

- (A) **COURSE TITLE & CODE** : **Marketing Management, G – 304**  
 (B) **LEVEL** : **Three**  
 (C) **BRANCH/ DISCIPLINE** : **General**  
 (D) **RATIONALE** :

In the era of global, consumer-focused, quality-driven business philosophies, the discipline of marketing plays important role in the formulation and implementation of corporate strategies. This has placed great demands on the disciplines primary functions of a) learning about customers and their needs b) designing and implementing responsive marketing strategies for goods and services, and c) communicating these efforts to customers.

The purpose of this course is to introduce students to the basic concepts of marketing management. The students are expected to develop and learn to apply the knowledge and analytical skills useful for marketing decision-making

(E) **TEACHING AND EXAMINATION SCHEME:**

Sl. No.	Course Code	Name of Course	Teaching Scheme					Examination Scheme				Total Marks
			Pre-requisite	L	T	P	C	Theory		Practical		
								ET	PA	ET	PA	
1.	G- 304	Marketing Management		3	2	-	5	75	25	--	--	100

(F) **DETAILED COURSE CONTENTS**

**CHAPTER 1.0 Understanding Marketing Management**

- Definition of marketing
- Definition of marketing management
- P's of marketing
- Marketing environment
- Consumer behaviour
- Marketing in a changing world
- Market segmentation

**CHAPTER – 2.0 MARKETING INFORMATION AND RESEARCH**

- Need of marketing information system
- Marketing research and market research

- Functions of marketing research
- Process of marketing research
- Sampling
- Data sources and collection
- Data analysis

### **CHAPTER – 3.0 PRODUCT POLICY**

- Definition of product
- Product mix
- Band
- Product positioning
- Pricing (Pricing considerations and Approaches)

### **CHAPTER - 4.0 MANAGING DISTRIBUTION**

- Definition of channels
- Channels of distribution
- Factors considered in selection of channels

### **CHAPTER – 5.0 PROMOTION**

- Advertising - Media selection
- Personal selling
- Sales promotion
- Publicity
- Promotion budget - i. Affordable Method, ii. Competitive- parity method, iii. Percentage of sales method, iv. Objective – task method

### **CHAPTER- 6.0 Marketing: Product Approach**

- Marketing of industrial products
- Marketing of consumer products
- Marketing of services.

#### **(G) SPECIFICATION TABLE SHOWING DISTRIBUTION OF MARKS AND HOURS**

Sl. No.	Chapter No.	Chapter Title	Hours	Marks			
				K	C	A	Total Mark
1.	1.0	UNDERSTANDING MARKETING MANAGEMENT	12	2	6	2	10
2.	2.0	MARKETING INFORMATION AND RESEARCH	12	6	6	3	15
3.	3.0	PRODUCT POLICY	12	2	6	2	10
4.	4.0	MANAGING DISTRIBUTION	12	4	3	3	10

Sl. No.	Chapter No.	Chapter Title	Hours	Marks			
				K	C	A	Total Mark
5.	5.0	PROMOTION	16	2	6	7	15
6.	6.0	MARKETING: PRODUCT APPROACH	16	4	6	5	15
<b>Total</b>			<b>80</b>				<b>75</b>

**Abbreviations:** K=Knowledge level, C= Comprehension Level, A=Application level

**(H) SUGGESTED IMPLEMENTATION STRATEGIES:**

This course will be taught in an application-oriented fashion. Various marketing management concepts and principles will be taught through brief lectures, case analyses, class exercises, and using marketing simulation games.

**(I) SUGGESTED LEARNING RESOURCES :**

**(a) Reference Books:**

S. No.	Title	Author, Publisher, Edition & Year
1.	Marketing Management – Hall	Kotler, Philip 8 <sup>th</sup> Edition, 1994
2.	Marketing Management	Dickson, Peter R. Dryden Press, 2 <sup>nd</sup> Edition, 1997
3.	Principles of Marketing; Prenetice – Hall	Kotler and Amstrong 9 <sup>th</sup> Edition, 2001
4.	Marketing Management Implementation and Control; The Indian Context	V.S. Ramaswamy and S. Nama Kumar Mac Millan Publication
5.	Marketing Services	Bidhi Chand Rawat Publications
6.	Marketing Management – A strategic Approach	Boyd, Harper W and Orville C. Walker Richard D. Irwin, 1990
7.	Marketing Management	S.A. Sherlekar Himalaya Publishing House, New Delhi, 4 <sup>th</sup> Edition
8.	Marketing	N. Rajan Nair Sultan Chand & Sons Publishers, New Delhi, 6 <sup>th</sup> Edition

**HOURS: -- MARKS: --**

**SUGGESTED LIST OF PRACTICALS:**

Not Applicable

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**SUGGESTED LIST OF TUTORIALS:**

- Discuss Modern concept of marketing.
- “Advertising is wasteful” do you agree?
- Consumerism
- Steps in New product development
- “There are no fundamental differences between the marketing of industrial and consumer goods”
- Social marketing

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- (A) **COURSE TITLE AND CODE** : **ANALOGUE TECHNIQUES (ECE-401)**
- (B) **LEVEL** : **FOUR**
- (C) **BRANCH/DISCIPLINE** : **ELECTRONICS & COMMUNICATION ENGINEERING**
- (D) **RATIONALE** :

This course is classified under Applied Technology group and is intended that the students learn the facts, concepts, principles and procedure of Linear/Analog integrated circuits and their applications in Electronics, so that he/she can use this knowledge in acquiring the supervision skill, proto type testing skill and investigation skill which is turn, will help in discharging his/her role as a supervisor in the industry or as n entrepreneur.

