 1 paper(s)
Select maximum 1 paper(s)

Papers:

EEL-311	Intelligent Contro.
EEL-312	PLC and Ward Controllers
EEL-313	Computer Aided Design of Electrical Machines
EEL-314	Special Topics in EED
EEL-315	Signal Processing

Paper Name: Information Security
Paper Code: EEL-303 Min: -- Max: 100

TLM	Hrs	Credits	AM	Min	Max	AT	Min	Max	Evaluation System
Lectures	4	4.00	Theory	40	100	EA	28	70	Marks System
						IA	12	30	Marks System

Paper Name: Intelligent Control
Paper Code: EEL-311 Min: -- Max: 100

TLM	Hrs	Credits	AM	Min	Max	AT	Min	Max	Evaluation System
Lectures	4	4.00	Theory	-	100	EA	28	70	Marks System
						IA	12	30	Marks System

Paper Name: PLC and Micro Controllers
Paper Code: EEL-312 Min: -- Max: 100

TLM	Hrs	Credits	AM	Min	Max	AT	Min	Max	Evaluation System
Lectures	4	4.00	Theory	-	100	EA	28	70	Marks System
						IA	12	30	Marks System

Paper Name: Computer Aided Design of Electrical Machines
Paper Code: EEL-313 Min: -- Max: 100

TLM	Hrs	Credits	AM	Min	Max	AT	Min	Max	Evaluation System
Lectures	4	4.00	Theory	-	100	EA	28	70	Marks System
						IA	12	30	Marks System

Elective

Paper Name: Special Topics in PED
Paper Code: EEL-314 Min: -- Max: 100

TLM	Hrs	Credits	AM	Min	Max	AT	Min	Max	Evaluation System
Lectures	4	4.00	Theory	-	100	EA	28	70	Marks System
						IA	12	30	Marks System

Paper Name: Signal Processing
Paper Code: EEL-315 Min: -- Max: 100

TLM	Hrs	Credits	AM	Min	Max	AT	Min	Max	Evaluation System
Lectures	4	4.00	Theory	-	100	EA	28	70	Marks System
						IA	12	30	Marks System

Paper Name: Simulation Lab
Paper Code: EEP-304 Min: -- Max: 100

TLM	Hrs	Credits	AM	Min	Max	AT	Min	Max	Evaluation System
Practical	6	2.00	Practical	40	100	EA	28	70	Marks System
						IA	12	30	Marks System

-04-

KURUKSHETRA UNIVERSITY KURUKSHETRA
SCHEME AND STRUCTURE FOR TEACHING SCHEDULE AND EXAMINATION

M.Tech. (ELECTRICAL & ELECTRONICS ENGINEERING)
(POWER ELECTRONICS & DRIVES SPECIALIZATION)

FIRST SEMESTER

Course No.	Title	Schedule of Teaching				Evaluation	
		L	T	P	Total	Int.	Ext.
MTEEl-1.1	Power Electronics Devices	4	-	-	4	40	60
MTEEl-1.2	Advanced Power System Analysis	4	-	-	4	40	60
MTEEl-1.3	Digital Control systems	4	-	-	4	40	60
MTEEl-1.4	Microprocessors and DSP	4	-	-	4	40	60
MTEEl-1.5	Power Electronics Lab	-	-	3	3	40	60
MTEEl-1.6	Seminar – 1	-	-	1	1	25	--
	Total	16	--	4	20	225	300

SECOND SEMESTER

Course No.	Title	Schedule of Teaching				Evaluation	
		L	T	P	Total	Int.	Ext.
MTEEl-2.1	Electric Drives	4	-	-	4	40	60
MTEEl-2.2	Power Apparatus and Machines	4	-	-	4	40	60
MTEEl-2.3	AC Controllers	4	-	-	4	40	60
MTEEl-2.4	Cryptography	4	-	-	4	40	60
MTEEl-2.5	Electric Drives Lab	-	-	3	3	40	60
MTEEl-2.6	Seminar – 2	-	-	1	1	25	--
	Total	16	--	4	20	225	300

THIRD SEMESTER

Course No.	Title	Schedule of Teaching				Evaluation	
		L	T	P	Total	Int.	Ext.
MTEEl-3.1	System Modeling and Optimization	4	-	-	4	40.	60
MTEEl-3.2	Modeling and Analysis of Electrical Machines	4	-	-	4	40	60
MTEEl-3.3	Information Security	4	-	-	4	40	60
MTEEl-3.4	Elective	4	-	-	4	40	60
MTEEl-3.5	Simulation Lab	-	-	3	3	40	60
MTEEl-3.6	Seminar - I on Dissertation	-	-	1	1	25	--
	Total	16	--	4	20	225	300

Dissertation topic and supervisor has to be finalized at the beginning of the 3rd semester.

