DIGITAL SIGNAL PROCESSING (ET-306E)

Week	Theory	
	Lecture Day	Topic (Including assignment / Test)
1st	1	Introduction to Z-transform
	2	Properties of Z-transform & its proof
	3	Inversion of Z-transform
	4	One sided Z-transform &solution of differential equations
2nd	5	Analysis of LTI system in Z-domain
	6	Introduction to causality Stability: schur-cohn stability test
	7	Numericals based on stability test.
	8	Introduction to fourier transform Relationship between Z-transform and fourier transform
3rd	9	Frequency selective filters; all pass filters, minimum-phase, maximum- phase and mixed-phase systems
	10	Introduction to DFT &properties of DFT
	11	Linear filtering using DFT
	12	Frequency analysis of signals using DFT, radix-2, radix-4, goertzel algorithm
4th	13	Direct form, cascade form for FIR systems
	14	Frequency sampling for FIR system
	15	lattice structure for FIR system
	16	Direct form for IIR systems
5th	17	cascade form for IIR systems
	18	Transposed form for IIR systems
	19	Parallel form for IIR systems
	20	Lattice structure for IIR systems
6th	21	lattice ladder structure for IIR systems
	22	Comparision between FIR &IIR systems
	23	State space structure
	24	Ouantization of filter co-efficent structures for all pass filters
7th	**1st minor test**	
8th	25	Discussion on 1st minor test question
	26	Characteristics of practical frequency selective filters
	27	Filter design specifications
	28	peak pass band ripple
9th	29	Minimum stop band attenuation
	30	Types of filters
	31	Design of FIR filter using windows
	32	Numerical on FIR filter using windows
10th	33	Kaiser window method
	34	Numerical on Kaiser window method
	35	Comparison of design methods for FIR filter
	36	Gibbs phenomenon
11th	37	Design of IIR filters from analog filters
	38	Design by approximation of derivatives
	39	Impulse invariance method
	40	Bilinear transformation method
	41	Numerical on Bilinear transformation method

12th	42	Introduction to Butterworth filter
	43	Numerical on butterworth filter
	44	Characteristics of butterworth filter
13th	45	Introduction to Chebyshev filter
	46	Numerical on Chebyshev filter
	47	Characteristics of Chebyshev filter
	48	Introduction to Elliptical analog filter
14th	**2nd minor test**	
15th	49	Discussion on 2nd minor test question
	50	Characteristics of Elliptical analog filter
	51	Design of IIR filter
	52	Numerical based on IIR system

ELECTRIC DRIVES & TRACTION (ET-310-E)
ELECTRIC DRIVES & TRACTION LAB (ET-320-E)

Week	Theory		Practical	
	Lecture Day	Topic (Including assignment / Test)	Practical Day	Topic
		Unit-I		
1st	1	Introduction to electric drives & traction	1	Study of industrial applications of various mills.
	2	Classification of different types of drives, components		
	3	Characteristics, advantages and disadvantages		
	4	Speed control methods of various AC drives		
2nd	5	Speed control methods of various DC drives	2	Study of different types of loading: (a) Intermediate loading (b) Continuous loading
	6	Acceleration & retardation time		
	7	Energy considerations. Braking of AC drives		
	8	Braking of DC drives		
3rd	9	Automatic control arrangement	3	Three phase fully controlled rectifier fed separately excited DC motor at different firing angle for obtaining speed-torque characteristics.
	10	Basic principle of induction motor drives		
	11	Three phase AC voltage controller fed IM drive		
	12	Voltage source inverter		
4th	13	Current source inverter	4	Single phase half controlled rectifier fed DC series motor at different firing angle for obtaining speed-torque characteristics.
	14	Slip Power control and static rotor resistance control		
	15	Chopper control of 3 -∅ slip ring induction motor		
	16	1st Assignment		
		UNIT-II		
5th	17	Rectifier controlled circuits	5	Chopper control of a DC series motor for obtaining torque characteristics.
	18	Single phase fully controlled rectifier fed separately excited DC motor		
	19	Single phase half controlled rectifier fed separately excited DC motor		
	20	3-∅ fully and half controlled fed separately excited DC Motor		
6th	21	Performance and characteristics of single phase rectifier controlled DC drives	6	Chopper control of a separately excited DC motor for obtaining speed-torque characteristics.
	22	Performance and characteristics of 3-∅ rectifier controlled DC drives		
	23	Control techniques of DC drives using chopper		
	24	Multi quadrant control of chopper fed motors		
7th	**1st Minor Test**			
		Unit-III		
8th	25	Components & classification of load torque	7	(a) VSI controlled induction motor drives. (b) CSI controlled induction motor drives.
	26	Fundamental load torque equation		
	27	Permissible frequency of starting and stopping		
	28	Definite time, speed torque conventions		