- (E) **TEACHING AND EXAMINATION SCHEME:**

Sl. No.	Course Code	Name of Course	Teaching Scheme					Examination Scheme				Total Marks
			Pre-requisite	L	T	P	C	Theory		Practical		
								ET	PA	ET	PA	
1.	EC-401	Analog Techniques		3	1	2	6	75	25	50	25	175

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**(F) DETAILED COURSE CONTENTS:**

**Chapter – 1 Voltage Regulators**

- Introduction to voltage regulators: Linear & switching regulators
- Linear voltage regulators: Circuit, block schematic, Pin diagram, salient features
- Specifications, ratings & operating principle of 723, 3085, 78XX & 79XX series IC's voltage regulators circuits and operating principle. Dual tracking power supply using 78XX and 79XX series demerits
- Switching regulators: Necessity, merits & demerits, principle circuit, block schematic, pin diagram, salient features, specification, ratings, operating principles & applications of switching regulator IC TL494, comparison of Linear & switching regulators

**Chapter – 2 Differential Amplifiers**

- D.C. Amplifiers: Necessity and types, BJT as DC amplifier Drift problem stabilized DC amplifier, Demerits
- Differential Amplifiers: Necessity and classification, single and double ended and balanced and unbalance types, Drift & CMRR consideration BJT as differential amplifiers, concepts of Dual power supply & its use. BJT differential amplifier using constant, Darlington pairs and super Beta transistor

**Chapter – 3 Operational Amplifiers**

- Introduction to OPAMP. Electrical properties, Transfer characteristics and parameters of ideal OPAMP and real OPAMP. Block diagram and operating principles of OPAMP, OPAMP configuration – open & closed loop. Necessity of feedback in OPAMP and Applications
- IC OPAMP. Circuit, Block schematic, symbol, pin diagram, specification, Rating, operating principle & field of applications of IC 741, Inverting and Non-inverting modes, Assumptions for ideal OPAMP, virtual ground concept
- Compensation techniques: Offset error voltage & current in real OPAMP compensation techniques. DC characteristics of OPAMP. Input bias current, Input offset current, Input offset voltage and thermal drift rate AC characteristics of OPAMP- frequency response, Roll-off rate & slew rate. Measurement of differential gain, Input & output resistances. Input bias current, Input off-set current, Input offset voltages, slew rate and CMRR. Effect of Negative feedback on OPAMP

**Chapter – 4 OPAMP Applications**

- Amplifiers: Inverting & non-inverting, unity gain (voltage follower/buffer) and summing amplifier, scalar, adder, subtractor/difference amplifier, AC amplifier using OPAMP.
- Instrumentation Amplifier: Necessity & requirement. Instrumentation amplifier with linear gain control using 2 & 3 OPAMP. Field of applications
- Voltage comparators: Necessity & classification. Transfer

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characteristics of ideal and real voltage comparators. Definition of parameter field of application comparison of comparators & Schmitt trigger circuit, block schematic, pin diagram, specifications, ratings, salient features and operating principles of IC 710, Field of applications as peak detector, peak to peak detector, zero-crossing detector, window detector, phase detector and voltage level detector

- Phase Locked Loops (PLL): Necessity of PLL, Block diagram and operation principle of PLL, Transfer characteristics of PLL, Definition of parameter – Lock range, capture range and pull-in-time, field of applications, circuits, block schematic pin diagram specification, ratings, operating principle of PLL IC – 565. Field of applications as AM demodulator, FM demodulator, Frequency multiplier and frequency synthesizer

#### **Chapter – 5 Active Filters & Passive Filters**

- Introduction: Definition, necessity, classification & application of filters
- Passive filter circuits: High pass, low pass, band pass and band select filters using passive components (R,L,C). Transfer characteristics and operating principle merits and demerits, field of applications
- Introduction: Definition, necessity & classification of active filters
- Active filter circuits low pass and high pass, notch filter circuits using OPAMP IC and operating principle, Merit & demerit comparison of passive and active filters field of applications

#### **Chapter – 6 Waveform Generators**

- Integrator and Differentiator: Demerits of passive integrators & differentiators
- Necessity of active integrators & differentiators OPAMP as integrator, OPAMP as differentiator and its limitations. Frequency compensation and practical circuits
- Multivibrators: OPAMP as a square wave and triangular wave generator, astable
- Monostable & bistable multivibrators, Schmitt trigger stair-case type wave form, Ramp and pulse generator using OPAMP

#### **Chapter – 7 Electronic Timers**

- Introduction to electronic timer : basic principle, classification, applications
- Timer IC : Circuit, block schematic, pin diagram, salient features specifications, ratings & operating principles of IC's 555
- IC Time Delay Relay : Circuits and operating principles using IC 555 timer using. Applications of IC 555 : Circuit and operating principles of astable, monostable, bistable, Schmitt trigger, VCO, water level controller, touch switch & ramp generator

## 6.0 SPECIFICATION TABLE OF DISTRIBUTION OF MARKS & HOURS

Chapter No.	Name of Chapter	Hours	Marks			
			K	C	A	Total Marks
1.	Voltage Regulators	4	4	2	2	8
2.	Differential Amplifiers	6	4	2	2	8
3.	Operational Amplifiers	8	5	4	6	15
4.	OPAMP Applications	8	3	4	5	12
5.	Active Filters & Passive filters	8	4	3	5	12
6.	Waveform Generators	8	4	2	6	12
7.	Electronic Timers	6	2	2	4	8
	<b>Total</b>	<b>48</b>				<b>75</b>

**NOTE:** For the entire course, 16hrs of tutorial has been allotted to be used effectively to justify the need of the students and importance of the specific topics.