FOURTH SEMESTER

Course No.	Title	Schedule of Teaching				Evaluation	
		L	T	P	Total	Int.	Ext.
MTEEl-4.1	Dissertation	-	-	15	15	-	200
MTEEl-3.6.1	Seminar-II on dissertation	-	-	1	1	25	--
	Total	-	--	16	16	25	200

List of Elective courses

S No	Course No	Title
1	MTEEl-3.4.1	Intelligent Control
2	MTEEl-3.4.2	PLC And Micro Controllers
3	MTEEl-3.4.3	Computer Aided Design Of Electrical Machines
4	MTEEl-3.4.4	Special Topics In PED
5	MTEEl-3.4.5	Signal Processing

The scheme for Examination:

1. For every Theory course :
   Internal Assessment 40 marks of which 30 marks will be assigned on the basis of two better tests out of three tests and 10 marks will be assigned on the basis of assignments/ CW.
   End semester Examination 60 marks.

NOTE: To examiner : The syllabus is divided into four units. There will be total eight questions, two from each unit.

The candidate is to answer five questions in all, selecting at least one from each unit.

2. For every Laboratory course: Internal Assessment 40 marks
   End semester Examination 60 marks.

3. For Dissertation: External as well as Internal examiners will examine the dissertation of the candidate, submit the report and conduct viva/ voce exam of the candidate. Exam marks will be awarded jointly.

The external examiner will be appointed by the BO Studies.

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Course No. MTEEl-1.1 **Power Electronics Devices**

L T P	**Marks (40 internal, 60 Exam)**
4 - -	**Exam Time 3 hrs.**

UNIT 1

Review of power switching devices, i.e., Thyristors, GTO, MOSFET, BJT, IGBT and MCT.

Trigger technique, optical isolator, protection circuit, isolation transformers.

Natural and forced commutation of SCRS

UNIT 2

Phase-controlled rectifier configuration, half wave, full wave, controlled bridge, three phase controlled rectifies, Control of output voltage by sequence and sector control. Reduction of harmonic using multiple-pulse control.

UNIT 3

Design of rectifier circuit. Comparative aspect of design using converter transformers-forced and self turn off devices.

UNIT 4

Chopper step down and step up configurations. Design of chopper circuits. Reduction of harmonics. Introduction to multiphase choppers. Analysis of rectifier and chopper circuits. Unity p.f. rectifiers.

References:

1. N. Mohan, T.M. Undeland & W.P. Robbin, "Power Electronics, Converter Applications and Design", John Wiley & Sons, 1989.
2. M.H. Rashid, "Power Electronics," Prentice Hall, 1994
3. B.K. Bose, "Power Electronics and AC Drives," 1986
4. R.Bausiere and G. Seguier, "Power Electronics Converters", Springer-Verlag, 1987
5. D.M. Mitchell, "DC-DC Switching Regulator Analysis," McGraw Hill, 1987

NOTE: To the examiner : There will be total eight questions, two from each unit. The candidate is to answer five questions in all, selecting at least one from each unit.

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Course No. MTEEl-1.2 **Advanced Power System Analysis**

L T P	Marks (40 internal, 60 Exam)
4 - -	Exam Time 3 hrs.

UNIT 1

Review of matrix operations, graph theory, and various circuit incidence matrices, primitive network and matrix, Formation of various network matrices by singular transformation interrelations.Building algorithm for bus iMTEElance matrix, Modification of bus iMTEElance matrix for change of reference bus for network changes, Formation of bus admittance matrix and modification,

UNIT 2

Gauss elimination, Node elimination (Kron reduction), LU factorization, Schemes of Ordering, Sparsity, Calculation of Z bus elements for Y bus.

Representation of three phase network elements, Treatment under balanced and unbalanced excitation, Transformation matrices, Unbalanced elements.

