SCHEME OF INSTRUCTION AND EXAMINATION
B.E III YEAR
Electrical and Electronics Engineering

SEMESTER-II

Sl. No	Course Code	Course Title	Scheme of Instruction		Scheme of Examination		
			Periods per Week		Duration in Hours	Maximum Marks	
			L/T	D/P		Sessionals	University Exam
1.	**EE 351**	Digital Signal Processing	4	-	3	25	75
2.	**EE 352**	Electrical Machinery – III	4/1	-	3	25	75
3.	**EE 353**	Switchgear and Protection	4	-	3	25	75
4.	**EE 354**	Microprocessors and Microcontrollers	4	-	3	25	75
5.	**CM 371**	Managerial Economics and Accountancy	4	-	3	25	75
6.	**EE 381**	Electrical Machines Lab-II	-	3	3	25	50
7.	**EE 382**	Power Electronics Lab	-	3	3	25	50
8.	**EE 383**	Integrated Circuits Lab	-	3	3	25	50
9.	**EE 384**	Industrial Visit	-	-	-	-	*Grade
		Total	**20/1**	**9**	**-**	**200**	**525**

*Excellent /Very Good/Good /Satisfactory /Unsatisfactory
Minimum two visits to the Industries.

EE 351

DIGITAL SIGNAL PROCESSING
(Common to IE & EEE)

Instruction	:	4 Periods per week
Duration of University Examination	:	3 Hours
Sessionals	:	25 Marks
University Examination	:	75 Marks

Objectives:
1. To be able to understand and apply classification, characterization, representation and analysis of signals and systems in time and frequency domain.
2. To understand the principle and design of digital filters and to introduce digital signal processor and their architecture.

UNIT-I

Introduction to Digital Signal Processing: Classification of Signals & Systems. Linear shift invariant systems, stability and causality, Sampling of Continuous signals -Signal Reconstruction, quantizing & encoding, linear constant co-efficient difference equations, properties of discrete system.

UNIT-II

Fourier Analysis: Distinguishing Fourier transform of discrete singular & discrete Fourier transform, Discrete Fourier series, Phase and amplitude spectra, Properties of Discrete Fourier Transform, Linear Convolution of sequence using DFT, Frequency domain representation of discrete time system DTFT and DFT , Computation of DFT. Fast Fourier transform: Radix- 2 decimation in time and decimation in frequency FFT algorithms, Inverse FFT.

UNIT-III

Z- Transform: Application of Z- Transforms for solution of difference equations of digital filters system function -stability criterion, Realization of filters -direct, canonic. Cascade and parallel form, linear phase realization.

UNIT-IV

IIR Filters: Design of Butterworth Chebyshev filters, IIR.filter design by impulse invariant bilinear transformation, impulse invariance method, step invariance method

UNIT-V

FIR Filters: Characteristics of FIR Digital Filters. Frequency response, comparison of FIR, IIR filters -Window techniques, Design of these filters -using -Rectangular, Hamming, Bartlet, Kaiser windows, Architecture and features of TMS 320C54X and ADSP signal processing chips, Applications of DSP.

Suggested Reading:

1. Oppenheim A V, and Schafer R. W., *Digital Signal Processing* –Prentice Hall Inc. 1975.

2. Anand Kumar
3. P. VenkataRamani, M.Bhaskar, *Digital Signal Processo1; Architecture, Programming & Application*, TataMcGrawHill-2004
4. Avatar Singh, S.Srinivasan, *Digital Signal Processing*, Thomson Publication, 2004.
5. Lafley, *DSP Processing. fundamentals. architecture & features*, SChand publishers & Co. 2000
6. Jackson L.B, *Digital Filters and Signal Processing*, Second edition, Kluwer Academic Publishers. 1989

EE 352

ELECTRICAL MACHINERY-III

Instruction	:	4/1 Periods per week
Duration of University Examination	:	3 Hours
Sessionals	:	25 Marks
University Examination	:	75 Marks

Objectives:

1. To be able to understand in detail about synchronous machines. Construction, principle, performance characteristics and testing.
2. To understand the construction, principle and performance characteristics of special machines.

UNIT-I

Synchronous Machines: Constructional Details, Types of windings –Winding factors -e.m.f. equation -Fractional pitch and fractional slot windings -Suppression of harmonics and tooth ripple -Armature reaction and reactance -Synchronous impedance.