## 7.0 SUGGESTED IMPLEMENTATION STRATEGIES

1. Demonstration of important concepts/ principles should be done by teacher for some equipment
2. Visits to industries for reinforcing concepts, demonstration of particular equipment / process

## 8.0 SUGGESTED LEARNING RESOURCES

1. Textbooks mentioned in the references.
2. TV programmes.
3. Periodicals like, news magazines, journals etc.
4. OHP transparencies

## 9.0 SUGGESTED PRACTICAL EXPERIENCES – (Marks –50)

Assemble the relevant electronic components and using appropriate instruments, analyse the performance of following circuits:

- a) DC voltage regulator circuit using IC 723 or IC 3085.
- b) Dual tracking power supply using IC 78XX & IC 79XX series.
- c) Switching regulator ICs.
- d) Single ended/Double ended BJT Difference amplifier.
- e) Operational amplifier IC 741-calculations of OP-AMP Parameters.
- f) OPAMP Inverting/non- Inverting amplifier.
- g) OPAMP Adder/Subtractor
- h) OPAMP Instrumentation amplifier.
- i) OPAMP Schmitt trigger
- j) Study of IC 710 voltage comparator
- k) PLL IC 565 AM Demodulator
- l) PLL IC 565 FM Demodulator
- m) PLL IC 565 as Frequency Synthesizer
- n) Astable Multivibrator using OPAMP.



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- o) Monostable Multivibrator using OPAMP.
  - p) Bistable Multivibrator using OPAMP.
  - q) DC time relay using IC 555.
  - r) Astable, monostable, bistable multivibrators using IC 555.
  - s) Water level controller using IC 555.
  - t) Touch switch using IC 555

#### 10.0 SUGGESTED REFERENCES

S.No.	Title	Author/Publisher/Edition/Year
1	OP-AMPS & Linear IC's	Botkar, K.R.; Khanna publishers, New Delhi, 3 <sup>rd</sup> , 1994
2	OP-AMPS	Clayton, G.B; Wiley Eastern Ltd. New York, Latest
3	OP-AMPS & Linear Integrated Circuits.	Gaikwad, R.; Prentice Hall India Ltd., New Delhi, Latest
4	OP-AMPS	Graeme & Toby, Wiley Eastern Ltd., New York, Latest
5	Micro Electronics	Millman, J. Tata McGraw Hill, New Delhi, 2 <sup>nd</sup> , 1990

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- (A) **COURSE TITLE AND CODE** : **DIGITAL ELECTRONICS (ECE-402)**  
 (B) **LEVEL** : **FOUR**  
 (C) **BRANCH/DISCIPLINE** : **ELECTRONICS & COMMUNICATION ENGINEERING**  
 (D) **RATIONALE** :

This course is classified under basic technology group is intended to enable the student understand the facts, concepts, principles and procedures of digital techniques and their application used in digital circuits & systems. This understanding will help in prototype testing and thereby the investigation skills, which in turn, will help him/her in performing the role of a supervisor in all technology areas and also assist those working under him.

- (E) **TEACHING AND EXAMINATION SCHEME:**

Sl. No.	Course Code	Name of Course	Teaching Scheme					Examination Scheme				Total Marks
			Pre-requisite	L	T	P	C	Theory		Practical		
								ET	PA	ET	PA	
1.	EC-402	Digital Electronics		3	1	2	6	75	25	50	25	175

- (F) **DETAILED COURSE CONTENTS:**

**Chapter – 1 Introduction To Digital Techniques**

- Numerical representations
- Comparison of digital and analog systems
- Merits of operation in the digital mode

**Chapter – 2**

**Digital Codes**

- Number systems: Binary, Decimal, Octal & Hexa-decimal
- Conversion of one number system to others, Binary addition, subtraction, multiplication and division
- Use of 1's and 2's compliments in binary arithmetic
- Binary codes: BCD numbers, weighted and non-weighted binary codes, 8421 BCD code, Excess-3 codes and Gray code, BCD addition and subtraction
- Use of 9's and 10's complement in decimal arithmetic, alphanumeric codes ASCII and EBC DIC

**Chapter – 3 Logic Gates**

- Basic logic gates: NOT, AND, OR gates using semiconductor diodes

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& BJTs symbol, Truth table, logic equation applications

- Universal logic gates: NOR, NAND gates using semiconductor diodes and BJTs symbol, truth table, logic equation, Basic logic gates using universal logic gates. Ex-OR and Ex-NOR gates
- Boolean algebra: Fundamental concepts & their basic laws-AND, OR, complementation, cumulative, Associative and distribution laws. De’Morgan’s theorems and numerical examples
- Verin diagram: Standard forms for Boolean function, SOP and POS and their conversion to standard forms, Karnaugh (k) map reduction techniques for 2 and 4 variables only

#### **Chapter – 4 Logic Design**

- Logic families: Characteristics of IC logic gates, unipolar and bipolar types IC logic families, Active and Passive pull-up loads, RTL, RCTL, DCTL, TIL, DTL, HTL, TTL, ECL, E<sup>2</sup>CL, CTL, MOS and CMOS. Logic families, comparison of logic family, performance, Advantages and disadvantages of IC logic families, Study of 7400 TTL series / CD 4000 series, ICD. 7400, 7402, 7404, 7406, 7408, 7430, 7432, 7486, 4001, 4011 and 40106 ICD. Their pin and schematic diagrams
- Multivibrators: Astable, Monostable and Bistable Multivibrators using inverter gates