UNIT 3

Network short circuit studies using Z bus, Short circuit calculations for various types of faults. Load flow studies, its importance. Classification of buses, load flow techniques, Iterative solutions and computer flow charts using Gauss-Seidel and Newton-Raphson methods, Decoupled and fast decoupled load flow solution, Representation of regulating and off nominal ratio transformers, Tie-line control, Comparison of methods.

UNIT 4

Introduction to AC-DC load flow problems: formation and solutions.

Power system security, Contingency analysis using Z bus using sensitivity factors.

Introduction to state estimation, maximum likelihood weighted least square error estimation, State estimate of an AC network.

References:

1. G.W. Stagg & A.H EI-Abaid, "Computer methods in Power system analysis", McGraw Hill, New York.
2. G.L Kusic., "Computer-Aided Power System Analysis", Prentice Hall of India, New Delhi.
3. John J.Grainger and W.D.Stevenson, "Power System Analysis", McGraw Hill, New York, 1994.
4. A.J. Wood & W.F. Wollenberg, "Power Generation, Operation, and Control", 2nd Edn, John Wiley & Sons, New York, 1996.
5. O.I. Elgerd, "Electric Energy Systems Theory: An Introduction", McGraw Hill, New York, 1982
6. J. Arrillaga, C.P Arnold & Harker, "Computer Modeling of Electrical Power Systems", John Wiley & Sons.

NOTE: To the examiner : There will be total eight questions, two from each unit.

The candidate is to answer five questions in all, selecting at least one from each unit.

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MASTER OF TECHNOLOGY (ELECTRICAL & ELECTRONICS ENGINEERING)

POWER ELECTRONICS & DRIVES SPECIALIZATION' w.e.f. 2010-11

Course No. MTEEl-1.3 **Digital Control Systems**

L	T	P
4	-	-

Marks (40 internal, 60 Exam)
Exam Time 3 hrs.

UNIT- 1 Review of Z-transform and inverse Z-transform modified Z-transform. Representation of discrete time systems.

UNIT- 2 Pulse Transfer Functions, State Space models. Stability analysis: Jury's Test and numericals based on this, Routh's test. Issues of sampling and discretization.

UNIT - 3 Models of Digital control devices and systems: Z-domain description & digital filters. Analysis of Discrete time systems, Controllability and Observability, Effects of sampling, multirate sampling.

UNIT - 4 Design of Digital controller: Classical & State-space techniques. Realization of Discrete time controller: Quantization errors.

References:

1. P.N. Paraskevopoulos, "Digital Control Systems", Prentice Hall, 1996,
2. M.Gopal, "Digital Control & State variable methods", TMH 1997.
3. K.Ogata, "Digital Control System" PHI

NOTE: To the examiner : There will be total eight questions, two from each unit. The candidate is to answer five questions in all, selecting at least one from each unit.

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KURUKSHETRA UNIVERSITY KURUKSHETRA
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POWER ELECTRONICS & DRIVES SPECIALIZATION w.e.f. 2010-11

Course No. MTEEl-1.4 **Microprocessors & Digital Signal Processors**

L T P **Marks (40 internal, 60 Exam)**
4 - - **Exam Time 3 hrs.**

UNIT- 1 Architecture of 8086 microprocessor, Development of 8086 processors, interrupt structure. Addressing modes, Instruction set and application programs, Main Assembler Directives, Interfacing D/A and A/D converters using programmable I/O devices.

UNIT - 2 Introduction to microcontrollers, Architecture of 8051 microcontroller, basic Instruction set, programming, serial data communication, interfacing with D/A and A/D converters.

UNIT - 3 Introduction to Digital Signal Processors, Architectures of TMS-320 series, Instruction Set, Programming and Interfacing.

UNIT – 4 Application of Microprocessors, Microcontrollers and Digital Signal Processing in Power and Control Systems.

References:

1. Gibson, "Microprocessors", Prentice Hall of India.
2. K.J. Ayala, "Micro Controller", Penram International.
3. Reference Manual of TMS-320 Digital Signal Processor.

NOTE: To the examiner : There will be total eight questions, two from each unit. The candidate is to answer five questions in all, selecting at least one from each unit.