UNIT-II

Synchronous Generator: V & Inverted V Carver Voltage Regulation -Phasor diagram of alternator with non-salient poles -O.C. and S.C characteristics –Synchronous impedance, Ampere turn, ZPF methods for finding regulation –Principle of two reaction theory and its application for the salient pole synchronous machine analysis -Synchronism and parallel operation.

UNIT-III

Synchronous Motor: Theory of operation- Vector diagram –Variation of current and p.f. with excitation -Hunting and its prevention –Current and power diagram Predetermination of performance –Methods of Starting and Synchronizing. Synchronizing Power, Synchronous Condenser.

UNIT-IV

Transient Stability Studies of Synchronous Machines: Elementary ideas of transient behavior of an Alternator -Three phase short circuit of an Alternator -Elementary ideas of the stability of synchronous machine connected to infinite Bus. Special Machines -Permanent Magnet Motors,
Switched Reluctance Motors, Hysteresis Motors, stepper motors, Applications.

UNIT- V

Servo motors: Two phase servo motor characteristics- Single phase motors- Theory and operation of single phase motors-Shaded pole ,Split phase and capacitor motors -Compensated and uncompensated series and repulsion motors. Linear Induction motors, Applications.

Suggested Reading:

1. I.J.Nagrath & D.P. Kothari, *Electrical Machines*, Tata McGraw 2004, 3rd Edition

2. S.K.Bhattacharya, *Electrical Machines*, Tata McGraw Hill, 2002.
3. P.S.Bhimbhra, *Generalized Theory of Electrical Machines*, Fifth Edition, Khanna Publishersl995,
4. M.G Say, *The Performance and Design of A.C Machines*, Pitman Publications, 1985.

EE 353

SWITCHGEAR AND PROTECTION

Instruction	:	4 Periods per week
Duration of University Examination	:	3 Hours
Sessionals	:	25 Marks
University Examination	:	75 Marks

Objectives:

1. To be able to understand the need of protection in power system and protection with conventional and static relays
2. To understand the protection of transformers, generators and need of circuit breakers.

Unit – I

Protective Relays: Introduction to protective relays, Need for protection primary & Backup protection, Zones of protection, Definitions of relay pickup, Dropout and reset values, Classification of relays, Operating principles and construction of electromagnetic and induction relays, Over current, Over voltage and power relays, Directional features. Universal relay torque equation, Over current protection for radial feeders and ring mains, Protection of parallel lines, Relay settings for over Current relays, Earth fault and phase fault protection.

Unit – II

Static Relays: Static phase and Amplitude comparators, Characteristics of Dual input comparators, Distance protection, 3-zone Distance relays, Characteristics Distance relays on the R-X diagram, Applications, Sampling comparator, static over current relays (block diagram approach only) Microprocessor based over current relay.

Unit – III

Transformer and generator protection: Differential relay, Percentage differential relay, Protection of generator and transformer using percentage differential relays, Split phase, Inter turn protection, Overheating, Loss of excitation, Protection of generators, Protection of transformers against magnetizing inrush, Buchholz relay, Protection of earthing transformers, Generator transformer unit protection.

Unit – IV

Circuit breakers: Need for circuit breakers, Arc Properties, Principles of arc quenching. Theories, Recovery and restricting voltages, Definitions in circuit breakers, Rated symmetrical and asymmetrical breaking current, Rated making current, Rated capacity, Voltage and Frequency of circuit breakers, Auto reclosure, Duty cycle, Current chopping, Resistance switching, Derivations of RRRV, Maximum RRRV etc., Circuit breaker calculations, Types of circuit breakers, Oil, Poor oil, Air, Air blast, SF6 and Vacuum circuit breakers, Testing of circuit breakers.

Unit – V

Over voltage protection: Protection of transmission lines against direct lightening strokes, Ground wires, Protection angle, Protection zones, Height of ground wire, Conductor clearances. Conductor heights, Tower footing resistance and its effects, Equipment protection assuming rod gaps, Arcing horns, Different types of lightening arrestors, construction, Surge absorbers, Peterson coil, Insulation co-ordination.

