Programme : Diploma in Electronics & Telecommunication
Programme Code : 03/17
Name of Course : Electronic Material & Components
Course Code : ET 461

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**03**	**48**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Two class tests , each of 60 minutes	3 Hrs.	3 Hrs.	3Hrs. For batch of 20 students	--
Marks	**20**	**80**	--	**50**	--

Course Rationale:

To provide basic information regarding the materials used in Electronics Devices & components. Also it covers the types of various Electronics components & their constructions.

Course Objectives:

After studying this course, the student will be able to

- Understand the different types of material & components.
- Understand the constructions specification & application of different Electronics components.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
1.	**Material & Components**			
	1.1	Types of material.	**04**	**06**
	1.2	Types of components, use of material. components, properties of material & components specification of material & components.		
2.	**Conducting Materials**			
	2.1	High conducting material.	**04**	**06**
	2.2	High resistivity materials.		
	2.3	Effect of temperature on mechanical & electrical properties.		
3.	**Dielectric Materials**			
	3.1	Types of Dielectric materials, Dielectric loss, breakdown & strength, basic properties &uses.	**04**	**06**
4.	**Active & Passive Components**			
	4.1	**Passive Components** : Constructions details of : Resisters, Capacitors & Inductors, properties, color codes, specifications, testing.	**05**	**12**
	4.2	**Active Components** : Testing of semiconductor diode, zener diode, LED, BJT, FET, UJT, SCR by multimeter.		
5.	**Switches & Relays**			
	5.1	Types of Switches & Relays Construction details, important parameters, specifications, merits & demerits, applications, testing.	**05**	**08**
6.	**Cables & Connectors**			
	6.1	Types of Cable & connectors Construction details properties, merits & demerits, applications, Specification testing.	**05**	**08**
7.	**Transformer**			
	7.1	Types of Transformer**,** Construction details properties, merits & demerits, applications, Specification testing.	**05**	**08**

8.	**Display Devices**			
	8.1	Types of Display Devices Construction details of LCD & LED Display properties, merits & demerits, applications, specification testing.	**05**	**08**
9.	**Microphones & Speakers**			
	9.1	Types of Microphones & Speakers Construction details properties, merits & demerits, applications, specification testing.	**05**	**08**
10.	**Introduction to ICs & SMD's**			
	10.1	IC's :- Types of Ics. specifications		**08**
	10.2	IC Packages, application of Ics		
	10.3	Fabrication of ICs: Fabrication methods, Procedures of manufacturing ICs, merits & limitations.		
	10.4	SMD:- Meaning of surface mounting technology & SMD advantages & disadvantages of SMD , Types of SMD resister, SMD capacitor, SMD transistor & SMD IC. Resister, capacitor, & Ics.		
	10.5	Soldering process & Testing adhesives, solder paste, soldering technique, ware soldering, Assembly of SMD's		
11.	**Environmental Testing**			
	11.1	Environmental Testing & protection as per ISI specification awareness (Only Introduction)	**01**	**02**
12.	**Mini Project**			
		Total	**48**	**80**

List of Practical/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment	Hrs
1.	Identify various Active and Passive components by physical observation	02
2.	Verify values of resistors & Capacitors by color codes & compare with actual values.	02
3.	Observe specification of R L &C from data manuals.	02
4.	Test various Passive components by multimeter	02

5.	Identify various Active components by physical observation	02
6.	Test various Active components by multimeter	02
7.	Identify various Switches & Relays by physical observation	02
8.	Test various Switches & Relays.	02
9.	Identify and Test various Cable & connectors	02
10.	Identify and Test various Transformer	02
11.	Identify and Test various Display Devices	02
12.	Identify and Test various Microphones & Speakers by physical observation	02
13.	Test various types of ICs by IC Tester.	02
14.	Miniproject (any two) : like regulator, battery charger, fire alarm, Doorbell, clapswitch , running light , temperature controller etc.	06
	Total	**32**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Material & components	Class room teaching & Laboratory work
2.	Conducting Materials	Class room teaching & Laboratory work
3.	Dielectric material	Class room teaching & Laboratory work
4.	Passive components Active components	Class room teaching & Laboratory work
5.	Switches & Relays	Class room teaching & Laboratory work
6.	Cables & connectors	Class room teaching & Laboratory work
7.	Transformer	Class room teaching & Laboratory work
8.	Display Devices	Class room teaching & Laboratory work
9.	Microphones & Speakers	Class room teaching & Laboratory work
10.	Introduction to ICs & SMD's	Class room teaching & Laboratory work
11.	Environmental Testing	Class room teaching & Laboratory work
12.	Mini Project	Laboratory work

Text Books:

Sr. No	Author	Title	Publication
1.	Dhir	Electronics components & Material	Tata Macgraw Hill
2.	Mrs. Madhuri Joshi	Electronics Material & components	

Reference Books:

Sr. No	Author	Title	Publication
1.	Dummer	Electronics Material & components	
2.	B.M. Tareev	Electronics Engg. Materials.	

Learning Resources : Reference Books, Manuals and Journals of Devices, Components Brochures.

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Material & components	02	01	01	04
2.	Conducting Materials	02	01	01	04
3.	Dielectric material	02	02	02	06
4.	Passive components & Active components	04	03	03	10
5.	Switches & Relays	04	02	02	08
6.	Cables & connectors	04	02	02	08
7.	Transformer	04	02	02	08
8.	Display Devices	04	02	02	08
9.	Microphones & Speakers	04	02	02	08
10.	Introduction to ICs & SMD's	04	02	02	08
11.	Environmental Testing	02	-	-	02
12.	Miniproject	-	-	06	06
	Total	**36**	**19**	**25**	**80**

(Prof. S.H.Jadhav)	(Prof. S. B. Kulkarni)	(Prof. R.M.Adhav)
Prepared By	**Secretary, PBOS**	**Chairman, PBOS**

Programme : Diploma in Electronics & Telecommunication
Programme Code : 03/17
Name of Course : Network Analysis
Course Code : ET 462

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**04**	**64**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Two class tests , each of 60 minutes	3 Hrs.	3 Hrs.	3 Hrs. For batch of 20 students	--
Marks	**20**	**80**	**50**	--	--

Course Rationale:

To familiarize the students with the basic laws, definitions and theorems used in analysis of electrical and electronic circuits.