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Course No. MTEEl-1.5 Power Electronics **LAB**

L	T	P
-	-	3

Internal : 40 Marks
Practical : 60 Marks
Total : 100 Marks

LIST OF EXPERIMENTS:-

(1) To study the characteristics of Thyristor, Triac, Transistor & MOSFET.
(2) To study full wave converter.
(3) To study speed control of Single phase induction motor using Cycloconverter.
(4) To study the voltage waveform across thyristors, capacitors & average output voltage for Morgan and Jones Chopper.
(5) To study the operation of a single phase dual converter & also verify that $\alpha_{1+} \alpha_{2=180}$.
(6) To find the average output voltage of step-up MOSFET based chopper circuit.
(7) To study the Harmonic reduction in inverter by phase displacement technique.
(8) To control the speed of DC series motor using chopper.
(9) To study different waveforms in Switched mode Regulator.
(10)To study series & parallel commutated inverter.
(11) To study PWM inverter.

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Course No. MTEEI-2.1 **Electric Drives**

L T P **Marks (40 internal, 60 Exam)**
4 - - **Exam Time 3 hrs.**

UNIT- 1 Basic concept characteristics and operating mode of drive motors. Starting, braking and speed control of motors. 4 quadrant drives.

UNIT- 2 Types of loads. Torque and associated controls used in process industries. Applications of solid state controllers such as choppers, rectifiers, inverter and cycloconverter in drive System, and their performance characteristics.

UNIT - 3 Modern trend in industrial drives. Studies relating to steel mills, paper mills, textile mill, machine tools etc.

UNIT - 4 A.C. motor drives in transportation system and traction. Duty cycle. Heating/cooling and insulation in motors. Choice of motors and rating.

References:

1. G.K. Dubey,"Fundamentals of Electrical Drives", Narosa Publishing House, New Delhi
2. R. Krishan,"Electric Motor Drives: Modeling analysis and control", PJI Pvt Ltd., New Delhi, 2001.
3. B.K. Bose, "Power Electronics and Variable Frequency Drives",Technology and Applications IEEE Pres, 1997.
4. B.K. Bose, "Modern Power Electronics and AC Drives", Pearson, Delhi, 2002.
5. L.A. Oliver, "Adjustable Speed Drives": Application Guide, JARSCO Engg. Corpn., and FPRI, Palo Alto, 1992.
6. J.M.D. Murphy and FG Turnbull, "Power Electronics Control of AC Motors", PERGAMON Press, UK, 1988.

NOTE: To the examiner : There will be total eight questions, two from each unit. The candidate is to answer five questions in all, selecting at least one from each unit.

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Course No. MTEEl-2.2 **Power Apparatus and Machines**

L	T	P
4	-	-

Marks (40 internal, 60 Exam)
Exam Time 3 hrs.

UNIT- 1 Generalized Theory of Electrical Machines: Introduction, primitive model, transformation, voltage equations for induction and synchronous machines. Servomoters, Stepper moters, synchros, BLDC motors

UNIT- 2 Induction Machines: Abnormal running operation, effect of space harmonics, slip power control, capacitor self-excitation of induction machines and its applications.

UNIT - 3 Transformers: Transformer as a mutually coupled circuit, equivalent circuit from coupled circuit approach. Multi circuit Transformers: Advantage, theory, equivalent circuit, regulation, three circuit transformers.

UNIT – 4 Three phase autotransformers: Connections and Analysis Parallel operation of dissimilar transformers. Harmonics; Inrush current phenomenon, effect of load and three phase connections. Sequence iMTEElances in transformers.

Referênces:

1. MIT Staff, "Magnetic Circuits and Transformers", MIT Press Cambridge.
2. L.F Blume,"Transformer Engineering", John Wiley & Sons, Inc, N.Y.
3. Fitzgerald & Kingsley, "Electric Machinery", McGraw Hill Co. New Delhi.
4. A Langsdorf, "Theory of alternating current Machinery", McGraw Hill Co. New Delhi.
5. PS Bimbhra ,"Generalized Theory of Electrical Machines", Khanna Publishers, New Delhi.

NOTE: To the examiner : There will be total eight questions, two from each unit. The candidate is to answer five questions in all, selecting at least one from each unit.

