

M.D. UNIVERSITY, ROHTAK
Scheme of studies & Examination
Bachelor of Technology (Electrical & Electronics Engg.)
SEMESTER V
‘F’ Scheme Effective from 2011–2012

Course No.	Course Title	Teaching Schedule				Marks of Class Work	Examination		Total Marks	Duration of Exam
		L	T	P	Total		Theory	Practical		
EE-311-F	Electrical Machines-II (EE, EEE)	3	1	-	4	50	100	-	150	3
EE-303-F	Electronic Measurement And Instrumentation (EE,EEE,ECE,IC)	3	1	-	4	50	100	-	150	3
EE-305-F	Analog Electronics Circuits (EE,EEE,ECE,IC)	3	1	-	4	50	100	-	150	3
EE-315-F	Power Systems-I (EE, EEE)	3	1	-	4	50	100	-	150	3
EE-317-F	Power Electronics (EE, EEE, Common with VI sem IC)	3	1	-	4	50	100	-	150	3
EE-309-F	Microprocessors And Interfacing (EE,EEE,ECE,IC)	3	1	-	4	50	100	-	150	3
EE-323-F	Electronic Measurement & Instrumentation Lab (EE,EEE,ECE,IC)	-	-	2	2	25	-	25	50	3
EE-321-F	Power Electronics Lab. (EE, EEE Common with VI sem , IC)	-	-	2	2	25	-	25	50	3
EE-319-F	Microprocessor & Interfacing Lab. (EE,EEE,ECE,IC)	-	-	2	2	25	-	25	50	3
EE-327-F	Electrical Machines-II LAB. (EE, EEE)	-	-	3	3	25	-	25	50	3
EE-333-F	Practical Training-I	-	-	2	2		-	-		-
	TOTAL	18	6	11	35	400	600	100	1100	

Note:

- 1) **Students will be allowed to use non-programmable scientific calculator. However, sharing of calculator will not be permitted in the examination.**
- 2) **Assessment of Practical Training-I, undergone at the end of IV semester, will be based on seminar, viva-voce, report and certificate of practical training obtained by the student from the industry. According to performance letter grades A, B, C, F are to be awarded. A student who is awarded ‘F’ grade is required to repeat Practical Training.**

L T P
3 1 -

Theory : 100 Marks
Class work : 50 Marks
Total : 150 Marks

Duration of Exam : 3 Hours

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

Poly-phase Induction Machine: Constructional features, production of rotating field, induction motor action, torque production, testing, development of equivalent circuit, performance characteristics, circle diagram, starting methods, methods of speed control - stator voltage control, stator resistance control, frequency control, rotor resistance control, slip power recovery control. double cage and deep bar motors. grid excited and self excited induction generators.

Section-B

Single phase Induction Motors: Double revolving field theory, cross field theory, different types of single phase induction motors, circuit model of single phase induction motor.

Section-C

Synchronous Generator: Principle, construction of cylindrical rotor and salient pole machines, winding, EMF equation, Armature reaction, testing, model of the machine, regulation -- synchronous reactance method, Rothert's mmf method, Potier triangle method. Output power equation, power angle curve, two reactance theory, slip test, transient and sub-transient reactances, synchronization, parallel operation.

Section-D

Synchronous Motor: Principles of synchronous motor, power angle curve, V-curve, starting, damper winding, synchronous condenser, applications.

TEXT BOOKS:

1. Electric Machines: I.J.Nagrath and D.P. Kothari, TMH, New Delhi.
2. Electric Machinery, Fitzgerald and Kingsley, MGH.
3. Electrical Machines, P.S. Bhimbra, Khanna Publishers Delhi

REF. BOOKS:

1. Theory of alternating current machinery: A.S. Langsdorf (TMH)
2. Generalized theory of Electrical Machines: P.S. Bhimbra(Khanna Pub.)

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Section-A

OSCILLOSCOPE:

Block diagram, study of various stages in brief, high frequency CRO considerations. Sampling and storage oscilloscope.