Course Objectives:

After studying this course, the student will be able to

- Understand the basic laws & definitions and theorems used in circuit's analysis,
- Be able to analyze the circuits,
- Appreciate the working of the circuits as a filter, resonant circuits, attenuators and equalizers
- Understand the transient response
- Understand the use of P-Spice in circuit analysis

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
1.	**Circuit Analysis: - Laws & Definition**			
	1.1	Revision of Kirchhoff's Laws.	**08**	**06**
	1.2	Calculation of Voltage, Current & Power in Series & Parallel components.		
	1.3	Types of Sources.		
	1.4	V-I relations of R, L & C.		
	1.5	Voltage & Current divider principles.		
	1.6	Star to delta & delta to star Transformations.		
	1.7	Source Transformation.		
	1.8	Characteristics impedance		
	1.9	Types of Network Elements - (Only Definitions) Active / Passive, Unilateral / Bilateral, Lumped / Distributed, Linear / Nonlinear Elements		
2.	**Mesh & nodal Analysis**			
	2.1	Mesh and nodal analysis of network.	**10**	**10**
	2.2	Principle of duality.		
3.	**Two port Network**			
	3.1	Z, Y, hybrid parameters and transmission parameters	**08**	**10**
4.	**Theorems**			
	4.1	Maximum Power transfer theorem.	**08**	**10**
	4.2	Superposition theorem.		
	4.3	Thevenin's theorem.		
	4.4	Reciprocity theorem.		
	4.5	Millman's Theorem.		
	4.6	Norton's theorem.		
5.	**Resonant Circuits**			
	5.1	Series and parallel resonant circuits.	**06**	**10**
	5.2	Voltage magnification factor, Q- factor, Bandwidth.		
6.	**Filters**			
	6.1	Constant-K type High pass, low pass, band pass, Band rejects filters.	**08**	**10**
	6.2	Attenuators & Equalizers.		

7.	**Transient response**			
	7.1	Transient analysis of RC, RL and RLC circuits for DC and sinusoidal Signal.	**08**	**10**
	7.2	Rise & Fall Times.		
8.	**Transmission Line**			
	8.1	Fundamentals of transmission line – Characteristic impedance, losses in transmission line, standing waves, and transmission line components, stub, and baluns.	**06**	**08**
9.	**Network analysis with P-Spice**			
	9.1	P-Spice circuit descriptions.	**08**	**06**
	9.2	P-Spice commands & statements.		
	9.3	DC. Analysis.		
	9.4	AC analysis.		
	9.5	Frequency response.(Theory question should be limited to passive components only. However more stress is to be given on practical)		
		Total	**60**	**80**

List of Practical/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment	Hrs
1.	Verification of KCL & KVL.	02
2.	Calculation of characteristics impedance	02
3.	Measurement of Node voltages and loop currents.	02
4.	Study of simple two ports Network, Calculation of Z and Y Parameters.	04
5.	To verify Maximum Power Transfer theorem	02
6.	To verify Thevenin's Theorem	02
7.	To verify Super position theorem	02
8.	To plot frequency response of Series resonance circuit.	02
9.	Study of Low pass filter Characteristic	02
10.	Study of High pass filter Characteristic	02
11.	To study RC High Pass & Low Pass Circuits	02
12.	Observe standing waves of a transmission line.	02

13.	Use P-Spice to calculate node voltages & component currents.	02
14.	Use P- Spice to Plot transient response of RC circuit.	02
15.	Use P-Spice to Plot frequency response of RC low pass filter.	02
	Total	**32**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Circuit analysis	Classroom teaching & Laboratory work
2.	Mesh & Nodal Analysis	Classroom teaching & Laboratory work
3.	Two port network	Classroom teaching & Laboratory work
4.	Theorems	Classroom teaching & Laboratory work
5.	Resonant circuits	Classroom teaching & Laboratory work
6.	Filters	Classroom teaching & Laboratory work
7.	Transient response	Classroom teaching & Laboratory work
8.	Transmission Line	Classroom teaching & Laboratory work
9.	Network analysis with P-Spice	Use of LCD Projector

Text Books:

Sr. No	Author	Title	Publication
1.	Shyammohan S. Palli	Circuits & Networks Analysis and Synthesis	Taata McGraw Hill
2.	John Ryder	Network analysis	Taata McGraw Hill

Reference Books:

Sr. No	Author	Title	Publication
1.	Chatopadhyay	Electrical circuits	Tata McGraw hill
2.	Umesh Sinha	Network Analysis	Sinha publications

Learning Resources : Reference Books, Manuals and Journals

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Circuit analysis	02	-	04	06
2.	Mesh & Nodal Analysis	02	04	04	10
3.	Two port network	02	-	08	10
4.	Theorems	02	-	08	10
5.	Resonant circuits	02	04	04	10
6.	Filters	02	-	08	10
7.	Transient response	02	04	04	10
8.	Transmission Line	02	06	-	08
9.	Network analysis with P-Spice	02	-	04	06
	Total	**18**	**18**	**44**	**80**

(Prof.S.S.Prabhune)
Prepared By

(Prof. S. B. Kulkarni)
Secretary, PBOS

Prof.R.M.Adhav)
Chairman, PBOS

Programme : Diploma in Electronics & Telecommunication
Programme Code : 03/17
Name of Course : Applied Electronics
Course Code : ET 463

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**03**	**48**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Two class tests , each of 60 minutes	3 Hrs.	3 Hrs.	--	--
Marks	**20**	**80**	**50**	--	--

Course Rationale:

As a core technology subject, it intends to teach operating principle and application of electronic circuits and devices like amplifiers, oscillators, switching circuits, wave shaping circuits. The subject knowledge is required in Industrial electronics, Instrumentation and Communication system. Understanding of the subject will provide skill to the students for trouble shooting & testing of some of circuits & devices.

Course Objectives:

After studying this course, the student will be able to

- Classify various amplifier circuits based on their characteristics.
- Classify different tunned circuits.
- Classify different multivibrators.
- Classify different wave shaping circuits.
- Classify different Time base circuits.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
1.	**FET Amplifier**			
	1.1	Biasing of FET: Source Self Bias, drain to source Bias, FET Common Source Amplifier: Working and Applications	**08**	**08**
	1.2	Introduction to MOSFET:Types, Construction,Working & Applications		
2.	**Power Amplifiers**			
	2.1	Introduction classification – Class A, Class B, Class AB & Class C, efficiency of each.	**12**	**16**
	2.2	Single stage class A power amplifier: Circuit operation, input & output waveforms , graphical Analysis and efficiency of i] Transformer couple resistive load single stage power amplifier ii] Class A push pull amplifier iii] Class B push pull amplifier iv] Class AB push pull amplifier		
	2.3	Concept of cross over distortion, Advantages of push pull amplifier , collector power dissipation requirement & specifications of power transistor, need of heat sink		
3.	**Tuned Amplifiers**			
	3.1	Intrduction & necessity of tuned amplifier.	**08**	**12**
	3.2	Basic tuned circuits, series & parallel resonance in tuned circuits.		
	3.3	Operating principle, circuit working, resonance frequency of single tuned, double tuned ,stager tuned amplifiers, neutralization.		
4.	**Wave Shaping Circuits**			
	4.1	Necessity of wave shaping circuits.	**08**	**16**
	4.2	Linear circuits – RC integrator & differentiator – input /output waveforms & frequency response.		

