 MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES																	
COURSE NAME : DIPLOMA IN DIGITAL ELECTRONICS																	
COURSE CODE : DE																	
DURATION OF COURSE : 6 SEMESTERS										WITH EFFECT FROM 2012-13							
SEMESTER : SIXTH										DURATION : 16 WEEKS							
FULL TIME / PART TIME : FULL TIME										SCHEME : G							
SR. NO.	SUBJECT TITLE	Abbreviation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME										SW (17600)
				TH	TU	PR	PAPER HRS.	TH (1)		PR (4)		OR (8)		TW (9)			
								Max	Min	Max	Min	Max	Min	Max	Min		
1	Management \$	MAN	17601	03	--	--	1&½	50#*	20	--	--	--	--	--	--		
2	Advanced Communication Systems	ACS	17656	04	--	02	03	100	40	25#	10	--	--	25@	10	50	
3	Mobile Communication	MCO	17657	03	--	02	03	100	40	--	--	--	--	25@	10		
4	Embedded System β	ESY	17658	03	--	02	03	100	40	50#	20	--	--	25@	10		
5	Elective (Any One)																
	Digital Signal Processing	DSP	17661	03	--	02	03	100	40	--	--	--	--	25@	10		
	Data Communication & Networking	DCN	17662	03	--	02	03	100	40	--	--	--	--	25@	10		
6	Simulation Software β	SSO	17807	--	--	02	--	--	--	--	--	--	--	25@	10		
7	Industrial Project β	IPR	17808	--	--	04	--	--	--	--	--	50#	20	50@	20		
TOTAL				16	--	14	--	450	--	75	--	50	--	175	--		50

Student Contact Hours Per Week: **30 Hrs.**
THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.
Total Marks : **800**
@- Internal Assessment, # - External Assessment, No Theory Examination, \$ - Common to all branches, #* - Online Theory Examination,
β - Common to ET / EJ / EN / EX / IE / EV / IU / ED / EI / MU / IS / IC
Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral, TW- Term Work, SW- Sessional Work.

- Conduct two class tests each of 25 marks for each theory subject. Sum of the total test marks of all subjects is to be converted out of 50 marks as sessional work (SW).
- Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.
- Code number for TH, PR, OR and TW are to be given as suffix 1, 4, 8, 9 respectively to the subject code.

Course Name : All Branches of Diploma in Engineering / Technology

**Course Code : EJ/EN/ET/EX/EV/IC/IE/IS/MU/DE/ME/PG/PT/AE/CE/CS/CR/CO/CM/IF/
EE/EP/CH/CT/PS/CD/ED/EI/CV/FE/IU/MH/MI/TX/TC/FG**

**Semester : Sixth for EJ/EN/ET/EX/EV/IC/IE/IS/MU/DE/ME/PG/PT/AE/CE/CS/CR/
CO/CM/IF/EE/EP/CH/CT/PS/TX/TC/FG and Seventh for MH/MI/CD/ED/EI/
CV/FE/IU**

Subject Title : Management

Subject Code : 17601

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
03	--	--	1&½	50#*	--	--	--	50

NOTE:

- **Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
- **Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).**

Rationale:

Management concepts are universal and it is a multidisciplinary subject. They are equally applicable to different types industries like Manufacturing, Service and Trade as well as different kind of business activities like industry, army, school, hospital, retail shops etc. Also, at the end of diploma course polytechnic students are expected to enter in to the Industrial Environment. This environment is altogether different and new to the students. A proper introduction and understanding of management fundamentals is therefore essential for all these students.

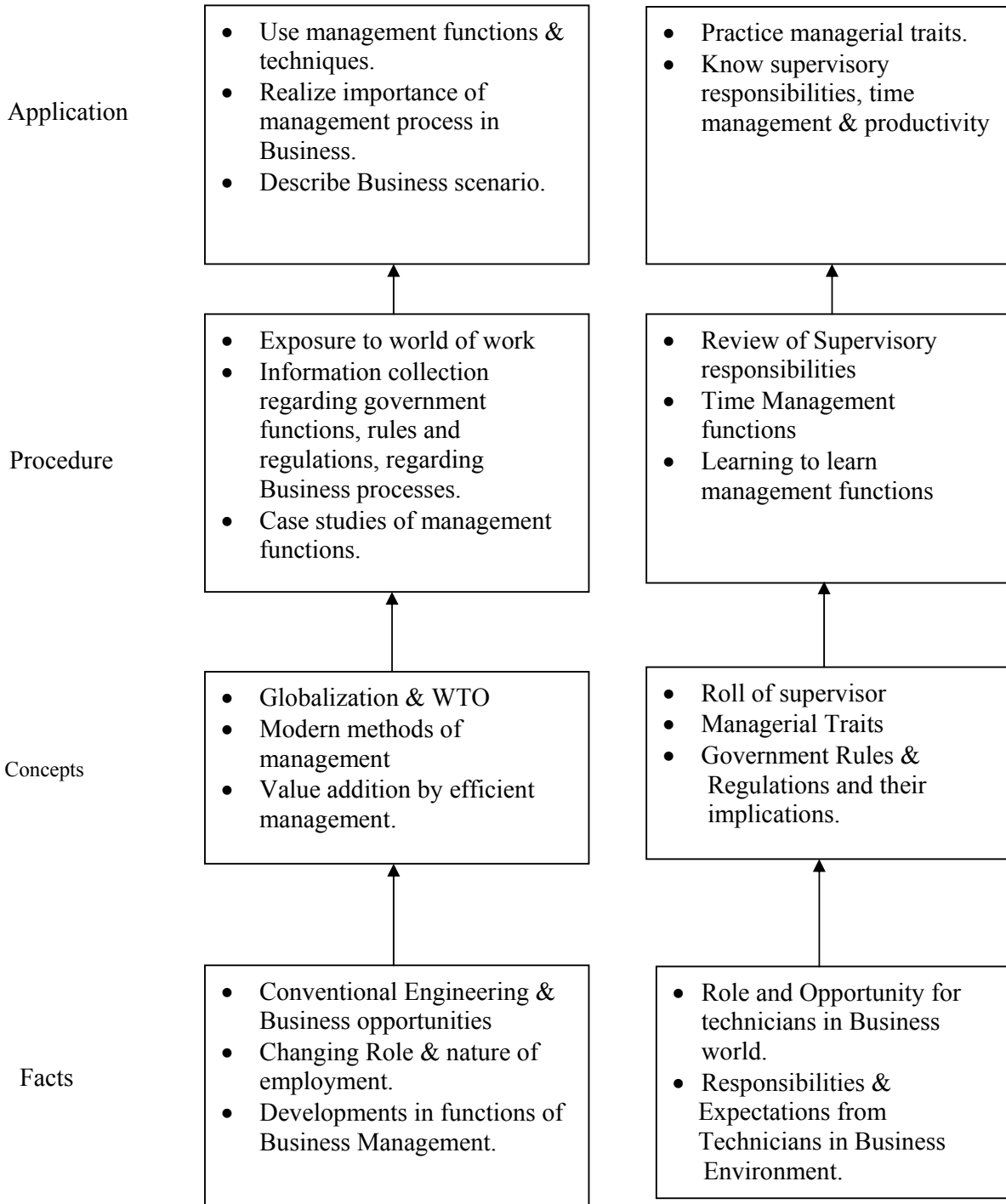
Contents of the this subject will enable the students to address various issues related to human resource, finance, materials, legislations etc. by use of basic principles of management. This will ensure that students will play their role effectively to enhance the quality of business output in total.