GENERATION & ANALYSIS OF WAVEFORMS:

Block diagram of pulse generators, signal generators, function generators wave analysers, distortion analysers, spectrum analyser, Harmonic analyser, introduction to power analyser.

Section-B

ELECTRONIC INSTRUMENTS:

Instruments for measurement of voltage, current & other circuit parameters, Q-meters, R.F. power measurements, introduction to digital meters.

FREQUENCY & TIME MEASUREMENT:

Study of decade counting Assembly(DCA), frequency measurements, period measurements, universal counter, introduction to digital meters.

Section-C

DISPLAY DEVICES:

Nixie tubes, LED's LCD's, discharge devices.

TRANSDUCERS:

Classification, Transducers of types: RLC photocell, thermocouples etc. basic schemes of measurement of displacement, velocity, acceleration, strain, pressure, liquid level & temperature.

Section-D

INTRODUCTION TO SIGNAL CONDITIONING:

DC signal conditioning system, AC signal conditioning system, data acquisition and conversion system

TEXT BOOK:

1. A course in Electrical & Electronics Measurements & Instrumentation : A.K.Sawhney; Dhanpat Rai & Sons.

REFERENCE BOOKS.

1. Electronics Instrumentation & Measurement Techniques : Cooper; PHI.

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Section-A

SINGLE AND MULTISTAGE AMPLIFIERS:

Classification of amplifiers, distortion in amplifiers, frequency response of an amplifier, step response of an amplifier, pass-band of cascaded stages, RC-coupled amplifier, low frequency response of RC coupled stage, effect of an emitter bypass capacitor on low Frequency response, multistage CE amplifier .

FEEDBACK AMPLIFIERS :

Feedback concept, transfer gain with feedback, general characteristics of negative feedback amplifiers, input resistance, output resistance, voltage series feedback, current series feedback, current shunt feedback, voltage shunt feedback.

Section-B

OSCILLATORS:

Sinusoidal oscillators, Barkhausen criteria, R-C phase shift oscillator, general form of oscillator circuit, wien-bridge oscillator, crystal oscillator.

Section-C

POWER AMPLIFIERS:

Class A, B, and C operations; Class A large signal amplifiers, higher order harmonic distortion, efficiency, transformer coupled power amplifier, class B amplifier : efficiency & distortion; class A and class B push-pull amplifiers; class C power amplifier.

OPERATIONAL AMPLIFIERS :

Ideal and practical operational amplifiers, inverting and non-inverting amplifier, differential amplifier, emitter coupled differential amplifier, transfer characteristics of a differential amplifier, offset error : voltage and current, common mode rejection ratio (CMRR) .

Section-D

LINEAR APPLICATIONS OF OPERATIONAL AMPLIFIERS :

Scale changer, phase shifter, adder, voltage to current converter, current to voltage converter, DC voltage follower, Bridge amplifier, AC coupled amplifier, AC voltage follower, Integrator, differentiator.

NON-LINEAR APPLICATIONS OF OPERATIONAL AMPLIFIERS :

Comparators, sample & hold circuits, Logarithmic amplifier, anti-log amplifier, logarithmic multiplier, waveform generators , Miller & Bootstrap sweep generators, regenerative comparator (Schmitt Trigger), multivibrators, ADC.

TEXT BOOK:

1. Agarwal - Foundations & Analog & digital electronics, Elsevier
2. Integrated Electronics: Milman Halkias, TMH.
3. Microelectronic Circuits : Sedra & Smith.

REFERENCE BOOKS:

1. Operational Amplifiers: Gaikwad
2. Electronic Circuit Analysis and Design (Second edition) : D.A. Neamen; TMH

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Section-A

REPRESENTATION OF POWER SYSTEM COMPONENTS: Introduction, Single-phase representation of balance three-phase network, The one-line diagram and the impedance or reactance diagram, Per unit (PU) system, Complex power, The steady state model of synchronous machine, Power transformer, Transmission of electric power, System protection, Representation of loads.