Suggested Reading:

1. Badriram and Viswakarma, *Power System Protection and Switchgear*, Tata McGraw Hill, 2004
2. Sunil S. Rao, *Switchgear and Protection*, Khanna Publications, 2000.
3. C.L. Wadhwa, *Electrical Power System*, Wiley Eastern Ltd., 2nd Edition, 2003

EE 354

MICROPROCESSOR AND MICROCONTROLLERS
(Common to IE & EEE)

Instruction	:	4 Periods per week
Duration of University Examination	:	3 Hours
Sessionals	:	25 Marks
University Examination	:	75 Marks

Objectives:
1. To be able to understand in detail about 8086 microprocessor architecture, programming and interfacing.
2. To be able to understand about 8051 microcontroller architecture, and programming.

UNIT-I

8086 Microprocessor: Architecture of 8086 -Segmented memory, Addressing modes, Instruction set, Minimum and Maximum mode operations, Timings Diagrams.

UNIT-II

8086 Programs: Assembly language Programming, Assembler directives, simple programs using Assembler, strings, procedures, Macros – Delay Timing.

UNIT-III

Memory and I/O interfacing: 8255(Programmable Peripheral-I), Programmable Internal Timer(8253), A/D and D/A Interfacing, Keyboard and display interface, interrupts of 8086.

UNIT-IV

Microcontrollers- 8051 microcontroller, Architecture, I/O ports, connecting external memory, Instruction set, Assembly language programming.

UNIT-V

Interfacing: Interrupts, serial I/O, Timers, Counters, Applications of micro controllers- Interfacing LEDs, Seven Segment display, Keyboard Interfacing

Suggested Reading:

1. Douglas. V.Hall, *Microprocessors and Interfacing* -Tata McGraw Hill- Revised rd edition, 2006.
2. Krishna Kant, *Microprocessors and Microcontrollers -Architecture, Programming and System Design 8085,8086,8051,8096*, Prentice –Hall India -2007.
3. Kenneth.Ayala, *The 8051 Microcontroller Architecture Programming and Applications*, Thomson publishers, 2nd edition.
4. Walter A. Triebel & Avtar Singh, *The 8088 and 8086 Microprocessor* -Fourth Edition, Pearson.

CM 371

MANAGERIAL ECONOMICS AND ACCOUNTANCY

Instruction	:	4 Periods per week
Duration of University Examination	:	3 Hours
Sessionals	:	25 Marks
University Examination	:	75 Marks

UNIT-I

Introduction to Economics and its evolution -Managerial Economics its scope, importance and relation to other sciences, its usefulness to engineers -Basic concept of Managerial economics.

UNIT-II

Demands Analysis -Concept of demand, determinants, Law of demand, its assumptions, Elasticity of demand, price, income and cross elasticity, Demand Forecasting -Markets Competitive structures, price-output determination under perfect competition and Monopoly. (Theory questions and small numerical problems can be asked).

UNIT-III

Theory of Production -Firm and Industry -Production function -input-out relations -laws of returns -internal and external economics of scale. Cost Analysis: Cost concepts -fixed and variable costs -explicit and implicit costs -out of pocket costs and imputed costs -Opportunity cost –Cost output relationship -Break-even analysis. (Theory and problems).

UNIT-IV

Capital Management, its significance, determination and estimation of fixed and working capital requirements, sources of capital-Introduction to capital budgeting, methods of payback and discounted cash flow methods with problems.
(Theory questions are numerical problems on estimating working capital requirements and evaluation of capital budgeting opportunities can be asked).

UNIT-V

Book-keeping, principles and significance of double entry book keeping, Journal, Subsidiary books, Ledger accounts, Trial Balance concept and preparation of Final Accounts with simple adjustments -Analysis and interpretation of Financial Statements through Ratios. (Theory questions and numerical problems on preparation of final accounts, cash book, petty cash book, bank reconciliation statement, calculation of some ratios).

Suggested Reading:

1. Varshney RL and KLMaheswari, *Managerial Economics*, Sultan Chand.
2. J C Pappas and EF Brigham, *Managerial Economics*.
3. Grawal TS, *Introduction to Accountancy*.