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Course No. MTEEI-2.3 **A.C. Controllers**

L T P **Marks (40 internal, 60 Exam)**
4 - - **Exam Time 3 hrs.**

UNIT- 1 Single-phase and three-phase back controllers. Triggering technique for power factor and harmonic controls. Design analysis of phase control circuits, solid state transfer switches.

UNIT- 2 Concept of three-phase to single phase and single phase to three-phase cyclo-converter. Symmetrical and asymmetrical control. Harmonic analysis of the output voltage. Effect of source inductance.

UNIT - 3 Line commutated inverter. Single-phase and three-phase inverters, configuration of VSI & CSI. Concept of PWM techniques, single and multiple pulse periodic and DC level modulation strategies.

UNIT - 4 Reduction of harmonics. Active filters, passive filter, Software and hardware methods of generating firing pulses.

References:

1. N. Mohan, T.M. Undeland & W.P. Robbin, "Power Electronics, Converter Applications and Design", John Wiley & Sons, 1989.
2. M.H. Rashid, "Power Electronics", Prentice Hall, 1994
3. B.K. Bose, "Power Electronics and AC Drives", 1986
4. R.Bausiere and G. Seguier, "Power Electronics Converters", Springer-Verlag, 1987
5. D.M. Mitchell, :DC-DC Switching Regulator Analysis", McGraw Hill, 1987

NOTE: To the examiner : There will be total eight questions, two from each unit. The candidate is to answer five questions in all, selecting at least one from each unit.

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Course No. MTEEl-2.4 **Cryptography**

L T P
4 - -

Marks (40 internal, 60 Exam)
Exam Time 3 hrs.

UNIT- 1 Introduction to Cryptography and information Security Mathematical Foundation Introduction to groups, rings and fields, structures of finite fields, groups constructed over points on an elliptic curve.

UNIT- 2 Congruences and residue classes, quadratic residues and square roots modulo integer. Theory of computational complexity, fundamentals of probability theory, birthday paradox.

UNIT - 3 Basic Cryptographic techniques – Classical techniques, Symmetric techniques (AES & DES), Asymmetric techniques – Discrete log problem, Deffie Hellman Key exchange, RSA algorithm, ElGamal systems, Elliptic curve arithmetic and Cryptography.

UNIT - 4 Message authentications, Cryptographic Hash Functions, Hash algorithms, MD5 message digest algorithm, Digital Signatures and authentication protocols.

References:-

1. W. Stallings, "Cryptography and Network Security", Pearson Education., New Delhi, 2003.
2. W. Mao, "Modern Cryptography: Theory and practice", Pearson Education., New Delhi, 2004.

NOTE: To the examiner : There will be total eight questions, two from each unit. The candidate is to answer five questions in all, selecting at least one from each unit.

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Course No. MTEEl-2.5 **Electric Drives Lab**

Internal : 40 Marks
Practical : 60 Marks
Total : 100 Marks

L	T	P
-	-	3

LIST OF EXPERIMENTS:-

(1) Study of industrial applications of various machines.
(2) Study of different types of loading on a particular machine:
  (a) Intermittent loading
  (b) Continuous loading
(3) Three phase fully controlled rectifier fed separately excited DC motor (1hp) at different firing angles for obtaining speed torque characteristics.
(4) Single phase fully controlled rectifier fed separately excited DC motor (1hp) at different firing angles for obtaining speed torque characteristics.
(5) Chopper control of DC series motor (1hp) for obtaining speed-torque characteristics.
(6) Chopper control of separately excited DC motor (1hp) for obtaining speed -torque characteristics.
(7) (a) VSI controlled induction motor drive (either through controlled rectifier or Chopper).
  (b) CSI controlled induction motor drive (either through controlled rectifier or Chopper).
(8) Half wave Cycloconverter fed IM drive for obtaining Speed-Torque Characteristics & torque controlled frequency for constant V/F ratio.
(9) (a) VSI Synchronous motor drives with load commutation.
  (b) CSI Synchronous motor drives with load commutation.
(10) Self controlled Synchronous motor drives employing cycloconverter.
(11) Regenerative braking of separately excited c motor.
(12) AC dynamic braking (Rheoststic) of three phase induction motor.
(13) Reverse voltage braking (Plugging) of a three phase induction motor.
(14) Measurement of moment of inertia (Retardation test) of a three phase induction motor.

III Sem.