Objective:

The students will able to:

1. Get familiarized with environment related to business processes.
2. Know the management aspects of the organisations.
3. Understand Role & Responsibilities of a Diploma engineer.
4. Understand importance of quality improvement techniques.
5. Appreciate need and importance of safety in industries.
6. Understand process of Industrial finance and its management.
7. Know the latest trends in industrial management.

Learning Structure:



Contents: Theory

Topic and Contents	Hours	Marks
<p>Topic 1: Overview of Business</p> <p>Specific Objectives</p> <ul style="list-style-type: none"> ➤ State various business types and sectors ➤ Describe importance of globalisation <p>1.1. Types of Business</p> <ul style="list-style-type: none"> • Service • Manufacturing • Trade <p>1.2. Industrial sectors Introduction to</p> <ul style="list-style-type: none"> • Engineering industry • Process industry • Textile industry • Chemical industry • Agro industry • IT industry • Banking, Insurance, Retail, Hospitality, Health Care <p>1.3 Globalization</p> <ul style="list-style-type: none"> • Introduction • Advantages & disadvantages with respect to India 	02	04
<p>Topic 2: Management Process</p> <p>Specific Objectives</p> <ul style="list-style-type: none"> ➤ State various management principles ➤ Describe different management functions <p>2.1 What is Management?</p> <ul style="list-style-type: none"> • Evolution • Various definitions of management • Concept of management • Levels of management • Administration & management • Scientific management by F.W.Taylor <p>2.2 Principles of Management (14 principles of Henry Fayol)</p> <p>2.3 Functions of Management</p> <ul style="list-style-type: none"> • Planning • Organizing • Directing • Controlling • Decision Making 	08	08
<p>Topic 3: Organisational Management</p> <p>Specific Objectives</p> <ul style="list-style-type: none"> ➤ Compare different forms of organisation, ownership for a specific business ➤ Describe types of departmentation <p>3.1 Organization :</p> <ul style="list-style-type: none"> • Definition 	08	08

<ul style="list-style-type: none"> • Steps in organization <p>3.2 Types of organization</p> <ul style="list-style-type: none"> • Line • Line & staff • Functional • Project <p>3.3 Departmentation</p> <ul style="list-style-type: none"> • By product • By process • By function <p>3.4 Principles of Organisation</p> <ul style="list-style-type: none"> • Authority & Responsibility • Span of Control • Effective Delegation • Balance, Stability and Flexibility • Communication <p>3.5 Forms of ownership</p> <ul style="list-style-type: none"> • Proprietorship • Partnership • Joint stock • Co-operative Society • Govt. Sector 		
<p>Topic 4: Industrial Safety and Legislative Acts</p> <p>Specific Objectives</p> <ul style="list-style-type: none"> ➤ Describe types of accidents & safety measures ➤ State provisions of industrial acts. <p>4.1 Safety Management</p> <ul style="list-style-type: none"> • Causes of accidents • Types of Industrial Accidents • Preventive measures • Safety procedures <p>4.2 Industrial Legislation - Necessity of Acts</p> <p>Important Definitions & Main Provisions of following acts:</p> <ul style="list-style-type: none"> • Indian Factory Act • Workman Compensation Act • Minimum Wages Act 	08	06
<p>Topic 5: Financial Management (No Numerical)</p> <p>Specific Objectives</p> <ul style="list-style-type: none"> ➤ Explain functions of financial management ➤ State the sources of finance & types of budgets. ➤ Describe concepts of direct & indirect taxes. <p>5.1 Financial Management- Objectives & Functions</p> <p>5.2 Capital Generation & Management</p> <ul style="list-style-type: none"> • Types of Capitals - Fixed & Working • Sources of raising Capital - Features of Short term, Medium Term & Long Term Sources <p>5.3 Budgets and accounts</p>	08	08