#### **Chapter – 5 Digital Systems**

- Introduction: types of digital systems and their block diagram, operating principles
- Combination Logic system: R-S flip-flop using BJTs, NOR and NAND gates clocked R-S flip-flop, propagation delay and Race-around condition, Master-Slave (M-S) J.K. flip-flop with preset and clear, T and D type flip-flops, field of application of flip-flop
- Sequential logic system: Register – SISO, SIPO, PISO and PIPO circulating shift registers counter - synchronous and asynchronous, ripple, up-down, ring, MOD-N, decode and BCD counter field of application of counters, comparison between counters and registers

#### **Chapter – 6 Encoders / Multiplexers**

- Necessity of Multiplexers
- Principles of Multiplexers and their types 2 to 1, 4 to 1, 8 to 1 and 16 to 1 lines, Block diagrams, operating principles and applications.
- Study of ICs – 74150, 74151, 74152, 74153 and 74157
- Multiplexer tree 32 to 1 and 64 to 1 line multiplexer 16 to 1 line multiplexer

#### **Chapter – 7 Decoders / Demultiplexers**

- Necessity of demultiplexer
- Principles of demultiplexer and their types 2 to 1, 4 to 1, 8 to 1 and 16 to 1 lines, Block diagrams, operating principles and applications
- Study of ICs – 74139, 74154 and 74155

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## **Chapter – 8 Code Converters**

- BCD to binary converter using IC 74184
- Binary to BCD converter using IC 74185
- Decimal to BCD using IC 74147 and 74148
- Hexa-decimal to binary
- Priority encoders, decoders and drivers – BCD to decimal decoders, ICs – 7447, 7448 and 4511, BCD to seven segment drivers ICs

## **Chapter – 9 Data Converters**

- Introduction: Necessity of data converters and their types
- Analog to digital converters: Necessity, different methods, staircase ramp, single slope, dual slope and successive approximation method. performance criteria. A/D converter ICs field of applications
- Digital to analog converters: Necessity, different methods, weighted register, ladder & binary ladder methods. Performance criteria, study of D/A converters ICs, field of applications

## **Chapter–10 Memories**

- Introduction: Characteristics of memory classification – Random access and sequential access memories, Read-Write and Read-Only memories, Volatile and Non-Volatile memories, Static and dynamic memory, magnetic core and semiconductor memory.
- Magnetic memory
- Semiconductor memory- Requirements and their types ROMs & RAMs, semiconductor RAMs storage cells, bipolar cells, static bipolar RAM and Static CMOS RAMs, MOS dynamic RAMs, Three state RAMs semiconductor RAMs –Mask programmable and erasable RAMs, EPROMs, EEPROM, Dot – matrix ROM
- Memory system reliability MTBF and Error detection using parity, charge coupled device & Magnetic bubbles study of 2716, 7481 and 701141 ICs

## **Chapter–11 Arithmetic Logic Unit**

- Introduction
- Adders – Half and full adders, series and parallel binary adders.
- Subtractors – Half and full subtractor
- Full adders / Full subtractor 1's and 2's complement adders, subtractor, shift operations, multiplication and division
- Full adders, BCD adders and BCD subtractors using 7483 IC
- Study of ALU ICs – 74181, 74381, 74481 and 4057

**(I) SUGGESTED SPECIFICATION TABLE OF MARKS & HOURS DISTRIBUTION:**

**Legends:** K=Knowledge level, C= Comprehension Level, A=Application level

Chapter No.	Chapter Title	Hours	Marks			
			K	C	A	Total Marks
1	Introduction to Digital Techniques	2	2	2	-	4
2	Digital Codes	4	4	1	-	5
3	Logic Gates	4	4	2	4	10
4	Logic Design	4	4	2	4	10
5	Digital Systems	4	6	2	2	10
6	Encoders / Multiplexers	4	2	2	2	6
7	Decoders / Demultiplexers	4	2	2	2	6
8	Code Converters	4	2	2	2	6
9	Data Converters	6	4	2	-	6
10	Memories	6	4	4	-	8
11	Arithmetic Logic Unit	6	2	2	-	4
<b>Total</b>		<b>48</b>				<b>75</b>

**NOTE:** For the entire course, 16hrs of tutorial has been allotted to be used effectively to justify the need of the students and importance of the specific topics.

**(J) SUGGESTED IMPLEMENTATION STRATEGIES:**

The implementation strategy to teach this course should be a good mix of the various teaching methods like lecture, question answer, assignment and lab. work. More drill and practice of numericals will be useful. Home and classroom assignments would prove more useful to develop the analytical skills.

**(K) SUGGESTED LEARNING RESOURCES:**

5. Textbooks mentioned in the references
6. Laboratory manuals
7. Periodicals like, news magazines, journals etc.

**(L) SUGGESTED PRACTICAL EXPERIENCES (Marks – 50)**

Depending upon the time available, of the following list, two or three experiences could be undertaken in one laboratory session.

- a) Assemble basic logic gates using diodes and BJT's and verify truth table.
- b) Assemble universal logic gates using BJT's and verify truth table.
- c) Construct & test a circuit to analyse the performance of NOR gate as universal gate.
- d) Assemble & test a circuit to analyse the performance of NAND gate as universal gate.
- e) Verify De Morgan's theorems.
- f) Assemble & test circuits to discover reduction using Karnaugh Map.
- g) Verify the truth table of R-S flip flop & clocked R-S flip flop.