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Course No. MTEEI-3.1 **System Modeling and Optimization**

L	T	P	
4	-	-	3 0 1

Marks (40 internal, 60 Exam)
Exam Time 3 hrs.

UNIT- 1 System Modeling:
Introduction, types of modeling, modeling of time-varying, distributed, stochastic, nonlinear, discrete event and hybrid systems.Conventional tools for linear system modeling, Introduction to non-conventional modeling tools , Neural models, fuzzy models.Model simulation languages and tools.

UNIT- 2 Optimization Theory:
Introduction to optimization theory, Importance in solving system engineering problems, Convex sets & Functions; affine and convex sets, supporting and separating hyper planes, dual cones and generalized inequalities.

UNIT - 3 Linear Programming problem Formulation, Simplex Method, Dual Simplex method, sensitivity analysis, duality in programming. Introduction to nonlinear programming; Unconstrained Optimization-formulation of quadratic optimization problems, gradient descent and steepest descent methods, Newton's method, self-concordance.

UNIT - 4 Constrained optimization – direct optimization, Cutting plane methods, methods of feasible direction, analytic center cutting plane methods.Multi-objective Optimization. Application to approximation and filling problems.

References:

1. SS Rao, "Optimization theory and applications" Wiley Eastern Ltd.
2. KV Mittal, "Optimization methods", Wiley Eastern Ltd.
3. NA Kheir, "System modeling and computer simulation" Marcel Decker, New York.
4. Korn G.A., "Interactive Dynamic System Simulation", McGraw Hill, N.Y.

NOTE: To the examiner : There will be total eight questions, two from each unit. The candidate is to answer five questions in all, selecting at least one from each unit.

KURUKSHETRA UNIVERSITY KURUKSHETRA
MASTER OF TECHNOLOGY (ELECTRICAL & ELECTRONICS ENGINEERING)
POWER ELECTRONICS & DRIVES SPECIALIZATION w.e.f. 2010-11

Course No. MTEEI-3.2 302 **Modeling & Analysis of Electric Machines**

L T P
4 - -

Marks (40 internal, 60 Exam)
Exam Time 3 hrs.

UNIT 1 Introduction to the modeling of electrical machines. Reference Frame Theory. Linear and non linear model,

UNIT 2 Modeling and Analysis of Induction and Synchronous Machines in the Steady state, synch. machine: basic configuration, excitation methods, d-q-0 transformation, phasor diagram, modeling considerations. Choice of variables, steady state and transient analysis.

UNIT 3 Computer Simulations of Induction and Synchronous machines, steady state and transient operation, load analysis, introduction to computer packages of computer simulation

UNIT 4 Speed and Torque Control in Induction and Synchronous motors.

References:

1. Paul C.Krause Oleg Wasynczuk, Scott D. Sudha, "Analysis of Electric Machines"
2. A. E. Fitzgerald, Charles Kingsley Stephen D.mang., "Electric Machinery", 6th Ed.,
3. Drag O Dollnar, "Electric Machines Modeling and Control", University of Marihar.
4. P S. Bhimbhra, "Generalized Theory of Electric Machines", Khanna Publication

NOTE: To the examiner : There will be total eight questions, two from each unit. The candidate is to answer five questions in all, selecting at least one from each unit.

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MASTER OF TECHNOLOGY (ELECTRICAL & ELECTRONICS ENGINEERING)
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Course No. MTEEL-3.4.1 **Intelligent Control**

L T P
4 - -

Marks (40 internal, 60 Exam)
Exam Time 3 hrs.

UNIT- 1 Introduction to Soft Computing Methodologies – Artificial Neural Networks, Fuzzy Logic, Genetic Algorithm. Need for intelligent control, intelligent system models,

UNIT- 2 introduction to system modeling using ANN and Fuzzy logic. Basic Fuzzy Logic System, Fuzzy Logic based system modeling, Fuzzy Logic based Controller Design. Theoretical and plementation issues.

UNIT - 3 Artificial Neural Netwoks, human brain model, artificial neuron interneuron architecture, types of ANN + feed forward and feedback. Supervised and unsupervised learning.

UNIT - 4 Boltzman Machine, recurrent neural architectures, neural modeling of engineering systems, ANN based controller design, theoretical and implementation issues. Introduction to neurofuzzy systems and their application to control of complex systems.