9th	29	Speed and current limit control	8	Half wave cycloconverter fed induction motor drive for obtaining speed-torque characteristics, torque frequency for constant V/f ratio.
	30	Automatic starting and pulling operation of synchronous motors		
	31	Introduction to Digitally Controlled (Microprocessor control of Electric drives)		
	32	Application areas and functions of µP in drive technology		
10th	33	Block diagram of arrangement and comparison with other method	9	(a) VSI controlled synchronous motor drives with load commutation. (b) CSI controlled synchronous motor drives with load commutation.
	34	Components for digital control		
	35	Vector control of IM drive using µP		
	36	2nd Assignment		
Unit-IV				
11th	37	Nature of traction load and motors	10	Self controlled synchronous motor drives employing a cycloconverter.
	38	Conventional DC & AC traction drives		
	39	Their characteristics		
	40	DC traction using chopper controlled DC motors		
12th	41	Polyphase AC motors for traction drives	11	Regenerative braking of a separately excited DC motor.
	42	Speed time relationship		
	43	Tractive effort for propelling a train		
	44	Power of a traction motor		
13th	45	Rating of motors	12	AC dynamic breaking of a three phase induction motor.
	46	Determination of motor rating		
	47	Nature of loads		
	48	Classes of motor duty		
14th	**2nd Minor test**			
15th	49	Frequency of operation of motor subjected to intermittent loads	13	Vector control of an induction motor using microprocessor. Microcontroller based speed control of any motor.
	50	Pulse loads etc		
	51	Thermal model of motor for heating		
	52	Thermal model of motor for cooling		

MICROCONTROLLER APPLICATION LAB (ET-316-E)

Week	Practical	
	Practical Day	**Topics**
1st	1	Copy a byte from TCON to a register R2 using at least four different methods
2nd	2	Store the no. 8DH in RAM 30H to 34H
3rd	3	Add the unsigned no. found in internal RAM locations 25H, 26H and 27H together and put the result in RAM locations 31H(MSB) and 30H(LSB)
4th	4	Write a program to subtract 2-data bytes indicating by string i.e. subtract a string of 8-bit data indicating by R1 from a string of data indicating by Ro. The number of data is indicating by R2
5th	5	The no. A6H is placed some were in external RAM between location 0100H and 0200H. Find the address of that location and put that address in R6 (LSB) and R5 (MSB). Find the address of the first two internal RAM locations between 0H and 60H, which contain consecutive numbers. If so, set the carry flag to 1, else clear the flag
6th	6	W.A.P. to find minimum value of date in memory block 9000 to 90FF and store the result in 9100H
7th	**1st minor test**	
8th	7	W.A.P.to arrange the given ten numbers in ascending order
9th	8	W.A.P. to generate BCD up counter and send each count to port A
10th	9	An assembly language program to find the smaller of two numbers
11th	10	An assembly language program to find the smallest number in any array of ten numbers
12th	11	An assembly language program to find whether the given number is even or odd
13th	12	An assembly language program to perform 16- bit division
14th	**2nd minor test**	
15th	13	An assembly language program to input five numbers. Calculate their sum & display the result

MICROCONTROLLER APPLICATION LAB (ET-316-E)

Practical		
Week	Practical Day	Topic
1st	1	Copy a byte from TCON to a register R2 using at least four different methods
2nd	2	Store the no. 8DH in RAM 30H to 34H
3rd	3	Add the unsigned no. found in internal RAM locations 25H, 26H and 27H together and put the result in RAM locations 31H(MSB) and 30H(LSB)
4th	4	Write a program to subtract 2-data bytes indicating by string i.e. subtract a string of 8-bit data indicating by R1 from a string of data indicating by Ro. The number of data is indicating by R2
5th	5	The no. A6H is placed some were in external RAM between location 0100H and 0200H. Find the address of that location and put that address in R6 (LSB) and R5(MSB). Find the address of the first two internal RAM location between 0H and 60H, which contain consecutive numbers. If so, set the carry flag to 1, else clear the flag
6th	6	W.A.P.to find minimum value of date in memory block 9000 to 90FF and store the result in 9100H.
7th	**1st minor test**	
8th	7	W.A.P.to arrange the given ten numbers in ascending order
9th	8	W.A.P. to generate BCD up counter and send each count to port A
10th	9	Multiply the unsigned number in register R3 by the unsigned number on port 2 and put the result in external RAM locations 10H(MSB) &11H(LSB)
11th	10	An assembly language program to find the smaller of two numbers

12th	11	An assembly language program to find the smallest number in an array of ten numbers.
13th	12	An assembly language program to find whether the given number in even or odd.