<ul style="list-style-type: none"> • Types of Budgets • Fixed & Variable Budget - Concept • Production Budget - Sample format • Labour Budget - Sample format • Profit & Loss Account & Balance Sheet - Meaning, sample format, meaning of different terms involved. <p>5.4 Meaning & Examples of -</p> <ul style="list-style-type: none"> • Excise Tax • Service Tax • Income Tax • Value Added Tax • Custom Duty 		
<p>Topic 6: Materials Management (No Numerical)</p> <p>Specific Objectives</p> <ul style="list-style-type: none"> ➤ Describe concept of inventory, ABC analysis & EOQ. ➤ Describe purchase functions & procedures ➤ State features of ERP & MRP <p>6.1 Inventory Concept, its classification, functions of inventory</p> <p>6.2 ABC Analysis - Necessity & Steps</p> <p>6.3 Economic Order Quantity Concept, graphical representation, determination of EOQ</p> <p>6.4 Standard steps in Purchasing</p> <p>6.5 Modern Techniques of Material Management</p> <ul style="list-style-type: none"> • Material Resource Planning (MRP) - Functions of MRP, Input to MRP, Benefits of MRP • Enterprise Resource Planning (ERP) - Concept, list of modules, advantages & disadvantages of ERP 	08	08
<p>Topic 7: Quality Management</p> <p>Specific Objectives</p> <ul style="list-style-type: none"> ➤ State Principles of Quality Management ➤ Describe Modern Technique & Systems of Quality Management <p>7.1 Meaning of Quality</p> <p>Quality Management System - Activities, Benefits</p> <p>Quality Control - Objectives, Functions, Advantages</p> <p>Quality Circle - Concept, Characteristics & Objectives</p> <p>Quality Assurance - Concept, Quality Assurance System</p> <p>7.2 Meaning of Total Quality and TQM</p> <p>Components of TQM - Concept, Elements of TQM, Benefits</p> <p>7.3 Modern Technique & Systems of Quality Management like Kaizen, 5'S', 6 Sigma</p> <p>7.4 ISO 9001:2000 - Benefits, Main clauses.</p>	06	08
Total	48	50

Learning Resources:**Books:**

Sr. No	Author	Name of Book	Publisher
01	Dr. O.P. Khanna	Industrial Engineering & Management	Dhanpat Rai & Sons New Delhi
02	Banga & Sharma	Industrial Engineering & Management	Khanna Publication
03	Dr. S.C. Saksena	Business Administration & Management	Sahitya Bhavan Agra
04	W.H. Newman E. Kirby Warren Andrew R. McGill	The process of Management	Prentice- Hall

E Source:

- nptel.iitm.ac.in
- <http://iETE-elAN.ac.in/subjects/amIndustrialMgmt.htm>

Course Name : Electronics Engineering Group
Course Code : EJ/ET/EN/EX/DE/ED/EI
Semester : Sixth for ET/EN/EX/EJ/DE and Seventh for ED/EI
Subject Title : Advanced Communication System
Subject Code : 17656

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
04	--	02	03	100	25#	--	25@	150

NOTE:

- Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

Rationale:

Initially communication technology focused on simple transmission links, but then quickly moved to increasingly sophisticated networks. Nowadays modern high capacity, high speed telecom networks based on microwave principles, optical fiber technology, satellite communication and radar systems became integral part of industry, society and other organizations.

Advance communication system is an application of devices and basic communication techniques. It is useful to understand principles, working, use of microwave devices and systems. Knowledge of optical fiber technology is helpful in understanding of optical communication system, maintenance of optical links and related components.

Study of satellite and radar communication system is important for understanding operation, maintenance and monitoring of these systems.

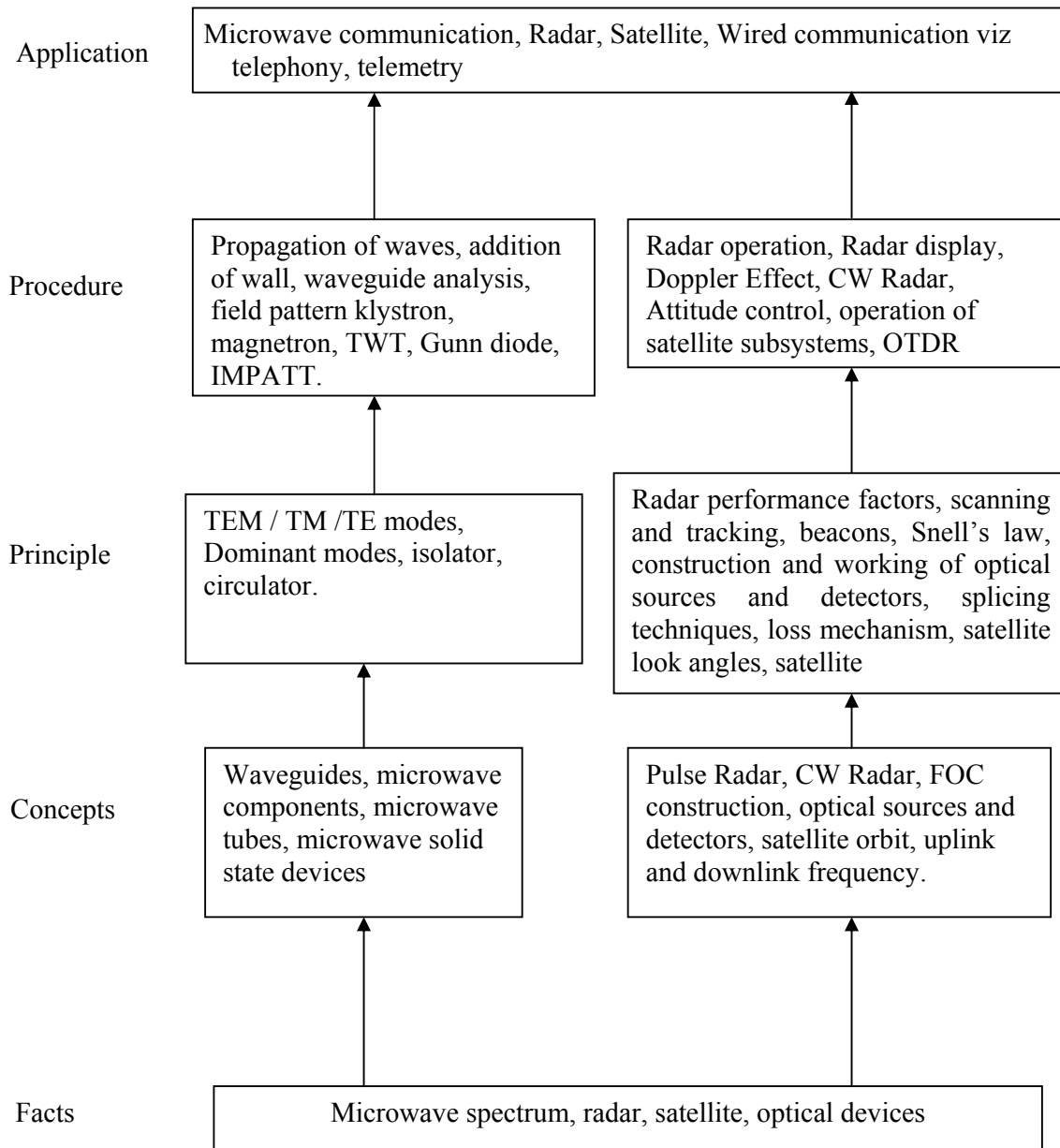
This subject is also useful as a basis to acquire in depth knowledge of advance communication systems and for analysis of these systems.