References:

1. T.J. Ross ," Fuzzy Logic Control", TM.H. Publications.
2. Drinnkov , "Fuzzy Logic Control", Narosa Publishers.
3. Simon Hekins ,"Comprehensive Neural Networks", Pearson Publications.
4. J.S.R. Jang, C.T. Sun, E. Mizutani,,"Neuro Fuzzy and Soft Computing",P.H.I. Publishers.

NOTE: To the examiner : There will be total eight questions, two from each unit. The candidate is to answer five questions in all, selecting at least one from each unit.

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Course No. MTEEI-3.3 **Information Security**

303

L T P
4 - -

Marks (40 internal, 60 Exam)
Exam Time 3 hrs.

UNIT- 1 Information Security and privacy, introduction, Security levels, Security aims.

UNIT- 2 System Security – Security models, Security functions and Security Mechanisms, Privacy enhancing Mechanisms, Access control: role based attribute based, Data base Security, Secure programming, Security evaluation criteria.

UNIT - 3 Network Security – Security Threats and vulnerabilities, Firewalls, IDS, VPNS, Router Security, Viruses, Worms, DoS, DDos attacks, OS Security, Security protocols, Security management, Audit and Assurance, Standards, Availability, Survivability, Introduction to disaster recovery and Forensics.

UNIT - 4 Introduction to Cryptography. Mathematical Foundation Introduction to groups, rings and fields, structures of finite fields, groups constructed over points on an elliptic curve.

References:-

1. B. Matt, "Computer Security", Pearson Education., New Delhi, 2003.
2. W. Stallings, "Cryptography and Network Security", Pearson Education., New Delhi, 2003.
3. Rolf Oppliger, "Secrets technologies for world wide web", 2nd Edition, Artech House, 2003.

NOTE: To the examiner : **There will be total eight questions, two from each unit. The candidate is to answer five questions in all, selecting at least one from each unit.**

KURUKSHETRA UNIVERSITY KURUKSHETRA
MASTER OF TECHNOLOGY (ELECTRICAL & ELECTRONICS ENGINEERING)
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Course No. MTEEl-3.4.3 **Computer Aided Design of Electrical Machines**

L T P
4 - -

Marks (40 internal, 60 Exam)
Exam Time 3 hrs.

UNIT- 1 Review of design processes of transformer and rotating electrical machines.

UNIT- 2 Computer aided design :Advantages, limitation, analysis and synthesis methods, selection of input data, design variables

UNIT - 3 Flow charts for the design of transformer and rotating electrical machines,

UNIT - 4 Introduction of optimization techniques, optimal design of electrical machines.

References:

1. M. Ramamoorthy; "Computer Aided Design of Electrical Equipment", East West Press, New Delhi.
2. Cyril G. Veinott, "Computer Aided Design of Electric Machinery", MIT Press, UK
3. A.K. Sawhney, "A Course in Electrical Machine Design", Dhanpat Rai & Co., Delhi
4. Upadhyay K.G., "Conventional and Computer aided design of electrical machines", Galgotia Publications, New Delhi

NOTE: To the examiner : There will be total eight questions, two from each unit. The candidate is to answer five questions in all, selecting at least one from each unit.

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Course No. MTEEI-3.4.2 **PLC & Microcontrollers**

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Marks (40 internal, 60 Exam)
Exam Time 3 hrs.

UNIT- 1 Logic design, Principle of Operation, Controller, Interfacing circuits, Modbus, Programming examples

UNIT- 2 PLC, Microcontroller

UNIT - 3 Architecture, instruction set, timer, interrupts,

UNIT – 4 I/O port, interfacing A/D converter, I2Cbus operation

References:

1. Programmable Logic controllers : Operation, interfacing and programming by Job Den Otter, PHI
2. Design with PIC Microcontrollers by John B.Peatman, Pearson

NOTE: To the examiner : There will be total eight questions, two from each unit. The candidate is to answer five questions in all, selecting at least one from each unit.

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Course No. MTEEI-3.4.3 **Computer Aided Design of Electrical Machines**

L T P 313
4 - -

Marks (40 internal, 60 Exam)
Exam Time 3 hrs.

UNIT- 1 Review of design processes of transformer and rotating electrical machines.

