GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA IN ELECTRONICS AND COMMUNICATION ENGINEERING

TEACHING SCHEME (w.e.f. 18th July '2011)

SEMESTER- V

SR. NO	SUB. CODE	SUBJECT	TEACHING SCHEME (HOURS)			CREDITS
			THEORY	TUTORIAL	PRACTICAL	
1	2351101	Micro Controller & Embedded Systems	4	0	4	8
2	2351102	Fiber Optic Communication	4	0	2	6
3	2351103	Microwave Engineering	4	0	2	6
4	2351104	Telecommunication Techniques & Application	4	0	0	4
5	2351105	PCB Designing Tools	0	0	2	2
6	2351106	Project - I	0	0	4	4
		Total	**16**	**0**	**14**	**30**

GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA IN ELECTRONICS AND COMMUNICATION ENGINEERING

Semester – V

Subject Code **: 2351101**

Subject Name **: Micro Controller & Embedded Systems**

Sr. No.	Subject Content	Hrs.
1.	**Evolution of Microcontrollers:** a. Digital System Organisation b. Interfacing other Logic Families c. Microcontroller Architectures d. Data Transfer Schemes e. Microcontroller Based Systems f. Packaging Information g. Microcontroller Families h. The Preceders	**6**
2.	**Introduction to Microcontroller Families:** a. 8051 Family architecture, features and capabilities b. Reset & Clock circuit c. I/O Ports & Characteristics d. Counter & Timers e. Seial Communication f. Interrupt Handling g. External Memory interfacing h. High Speed Derivatives of 8051 family i. AT89C52	**6**
3.	**Introduction to Assembly Language Programming:(only 8051)** a. Software Development b. Assembly Language Programming c. Assembler Directives d. Instruction Set e. Programming Examples f. C-Cross Compiler	**20**
4.	**Advanced Programming Techniques(Conceptual limited up to Flow charts)** a. Code Converters b. Array Handling & Testing Process Maturity Models c. Counters And Delays d. Sample programs for looping, counting and indexing	**6**

5.	**External Peripheral Devices:** a. Sensors(Temperature, Level, Tilt, RH, Pressure, Hall effect, PIR, Strainguage) b. Input Devices o DIP Switch o Thumbwheel switch o Tactile switch o ADC0804 o DAC 0808 c. Output Devices (Relay ,Solenoid valve,7 segment Display, LCD d. Block diagram for analog interfacing Design (Sensor to Actuator) e. Interfacing of RTC12887	**12**
6.	**Advance RISC Machines:** a. Introduction to ARM b. ARM architecture c. ARM based MCUs d. ARM/THUMB programming model e. PIC controller: introduction and features of PIC18F4431 f. ADμC-842	**6**
	Total	**56**

The sample experiments to be performed included, but are not limited to the following:

1. Building oscillator circuits for 8051.
2. Building reset circuits for 8051.
3. Internal Architecture of 8051.
4. Interrupt mechanism of 8051.
5. Connecting external memory circuits.
6. Assembly programs for various operations .
7. Interfacing LED display.
8. Interfacing to sensor.
9. Interfacing hex keypad.
10. Interfacing LCD display.
11. Interfacing of relay.
12. Interfacing of stepper motor.
13. Interfacing of 8255, 8279 & 8251.
14. Practice of Downloading Program For Execution
15. Program for complex Boolean application.

Reference Books:

1. 8051 Microcontrollers MCS Family and Its variants - Satish Shah , Oxford University Press.
2. Microcontrollers: Architecture, Programming, Interfacing and System Design, Raj Kamal, Pearson.
3. The 8051 Microcontroller and Embedded Systems Using Assembly and C -Mazidi, Mazidi and McKinlay, Pearson.
4. The 8051 Micro controller Architecture, Programming and Applications, K. J. Ayala, Penram.
5. 8051 Microcontroller & Embedded System Sampath K. Venkatesh Katson.

GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA IN ELECTRONICS AND COMMUNICATION ENGINEERING

Semester – V

Subject Code **: 2351102**

Subject Name **: Fiber Optic Communication**

Sr. No.	Subject Content	Hrs.
1.	**Principles of Optical Ray Transmission:** 1.1 Elementary fiber optic communication system 1.2 Advantages of fiber optic communication 1.3 Basic optical laws: reflection, Snell's law, refraction, critical angle 1.4 Optical waveguide: Basic structure, launching and propagation of optical ray in the waveguide, acceptance angle, numerical aperture, modes of propagation 1.5 Refractive index profiles, single-mode and multi-mode step index fiber, graded index fiber 1.6 Losses in fiber: absorption, scattering, bending 1.7 Signal distortions in fiber	**10**
2.	**Optical Fibers and Cables:** 2.1 Fiber materials: glass, Halide, Active glass, Chalgenide, plastic 2.2 Fiber fabrication: double crucible method, plasma-activated chemical vapour deposition 2.3 Structure of a typical fiber cable 2.4 Joining of fibres: alignment, fusion splicing, mechanical splicing 2.5 Cylindrical ferrule connector, GRIN-rod lens, expanded beam connector	**8**
3.	**Optical Sources and Detectors:** 3.1 Characteristics of an ideal optical source 3.2 Light emitting diodes: heterojunction structure, surface emitting LED, edge emitting LED 3.3 Semiconductor LASER Diode: construction and operation 3.4 Comparision of LED and LASER 3.5 Source to fibre coupling 3.6 Characteristics of an ideal optical detector 3.7 PIN Diode 3.8 Avalanche photo diode 3.9 Photo transistor 3.10 Coupling of fibres to detectors	**10**

4.	**Optical Components:** 4.1 Optical amplifiers: semiconductor laser amplifier, fiber amplifier 4.2 Optical couplers and isolators 4.3 Optical switches 4.4 Beam splitter 4.5 Optic multiplexer and demultiplexer 4.6 Optical wavelength convertor 4.7 Bragg grating 4.8 MEMS mirrors and MEMS switches	**10**
5.	**Optical Communication Systems:** 5.1 LED modulation: analog, digital 5.2 LASER modulation: analog, digital 5.3 Optical receiver block diagram 5.4 Common source FET preamplifier 5.5 Regenerative repeater 5.6 Optical heterodyne detection 5.7 Time divison multiplexing in optical domain 5.8 Frequency divison multiplexing in optical domain	**8**
6.	**Fibre Optic Measurements:** 6.1 Performance measurement parameters for a typical optical link 6.2 Optical power meter 6.3 Optical attenuator 6.4 Tunable LASER source 6.5 Optical spectrum analyzer 6.6 Optical time domain reflectometer 6.7 Attenuation measurement: cutback technique, insertion-loss method 6.8 Intermodal dispersion measurement in time domain 6.9 Refractive index profile measurement using nearfield scanning method, numeric aperture measurement usung scanning photodetector.	**10**
	Total	**56**

The sample experiments to be performed include, but are not limited to the following.

1. Study of Optical fiber cable
2. Study of splicing and joining of fibers
3. To find N.A. of optical fiber
4. Characteristics of LED
5. Characteristics of LASER Diode
6. Study of losses
7. Characteristics of phototransistor
8. Characteristics of PIN photo diode
9. Characteristics of APD photo diode

10. To build and test LED and LASER drive circuits
11. Study of Optical transmitter
12. Study of Optical receiver
13. Measurement of optical attenuation
14. Measurement of dispersion
15. Study of optical time domain reflectometer
16. Study of tunable LASER source
17. Study of optical spectrum analyzer

References Books:

1. Optical Fiber Communications: Principles and Practices, J. M. Senior.
2. Optical Fiber Communications, Gerd Keiser.
3. Fiber Optic Communications, J. C. Palais.
4. Fiber Optics abd Optoelectronics, R. P. Khare.

GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA IN ELECTRONICS AND COMMUNICATION ENGINEERING

Semester – V

Subject Code **: 2351103**
Subject Name **: Microwave Engineering**

Sr. No.	Subject Content	Hrs.
1.	**Microwaves and Propagation:** 1.1 Microwaves: frequency spectrum, bands, advantages of microwave communication 1.2 Transmission line: lumped parameter representation, lossless open and short circuited line. 1.3 Standing wave pattern, standing wave ratio, reflection coefficient. 1.4 Impedance matching: single stub matching, double stub matching. 1.5 Wave propagation in guide: reflection of waves, zigzag path, phase velocity, group velocity. 1.6 Rectangular waveguides: structure, cut-off wavelength, TE and TM modes, field patterns. 1.7 Circular waveguides: structure, cut-off wavelength, TE and TM modes, field patterns, comparison with rectangular waveguide.	**6**
2.	**Microwave Components:** 2.1 S parameters of a two port network. 2.2 Waveguide Tees and bends: E-plane Tee, H-plane Tee, Magic Tee, E-plane bend, H-plane bend. 2.3 Hybrid ring 2.4 Directional couplers. 2.5 Isolators and circulators: principle, structure, operation and applications 2.6 Cavity Resonators: operation, types of cavity, applications, coupling and tuning of cavities. 2.7 Stripeline and microstrip circuits.	**14**
3.	**Microwave Tube Oscillators and Amplifiers:** 3.1 Frequency limitations of vacuum tubes 3.2 Multicavity klystron: operation, klystron amplifier, oscillator and applications 3.3 Reflex klystron: operation Transit times and applications 3.4 Magnetrones: construction, field interaction, frequency pulling and pushing, applications 3.5 Traveling wave tubes : Construction, operation, applications 3.6 Backward wave oscillators	**8**