General Objectives:

Students will be able to:

- Understand concepts and applications of microwave and optical spectrum.
- Understand construction and working of microwave components and devices.
- Understand basic principle & operation of radar systems.
- Understand the construction, working and uses of optical communication system components
- Know the concept, working and application of satellite communication system.

Learning Structure:



Theory:

Topic and Contents	Hours	Marks
<p>Topic 1: Wave Guide and Components: Specific Objectives: Students will be able to</p> <ul style="list-style-type: none"> ➤ Identify band designation with range in microwave spectrum. ➤ Compare waveguide with two wire transmission line. ➤ Plot the field pattern for dominant mode (Lower) of rectangular waveguide. <p>Contents:</p> <p>1.1 Introduction to basics of microwave transmission. [08]</p> <ul style="list-style-type: none"> • Microwave spectrum and band designations. • Comparison of wave guide with transmission line. • Rectangular waveguides: Propagation of waves through rectangular wave guide, Reflection of waves from a conducting plane- Basic behaviour, dominant mode at the conducting surface, dominant mode of operation, plane waves at conducting surface, parallel and normal wavelength, phase velocity. The parallel plane waveguide, cut off wavelength, cut off frequency, group and phase velocity.(Simple numericals) • Rectangular waveguide modes: TEm,o modes, TEm,n modes, TMm,n modes, field patterns of TE1,0,TE2,0,TE1,1 modes. <p>1.2 Circular waveguide- [04]</p> <ul style="list-style-type: none"> • Analysis of behavior • field patterns for dominant mode, • Advantages and applications of circular waveguide. <p>1.3 Waveguide components [08]</p> <ul style="list-style-type: none"> • Flanges, Rotating coupling, Bends & corners, Taper & Twist. • Multiple Junctions - E plane, H- plane and Hybrid junction. • Cavity resonators - operation, types and applications • Auxiliary components- Directional coupler, Isolator and circulators, Detector mounts, switches - Duplexer. 	12	20
<p>Topics 2: Microwave Devices: Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Sketch the constructional details and the working of klystron , TWT & magnetron ➤ Sketch and explain the construction of semi conductor microwave devices. <p>Contents:</p> <p>2.1 Microwave vacuum tube devices. [12] Construction, working, specifications and applications of</p> <ul style="list-style-type: none"> • Two cavity Klystron amplifier, • Reflex Klystron, • Magnetron • TWT <p>2.2 Microwave semiconductor devices. [08] Construction, working and applications of</p>	12	20

<ul style="list-style-type: none"> • Gunn diode, • IMPATT diode • PIN diode. • Tunnel diode 		
<p>Topics 3: Radar Systems:</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Interpret the radar range equation ➤ Explain operation of pulse radar, MTI and CW radar system ➤ Interpret the position of target by observing displays ➤ Explain the operation of A-scope, PPI, ATD displays <p>Contents:</p> <ul style="list-style-type: none"> • Basic block diagram of radar system. • Radar performance factors: Radar range equation, factors influencing max. Range, effect of noise. • Basic pulse Radar system: Block diagram & description. • Antenna scanning & Tracking (Definition, types and principle)of Antenna scanning: Horizontal, vertical, helical and spiral. • Antenna tracking: Sequential, conical and monopulsl • Display Methods: A-Scope, PPI, Automatic target detection • Block diagram, operation and application of pulsed radar system and MTI and CW Doppler radar. • Radar Becons • Antannas used in RADAR: 	12	16
<p>Topics 4: Satellite Communication System:</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Draw block diagram of various subsystems of satellite ➤ Explain the operation of satellite earth station <p>Contents:</p> <p>4.1 Introduction to satellite communication system [08]</p> <ul style="list-style-type: none"> • Importance of satellite communication system. • Concept of orbit & its types • Communication link : uplink & downlink frequency, • look angle altitude, elevation angle, Azimth angle footprint & station keeping • Block diagram and function of satellite earth station <p>4.2 Subsystems of satellite :Block diagram and Principle [08]</p> <ul style="list-style-type: none"> • Power subsystem • Communication channel subsystem • Attitude control subsystem • Thermal control subsystem • Telemetry tracking and command subsystem • Main & auxiliary propulsion subsystem • Antenna subsystem 	10	16
<p>Topics 5: Theory of optics & fundamentals of optical fiber</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Draw constructional sketch of fiber optic cable ➤ Classify optical fibers <p>Contents:</p> <ul style="list-style-type: none"> • Optical spectrum: Band name and its range. • Definition & concept of reflection, refraction dispersion, diffraction 	06	12