UNIT- 2 Computer aided design :Advantages, limitation, analysis and synthesis methods, selection of input data, design variables

UNIT - 3 Flow charts for the design of transformer and rotating electrical machines,

UNIT - 4 Introduction of optimization techniques, optimal design of electrical machines.

References:

1. M. Ramamoorthy; "Computer Aided Design of Electrical Equipment", East West Press, New Delhi.
2. Cyril G. Veinott, "Computer Aided Design of Electric Machinery", MIT Press, UK
3. A.K. Sawhney, "A Course in Electrical Machine Design", Dhanpat Rai & Co., Delhi
4. Upadhyay K.G., "Conventional and Computer aided design of electrical machines", Galgotia Publications, New Delhi

NOTE: To the examiner : There will be total eight questions, two from each unit. The candidate is to answer five questions in all, selecting at least one from each unit.

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Course No. MTEEI-3.5 Simulation **LAB**

304

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Internal : 40 Marks
Practical : 60 Marks
Total : 100 Marks

List of Experiments:

1. To develop a program for solution of a non linear algebric equation using Gauss-Siedal method.
2. Simulation and Analysis of a simple single phase system using Power System Blockset.
3. Simulation of three phase power system using Power System Blockset.
4. Simulation of synchronous machine using Power System Blockset.
5. Simulation of variable frequency induction motor drive using Power System Blockset.
6. Simulation of chopper fed DC motor drive.

Course No. EEL-414 Special Topics in PED

L T P Total
4 0 0 4

Credits-4
Duration of Exam- Three hours
During Semester Evaluation Weightage- 30 Marks (Internal)
End Semester Examination Weightage- 70 Marks (External)

Unit 1: I.C.I-IM Drive: Drive configuration; Communication at different speed; Control structure. FOC-IM Drive: Drive Configuration; mathematical modelling; direct and indirect FOC

Unit 2: Stepper motor and Drive configurations, Brush less DC drive configuration, Low speed commutation, Inverter control strategies.

Unit 3: Permanent magnet SM drive converter configuration, Synchronization, Trapezoidal and sinusoidal drive control structure.

Unit 4: Principle of soft switching in inverters.
Resonant converters. Modeling strategies, Analysis and design of Power Electronics Circuit.

References:

1. Power Electronics, Rashid, P.C.Sen, Nedmoohan

Note: Examiner will set eight questions taking 02 questions from each unit. Students will be required to attempt five questions in all selecting atleast 01 from each unit.

Course No. ECE-318 **Signal Processing**

L T P Total
4 0 0 4

Credits-4
Duration of Exam- Three hours
During Semester Evaluation Weightage- 30 Marks (Internal)
End Semester Examination Weightage- 70 Marks (ext.)

Unit 1: Discrete time Signal & System: - Discrete time signal and sequences; resolution of discrete- time signal into impulses, analysis of discrete- time LTI system, convolution seem causality and stability; difference equations and their solutions; response to complex exponential signals; frequency response function

Unit 2: Transforms - Representation of sequences by fourier transform ; Z transforms, ROC; LTI in Z domain; sampling, frequency domain representation, application of Z transform in transient A.C. signal filtering.

Discrete Fourier transform: Frequency domain sampling; The DFT, linear and circular convolution; application in A.C. transient signal analysis, FFT algorithm, DIT and DIF.

Unit 3: Discrete-time system: Block diagram representation of linear constant coefficient difference equation, direct form I and II, cascade form, parallel form ; finite precision word-length effect , number representation ; effect of quantization and rounding of noise; zero input limit cycles in fixed point realization.

Unit 4:
Filter design: Design of FIR filters by windowing; Butterworth and Chebyshev filters; IIR filters, impulse invariance and bilinear transformation.

Applications: Dual tone multi-frequency signal detection; spectral analysis, application in power system, image processing, multidimensional digital signal processing.

References:

1. Openheim & Schafer -- Discrete time signal processing; PHI
2. Proakes & Manolakes --Digital signal processing; PHI
3. Mitra , S.k. --Digital signal processing ; TMH.
4. B.C.Kuo-- Digital signal processing
5. M.Gopal--Digital signal processing

Note: Examiner will set eight questions taking 02 questions from each unit. Students will be required to attempt five questions in all selecting atleast 01 from each unit.