- h) Verify the truth table of IC J-K M-S flip flop.
- i) Construct a J-K M-S flip flop circuit using NAND gates & verify it's truth table.
- j) Investigate the conversion of J-K flip flop to T & D type flip flop.
- k) Investigate the performance of 4-bit ripple counter using IC 7476.
- l) Investigate the performance of IC 7490.
- m) Construct a ring counter & test the circuit.
- n) Assemble a circuit & analyse the performance of multiplexing IC's.
- o) Assemble a circuit & analyse the performance of demultiplexing IC's.
- p) Design a display circuit using BCD to seven segment drivers IC's.

**(M) SUGGESTED REFERENCES**

S. No.	Title	Author/ Publisher/Edition/Year
1	Digital computer fundamentals	Barli, Tata McGraw-Hill; New Delhi, 6 <sup>th</sup> , 1995
2	Digital Electronics	Bignell, James & Donovan Robert; Delmar, Thomson Learning, Singapore, <a href="http://www.delmar.com">www.delmar.com</a> , 1 <sup>st</sup> . 2000
3	Modern Digital Electronics	Jain, R.P.; Tata McGraw-Hill, New Delhi, 2 <sup>nd</sup> , 2000
4	Digital Electronics Practical	Jain, R.P.; Tata McGraw-Hill, New Delhi, 1 <sup>st</sup> , 1999
5	Digital Principles and Application	Malvino & Leach, Tata McGraw-Hill; New Delhi, 4 <sup>th</sup> , 1996
6	Digital Principles	Malvino, Tata McGraw-Hill; New Delhi, latest
7	Digital Circuits	Nowicki, J.R.; Edward Arnold, London, 1 <sup>st</sup> , 1990
8	Laboratory Manual and Teacher Guide in Digital Electronics	TTTI, Bhopal and DTE, Goa, 1 <sup>st</sup> , 2001

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- (A) **COURSE TITLE AND CODE** : **ELECTRONICS MEASUREMENT & MEASURING INSTRUMENTS (ECE-404)**
- (B) **LEVEL** : **FOUR**
- (C) **BRANCH/DISCIPLINE** : **ELECTRONICS & COMMUNICATION ENGINEERING**
- (D) **RATIONALE** :

Measurement provides us with a means of describing various phenomena in quantitative terms and plays an important role in all branches of engineering and science. This course intends to teach the students facts, concepts, principles and procedure of analog and digital electronic measuring instrument and the measurement techniques for the measurement of various electrical quantities, so that he can use this knowledge in acquiring supervision skills, prototype testing and investigation skills which in turn, will help to discharge his role as a supervisor in all technology areas and to assist in carrying out the investigation work and R&D.

- (E) **TEACHING AND EXAMINATION SCHEME:**

Sl. No.	Course Code	Name of Course	Teaching Scheme					Examination Scheme				Total Marks
			Pre-requisite	L	T	P	C	Theory		Practical		
								ET	PA	ET	PA	
1.	EC-404	Electronic Measurements & Measuring Instruments		3	1	2	6	75	25	50	25	175

- (F) **DETAILED COURSE CONTENTS:**

**Chapter – 1 Concepts of Electronic Measurement**

- Necessity of electronic measurements
- Block diagram of electronic measuring system
- Various types of electronic instruments
- Methods of measurements
- Basic characteristics of measuring devices
  - Accuracy
  - Precision
  - Error

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- a) Intrinsic, absolute and relative error
  - b) Uncertainty and random error
  - c) Systematic and instrumental error
  - d) Interference error
  - e) Installation errors (application errors)
  - f) Operational errors (human errors)
  - g) Zero drift
  - h) Error due to sensitivity changes
  - i) Statistical errors
  - j) Weighting of errors
  - Linearity
  - Hysteresis
  - Threshold
  - Repeatability
  - Reliability and maintainability
  - Span
  - Dynamic accuracy
  - Response time
  - a) First-order system
  - b) Second-order system
  - Calibration

## **Chapter – 2 Standards and units of measurement**

- Standards of measurement
  - Classification of standards
  - Standards for mass, length, volume
  - Standards for time, frequency
  - Electrical standards (ampere, resistance, voltage, capacitance, inductance)
  - Standards of temperature and luminous intensity
  - IEEE standards
  - IS
- Units of measurement
  - Systems of units
  - Electric and magnetic units
  - Conversion of units

## **Chapter – 3 Analog Instruments: Voltage, Current, Impedance & Power Measurement**

- Multimeter
- Electronic voltmeters
- Transistorized voltmeters
- DC voltmeter with direct couple amplifier
- AC voltmeters using rectifier and amplifier combinations
- Consideration in choosing an analog voltmeter
- Differential voltmeter
- Use of AC probes
- RF power meter
- LCR meter



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- Q-meter

**Chapter – 4 Other Important Analog Instruments**

- Signal generators: Sine wave, square wave, pulse, function generators, sweep frequency generators
- Signal analysers: wave, thermal, distortion, spectrum & logic analysers
- Oscilloscope: single and double beam, dual trace, storage CROs, curve tracer
- Amplifier Measurements: Input and output impedance measurements, signal to noise ratio and noise figure measurements, square wave testing of an amplifier, swept frequency measurement of an amplifier
- IC tester, transistor tester

**Chapter – 5 Digital Instruments**

- Digital voltmeter
- Digital single and dual trace CROs
- Digital storage oscilloscope
- Digital IC tester
- Advantages & disadvantages of digital instruments
- Comparison between analog and digital instruments
- D-A and A-D conversion
- Principles of digital voltmeters
- Frequency counter

**Chapter – 6 Measurement of Frequency**

- Standard frequency wave absorption meters
- Heterodyne meter
- Frequency measurement by CRO

**Chapter – 7 Waveform Measurement**

- Oscillographic representation of waveforms
- Time interval measurement
- Measurement of phase