MICROCONTROLLER & APPLICATIONS/ET-304E

Week	Theory	
	Lecture Day	Topic (Including assignment / Test)
1st	1	Comparing b/w microprocessor & microcontroller
	2	Technological trends in microcontroller developments
	3	Survey of microcontroller
	4	4-bit microcontroller
2nd	5	8-bit microcontroller
	6	16-bit microcontroller
	7	32-bit microcontroller
	8	Applications of microcontroller
3rd	9	Applications of microprocessor
	10	Scope of microcontroller
	11	Scope of microprocessor
	12	Assignment on microcontroller
4th	13	Block diagram, pin diagram of 8051
	14	Functional description of internal units
	15	Registers, PSW, RAM/ROM
	16	Stack, oscillator & clock
5th	17	I/O pins, ports & circuits connecting external memory
	18	Counters & timers, Serial data interrupt
	19	Serial data transmission/reception & transmission modes
	20	Timer flag interrupt, External interrupt
6th	21	S/w generated interrupts
	22	External memory & memory space decoding
	23	Expending I/Os
	24	Memory mapped I/O reset & clock circuits
7th	**Minor Test**	
8th	25	8051 instruction syntax, Addressing modes
	26	Data transfer instructions
	27	Logical instructions, Arithmetic instructions
	28	Jump & call instructions
9th	29	Interrupts & interrupts handler subroutines
	30	Writing assembly language programs
	31	Time delay
	32	Pure s/w time delays, s/w polled timers
10th	33	Pure H/w delay
	34	Lookup tables
	35	Serial data transmission using time delays & polling
	36	Interrupt driven serial transmission & reception
11th	37	Interfacing keyboards
	38	Programs for small keyboards
	39	Programs for matrix keyboards
	40	Interfacing multiplexed displays
	41	Numeric displays

12th	42	LCD display
	43	Measuring frequency & pulse width
	44	Interfacing ADCs
13th	45	Interfacing DACs
	46	H/w circuits for handling multiple interrupts
	47	Assignment on assembly language programs
	48	Programs for matrix keyboards
14th	**Minor Test**	
15th	49	8051 serial data communication modes-mode-0
	50	Mode-1
	51	Mode-2
	52	Mode-3

POWER ELECTRONICS-II (ET-308-E)
POWER ELECTRONICS-II LAB (ET-318E)

Week	Theory		Practical	
	Lecture Day	Topic (Including assignment / Test)	Practical Day	Topic
		Unit-I		
1st	1	Introduction to subject	1	Experiment to find the average output voltage of step up MOSFET based chopper circuit
	2	DC to DC CONVERTER: Classification of choppers, Principle of operation		
	3	Step up chopper, Steady state		
	4	Steady state analysis of Class A choppers under different load conditions		
2nd	5	Steady state analysis of Class A choppers under different load conditions	2	Experiment to plot the graph between average output voltage versus speed of DC motor using Chopper circuit.
	6	Switching mode regulator: Buck, Boost		
	7	Switching mode regulator: Buck-boost & Cuk regulators		
	8	Current commutated chopper		
3rd	9	Current commutated chopper, Voltage commutated chopper	3	Experiment to find output voltage across switched mode regulators: Buck, Boost, buck-boost, cuk regulator.
	10	Voltage commutated chopper, Output voltage control techniques		
	11	One, two and four quadrant choppers		
	12	MOSFET and transistor based choppers		
		Unit-II		
4th	13	DC to AC CONVERTER: Classification	4	Experiment to draw the voltage waveform across thyristor, capacitor & output voltage of Jones chopper.
	14	Basic series inverter		
	15	Improved series inverter		
	16	Parallel inverter		
5th	17	Single phase voltage source inverter, Steady state analysis	5	Experiment to draw the voltage waveform across thyristor, capacitor & output voltage of Morgan's chopper.
	18	Modified Mc-murray inverter		
	19	Modified Mc-murray Bedford inverter		
	20	Voltage control in single phase inverters		
6th	21	PWM inverters, Reduction of harmonics	6	Experiment to find the output voltage and frequency of a 1-phase series inverter by varying R,L,C component
	22	Current source Inverter		
	23	Three phase bridge inverter		
	24	Three phase bridge inverter		
7th	**1st Minor Test**			
		Unit-III		
8th	25	INVERTERS **:** Basic circuit	7	Experiment to draw the waveforms of parallel inverter
	26	120 degree mode conduction schemes		
	27	180 degree mode conduction schemes		
	28	Modified McMurray – Bedford half bridge inverters		
9th	29	Modified McMurray – Bedford half bridge inverters	8	Experiment to draw the waveform of output voltage of 3-phase to 1-phase
	30	Modified McMurray – Bedford full bridge inverters		