4. Maheswari S.N, *Introduction to Accountancy*.
5. Panday I.M, *Financial Management*.

EE 381

ELECTRICAL MACHINES LAB -II

Instruction	:	3 Periods per week
Duration of University Examination	:	3 Hours
Sessionals	:	25 Marks
University Examination	:	50 Marks

Objectives:

1. To learn operation and performance characteristics of induction machines by conducting various experiments and tests practically
2. To understand the operation and performance characteristics of synchronous machines by conducting various experiments and tests.

LIST OF EXPERIMENTS:

1. Three phase to Two phase conversion (Scott connection).

2. Heat run test on Three phase transformer.

3. No-load test blocked rotor test and load test on 3-phase Induction motor.

4. Speed control of Three phase Induction motor by any three of the Following.
   a. Cascade connection
   b. Rotor impedance control
   c. Pole changing
   d. Rotor slip recovery -Kramer drive
   e. V/f control.

5. Retardation Test, Dynamic Braking of DC Shunt Motors.

6. Performance characteristics of Single phase Induction motor.

7. Voltage regulation of Alternator by
   a. Synchronous impedance method
   b. Ampere-turn method.
   c. Z.P.F. Method.

8. Regulation of Alternator by slip test.

9. Determination of V curves and inverted V curves of synchronous motor.

10. Power angle characteristics of a synchronous motor.

11. Load characteristics of Induction Generator.

12. P.F Improvement of Induction motor using capacitors.

Note: ATLEAST 10 EXPERIMENTS SHOULD BE CONDUCTED IN THE SEMESTER.

EE 382

POWER ELECTRONICS LAB
(Common to IE & EEE)

Instruction	:	3 Periods per week
Duration of University Examination	:	3 Hours
Sessionals	:	25 Marks
University Examination	:	50 Marks

Objectives:

1. To be able to understand various power switching devices, trigger circuits, characteristics and applications by conducting the experiments.
2. To learn and understand the various converters practically like rectifiers, choppers and inverters principle operation, characteristics and applications.

LIST OF EXPERIMENTS:

1. S.C.R. BJT, MOSFET and IGBT Characteristics.

2. Gate triggering circuits for SCR, BJT, MOSFET and IGBT using R, RC, UGT and IC's.

3. Single phase step down cyclo converter with Rand RL loads.

4. A.C voltage controllers with R and RL loads.

5. Study of forced commutation techniques.

6. Two quadrant D.C drive.

7. Bridge rectifiers -half control and full control with Rand RL loads.

8. Simulation of Single Phase Full converter and Semi converter.

9. Simulation of Single Phase & Three Phase Inverter.

10. Buck and Boost choppers.

11. Study of l kVA UPS and SMPS For variable voltage with constant load, Constant voltage with variable load.

12. V/f control of AC drive.

13. Single phase inverter with R and RL Load

Note: ATLEAST 10 EXPERIMENTS SHOULD BE CONDUCTED IN THE SEMESTER.

EE 383

INTEGRATED CIRCUITS LAB
(Common to IE & EEE)

Instruction	:	3 Periods per week
Duration of University Examination	:	3 Hours
Sessionals	:	25 Marks
University Examination	:	50 Marks

LIST OF EXPERIMENTS:

1. Generation of triangular, sine and square wave using IC's.

2. PLL (Phase locked loop).

3. Design of a stable multivibrator using 555 timer.

4. Active filters.

5. Instrumentation amplifier --Sample and hold circuit.

6. Design of integrator and differentiator using Op-Amp.

7. Multiplexer --application for logic realization and parallel to serial Conversions.

8. Synchronous counters.

9. Asynchronous counters.

10. Clippers and clampers using Op-Amps.

11. Monostable operation using IC's.

12. Boot-strap sweep circuit using Op-Amp.

13. Half adder, full adder and subtractor and realization of combinational logic.

14. A/D converters.

15. D/ A converters.

Note: AT LEAST TEN EXPERIMENTS SHOULD BE CONDUCTED IN THE SEMESTER.

EE 384

INDUSTRIAL VISIT/STUDY

At least 3 days in semester	3 x 8 =24 hours
Sessional /Examination	*Grade

Students are expected to visit at least two industries during the semester and submit a detailed technical report on the study -visits to the Department. The Department should evaluate the reports through a Committee consisting of Head of the Department and two senior faculty members to award the Grades.

*Excellent /Very Good/Good /Satisfactory /Unsatisfactory.