,absorption & scattering with help of light theory <ul style="list-style-type: none"> • Definition of critical angle, Snell's law, numerical aperture, acceptance angle, acceptance cone. • Advantages & disadvantages of Fiber Optic communication • Block diagram of Fiber Optic communication system 		
Topics 6: Optical Communication System Specific Objectives: <ul style="list-style-type: none"> ➤ Explain construction & working of LED, Laser and avalanche photo diode. ➤ Explain splicing techniques ➤ Know causes of losses in fiber optic system and minimize them. Contents: 6.1 Types of fiber optics cable and its losses [08] <ul style="list-style-type: none"> • Optical fiber types & characteristics. • Losses in optical fiber: Absorption loss, Scattering loss, Dispersion loss, Radiation loss, Coupling loss. 6.2 Optical sources and detectors [04] <ul style="list-style-type: none"> • Optical sources: Edge emitter and Surface emitter LED, Laser construction & working principle, Comparison of different sources. • Photo Detector: Review of PIN photo diode, avalanche photo diode-construction & working principle. 6.3 Splicers and connectors : [04] <ul style="list-style-type: none"> • Splicing techniques- Properties of splicing, fusion splice, V-groove splice and elastic tube splice. Fusion splice and V-groove splice • Fiber connector-properties of connector, ferrule connector 6.4 Attenuation measurements: OTDR block diagram, working principle, and OTDR trace	12	16
Total	64	100

Practical:**Skills to be developed:****Intellectual Skills:**

1. Interpret the characteristics.
2. Identify and select the microwave devices.
3. Calculate different parameters.

Motor Skills:

1. Measure different quantities related to waveguides and microwave devices.
2. Verify characteristics of microwave devices, fiber optic sources and detectors.

List of Practical:

1. Write specifications of Microwave Test Bench and five major Microwave components.
2. Verify the characteristics of Reflex Klystron.

3. Verify characteristics of microwave tees E-plane, H-plane and E-H plane.
4. Verify characteristics of the isolator.
5. Verify characteristics of circular.
6. Verify properties of Multi-Hole Directional Coupler.
7. Calculate the Numerical Aperture(NA) of given optical fiber by using Trigonometric method (visual method)
8. Measure the bend loss and attenuation in given FOC
9. Plot (i) V-I characteristics of LED (ii) Characteristics of the output light intensity against forward current of LED
10. V-I characteristics of photo-diode (Detector) at different luminance.

Assignments:

1. Radar- Block diagram and operation of pulsed radar system.
2. Satellite communication- Block diagram and operation of satellite Earth Station.
3. Visit to Earth station/ Radio station/ TV relay station/ Airport/ BSNL.

Learning Resources:**Books:**

Sr. No.	Author	Title	Publisher
01	John F Kennedy	Electronic Communication system	Tata McGraw Hill
02	William Schewber	Electronic Communication system	PHI publication
03	Wayne Tomasi	Advanced Electronic Communication system	PHI / Pearson publication
04	Gerd Keiser	Optical Fiber Communication	Tata McGraw Hill

Course Name : Electronics Engineering Group
Course Code : EJ/ET/EN/EX/DE/ED/EI
Semester : Sixth for ET/EN/EX/EJ/DE and Seventh for ED/EI
Subject Title : Mobile Communication
Subject Code : 17657

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
03	--	02	03	100	---	--	25@	125

NOTE:

- Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

Rationale:

The 21st century has brought the rapid growth of cell phones, LAN and wireless appliances. Wireless communication is driving the whole world towards greater integrity. RF spectrum in higher bands is available for mobile communications. Mobility awareness in civilized societies, global standardization of wireless devices and products are leading towards huge growth.

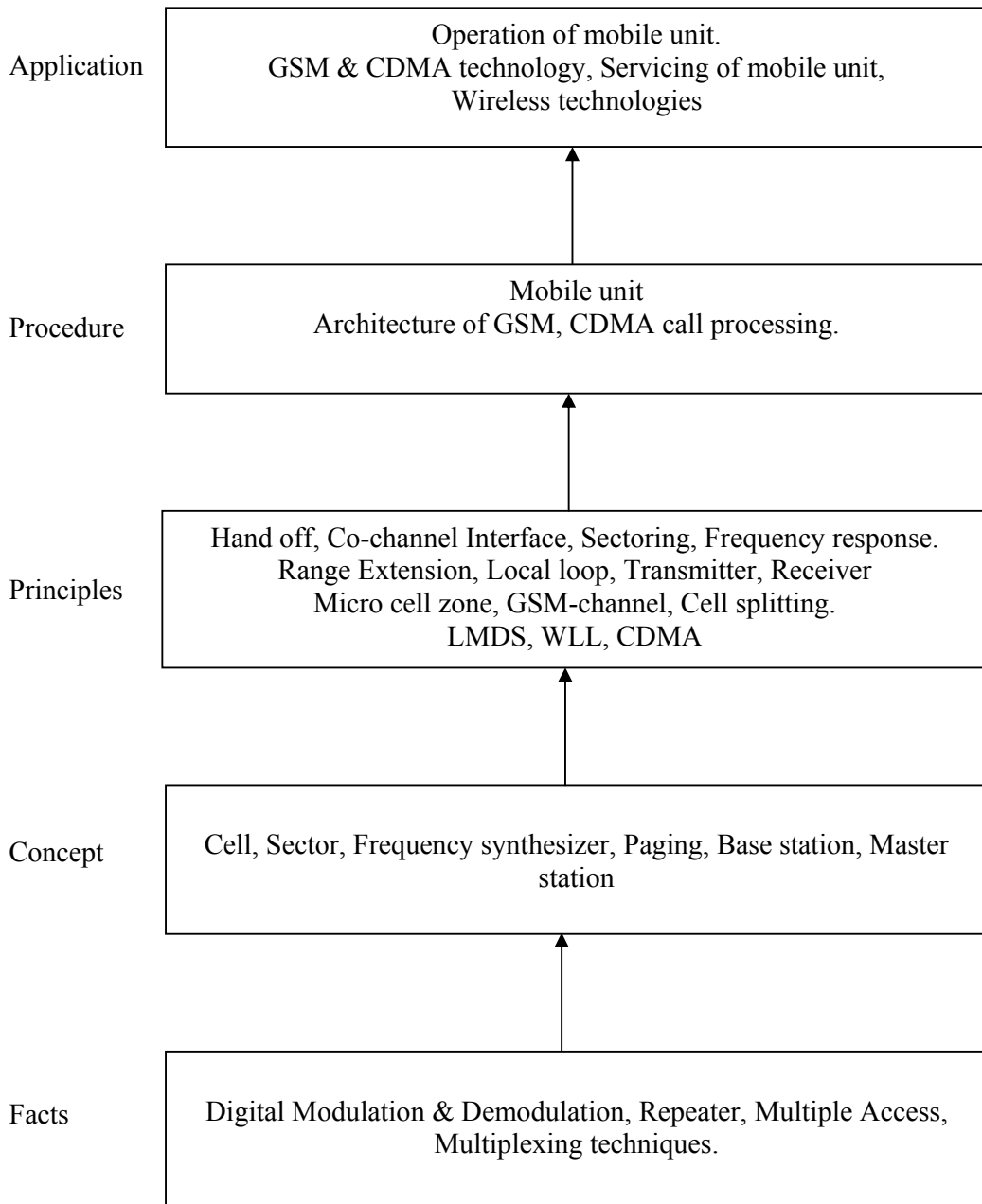
Students will know the fundamentals of mobile communication, basics of cellular system and different services provided by the cellular system. This subject gives the knowledge of cellular system architecture, components and its application along with its standards. It is the application of wireless digital communication.