	31	Modified McMurray – Bedford full bridge inverters		cycloconverter.
	32	Brief description of series & parallel inverter		
10th	33	Brief description of series & parallel inverter	9	Experiment to find rms value of output voltage by delta angle of 1-phase IGBT based PWM inverter in MPWM technique .
	34	Brief description of series & parallel inverter		
	35	Transistor based inverters		
	36	MOSFET based inverters		
Unit-IV				
11th	37	POWER SUPPLIES : Introduction	10	Experiment to find rms value of output voltage by delta angle of 1-phase IGBT based PWM inverter in SPWM technique.
	38	Switched mode D.C. and A.C. power supplies		
	39	Switched mode D.C. and A.C. power supplies		
	40	Applications : dielectric and induction heating		
12th	41	Block diagram of D.C. motor speed control	11	Experiment to study the operation of Dual converter.
	42	DRIVES: Introduction to electric drives		
	43	DRIVES: Introduction to electric drives		
	44	Drives: Converter fed D.C. drives		
13th	45	Drives: Chopper fed D.C. drives	12	Experiment to study the reduction of harmonics in inverter using phase displacement control technique.
	46	AC drives: Stator voltage control		
	47	V/f control		
	48	Rotor resistance control		
14th	**2nd Minor test**			
15th	49	Static Scherbius system	13	Viva-Voce
	50	Static Kramer systems		
	51	Old university paper discussion		
	52	Revision		

POWER SYSTEM ANALYSIS & PROTECTION (ET-302E)

Week	Theory	
	Lecture Day	**Topic (Including assignment / Test)**
1st	1	**Introduction :** Per unit quantities characteristics
	2	Representation of components of a power system
	3	Synchronous machines, transformers
	4	Lines cables & loads. Single line diagram
2nd	5	Impedance diagram, line reactance diagrams.
	6	**Protective Relaying, Operating principle**
	7	Scheme of protection of generators, transformers
	8	Transmission lines & bus-bars
3rd	9	Carrier current protection,
	10	Functional characteristics of relays
	11	Electromagnetic and static relays, over current,
	12	Differential relay, impedance relay.
4th	13	**Neutral grounding :** Need for neutral grounding
	14	Various types of neutral grounding
	15	**Circuit Interruption :** Circuit interruption, theory of arc formation
	16	It's excitation in AC & DC circuits
5th	17	Interruption of capacitive & inductive currents
	18	Rupturing capacity & rating of circuit breakers.
	19	**Circuit Breakers :** Classification of CB
	20	Circuit-breakers of low medium,
6th	21	High & extra high voltages
	22	Multi break & resistance switching
	23	Auto restoring of high capacity
	24	HV circuit breakers. Re striking & recovery voltage
7th		
8th	25	**Fault Analysis**:- Symmetrical faults
	26	Calculation of fault currents,
	27	Use of current limiting reactors
	28	Unsymmetrical faults:
9th	29	Types of transformation in power system analysis
	30	Sequence network of power system
	31	**Symmetrical components** transformation
	32	Sequence impedance of power system elements,
10th	33	Analysis of unsymmetrical fault
	34	Short faults sequence components filters
	35	Problems on Network analysis
	36	It's application to interconnected system
11th	37	**Transients in Power Systems:**
	38	Transient electric phenomenon
	39	Lighting & switching surges
	40	Concept of Travelling waves
12th	41	Problems Analysis
	42	Reflection of waves with different line termination

	43	Refraction of waves with different line termination
	44	Protection against dangerous pressure rises.
13th	45	**Stability of power System**
	46	Concepts of stability
	47	Power angle characteristics of Synchronous
	48	Steady state & transient stability
14th		
15th	49	Swing equation
	50	Assignment
	51	Numerical Problems
	52	Revision and Overview