	4.3	Non-linear circuits - Clipper : diode series,shunt ,positive ,negative ,biased & unbiased combinational clipper. Clampers – positive & negative clampers		
	4.4	Numericals based on clipping and clamping circuits		
5.	**Multivibrators**			
	5.1	Transistor as switch. Definition & graphical representation of different time periods.	**06**	**16**
	5.2	Multivibrator classification , circuit ,waveforms working & frequency , applications. AMV ,BMV, MMV ,& Schmitt trigger		
	5.3	Numericals based on Multivibrator circuits		
6.	**Time Base Generator**			
	6.1	Voltage time base generator , exponential sweep generator ,	**06**	**12**
	6.2	UJT Relaxation Oscillator, negative resistance generator. working principle & operation .		
	6.3	Current time base generator.		
	6.4	Bootstrap & Miller sweep generator , applications in TV & CRO		
		Total	**48**	**80**

List of Practical/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment	Hrs
1.	Plot Frequency response of FET amplifier	02
2.	Study of Class A, Class B, Class C, power amplifier	04
3.	Plot frequency response of single tuned amplifier circuits	02
4.	Study of RC differentiator	02
5.	Study of RC integrator	02
6.	Study of Clipping circuits (Positive and negative)	04
7.	Study of clamping circuits(Positive and negative)	04
8.	Study of Astable Multivibrators	02
9.	*Study* of Monostable Multivibrator	02
10.	Study of Bistable Multivibrator	02
11.	Study of Schmitts Trigger circuit	02

12.	Study of UJT relaxation oscillator	02
13.	Study of Boostrap sweep generator	02
	Total	**32**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	FET Amplifier	Classroom Teaching and laboratory work
2.	Power Amplifiers	Classroom Teaching and laboratory work
3.	Tuned Amplifiers	Classroom Teaching and laboratory work
4.	Wave shaping circuits	Classroom Teaching and laboratory work
5.	Multivibrators	Classroom Teaching and laboratory work
6.	Time base generator	Classroom Teaching and laboratory work

Text Books:

Sr. No	Author	Title	Publication
1.	R.S.Sedha	Applied Electronics	S.Chand & Co.
2.	B. L. Theraja	Basic Electronics	Tata McGraw-hill New Delhi

Reference Books:

Sr. No	Author	Title	Publication
1.	Paul Malvino	Electronic Principles	Tata McGraw-hill New Delhi
2	Allen Mottershed	Electronics Devices & Circuits	Prantice Hall India LTD.
3	J.Millman and H.Taub	Pulse Digital & Switching Waveforms	Tata McGraw-hill New Delhi
4	G.K.Mittal and A.R.Vanvasai	Pulse & Digital Electronics	Khanna Publication

Learning Resources : Nil

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	FET Amplifier	04	04	-	08
2.	Power Amplifiers	04	08	04	16
3.	Tuned Amplifiers	04	08	-	12
4.	Wave shaping circuits	04	08	04	16
5.	Multivibrators	04	08	04	16
6.	Time base generator	04	08	-	12
	Total	**24**	**44**	**12**	**80**

(Prof. R . M. Adhav)
Prepared By

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Secretary, PBOS

(Prof.R. M. Adhav)
Chairman, PBOS

Programme : Diploma in Electronics & Telecommunication
Programme Code : 03/17
Name of Course : Linear Integrating Circuits
Course Code : ET 464

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**04**	**64**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Two class tests , each of 60 minutes	3 Hrs.	3 Hrs.	3Hrs. For batch of 20 students	--
Marks	**20**	**80**	**50**	--	--

Course Rationale:

The physical world is inherently analog, indicating that there is always need for analog circuitry. Today the growth of any industry is depending upon electronics to a great extent. This subject acquaints students with general analog principles and design methodologies using practical devices & application. It focus on process of learning about signal conditioning, signal generation, instrumentation, timing & control using various IC circuitry

Course Objectives:

After studying this course, the student will be able to

- Describe working principle of OPAMP and its application
- Define the Op-amp characteristics.
- Learn the features and advantages of integrated circuits.

•	Design electronic circuit using OPAMP for various mathematical operations.
•	Design electronic circuit using OPAMP for industrial application.
•	Design electronic circuit using timer IC's
•	Analyze the response of frequency selective circuit such as PLL with respect to the incoming signal.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
1.	**Differential Amplifier**			
	1.1	Definition, circuit diagram, difference and common mode operation, gain (only expressions no derivations)	**06**	**08**
	1.2	Significance of CMRR, diff. amp. With constant current source to improve CMRR.		
2.	**Salient Features of Operational Amplifier (OPAMP)**			
	2.1	Importance Of Op-Amp Equivalent Circuit ,Circuit Symbols And Terminals	**10**	**12**
	2.2	Block diagram (all stages) Function of all stages (with the circuit such as balanced, unbalanced differential amplifiers with simple current source, level shifter and complementary push pull amplifier)		
	2.3	Definitions of parameters of op-amp Input offset voltage, Input offset current, Input bias current, differential input resistance, Input capacitance, Input voltage range, offset voltage adjustment, CMMR, SVRR, large signal voltage gain, supply voltages, supply current, output voltage swing, output resistance, slew rate, gain bandwidth product, output short circuit current.		
	2.3	Ideal op-amp: electrical characteristics, Ideal voltage transfer curve OPAMP IC's: 741 pin diagram and pin function		
	2.4	Open loop and closed loop configuration of op-amp, its comparison, problem based on – ve feedback.		
	2.6	Basic concept of frequency compensation of op-amp		

3.	**OPAMP Basic Circuits**			
	3.1	Virtual ground concept.	**10**	**12**
	3.2	Open loop configuration – Inverting, Non-inverting.		
	3.3	Close loop configuration – Inverting, non- inverting, Differential amplifier, unity gain amplifier (voltage follower), inverter (sign changer) Inverting & non-inverting configuration of Adders. (Summing amplifier, scaling Amplifier, averaging amplifier). Substractor. Integrator. Differentiator.		
	3.4	Numerical based on designing of above circuit.		
4.	**Applications of OPAMP**			
	4.1	Instrumentation amplifier , requirements, Circuit diagram, circuit operation, derivation of output voltage equation using one , two ,three OP-AMP ,advantages & applications,	**12**	**12**
	4.2	Voltage to current converter(with floating load, with grounded load)		
	4.3	Current to voltage converter		
	4.4	Sample and hold circuit (IC LF 398, Pin diagram specification and pin functions only)		
	4.5	Logarithmic and antilogarithmic amplifiers (using Diodes) Analog divider and analog multiplier.		
	4.6	Comparators (IC 710 Pin diagram specification and pin functions only).Concept of comparator: zero crossing detector, Schmitt trigger, window detector, phase detector, active peak detector, peak to peak detector		
5.	**Filters**			
	5.1	Introduction to filters, Classification of filters Merits & demerits of active filters over passive filters. Concept of passive & active filters Ideal and actual characteristics, terms: - cut off frequency, pass band, stop band, center frequency, roll off rate, BW, Q-factor,	**10**	**12**