4.	**Semiconductor Microwave Devices:** 4.1 Limitations of transistor at high frequencies. 4.2 Varactor diode: construction and operation. 4.3 Parametric amplifier: principles, process of amplification. 4.4 Gunn diodes: Gunn effect, characteristic, oscillator, amplifier and applications 4.5 Construction and operation of avalanche transit time devices:PIN, IMPATT and TRAPATT diodes. 4.6 High electron mobility transistors: structure, operation and applications 4.7 Fundamentals of Masers, Ruby maser, solid state maser.	**6**
5.	**Microwaves Measurement:** 5.1 Measurement of Power: bolometer method, caloriemeter method 5.2 Frequency and wavelength measurement 5.3 Attenuation Measurement 5.4 VSWR Measurement 5.5 Measurement of Q by transmission	**8**
6.	**Radar Systems:** 6.1 Basic Principles. 6.2 Radar range equation, factors influencing maximum range. 6.3 Basic pulse radar system: block diagram and its working. 6.4 Moving target indicator. 6.5 Doppler Radar. 6.6 Frequency modulated CW radar.	**8**
7.	**Satellite Communications Systems:** 7.1 Microwave link. 7.2 Synchronous and non-synchronous satellite. 7.3 Earth stations: block diagram and classification. 7.4 Satellite space craft sub-systems: Attitude and orbit control system, telemetry tracking and command, power system, transponder, space craft antennas. 7.5 Domestic satellite system.	**6**
	Total	**56**

The sample experiments to be performed included, but are not limited to the following:

1. To study different types of Microwave components.
2. To study the gunn power supply and V.S.W.R. meter.
3. To set the microwave bench for optimum operation.
4. To measure the guide wave length and to compute the free space wave length, microwave frequency, characteristic wave impedance of wave guide and the phase velocity.

5. To calibrate the variable attenuator and to plot the attenuation.
6. To measure VSWR for different types of load. (e. g. matched load, horn load and short load).
7. To measure the attenuation of a given attenuator.
8. To study the operation of a directional coupler.
9. To measure the coupling factor and the directivity of a directional coupler.
10. To measure the reflection co-efficient for different types of load.
11. To study the reflex klystron.
12. To measure the microwave frequency with the help of a wave meter.
13. To measure Q of cavity.
14. To study various sub-systems of space craft.

Reference Books:

1. Electronics Communications System -George Kennedy, T.M.H. Pub.
2. Microwave Devices and Circuits -S. Y. Liao, Pearson Pub.
3. Electronics Communications -Sanjeev Gupta, Khann Pub.
4. Introduction to Microwaves -A.H. Wheeler, P.H.I. Pub.
5. Satellite Communications -Timothy Pratt, Johnn Wiley and Sons

GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA IN ELECTRONICS AND COMMUNICATION ENGINEERING

Semester – V

Subject Code **: 2351104**

Subject Name **: Telecommunication Techniques & Application**

Sr. No.	Subject Content	Hrs.
1.	**Introduction:** 1.1 Evolution of Telecommunication 1.2 Simple Telephone communication 1.3 Basics of a switching system 1.4 Major telecommunication networks	**4**
2.	**Electronic Space Division Switching:** 2.1 Stored program control 2.2 Centralized SPC 2.3 Distributed SPC and level 1, 2, 3, processing 2.4 Enhanced Services 2.5 Two stage networks and multistage networks	**8**
3.	**Speech Digitisation and Coding:** 3.1 Merits and demerits of digital speech transmission 3.2 PCM system for speech communication 3.3 Characteristics of speech signals 3.4 Differential pulse code modulation 3.5 Vocoders	**8**
4.	**Time Division Switching:** 4.1 Generalised time division space switch 4.2 Basic time division time switching 4.3 Time multiplexed space switching 4.4 Time multiplexed time switching 4.5 Combination switching 4.6 Three stage combination switching	**8**