**Chapter – 8 Transducers**

- Classification of transducers
- Strain gauges
- Displacement transducers
- Linear variable - differential transformer (LVDT)
- Photo electric transducers
- Temperature measurements
- Thermocouples
- Photosensitive devices
- Nuclear radiation detection instruments

**Chapter – 9 Displays and Recorders**

- Displays

- Analog indicators/displays
- Digital indicators/displays
  - a) Cold cathode displays
  - b) Fluorescent displays
  - c) Light emitting diodes
  - d) Liquid crystal displays
  - e) Alpha-numeric display
- Recorders
  - Graphic recorder
  - Optical oscillograph
  - x-y recorder
  - Magnetic recorder
  - Printer
  - Plotter

**(G) SUGGESTED SPECIFICATION TABLE OF MARKS & HOURS DISTRIBUTION**

**Legends:** K=Knowledge level, C= Comprehension Level, A=Application level

Chapter No.	Chapter Title	Hours	Marks			
			K	C	A	Total Marks
1	Basic Concepts of Electronic Measurements	6	4	2	2	8
2	Standards and units of measurement	3	2	1	2	5
3	Analog Instruments: Measurement of Voltage, Current , Impedance and Power	6	2	2	6	10
4	Other Important Analog Instruments	9	4	4	8	16
5	Digital Instruments	6	4	2	4	10
6	Measurement of Frequency	3	-	2	2	4
7	Waveform Measurement	3	-	2	2	4
8	Transducers	8	2	4	6	12
9	Displays and Recorders	4	4	-	2	6
<b>Total</b>		<b>48</b>				<b>75</b>

**NOTE:** For the entire course, 16hrs of tutorial has been allotted to be used effectively to justify the need of the students and importance of the specific topics.

**(H) SUGGESTED IMPLEMENTATION STRATEGIES**

The implementation strategy to teach this course should be a good mix of the various teaching methods like lecture, question-answer, assignment and lab. work. More drill and practice in the laboratory would prove more useful to develop the measurement skills.

**(I) SUGGESTED LEARNING RESOURCES**

8. Textbooks mentioned in the references.
9. Laboratory manuals
10. Laboratory sheet, workbook etc.

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**(J) SUGGESTED PRACTICAL EXPERIENCES (Marks –50)**

- a) Measurement of voltage by an ordinary voltmeter and also by an FET voltmeter and hence to establish the supremacy of an electronic voltmeter.
- b) Measurement of L, C and R using impedance measuring bridge (LCR bridge) and digital LCR meter.
- c) Measurement of ‘Q’ of a coil by Q meter at different frequencies.
- d) Measurement of co-efficient of coupling between two coils using ‘Q’ meter.
- e) Measurement of frequency by time division and lissajous figure method using CRO.
- f) Measurement of depth of modulation using CRO.
- g) Measurement of frequency of wave absorption meter or heterodyne meter.
- h) Measurement of A.F. power by a power meter.
- i) Measurement of strain with various available strain gauges.
- j) Measure the temperature of a furnace with the help of pyrometer.
- k) Measurement of force using a load cell.
- l) Measurement of temperature using thermocouple.

**(K) SUGGESTED REFERENCES**

S. No.	Title	Author/ Publisher/Edition/Year
9	Instrumentation for Engineering Measurements	Cerni & Foster; Tata McGraw Hill, New Delhi, Latest
10	Electronic instrumentation & measurement techniques	Cooper, W.D. & Helfrick, A.D., New Delhi: Prentice Hall of India, Latest
11	Instrumentation for Engineering Measurements	Dally, J.W. et al; John Wiley & Sons, New York, Latest
12	Instrumentation, Measurement & Feedback	Jones; McGraw Hill, New York, 1 <sup>st</sup> , 1994
13	Electronic Instrumentation	Malvino; Tata McGraw Hill, New Delhi, Latest
14	Electrical & electronic measurement & instruments	Rambhadran, S,;Delhi: Khanna Publishers, 1 <sup>st</sup> , 1994
15	Electronic Measurements & Instrumentation	Rao & Sutrave; Nirali Prakashan, Pune, Latest
16	A course in electrical & electronic measurements and instrumentation	Sawhney, A.K., Delhi: Dhanpat rai & sons, Latest
17	Electrical measurements & measuring instruments	Suryanarayana, New Delhi, Tata McGraw Hill, 1 <sup>st</sup> , 1994

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- (A) **COURSE TITLE AND CODE** : **ELECTRONICS WORKSHOP PRACTISE (ECE-408)**
- (B) **LEVEL** : **FOUR**
- (C) **BRANCH/DISCIPLINE** : **ELECTRONICS & COMMUNICATION ENGINEERING**
- (D) **RATIONALE** :

This course is intended to help the students to understand facts, concepts and techniques of manufacturing of various items used in electronic industries. This course envisages to develop practical skills in students for using tools, accessories, equipment etc. properly. It will also make the students familiar with the measuring techniques used in electrical/electronics systems. The student will also be able to implement, test electronics circuits on breadboard and prepare PCB. This course is also intended to develop skills of soldering, fabrication of small chassis, transformer winding, preparation of P.C.B. from artwork and assembly of units. These skills are required to develop prototype designs, maintenance and for troubleshooting in the industry. This course will also provide necessary knowledge & skills for the project work in third year of this diploma programme.