	5.2	First order & second order Butterworth filters. Low pass filter, high pass filter, band pass filter(wide band pass , narrow band pass filter) Band reject filter(wide band reject, narrow band reject filter), all pass filter		
6.	**Timers**			
	6.1	Introduction to timer IC 555. Block diagram of IC 555 and its pin diagram & function of each pin	**10**	**16**
	6.2	Concepts of different timer circuits used in industries: water level controller, touch plate switch, frequency divider etc.		
	6.3	Monostable multivibrator, astable multivibrator, bistable multivibrator, Schmitt trigger, voltage controlled oscillator. IC 556 features, pin diagram and specifications.		
	6.4	Designing of simple circuits and trouble shooting of these circuits Numericals based on timers.		
7.	**PLL**			
	7.1	IC 565 (phase lock loop), its block diagram and pin diagram,	**06**	**08**
	7.2	IC566 (voltage controlled oscillator), its block diagram and pin diagram, Application of PLL as frequency multiplier, FM demodulator.		
		Total	**64**	**80**

List of Practical/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment (Any sixteen)	Hrs
1.	Study of differential amplifier (verify the effect of RE on CMRR)	02
2.	Measurement of OP-Amp Parameters	02
3.	To assemble inverting and non inverting amplifier and draw input output waveforms.	02
4.	To assemble adder and substractor using OPAMP	02
5.	Observe output of active integrator for different types of input (sine and square)	02
6.	Observe output of active differentiator for different types of input (sine and square)	02

7.	Study of input and output for V to I converter and I to V converter	02
8.	To assemble zero crossing detector	02
9.	Plot the frequency response of second order Butterworth low pass filter.	02
10.	Plot the frequency response of First order Butterworth low pass filter.	02
11.	Plot the frequency response of First order Butterworth high pass filter.	02
12.	Study of Astable multivibrator using IC 555.	02
13.	Study of bistable multivibrator using IC 555.	02
14.	Study of Schmitt trigger using IC 555.	02
15.	Study of monostable multivibrator using IC 555	02
16.	Plot the characteristics of PLL	02
	Total	**32**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Differential Amplifier	Classroom Teaching and laboratory work
2.	Salient features of OPERATIONAL AMPLIFIER (OPAMP)	Classroom Teaching and laboratory work
3.	OPAMP basic circuits	Classroom Teaching and laboratory work
4.	Applications of OPAMP	Classroom Teaching and laboratory work
5.	Filters	Classroom Teaching and laboratory work
6.	Timers	Classroom Teaching and laboratory work
7.	PLL	Classroom Teaching and laboratory work

Text Books:

Sr. No	Author	Title	Publication
1.	Ramakant Gaikwad	Op-Amp & Linear Integrated Circuits	Prentice-hall of India New Delhi
2.	D Roy Choudhari & Salil Jain	Linear Integrated circuits	New Age International (P) Ltd. Publishers New Delhi

Reference Books:

Sr. No	Author	Title	Publication
1.	Sergio Franco	Design with OPAMP & analog integrated ckts	Tata McGraw-hill New Delhi
2.	G B Clayton	Operational Amplifiers	British library cataloguing in publication data
3.	William d. Stanley	Operational Amplifier with Linear Integrated Circuits	Pearson Education
4.	Coughlin & Dirscoll	Operational amplifier & Linear Integrated circuits	Pearson Education
5.	K.R. Botkar	Integrated circuits	Khanna Publisher, New Delhi

Learning Resources :

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Differential Amplifier	04	04	--	08
2.	Salient features of Operational Amplifier	04	08	--	12
3.	OPAMP basic circuits:	04	08	--	12
4.	Applications of OPAMP	--	06	06	12
5.	Filters	--	06	06	12
6.	Timers	04	08	04	16
7.	PLL	--	04	04	08
	Total	**16**	**44**	**20**	**80**

(Prof. R. M. Adhav)
Prepared By

(Prof. S. B. Kulkarni)
Secretary, PBOS

(Prof.R. M. Adhav)
Chairman, PBOS

Programme : Diploma in Electronics & Telecommunication
Programme Code : 03/17
Name of Course : Power Electronics
Course Code : ET 465

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**04**	**64**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Two class tests , each of 60 minutes	3 Hrs.	3 Hrs.	3 Hrs. For batch of 20 students	--
Marks	**20**	**80**	**50**	--	--

Course Rationale:

Electronics has entered into lot of domestic applications, security Gadget and industrial control. Industrial electronics makes Students conversant with major industrial applications.

Course Objectives:

After studying this course, the student will be able to

- Student will be able to know and select proper ICs for industrial circuits. Students will be able to identify faults in Circuits. Students will be able to state necessity of controls provided in industry.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weigh tage
1.	**Thyristers**			
	1.1	Introduction to thyrister family	**08**	**12**
	1.2	Silicon Control Rectifier –constructional features, working with two transistor analogy. Physical operation of SCR.		
	1.3	SCR terminology –Forward break over voltage ,ON state voltage, holding current latching current, forward current rating, gate triggering current, power rating, turn on time, turn off time.		
2.	**Power Devices**			
	2.1	**TRIACS** : construction, working, gate triggering modes, applications,	**08**	**08**
	2.2	Comparison of triac & antiparallel SCRs.		
	2.3	**Diac**: construction, working, applications. Quadrics, Fast recovery diodes.		
	2.4	SCS, SBS, SUS		
	2.5	Power diodes: principle of operation of Power diodes, voltage ratings & current ratings, snubber circuit for power transistor, MOSFET, IGBT, construction, principle of working, applications.		
3.	**Methods of Turn ON & Turn OFF of SCR's** (explanation with only circuit diagram)			
	3.1	Light turn ON, voltage triggering, dv/dt turn ON, Gate turn ON	**12**	**16**
	3.2	Natural commutation, forced commutation Gate turn OFF.		
	3.3	Methods of triggering SCR Circuit a) Pulse control by R-C N/W. b) Pulse triggering by saturable reactor. c) Composite triggering by PWM controller & discrete transistors.		
	3.4	Methods of forced commutation. Class A, Class B, Class C, Class D, Class E, Class F(explanation with only circuit diagram& waveforms)		