General Objectives:

The student will be able to:

1. Describe cellular concept such as frequency reuse, hand off available in various mobile standards.
2. Understand GSM system, CDMA (IS-95), SS7 architecture and call processing in these system.
3. Understand 3G Mobile Communication system.

Learning Structure:



Theory:

Topic and Contents	Hours	Marks
<p>Topic 1: Introduction to Wireless Communication System</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State a need and application of mobile communication. ➤ State technological evolution in radio communication ➤ State basic features of AMPS, N AMPS, IS 95, GSM standards along with Global geographical utility. ➤ Explain principle of Working of Paging system, cordless telephone system, cellular telephone system and call processing. ➤ Explain operation of mobile unit. <p>Contents:</p> <p>1.1 [10]</p> <ul style="list-style-type: none"> • Evolution of mobile radio communications (2G,2.5G and 3G wireless system) • Mobile radio system around the world (AMPS, IS 95,GSM, N - AMPS) • Applications of wireless communication systems <ul style="list-style-type: none"> i. Paging System. ii. Cordless telephone system. iii. Cellular telephone system. Call processing in cellular telephone system. <p>1.2 Mobile Unit [10]</p> <ul style="list-style-type: none"> • Block diagram and operation of mobile Unit. • Block Diagram and operation of frequency synthesizer, transmitter, Receiver, Logic Unit and Control unit. Essential features of hand set. • Definition of mobile base station, Mobile control station. 	08	20
<p>Topic 2: The Cellular Concept</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Explain Cell Structure and its importance. ➤ State need and process of Frequency reuse, Handoff and its types. ➤ State types of interference and methods of increasing channel capacity. ➤ State how to improve coverage and capacity in cellular system. <p>Contents:</p> <p>2.1 Introduction to cellular system. [10]</p> <ul style="list-style-type: none"> • Frequency reuse concept. • Multiple Access Technologies for Cellular systems. • Cellular system operation and Planning Principles. • System Architecture • Location updating and call setup. • Hand off strategies and Power control. <p>2.2 Interference and system capacity. [10]</p> <ul style="list-style-type: none"> • Co channel interference & system capacity. • Channel planning for wireless system. • Adjacent channel Interference. • Improving coverage and capacity in cellular system. • Cell splitting. • Sectoring. • Repeater for range extension. 	10	20

<ul style="list-style-type: none"> • Micro cell zone concept. 		
<p>Topic 3: Digital Cellular Mobile Systems.</p> <p>Specific Objective:</p> <ul style="list-style-type: none"> ➤ Explain GSM system architecture, features, services and channel types. ➤ Explain CDMA System architecture, radio aspects and features. ➤ Define and explain Signaling Traffic, services and performance of Signaling System in SS7. <p>Contents:</p> <p>3.1 G.S.M : Concept of GSM, the European TDMA Digital Cellular standard. [10]</p> <ul style="list-style-type: none"> • GSM Standardization and service aspects • GSM Architecture. • GSM Radio Aspects. • Security Aspects. • GSM Protocol Model • Typical flow sequence in GSM <p>3.2 IS 95:Concept of IS 95, the North American CDMA Digital Cellular standard. [08]</p> <ul style="list-style-type: none"> • Introduction • Service Aspects • Network reference Model and Security aspects. • Radio aspects • Key features of IS 95 CDMA systems <p>3.3 Signaling system no.7 (SS7) : Concept of SS7 [06]</p> <ul style="list-style-type: none"> • NSP of SS7 • Signaling Traffic in SS7 • SS7 services and performance. 	16	24
<p>Topic 4: Modern Wireless Communication System</p> <p>Specific Objective:</p> <ul style="list-style-type: none"> ➤ List out features of 2.5 G GSM Standards HSCSD, GPRS and IS-136, EDGE and IS 95B. ➤ State features of IMT 2000 Radio spectrum, vision and Evolution. <p>Contents:</p> <p>4.1 Evolution for 2.5 G TDMA standards [12]</p> <ul style="list-style-type: none"> • HSCSD for 2.5 G GSM • GPRS for 2.5 G GSM and IS-136 • EDGE for 2.5vg GSM and IS-136 • IS-95B for 2.5 G CDMA. <p>4.2 IMT 2000 [04]</p> <ul style="list-style-type: none"> • IMT 2000 Vision and Evolution Aspects. • Radio Spectrum for IMT -2000 	06	16
<p>Topic 5: Modern wireless Networks</p> <p>Specific Objective:</p> <ul style="list-style-type: none"> ➤ State features of 3G wireless networks- UMTS, 3G CDMA 2000, G-TD-SCDMA ➤ Explain WLL and LMDS technology ➤ State features of Bluetooth and Personal Area networks ➤ State Conceptual features of 4G and 4.5G. ➤ Explain 4G architecture and its capability ➤ Define and state importance of Blockage, voice channel blockage, Voice 	08	20