Section-B

LOAD FLOW STUDIES: Introduction, Network model formulation, Formation of YBUS by singular transformation, Load flow problem, Gauss-siedel method, Newton-Raphson method, Decoupled load flow studies, Comparison of load flow methods, Control of voltage profile.

Section-C

OPTIMAL SYSTEM OPERATION: Introduction, Optimal operation of generators on a bus bar, Optimal unit commitment (UC), Reliability considerations, Optimal generation scheduling, Optimal load flow solution, Optimal scheduling of hydrothermal system.

Section-D

AUTOMATIC GENERATION AND VOLTAGE CONTROL: Introduction, Load frequency control (single area case), Load frequency control and economic dispatch control, Two- area load frequency control, Optimal (two-area) load frequency control, Automatic voltage control.

TEXT BOOK:

Power System Engineering – DP Kothari, I J Nagrath, Tata McGraw Hill

Electrical Power system by C L Wadhwa

Power system Engineering by P. Kundur

Tleis - Power systems analysis using Fault tolerance systems, Elsevier

A Course in Electrical Power: Gupta, Soni & Bhatnagar (Dhanpat Rai & Sons).

REF. BOOKS:

1. Elements of power system analysis: W.D.Stevenson (MGH)
2. Electric Power: S.L.Uppal (Khanna Pub.)
3. Electrical power: J.B.Gupta (S.K.Kataria & Sons).
4. Power System Engineering: B. R. Gupta.
5. Electric Power System: B.M.Weedy, John Wiley & Sons.
6. Transmission & Distribution of Electrical Engineering: H.Cotton.
7. Transmission & Distribution of Electrical Engineering: Westing House & Oxford Univ. Press, New Delhi.
8. Transmission & Distribution of Electrical Engineering: Westing House & Oxford Univ. Press, New Delhi.

EE-317-F**POWER ELECTRONICS**

L T P
3 1 -

Theory : 100 Marks
Class work : 50 Marks
Total : 150 Marks

Duration of Exam: 3 Hours

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Section-A**INTRODUCTION:**

Role of power electronics, review of construction and characteristics of power diode, Shottky diode, power transistor, power MOSFET, SCR, DIAC, Triac, GTO, and IGBT & SIT.

SCR:

Ratings and protections, series and parallel connections, R, RC and UJT firing circuit and other firing circuits based on ICs and microprocessors; pulse transformer and opto-coupler, commutation techniques.

Section-B**AC REGULATORS:**

Types of regulator, equation of load current, calculation of extinction angle, output voltage equation, harmonics in load voltage and synchronous tap changer, three phase regulator.

CONVERTERS:

One, two, three, six and twelve pulse converters, fully and half controlled converters, load voltage waveforms, output voltage equation, continuous and discontinuous modes of operation, input power factor of converter, reactive power demand, effect of source inductance, introduction to four quadrant / dual converter, power factor improvement techniques, forced commutated converter, MOSFET and transistor based converters.

Section-C**INVERTERS :**

Basic circuit, 120 degree mode and 180 degree mode conduction schemes, modified McMurray half bridge and full bridge inverters, McMurray -Bedford half bridge and bridge inverters, brief description of parallel and series inverters, current source inverter (CSI), transistor and MOSFET based inverters.

CHOPPERS :

Basic scheme, output voltage control techniques, one, two, and four quadrant choppers, step up chopper, voltage commutated chopper, current commutated chopper, MOSFET and transistor based choppers.

Section-D**CYCLOCONVERTERS:**

Basic principle of frequency conversion, types of cycloconverter, non-circulating and circulating types of cycloconverters.

DRIVES: Introduction to electric drives: DC drives – converter and chopper fed dc drives, ac drives - stator voltage control, V/f control, rotor resistance control, static Scherbius system and static Kramer systems.