4.	**SCR Protection Circuit**			
	4.1	Snubber circuit, gate protection circuit, SCR crowbar circuit	**08**	**12**
	4.2	Series & parallel operations of SCRs, triggering of series & parallel connected SCRs.		
5.	**SCR Converters (Only Circuit Diagrams & Wave Forms)**			
	5.1	Line commuted converters -uncontrolled rectifiers, full controlled rectifiers & semi controlled rectifiers (only definition).	**08**	**08**
	5.2	SCR half wave rectifier with inductive load, effect of free wheeling diode, (no mathematics) half wave SCR rectifier with resistive load Single phase full wave SCR controlled rectifier using center tap transformer & bridge with inductive load (working with circuit diagram & waveforms)		
6.	**Inverters, Dual Converters Chopper & Cycloconverters**			
	6.1	**Line commuted & single 14phase** Line commuted Inverters: full controlled Inverters (resistive load only Circuit diagrams working & wave forms) effect of source impedance, application.	**12**	**16**
	6.2	Forced commuted inverter: Single phase parallel capacitor commuted inverter (resistive load only) Circuit diagrams, working& waveform. Advantages of parallel inverter, single parallel inverter with feedback diodes. Single phase series inverter output frequency, disadvantage of series inverter voltage source & current source inverter.		
	6.3	Functional block diagram of line commuted converter. Inversion mode operation.		
	6.4	Choppers: principle of operation, application of choppers, chopper control technique voltage step down chopper, voltage step up chopper, Jones chopper, AC chopper.		

	6.5	Cycloconverter: Types of cycloconverters principle of Single phase/ Single phase cycloconverter effect of inductive load Single / Single phase bridge cycloconverter problem when o/p frequency is not sub multiple of i/p frequency.		
7.	**D.C. Motor Control**			
	7.1	By SCR Armature voltage control, effect of free wheeling diode, varying load, varying supply voltage. Speed control of D.C. series motor (separately excited dc motor)	**08**	**08**
	7.2	A.C. power control of lamp dimmer, chopper control (ON-OFF) of D.C. series motor. PLL control of D.C. motor (only block diagram)		
		Total	**64**	**80**

List of Practical/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment	Hrs
1.	Study of SCR characteristics	02
2.	Characteristics of diac.	02
3.	Characteristics of triac.	02
4.	Study of SCR Turn – ON methods	02
5.	Study of half controlled rectifier.	04
6.	Study of fully controlled rectifier.	04
7.	Study of series inverter.	04
8.	Study of parallel inverter.	04
9.	Study of Jone's chopper.	02
10.	Study of Morgan's chopper.	02
11.	Study of speed control of D.C.Motor	04
	Total	**32**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Thyristers:	Class room teaching & Laboratory work
2.	Methods of turn ON & turn OFF of SCR's	Class room teaching & Laboratory work
3.	SCR protection circuit	Class room teaching & Laboratory work
.	SCR converters	Class room teaching & Laboratory work
5.	Inverters, Dual converters chopper & cycloconverters	Class room teaching & Laboratory work
6.	TRIACS , Diac	Class room teaching & Laboratory work
7.	D.C. motor control	Class room teaching & Laboratory work

Text Books:

Sr. No	Author	Title	Publication
1.	Singh, Khanchandani	Power Electronics	Tata McGraw Hill Publication.
2.	Rashid	Power Electronics	Tata McGraw Hill Publication.
3.	Ramamoorthy	Thyristors and applications	

Reference Books:

Sr. No	Author	Title	Publication
1.		SCR Manual.	General Electric.

Learning Resources : Reference Books, Manuals and journals

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Thyristers:	04	06	02	12
2.	Power Devices	04	02	02	08
3.	Methods of turn ON & turn OFF of SCR's	08	04	04	16
4.	SCR protection circuit	04	06	02	12
5.	SCR converters	04	02	02	08
6.	Inverters, Dual converters chopper & cycloconverters	08	04	04	16
7.	D.C. motor control	04	02	02	08
	Total	**36**	**26**	**18**	**80**

(Prof. C. R. Joshi)
Prepared By

(Prof. S. B. Kulkarni)
Secretary, PBOS

(Prof.R. M. Adhav)
Chairman, PBOS

Programme : Diploma in Electronics & Telecommunication
Programme Code : 03/17
Name of Course : Digital Electronics
Course Code : ET 466

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**04**	**64**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Two class tests , each of 60 minutes	3 Hrs.	3 Hrs.	3 Hrs. For batch of 20 students	--
Marks	**20**	**80**	**50**	--	--

Course Rationale:

This subject forms the foundation of digital electronic systems. It is essential to know these fundamentals to understand the concept of microprocessors & its applications.

Course Objectives:

After studying this course, the student will be able to

- Know the Concept of Digital Circuits.
- Understand the operations of fundamental digital circuits.
- Simplify logic circuits using Boolean algebra
- Construct simple logic circuits, counters using IC's.
- Explain the functions of various digitals IC's.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
1.	**Number system and Logic Gates**			
	1.1	Decimal, binary, octal, hexadecimal number systems conversion of one system into other.	**08**	**10**
	1.2	**Logic gates**: - Logic Gates - truth tables, Logic Gates Ics - 7400, 7402, 7404, 7408, 7432, 7486, CD 4001, 4011, 40106.		
	1.3	**Codes:** BCD, Grey, EX-3, ASCII		
2.	**Digital Logic Families**			
	2.1	RTL, TTL, ECL, CMOS; Characteristics, circuits, comparison.	**04**	**06**
3.	**Boolean Algebra**			
	3.1	Fundamentals of Boolean algebra, Basic laws, DeMorgan's theorem,	**08**	**10**
	3.2	Applications of Boolean algebra,		
	3.3	K-map reduction Techniques (up to 4 variable maps) Conversion from sum of products to product of sum form and vice versa		
4.	**Combinational Circuits**			
	4.1	**Binary Arithmetic**: - addition, subtraction, multiplication and division Binary subtraction using 1's and 2's complement, BCD addition and subtraction.	**10**	**12**
	4.2	**Combinational circuits:** Half adder, full adder, half subtractor, full subtractor, addition and subtraction using 2's compliment, 4 bit binary adder, Parallel binary adder, BCD adder, ALU		
5.	**Combinational Circuits II**			
	5.1	Multiplexers - 8 to 1 Line, 16 to 1 line Demultiplexers - 1 to 8 line, 1 to 16 line,	**08**	**10**
	5.2	Decoder - BCD to binary, binary to BCD & BCD to decimal, 3 line to 8 line		
	5.3	Encoder - Priority encoders		
	5.4	Display driver - BCD to seven-segment decoder.		
	5.4	IC74150, 74154, 74155, 4511, 40147, 7447, 4511; keyboard encoder. Encoders & Decoders		