- (E) **TEACHING AND EXAMINATION SCHEME:**

Sl. No.	Course Code	Name of Course	Teaching Scheme					Examination Scheme				Total Marks
			Pre-requisite	L	T	P	C	Theory		Practical		
								ET	PA	ET	PA	
1.	EC-409	Electronic Workshop Practice		-	-	6	6	-	-	50	50	100

- (F) **DETAILED COURSE CONTENTS:**

**Chapter – 1 Electronic Components Identification**

- Identification & comparison of the following components:
  - Resistors (carbon, wire wound and metal film), potentiometer
  - Capacitors (electrolytic, ceramic, mica, silver mica, paper, polystyrene, metalized polystyrenes)
  - Active devices (transistor, diode and IC's)

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## **Chapter – 2 Soldering**

- Solder materials fluxes and soldering iron
- Method of soldering
- Defects in soldering and precautions
- Extensive practice in component soldering and earthing
- Familiarization of different types of soldering irons, mains operated, battery operated, high and low leakage, adjustable bit types
- Different grades of soldering materials
- Precautionary measures for soldering semiconductors and ICs

## **Chapter – 3 PCB TESTING**

- Designing the Printed Circuit Board (PCB) layout for simple electronic circuit
- Making of PCB, given the artwork
- Fitting of components
- Completing the above circuit
- Testing the circuit and corrections if any for proper functioning

## **Chapter – 4 CABLES & CONNECTORS**

- Various types of cables:  
Co-axial cable, Twisted pair cable, Flat ribbon cable, Fibre optic cable
- Identification and use of various types of connectors:  
BNC connector, Banana connector, Crocodile connector, Male and female D type connector, Flat cable connector, Printed circuit connector, UTP connector

## **Chapter – 5 Other Accessories and Instruments**

- Tools and accessories used in manufacturing of electronic circuits.
  - Different types of cutters, Nose pliers, Wire strippers, Screw drivers, Lead strengtheners, Extractors,
  - Soldering station ,Desoldering pump
- Functions, setting and use of Display devices/ indicators and recorder in Panels
- Setting and use of Common Measuring Instruments and equipments used in electronic applications : Multimeter, AC voltmeter, AC and DC ammeter, LCR meter, Regulated power supply, CRO, Function Generator

## **Chapter – 6 Assembling of Simple Electronic Circuits**

- Assembly and testing of few simple circuits like
  - Battery eliminator,
  - IC regulator circuits,
  - IC timer circuit,
  - IC operational amplifier circuit.

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**(G) SPECIFICATION TABLE OF DISTRIBUTION OF PRACTICAL HOURS**

<b>Chapter No.</b>	<b>Name of Chapter</b>	<b>Practical Hours</b>	<b>Total Marks</b>
1	Electronic Components Identification	6	4
2	Soldering	20	8
3	PCB Testing	18	10
4	Cables & Connectors	10	8
5	Other Accessories and Instruments	24	12
6	Assembling of Simple Electronics Circuits	18	8
	<b>Total</b>	<b>96</b>	<b>50</b>

**(H) IMPLEMENTATION STRATEGIES**

Before the start of practical, every instructor will give:

- Demonstration of basic tools, equipment marking and measuring instruments etc.
- Demonstration of various operations to be performed sequentially.
- Explanation of the method of selection of materials (types, quality, quantity, size etc.)
- Sufficient practice in handling various tools/equipment.
- Sufficient practice of various operations.
- Procedure to develop safety awareness on shop floor.

**(I) LEARNING RESOURCES SUGGESTED TO BE USED**

11. Textbooks mentioned in the references.
12. Periodicals like magazines, journals on electronics etc.

**(J) SUGGESTED LIST OF EXPERIENCES – (Marks –50)**

- a) Identification and use of different tools and accessories used in manufacturing of electronic circuits.
  - Different types of cutters
  - Nose pliers
  - Wire strippers
  - Screw drivers
  - Lead strengtheners
  - Extractors
  - Soldering iron
  - Desoldering pump
  - Crimping tool
- b) Use of regulated power supply. Front panel controls and their functions.
- c) Use of DC and AC voltmeter and ammeter to measure DC and AC voltage current.
- d) Use of analog multi-meter to measure.
  - AC and DC voltage
  - AC and DC current
  - Different resistor
  - Continuity testing

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- e) Use of digital multi meter to measure:
    - AC and DC voltage
    - AC and DC current
    - Different resistor
    - Continuity testing
  - f) Use of different switches
    - Toggle switches – SPST, SPDT, DPST, DPDT
    - Thumb-wheel switches
    - Rotary switches
    - Push on/Push off switches
    - Keyboard switches – mechanical, capacitive, membrane
    - DIP switches
  - g) Use of different display devices
    - LED display
    - Seven segment display
    - LCD display
  - h) Prepare computer network cable (use different type of cable and connector)
  - i) Use of breadboards to implement simple electronic circuits using resistors/capacitors/diodes/transistors/switches/display devices.
  - j) Prepare two simple electronic circuits using general purpose PCBs.
  - k) Prepare two PCBs for simple electronic circuits.
  - l) Circuit assembly on breadboards and PCBs (rectifiers, oscillators, amplifiers).
  - m) Assembly of battery eliminator, IC regulator circuits, IC timer, IC operational amplifier circuit.
  - n) Make a panel for a given circuit.
  - o) Connect the instruments and the devices for a circuit on a panel.