5.	**Traffic Engineering:** 5.1 Network traffic pattern on a working day 5.2 Network traffic load and parameters 5.3 Grade of service and blocking probability 5.4 Delay systems	**8**
6.	**Telephone Networks:** 6.1 Subscriber loop system 6.2 Switching hierarchy and routing 6.3 Transmission plan 6.4 Numbering plan 6.5 Charging plan 6.6 Signaling techniques	**8**
7.	**Data Networks:** 7.1 Difference between voice traffic and data traffic 7.2 Switching techniques for data transmission: circuit switching, store and forward switching. 7.3 Local area networks: technologies, advantages, applications 7.4 Metropolitan area network 7.5 Fiber optic network 7.6 ISO OSI refence model: a brief introduction 7.7 Internet working	**8**
8.	**Integrated Services Digital Networks (ISDN):** 8.1 Introduction of ISDN 8.2 Motivation for ISDN 8.3 New services: videotex, E-mail, digital fascimile, teletex, database access 8.4 Network and protocol architecture. 8.5 Transmission channels 8.6 Signalling: user level, network level 8.7 Numbering and addressing 8.8 Interworking 8.9 Expert system in ISDN 8.10 Broadband ISDN	**4**
	Total	**56**

Reference Books:

1. Telecommunication Switching Systems and Networks, T. Viswanathan, PHI.
2. Telecommunications Switching, Traffic and Networks, JE Flood, Pearson.
3. Using ISDN, James Y Bryce, PHI.

GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA IN ELECTRONICS AND COMMUNICATION ENGINEERING

Semester – V

Subject Code **: 2351105**

Subject Name **: PCB Designing Tools**

Sr. No.	Subject Content	Hrs.
1.	**Capture Basics:** 1.1 The Capture work environment 1.2 Starting a project 1.3 Setting up project 1.4 Printing and plotting	**4**
2.	**Creating Designs:** 2.1 Design structure 2.2 Placing, editing, and connecting parts and symbols 2.3 Adding and editing graphics and text 2.4 Changing view of a schematic page 2.5 Creating and editing parts	**8**
3.	**Processing Design:** 3.1 Processing tools 3.2 Preparing to create a netlist 3.3 Creating a netlist 3.4 Creating reports 3.5 Exporting and importing schematic data 3.6 Generating a part	**4**
4.	**Circuit Simulation:** 4.1 Using Capture with PSpice 4.2 Creating a New Simulation Profile 4.3 Setting up the simulation 4.4 Simulating the circuit and observing the simulation results 4.5 Use of the Probe Cursors in PSpice	**8**
5.	**Creating PCB Using Layout:** 5.1 The Layout design environment 5.2 Using Capture with Orcad Layout 5.3 Setting up the board 5.4 Creating and editing obstacles	**4**

	5.5 Creating and editing text 5.6 Placing and editing components 5.7 Routing the board 5.8 Using thermal reliefs and copper pour zones 5.9 Post processing 5.10 Creating and editing footprints	
	Total	**28**

Note:

Students have to prepare circuit schematics and PCB layouts of electronic circuits of complexity varying from resistive network to microcontroller based systems.

References Books:

1. OrCAD Capture User's Guide, Cadence Design Systems, Inc.
2. PSPICE for Basic Circuit Analysis, J. G. Tront , MGH
3. OrCAD Layout User's Guide, Cadence Design Systems, Inc.

GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA IN ELECTRONICS AND COMMUNICATION ENGINEERING

Semester – V

Subject Code **: 2351106**
Subject Name **: Project – I**

GUIDELINES FOR PROJECT :

PROJECT DEFINATION

FROM WHERE YOU CAN SEARCH

- ANY INDUSTRIAL AUTOMIZATION
- ANY INNOVATIVE IDEA TO ENHANCE PRODUCT ACCEPABILITY
- REAL WORLD PROBLEM SOLUTION
- CAN TAKE IDEA FROM NET
- FUTURE EXPANSION OF EXISTING PROJECT FEEDBACK
- ADOPTING INNOVATIVE METHODOLOGY FOR EXISTING PROJECT

STEPS FOR IMPLEMENTATION- MODULAR APPROACH IS ALLOWED

1. EVENT DEFINATION AT MICROLEVEL WITH TIME SCALE & PHYSIBILITY
2. IMPLEMENT EACH EVENT
3. PHYSICAL IMPLEMETATION & TESTING FOR REQUIRED RESULTS
4. MODIFICATION IN IMPLEMETATION IF REQUIRED FOR ANY REASON
5. EMBEDDING OF EVENTS FOR TOTAL SOLUTION
6. PROTOTYPE FORMATION
7. IMPLEMETATION AT REAL ENVIRONMENT
8. PERFORMANCE ANALYSIS

DAY TO DAY DOCUMENTATION, REPORTING &CONTINUOUS EVALUATION FOR DEVELOPMENT IN EACH PHASE OF PROGRESSIVE DEVELOPMENT TIME TO TIME CERTIFIED BY TEACHER INCHARGE OF PROJECT THROUGH PROPER CHANNEL