<p>quality and word error rate.</p> <p>Contents:</p> <p>5.1 Third Generation (3G) Wireless Networks. [10]</p> <ul style="list-style-type: none"> • 3G W-CDMA (UMTS) (Universal mobile Telecommunication system.) • 3G CDMA 2000 • 3G- TD-SCDMA (synchronous) • Wireless local loop and LMDS (local multipoint distribution) <p>5.2 Wireless Local Area Networks [10]</p> <ul style="list-style-type: none"> • Features of Bluetooth and Personal Area Networks(PANS) • Concept of Ad hoc mobile communication for 4G and 4.5G. • 4G wireless architecture and capabilities, characteristics, • MANET applications. • Concept of Blockage, voice-channel Blockage, call drops, voice quality, word error rate. <p>(no need of detail mathematical calculation and/or derivation)</p>		
Total	48	100

Practical:**Skills to be developed:****Intellectual Skills:**

1. Identification of different components and their use.
2. Interpret various generation technologies.

Motor Skills:

1. Follow standard testing procedure
2. Accurate measurement of waveforms and write results.
3. Report writing.

List of Practical:

1. Perform installation of mobile phone, registration, activation and authentication of mobile handset
2. Observe Input / Output signal of different sections of mobile phone unit.
3. Read the content of SIM card.
4. Perform testing procedure of different sections of mobile phone.
5. Find out different add-on accessories for cell phones (battery, charger, hands free data cable, memory card) and their interfacing with Handset.
6. Identify different sections and component of mobile unit such as (Ringer section, dialer section, receiver section etc.)
7. Troubleshooting and testing of mobile handset. Such as Speaker problem, Ringer problem, Mike problem, Vibrator problem, SIM card problem, charging problem, display problem, Dialing/keypad problem, Dead handset, Network problem, water dipped handset
8. Check network availability manual and auto selection of network using AT commands in mobile.
9. Observe the process of Call connection and Call release of Mobile system.

List of Assignments: (Any Three)

1. Industrial visit to mobile company BTS BSC MSC – GSM (Airtel, idea, Vodafone) to know duties and responsibilities of O & M engineer, Microwave and GSM antenna tower maintenance.
2. Industrial visit to CDMA mobile station BTS BSC MSC (TATA Indicom, Reliance)

3. Prepare report on features, services and technology provided by different companies.
4. Find out the electrical specifications of different handsets provided by different companies. Prepare report on GSM technology, its network, GSM capability & data Services, handoff, frequency reuse, cell splitting.
5. Study and prepare report on cell site, distance coverage, antennas used. Role of RF engineer.
6. Listing out message center number and their use.

Learning Resources:

1. Reference Books:

Sr. No.	Author	Title	Publisher
1	T.S. Rappaport	Wireless Communication Principles & Practice	Pearson Education
2	William Lee	Mobile Cellular Tele communication	Tata McGraw Hill
3	C K Toh	Ad Voc Mobile wireless Networks	Pearson Education
4	Raj Pandya	Mobile and Personal communication system and services	IEEE Press, PHI
5	Steffano Basagni Marco, Silvia, Ivan	Mobile AD HOC Network	Wiley India Pvt. Ltd.

2. CDs, PPTs Etc.:

http://nifrash.weebly.com/uploads/3/5/0/9/3509162/gsm_introduction.ppt

<http://www.gadgetcage.com/4g-mobile-communications-presentation-powerpoint-download/4305/>

3. IS, BIS and International Codes:

IS 15040:2010

CISPR 25:2008

Radio Disturbance Characteristics for Protection of receivers Used on Board Vehicles, Boats and Internal Combustion Engines – Limits and Methods of Measurement

4. Websites:

- http://en.wikipedia.org/wiki/W-CDMA_%28UMTS%29 for WCDMA
- <http://www.itu.int/ITU-R/index.asp?category=information&link=imt-advanced&lang=en> for IMTS
- <http://www.mobiledia.com/glossary/33.html>
- <http://www.youtube.com/watch?v=whYljse4Abc>

Course Name : Electronics Engineering Group
Course Code : ET/EN/EJ/IE/IS/IC/DE/EV/MU/IU/ED/EI
Semester : Sixth for ET/EN/EX/EJ/IE/IS/IC/DE/EV/MU and Seventh for IU/ED/EI
Subject Title : Embedded System
Subject Code : 17658

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
03	--	02	03	100	50#	--	25@	175

NOTE:

- Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

Rationale:

In the age of computer we are surrounded by the Embedded System – at home, office, colleges, canteen, toys, cell phones, transit, aerospace technology, military application. Out of millions of processor manufactured every year, nearly 95% processors are used in Embedded System. The Embedded Systems design is with or without OS. Most of them are Real Time Embedded Systems.