6.	**Sequential Circuits**			
	6.1	RS, JK, D, T and master slave JK flip-flops	**10**	**12**
	6.2	Shift registers		
	6.3	Synchronous and Asynchronous MOD-N counters – up-down Counters using Ics4098, 74221, 7474, 7475, 7476,74192, 7490, 7493, 7495, 74106 and 4518		
7.	**Semiconductor Memories**			
	7.1	Random access memories, basic memory cells, Dimension of memory access. RAM, ROM,	**08**	**10**
	7.2	Static and dynamic memories. PROM, EPROM, EEPROM.		
	7.3	Memory organization		
	7.4	MOS memories, IC 7481,2716, 6116		
	7.5	CCD memory		
8.	**ADC and DAC**			
	8.1	ADC Methods: Dual slope and successive .approximation method, staircase ramp method	**08**	**10**
	8.2	DAC Method: R- 2R ladder, weighted resistor Study of DAC O8O8 and ADC O8O9, 3½-digit digital panel meter.		
		Total	**64**	**80**

List of Practical/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment	Hrs
1.	Study of Digital IC tester	02
2.	Study of logic gates & verification of truth tables.	02
3.	Verification of De-Morgan's Theorem.	02
4.	Verification of Half Adder & full Adder using logic gates	02
5.	Verification of Half subtractor & full subtractor using logic gates	02
6.	Study of 4 bit full adder IC 7483.	02
7.	Study of Multiplexer using IC	02
8.	Study of DeMultiplexer using IC	02
9.	Study of BCD to decimal decoder	02
10.	Study of Priority encoder	02

11.	Study of display driver	02
12.	Study of key board encoder	02
13.	Verification of JK, D & T flip-flop	02
14.	Study of shift register	02
15.	Study of ripple counter	02
16.	Study ADC & DAC circuits	02
	Total	**32**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Number System	Classroom Teaching
2.	Digital Logic Families	Classroom Teaching & Laboratory work
3.	Boolean Algebra	Classroom Teaching & Laboratory work
4.	Combinational Circuits I	Classroom Teaching & Laboratory work
5.	Combinational Circuits II	Classroom Teaching & Laboratory work
6.	Sequential circuits	Classroom Teaching
7.	Semiconductor memories	Classroom Teaching
8.	ADC & DAC	Classroom Teaching & Laboratory work

Text Books:

Sr. No	Author	Title	Publication
1.	Malvino	Principles of Digital Electronics	Mcgraw Hill
2.	R.P.Jain	Digital Electronics	Tata Mcgraw Hill
3.	B.Ram	Microprocessor & Microcomputer	S.Chand

Reference Books:

Sr. No	Author	Title	Publication
1.	Pal mer	Introduction to digital systems	Mcgraw Hill
2.	Mathur	Introduction to microprocessor	Tata Mcgraw Hill

Learning Resources : Reference Books, Manuals and journals of devices, Components brochures

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Number System	04	02	04	10
2.	Digital Logic Families	04	02	--	06
3.	Boolean Algebra	04	02	04	10
4.	Combinational Circuits I	04	04	04	12
5.	Combinational Circuits II	04	02	04	10
6.	Sequential Circuits	04	04	04	12
7.	Semiconductor memories	04	02	04	10
8.	ADC & DAC	04	02	04	10
	Total	**32**	**20**	**28**	**80**

(Prof. B. V. Karhade)
Prepared By

(Prof. S. B. Kulkarni)
Secretary, PBOS

(Prof. R. M Adhav)
Chairman, PBOS

Programme : Diploma in Electronics & Telecommunication
Programme Code : 03/17
Name of Course : Electronic Measuring Instruments.
Course Code : ET 467

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**03**	**48**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Two class tests , each of 60 minutes	3 Hrs.	3 Hrs.	3 Hrs. For batch of 20 students	--
Marks	**20**	**80**	**50**	--	--

Course Rationale:

Electronic Technicians are required to handle measuring Instruments as tool, frequently. Hence, knowledge and hands on experience of these instruments is essentials.

Course Objectives:

After studying this course, the student will be able to

- To understand Static & Dynamic Characteristics of Measuring Systems.
- To understand Measuring principles of AC & DC Bridges.
- To understand Measuring principles of Analog Instruments.
- To understand Measuring principles of Digital Instruments.
- To understand Measuring principles of Recording Instruments.
- To understand Measuring principles of Electronic Instruments.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
1.	**Measuring Systems & Characteristics of Instruments**			
	1.1	Introduction to measurement systems	**08**	**10**
	1.2	Direct & In-Direct Measurement systems.		
	1.3	Types of measuring instruments- Mechanical, Electro-Mechanical & Electronic Instruments.		
	1.4	Basic functions of instruments- Indicating, Recording & Controlling.		
	1.5	Generalized block dig. Of instrumentation		
	1.6	Static & Dynamic characteristics of Instruments. Accuracy, Precision, sensitivity, Resolution, Repeatability, Reproducibility, Histogram,		
	1.7	Types of Errors in measurement- Gross, Systemic & Random Errors with remedies.		
	1.8	Comparison of Analog & Digital Instruments.		
2.	**Analog DC and AC Meters**			
	2.1	Classification of Analog Instruments.	**10**	**14**
	2.2	Definition of Average & RMS value.		
	2.3	PMMC- Construction & Working Principle, Galvanometer,		
	2.4	Analog DC Ammeters & Voltmeters. Analog AC Ammeter and Voltmeter-Average Responding (Rectifier type) Analog Multi-meter- Block Diagram of Analog Multi-meter and operation only.		
	2.5	How to use Basic meters.		
3.	**Digital Meters**			
	3.1	Concepts of ADC & DAC only.	**12**	**14**
	3.2	Resolution, Sensitivity and Accuracy of digital display.		
	3.3	Digital frequency meter- Block Diagram and operation only.		
	3.4	Digital Voltmeter-Ramp type DVM, Integrating type DVM, Successive approximation type DVM, Dual slope type DVM. (Block diagram, Operation and waveform if required).		