TEXT BOOK:

1. Power Electronics: P.S Bhimra
2. Power Electronics : MH Rashid; PHI
3. Bose - Power electronics, Elsevier

REFERENCE BOOKS:

1. Rashid - Handbook of power electronics, Elsevier
2. Power Electronics : PC Sen; TMH
3. Power Electronics: HC Rai; Golgotha
4. Thyristorised Power Controllers: GK Dubey, PHI
5. Power Electronics and Introduction to Drives: A.K.Gupta and L.P.Singh;Dhanpat Rai

EE-309-F

MICROPROCESSORS AND INTERFACING

L T P

3 1 -

Theory : 100 Marks

Class work : 50 Marks

Total : 150 Marks

Duration of Exam : 3 Hours

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Section A

THE 8085 PROCESSOR :

Introduction to microprocessor, 8085 microprocessor : Architecture, instruction set, interrupt structure, and Assembly language programming.

Section B

THE 8086 MICROPROCESSOR ARCHITECTURE :

Architecture, block diagram of 8086, details of sub-blocks such as EU, BIU; memory segmentation and physical address computations, program relocation, addressing modes, instruction formats, pin diagram and description of various signals

Section C

INSTRUCTION SET OF 8086 :

Instruction execution timing, assembler instruction format, data transfer instructions, arithmetic instructions, branch instructions, looping instructions, NOP and HLT instructions, flag manipulation instructions, logical instructions, shift and rotate instructions, directives and operators, programming examples.

Section D

INTERFACING DEVICE :

8255 Programmable peripheral interface, interfacing keyboard and seven segment display, 8254 (8253) programmable interval timer, 8259A programmable interrupt controller, Direct Memory Access and 8237 DMA controller.

TEXT BOOKS :

1. Microprocessor Architecture, Programming & Applications with 8085 : Ramesh S Gaonkar; Wiley Eastern Ltd.
2. The Intel Microprocessors 8086- Pentium processor : Brey; PHI

REFERENCE BOOKS:

1. Microprocessors and interfacing : Hall; TMH
2. The 8088 & 8086 Microprocessors-Programming, interfacing,Hardware & Applications :Triebel & Singh; PHI
3. Microcomputer systems: the 8086/8088 Family: architecture, Programming & Design : Yu-Chang Liu & Glenn A Gibson; PHI.
4. Advanced Microprocessors and Interfacing : Badri Ram; TMH

L T P	CLASS WORK	:	25 Marks
0 0 2	EXAM	:	25 Marks
	TOTAL	:	50 Marks
	DURATION OF EXAM	:	3 HRS

LIST OF EXPERIMENTS:

- 1) Study blocks wise construction of a analog oscilloscope & Function generator.
- 2) Study blocks wise construction of a Multimeter & frequency counter.
- 3) Study Measurement of different components & parameters like Q of a coil etc using LCRQ meter.
- 4) Study of distortion factor meter and determination of the % distortion of the given oscillator
- 5) Determine output characteristics of a LVDT and Measure displacement using LVDT
- 6) Study characteristics of temperature transducer like Thermocouple, Thermistor & RTD with implementation of a small project using signal conditioning circuits like instrumentation amplifier.
- 7) Measurement of Strain using Strain Guage.
- 8) To study differential pressure transducer & signal conditioning of output signal.
- 9). Measurement of level using capacitive transducer..
- 10) Study of Distance measurement using ultrasonic transducer.

Note: Any Eight Experiments should performed from above list and two experiments can be suitably chosen on the contemporary topics

L T P

0 0 2

LASS WORK :25 Marks

EXAMS : 25 Marks

TOTAL : 50 Marks

DURATION OF EXAM: 3 HRS

LIST OF EXPERIMENTS:

1. Static Characteristics of Power diode & Shottky diode and to study reverse recovery of Power Diode & Shottky diode.
2. Characteristics of IGBT & GTO
3. To study R, RC and UJT firing Circuit with Pulse transformer
4. To study of Firing Circuit based on ICs NE555, 7408 & 3140
5. To Study of Pulse transformer & opto coupler technique
6. To Study of SCR Communication Technique Class A-E.
7. Speed control of small motor using Single Phase Half wave & Full wave fully controlled Converter
8. Speed control of small motor using Single Phase Dual Converter (Continuous and discontinuous Control)
9. Study of Mc Murray - Bed ford Half & Full Bridge Inverter
10. To study Parallel Inverter to drive small AC Induction motor
11. Speed control of a small DC motor using MOSFET based Chopper with output voltage control technique
12. Speed control of small AC induction motor using Single Phase non circulating type bridge by frequency conversion.