**(K) REFERENCE BOOKS**

<b>S. No.</b>	<b>Title</b>	<b>Author/ Publisher/Edition/Year</b>
1	Printed circuit board. Design & technology	William Bosschart, Tata McGraw Hill, New Delhi, Latest
2	Electronic Drafting & Drawing.	Y.I. Shah, Jeevandeep Prakashan, Ramdeet, Mumbai, Latest
3	Basic Electronics & Linear circuits	Bhargava & Gupta, Tata McGraw Hill; New Delhi, Latest
4	Practical Semiconductor Data manuals.	BPB Publications; New Delhi, 1 <sup>st</sup> , 1997
5	Transistor selector data manual	Towers International, BPB Publications; New Delhi, 1 <sup>st</sup> , 1990
6	Laboratory Manual and Teacher Guide in Basic Electronics	TTTTI, Bhopal and DTE, Goa, 1 <sup>st</sup> , 2001

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- (A) **COURSE TITLE AND CODE** : **MICROPROCESSOR 8085 (ECE-502)**  
 (B) **LEVEL** : **FIVE**  
 (C) **BRANCH/DISCIPLINE** : **ELECTRONICS & COMMUNICATION  
ENGINEERING**

- (D) **RATIONALE** :

This course under the applied technology group is intended to help the students to understand principle of working of microprocessors and their applications so that he/she can use the knowledge and skills to apply them in new related situations.

- (E) **TEACHING AND EXAMINATION SCHEME:**

Sl. No.	Course Code	Name of Course	Teaching Scheme					Examination Scheme				Total Marks
			Pre-requisite	L	T	P	C	Theory		Practical		
								ET	PA	ET	PA	
1.	EC-408	Microprocessor 8085		3	1	2	6	75	25	50	25	175

- (F) **DETAILED COURSE CONTENTS:**

**Chapter – 1 Introduction to Microprocessor**

- Hardware concepts
- Software concepts

**Chapter – 2 Microprocessor 8085**

- Architecture of 8085 – Address bus, data bus, control bus, ALU, Registers, control logic etc.
- Operation – Microprocessor initiated, internal data, memory Read/Write, I/O Read/Write
- Timing Cycle

**Chapter – 3 Programming 8085 Microprocessor**

- Data transfer instruction
- Arithmetic and logic operation
- Branch operation
- Writing assembly language programs and debugging
- Looping, counting, indexing
- Additional data transfer and 16 bit Arithmetic instructions
- Arithmetic operation (memory related)
- Rotate, compare
- Counters and time delays – Illustrative programs
- Stack and subroutines – conditional call and return instructions
- Code conversion, BCD arithmetic and 16 bit data operations



- Assemblers

#### Chapter – 4 Interfacing Peripherals

- Parallel I/O & interfacing applications
- Interrupts
- Interfacing data converters – D/A , A/D converters
- Programmable I/O chips 8155 / 8156, 8355 / 8755
- Programmable keyboard / display interface 8279
- General purpose programmable peripheral devices – 8255 , 8253, 8259, 8257
- Serial I/O and data communication

#### Chapter – 5 Microprocessor-Based Systems

- Single board 8085-microprocessor kit development
- Microprocessor based stepper motor control
- Temperature controllers
- Liquid level controllers

### (G) SUGGESTED SPECIFICATION TABLE OF MARKS & HOURS DISTRIBUTION:

**Legends:** K=Knowledge level, C= Comprehension Level, A=Application level

Chapter No.	Chapter Title	Hours	Marks			
			K	C	A	Total Marks
10	Introduction To Microprocessor	4	4	3	-	7
11	Microprocessor 8085	16	5	7	8	20
12	Programming 8085 Microprocessor	16	3	5	8	16
13	Interfacing Peripherals	18	5	3	12	20
14	Microprocessor-based Systems	10	4	3	5	12
<b>Total</b>		<b>64</b>				<b>75</b>

**NOTE:** For the entire course, 16hrs of tutorial has been allotted to be used effectively to justify the need of the students and importance of the specific topics.

### (H) SUGGESTED IMPLEMENTATION STRATEGIES:

- Lecture session with question and answer
- Use of audio visual aids
- Assignments on various topics.

Moreover, when teaching this course, drill and practice on programming exercises have to given as classroom and home assignments.

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**(I) SUGGESTED LEARNING RESOURCES:**

13. Textbooks mentioned in the references.
14. Laboratory manuals, work book etc.
15. Technical magazines, etc.
16. OHP transparencies

**(J) SUGGESTED PRACTICAL EXPERIENCES – (Marks –50);**

- a) Develop Assembly language programming for the following problems.
  - One's complement.
  - Shift left.
  - Bit addition of two numbers.
  - 16-bit addition of two numbers.
  - Bit subtraction.
  - Bit multiplication.
  - Binary division.
  - Find largest number.
  - Find smallest number.
  - Data transfer.
  - Arranging numbers in ascending / descending order.
- b) Interface IC 8155 with microprocessors for simple application problems
- c) Interface IC 8279 with microprocessors for simple application problems
- d) Interface IC 8255 with microprocessors for simple application problems
- e) Interface IC 8257 with microprocessors for simple application problems
- f) Develop relevant programmes for microprocessor-based temperature and level control systems

**(K) SUGGESTED REFERENCES**

S.No.	Title	Author & Publisher/Edition/Year
1.	Microprocessor	Douglas Hall/ Prentice Hall, New York, Latest
2.	Microprocessor Architecture	Gaonkar/ Wiley Eastern, New Delhi, 1 <sup>st</sup> , 1989
3.	Microprocessor	Gaonkar/ Wiley Eastern, New Delhi, 1 <sup>st</sup> , 1993
4.	8086 / 8088 family architecture programming and design	Gibson and Lice/ Prentice Hall, New York, Latest
5.	Introduction to microprocessors	Laventhal/ Prentice Hall, New Delhi, Latest
6.	Introduction to microprocessor	Mathur/ Tata McGraw Hill, New Delhi, 1 <sup>st</sup> , 1990
7.	8086 / 8088 family design programming and interfacing	Uffenbeck/ Prentice Hall, New York, Latest

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