	3.5	Digital Multi-meter- Block Diagram and operation only. LCR, Q meter- Block diagram and operation only.		
4.	**Oscilloscope**			
	4.1	Oscilloscope subsystems- Display subsystems- CRT, Deflection of electron beam in CRT, Electrostatic and Electromagnetic deflection sensitivity. Vertical deflection Pre-amplifier, Main vertical amplifier, delay line. Horizontal deflection subsystems- Trigger circuit, Time base generator, Main Horizontal amplifier.	**16**	**18**
	4.2	CRO Probes- General block diagram of CRO probe, passive voltage probe, and their compensation, Active voltage probes, current probes. Calibration circuits.		
	4.3	CRO-Block diagram of single beam dual trace and dual beam oscilloscope. Block diagram of Digital storage oscilloscope: Block Diagram Usage of DSO for testing Digital Circuits, Comparison with Normal CRO Uses of CRO- Frequency and phase measurement, Tracing of diode and transistor characteristics.		
5.	**Signal Generator and Analyzer**			
	5.1	Signal generator (AF and RF type)	**08**	**12**
	5.2	Function generator, pulse generator		
	5.3	Spectrum & Logic analyzer : Specifications, Block diagram, Various controls and operation only.		
6.	**Recorders**			
	6.1	Requirements, specifications & selection of : Strip Chart Recorder, Galvanometer type recorder	**10**	**12**
	6.2	Null type recorder,		
	6.3	X-Y Recorder		
	6.4	Magnetic recorders		
	6.5	Optical Recorders along with their Principle of working, advantages, Disadvantages & applications		
		Total	**64**	**80**

List of Practical/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment	Hrs
1.	Measure DC Voltage & DC Current using PMMC instruments.	02
2.	Measurement of R.L.C using LCR, Q meter.	02
3.	Study front panel controls and specification of typical CRO.	02
4.	Measure frequency, voltage, phase difference (by time measurement) using CRO.	04
5.	Testing of component using CRO.	02
6.	Using Lissagous pattern find frequency & phase difference of unknown signal.	04
7.	Study & use of Digital Storage Oscilloscope.	04
8.	Measure frequency & voltage of the different o/p waveforms of function generator.	02
9.	Study of Logic analyzer	04
10.	Study of X-Y Recorders.	02
11	Study and use of Spectrum analyzers	04
	Total	**32**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Measuring Systems & Characteristics of Instruments.	Class room teaching
2.	Analog DC and AC Meters	Class room teaching & Laboratory work
3.	Digital Meters.	Class room teaching & Laboratory work
4.	Oscilloscope.	Class room teaching & Laboratory work
5.	Signal Generator and Analyzer.	Class room teaching & Laboratory work
6.	Recorders.	Class room teaching & Laboratory work

Text Books:

Sr. No	Author	Title	Publication
1.	Electrical & Electronic Measurements & Instrumentations	A.K. Sawhney	Dhanpat Rai &Co.
2.	Electronics Instrumentation & measurement Systems	J.G.Joshi	Khanna Publication

Reference Books:

Sr. No	Author	Title	Publication
1.	Modern Electronic Instrumentation & Measurement Techniques	W.D. Cooper	PearsonEducation, NewDelhi
2.	Electronic Instruments	Kalsi	Tata Mc Grow Hill

Learning Resources :

Reference manuals, Instrumentation Hand book by Liptak, Instrumentation Hand book by Anderson, Technical Reference book of Instruments, Service Manuals of Instruments, Handouts, O.H.P. Transparencies / L.C.D. Projector.

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Measuring Systems & Characteristics of Instruments.	04	04	04	12
2.	Analog DC and AC Meters	04	04	06	14
3.	Digital Meters.	04	04	06	14
4.	Oscilloscope.	04	04	06	14
5.	Signal Generator and Analyzer.	04	04	04	12
6.	Recorders.	04	04	06	14
	Total	**24**	**24**	**32**	**80**

(Prof. G.W.Sonone)
Prepared By

(Prof. S. B. Kulkarni)
Secretary, PBOS

(Prof.R. M. Adhav)
Chairman, PBOS

Programme : Diploma in Electronics & Telecommunication
Programme Code : 03/17
Name of Course : Principles of Communication
Course Code : ET 468

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**04**	**64**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Two class tests , each of 60 minutes	3 Hrs.	3 Hrs.	3 Hrs. For batch of 20 students	--
Marks	**20**	**80**	**50**	--	--

Course Rationale:

This subject is introduced with the view that students are made familiar with basics of communication system like Amplitude, Frequency Modulation and modern communication systems.

Course Objectives:

After studying this course, the student will be able to

- To understand the working of the Communication system
- To develop skills to enable them to operate and service the circuits in the systems

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
1.	**Amplitude Modulation**			
		Importance of communication, introduction, frequency spectrum Management	**10**	**12**
		Introduction,definition, theory of Amplitude modulation, sidebands produced in amplitude modulation, generation of amplitude modulation, single sideband generation, suppression of carrier		
2.	**Frequency & Phase Modulation**			
	2.1	Introduction, definition, Modulation index in FM, Sidebands produced in frequency modulation	**10**	**12**
	2.2	Phase modulation, comparative advantages & disadvantages of AM & FM, Frequency modulation methods.		
3.	**Demodulation of AM & FM Waves**			
	3.1	Introduction, Basic principles of demodulation, Diode detection & distortion in diode detector - frequency demodulation methods.	**10**	**12**
4.	**AM & FM Transmission System**			
	4.1	Introduction, Class C radio frequency power amplifier, AM transmitter (block diagram), neutralization & its types, single sideband transmitter (block diagram), sideband filters	**10**	**12**
	4.2	FM transmitter (block dia.)		
5.	**Radio Receivers**			
	5.1	Introduction, superheterodyne receivers, AM receivers, Oscillators, tracking, receiver alignment, communication receivers, receiver	**10**	**12**
	5.2	Characteristics, receiver noise, noise consideration in practical receivers, SSB receivers, Effect of noise on amplitude & frequency modulation, FM receivers.		
6.	**Pulse Modulation**			
	6.1	Sampling theorem, Natural sampling, flat top sampling , sample & Hold circuit, PAM, PWM, PPM	**04**	**06**

7.	**Radio Wave Propogation**			
	7.1	Tropospheric propogation, line of sight propogation, inospheric propogation, ground wave propogation.	**04**	**06**
8.	**Antennas**			
	8.1	Radiation Principle, concept of isotropic antennas, dipole antennas, radiation resistance, VHF antennas, working of Yagi antenna, parabolic Reflector.	**06**	**08**
		Total	**64**	**80**

List of Practical/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment	Hrs
1.	To find modulation index by envelope & trapezoid method.	02
2.	To study FM & find modulation index.	02
3.	Study of diode detector.	02
4.	Study of FM detector.	02
5.	To study class C amplifier.	02
6.	To study AM transmitter.	02
7.	Study of radio receiver circuit.	02
8.	To find sensitivity & selectivity of radio receiver.	02
9.	Fault finding of radio receiver.	02
10.	Alignment of radio receiver.	02
11.	Study of PPM	02
12.	Study of analog sampling and reconstruction of signal.	04
13.	Study of various antennas.	04
14.	To plot radiation pattern of any one antenna.	02
	Total	**32**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Importance of communication	Classroom teaching
2.	Amplitude Modulation	Classroom teaching & laboratory work.
3.	Frequency & Phase Modulation	Classroom teaching & laboratory work.
4.	Demodulation of AM/FM waves	Classroom teaching & laboratory work.
5.	AM/FM communication system	Classroom teaching & laboratory work.
6.	Radio Receiver	Classroom teaching & laboratory work.
7.	Radio wave propogation	Classroom teaching
8.	Antennas	Classroom teaching & laboratory work

Text Books:

Sr. No	Author	Title	Publication
1.	Kennedy	Principles of communication	McGraw Hill
2.	Umesh sinha	Communication systems	New Age
3.	Roddy Collen	Electronic communication	Prentice Hall

Reference Books:

Sr. No	Author	Title	Publication
1.	A.B.Carlson	Communication system	McGraw Hill
2.	Taub & Schilling	Principles of communication system	McGraw Hill
3.	M.L.Gupta	Electronic & Radio Engineering	Dhanpat Rai Pub.