EE-319-F	MICROPROCESSOR & INTERFACING LAB.		
L T P		CLASS WORK	: 25 Marks
0 0 2		EXAM	: 25 Marks
		TOTAL	: 50 Marks
		DURATION OF EXAM	: 3 HRS

List of Experiment

ANY TEN EXPERIMENTS SHOULD BE PERFORMED:

1. Write a program using 8085 for Hexadecimal addition & subtraction of two numbers.
2. Write a program using 8085 Microprocessor for addition and subtraction of two BCD numbers
3. Write a program to perform multiplication and division of two 8 bit numbers using 8085
4. Write a program using 8086 for division of a defined double word (stored in a data segment) by another double Word division and verify.
5. Write a program using 8086 for finding the square root of a given number and verify.
6. Write a program using 8086 to copy 12 bytes of data from source to destination & verify.
7. Write a program to find maximum and minimum from series using 8086.
8. Write a program to initiate 8251 and to check the transmission and reception of character.
9. Write a program to interface ADC & DAC with 8085 & demonstrate generation of square wave.
10. Write a program to control the operation of stepper motor using 8085/8086 and 8255 PPI.
- 11 Write a program to interface 8X8 LED Matrix Display using 8085/8086 microprocessors and 8255 PPI.
12. Write a program to control the traffic light system using 8085/8086 and 8255 PPI.
13. Write a program to control simulated elevator 8085/8086 microprocessors and 8255 PPI.

L T P	CLASS WORK	:	25 Marks
0 0 2	EXAM	:	25 Marks
	TOTAL	:	50 Marks
	DURATION OF EXAM	:	3 HRS

List of Experiments:

1. Study of the No Load and Block Rotor Test in a Three Phase Slip Ring Induction Motor & draw its circle diagram
 2. To Study the Starting of Slip Ring Induction Motor by Rotor Resistance Starter.
 3. To Study and Measure Direct and Quadrature Axis Reactance of a 3 phase alternator by Slip Test
 4. To Study and Measure Positive, Negative and Zero Sequence Impedance of a Alternator
 5. To Study and Measure Synchronous Impedance and Short circuit ratio of Synchronous Generator .
 6. Study of Power (Load) sharing between two Three Phase alternators in parallel operation condition
 7. Synchronization of two Three Phase Alternators, by
 - a) Synchroscope Method
 - b) Three dark lamp Method
 - c) Two bright one dark lamp Method
 8. To plot V- Curve of synchronous motor.
 9. To study and verify Load characteristics of Long Shunt & short shunt Commutatively Compound Generator using 3 phase induction motor as prime mover.
 10. To perform O.C. test on synchronous generator. And determine the full load regulation of a three phase synchronous generator by synchronous impedance method
- NOTE: At least 10 experiments are to be performed, with at least 7 from above list, remaining three may either be performed from above list or designed & set by concerned institution as per scope of syllabus.

L T P

- - 2

At the end of fourth semester each student would undergo six weeks practical training in an industry/Professional organization/research laboratory with the prior approval of the Director Principal/Principal of the concerned college and submit a written typed report along with a certificate from the organization. The record will be evaluated by a board of examiners to be appointed by the Director- Principal/Principal of the concerned college during V Sem. who will award one of the following grades:

Excellent : A

Good : B

Satisfactory : C

Non – Satisfactory : F

A student who has been awarded ‘F’ grade will be required to repeat practical training even after eighth semester.