Learning Resources : Reference Books, Journals, Data Manuals, Computer Based Teaching.

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Pulse Modulation :	02	02	02	6
2.	Amplitude Modulation	04	04	04	12
3.	Frequency & Phase Modulation	05	04	03	12
4.	Demodulation of AM/FM waves	05	04	03	12
5.	AM/FM communication system	05	04	03	12
6.	Radio Receiver	04	04	04	12
7.	Radio wave propogation	04	02	-	6
8.	Antennas	04	-	04	8
	Total	**33**	**24**	**23**	**80**

(Prof. T. B. Lawate)
Prepared By

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Secretary, PBOS

(Prof. R. M. Adhav)
Chairman, PBOS

Programme : Diploma in Electronics & Telecommunication
Programme Code : 03/17
Name of Course : Microprocessor & Microcontroller Fundamentals
Course Code : ET 469

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**04**	**64**
Practical	**04**	**64**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Two class tests , each of 60 minutes	3 Hrs.	3 Hrs.	3 Hrs. For batch of 20 students	--
Marks	**20**	**80**	**50**	--	--

Course Rationale:

This subject gives preliminary knowledge of microprocessor 8085 programming and commonly used programmable interface & control ICs. This Subject also focuses on mainly used microprocessor-based systems.

Course Objectives:

After studying this course, the student will be able to

- Preliminary Knowledge of 8085 µP and Micro controller 8051
- Develop programs in assembly language.
- Detailed study of interfacing, control ICs etc.
- Knowledge of mainly used microprocessor based systems.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
	SECTION – I			
1.	**Microprocessor Systems**			
	1.1	Architecture.	**06**	**08**
	1.2	Pin diagram.		
	1.3	Control signals.		
	1.4	Multiplexing of address & Data Bus.		
	1.5	μp system (block diagram.).		
	1.6	Logic devices for interfacing, Tri-state devices, Buffer, Encoder, Latches.		
2.	**8085 Assembly Language Programming**			
	2.1	Programming model.	**10**	**16**
	2.2	Addressing modes.		
	2.3	Instruction classification.		
	2.4	Instruction format.		
	2.5	Instruction set.		
	2.6	Additional Instruction.		
	2.7	Simple Programs.		
	2.8	Stacks & subroutines.		
	2.9	16 bit data operation.		
3.	**Memory Interfacing**			
	3.1	Memory structure & its requirements.	**06**	**04**
	3.2	Basic concepts in Memory interfacing Address Decoding.		
	3.3	Interfacing of RAM and EPROM		
4.	**Interfacing I/O Devices**			
	4.1	I/O Mapped I/O & Memory mapped I/O concepts	**06**	**08**
	4.2	Peripheral I/O instructions.		
	4.3	I /O execution, Device selection & Data transfer.		
	4.4	Absolute & Linear select decoding.		
	4.5	Interfacing I/Os using decoders.		
	4.6	Interfacing I/P device, DIP switches.		
	4.7	Seven segment LED as O/P device.		
	4.8	Memory mapped I/O.		

5.	**8085 Interrupts**			
	5.1	Interrupt.	**04**	**04**
	5.2	Vectored Interrupts.		
	5.3	Restart as software instructions.		
		SECTION – II		
6.	**8051 Architecture**			
	6.1	Comparison of microprocessors & micro controllers.	**12**	**12**
	6.2	8051 Architecture : pin diagram,Ports & circuits, connecting external memory.		
	6.3	Counters & timers.		
	6.4	Serial data i/p & o/p.		
	6.5	Interrupts.		
7.	**8051 Assembly Language Programming**			
	7.1	Addressing Modes.	**12**	**12**
	7.2	Instruction set : Data moving instructions, logical & arithmetic Instructions,. Jump, call instructions, subroutines.		
	7.3	Interrupts		
8.	**Applications**			
	8.1	Interfacing of LED and LCD Display , Keyboard , DAC & ADC , pulse measurements	**06**	**10**
9.	**Serial communication modes of 8051**			
	9.1	Mode 0 to 3.	**02**	**06**
		Total	**64**	**80**

List of Practical/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment	Hrs
1.	Demonstration of 8085 μP Kit.	02
2.	Assembly language programs which cover Data moving, Arithmetic, Logical, machine control instructions and jumps. (Any 15)	30
3.	Identification & observation of 8051 system board on the kit.	02
4.	Assembly language programs which cover Data moving, Arithmetical, Logical, single bit instructions and jumps. (Any 15)	30
	Total	**64**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
	SECTION I	
1.	Microprocessor Systems	Class room teaching & Laboratory work
2.	8085 Assembly language programming	Class room teaching & Laboratory work
3.	Memory Interfacing	Class room teaching & Laboratory work
4.	Interfacing I/O Devices	Class room teaching & Laboratory work
5.	8085 Interrupts	Class room teaching & Laboratory work
	SECTION II	
1.	8051 Architecture	Classroom Teaching & Lab. Work
2.	8051 Assembly Language Programming	Classroom Teaching & Lab. Work
3.	Applications	Classroom Teaching & Lab. Work
4.	Serial Communication modes of 8051	Classroom Teaching & Lab. Work

Text Books:

Sr. No	Author	Title	Publication
1.	Ramesh Goankar	Microprocessor Architecture, Programming & applications with 8085.	PHI
2.	Mazidi	8051 microcontroller and Embedded Systems	Pearson/PHI

Reference Books:

Sr. No	Author	Title	Publication
1.	Douglas V. Hall	Microprocessor and Interfacing : Programming and hardware	TMH
2.	Kenneth J. Ayala	The 8051 Microcontroller	Thomson Publishers

Learning Resources : Reference Books, Journals, Data Manuals, URL's.

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
SECTION I					
1.	Microprocessor Systems	04	04	-	**08**
2.	8085 Assembly language programming	08	04	04	**16**
3.	Memory Interfacing	02	-	02	**04**
4.	Interfacing I/O Devices	04	-	04	**08**
5.	8085 Interrupts	02	02	-	**04**
SECTION II					
1.	8051 Architecture	04	08	-	**12**
2.	8051 Assembly Language Programming	04	-	08	**12**
3.	Applications	-	06	04	**10**
4.	Serial Communication modes of 8051	06	-	-	**06**
	Total	**34**	**24**	**22**	**80**

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