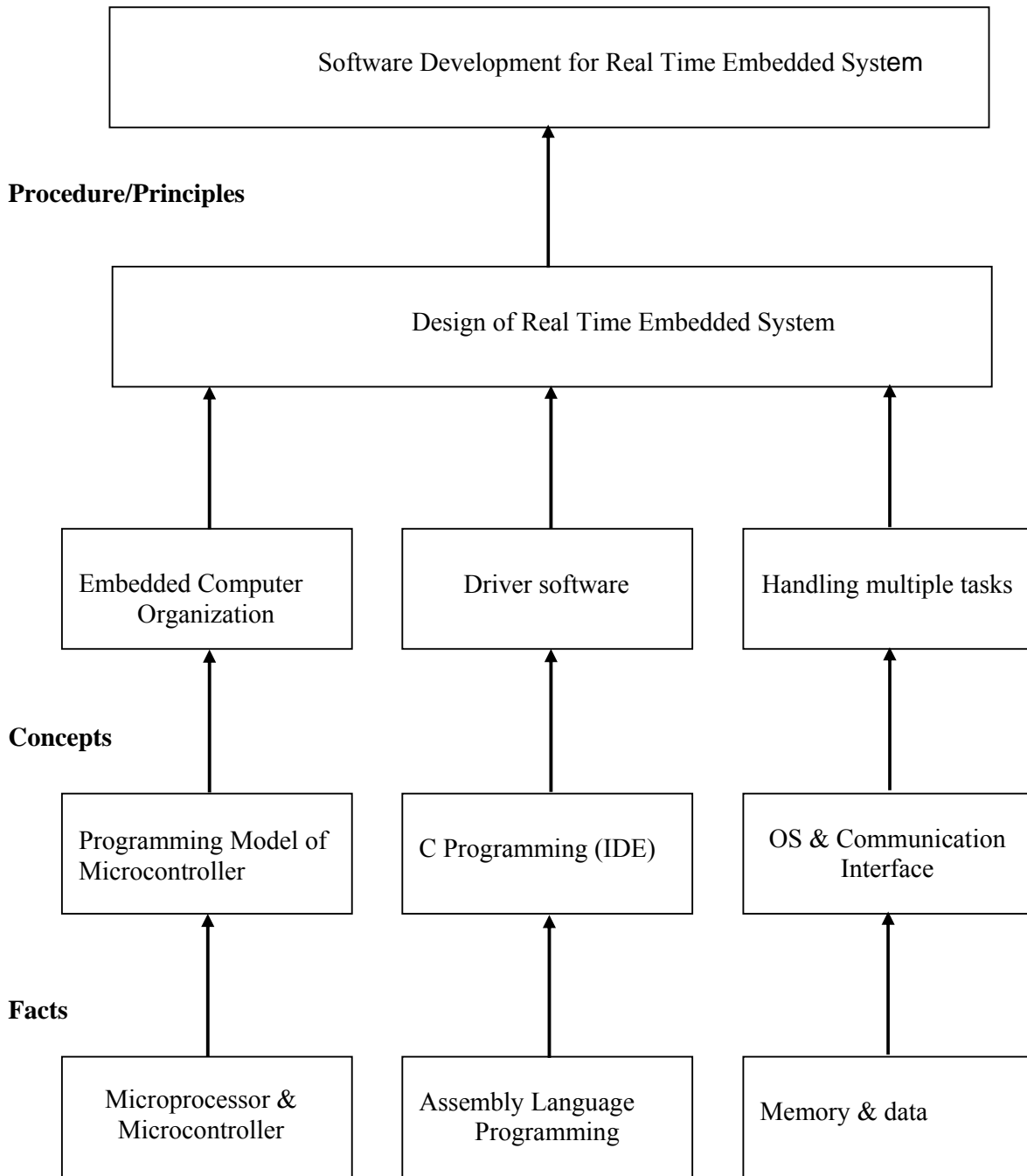
Due to such tremendous growth of Embedded Systems in recent years, one needs to be familiar with its design aspects, characteristics. Also the knowledge and programming of Real Time Embedded System is must. This subject is the advanced part of the subject Microcontroller.

General Objectives:

1. Differentiate and decide the architectures of processors for application.
2. Define communication media.
3. Design and development of small Embedded Systems.
4. Development of software.
5. Understand architecture of RTOS.

Learning Structure:

Application



Theory:

Topic and Contents	Hours	Marks
<p>Topic 1: Architecture of Microprocessor and Microcontroller</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Study of Architecture of microcontroller 89C51. ➤ Distinguish Microprocessor and Microcontroller architectures. <p>Contents:</p> <p>1.1 Architecture of Microcontroller 89C51 GPR, SFR</p> <ul style="list-style-type: none"> • Address, Data & Control bus generation. • Memory structure (Data and Program memory) • IO Ports, Interrupts, • Timer/Counter, Serial Communication <p>1.2 Block diagram and description of architectures of Processors:</p> <ul style="list-style-type: none"> • Von Neumann • Harvard • RISC • CISC • DSP • Multi Core Processor 	08	08
<p>Topic 2: Programming Microcontroller 89C51 with 'C'</p> <ul style="list-style-type: none"> ➤ Use Integrated Development Tools ➤ Develop Program logic with 'C'. <p>Contents:</p> <p>2.1 Software Development Tools: Operation and selection (08 Marks)</p> <ul style="list-style-type: none"> • Integrated Development Environment (IDE): Cross-Compiler, Emulator and Flash/OTP Programmer. • In-Circuit Emulator (ICE), debugger, JTAG port • Embedded C: Assembly Language V/S Embedded C. • Programming Microcontroller 89C51 with C. • 'C' Compiler for Microcontroller 89C51: SPJ Systems, Keil • Program downloading tools: ISP/IAP <p>2.2 Programming with 'C': (16 Marks)</p> <ul style="list-style-type: none"> • Input/output operation. • Bit/Byte operations. • Arithmetic and Logical operations on data. • Time delay routines. • Timer/Counter operations. • Generation of patterns on port lines. • Serial Communication. • Use of Assembly Instruction in 'C' program. 	12	24
<p>Topic 3: Communication Protocols</p> <ul style="list-style-type: none"> ➤ Use of communication modes and protocols. <p>Contents:</p> <ul style="list-style-type: none"> • Need of communication interface in embedded system. • Serial V/S Parallel Communication, Synchronous V/S Asynchronous Communication • RS232: DB9-pin functions, MAX 232, MAX 233, Microcontroller 8051 connection with RS232 and RS485 • Communication protocols 	06	16

<ul style="list-style-type: none"> Serial Communication Protocol: I2C, CAN, USB, Serial Peripheral Interface (SPI), Synchronous Serial Protocol (SSP). Parallel Communication Protocol: PCI, PCI-X Wireless Communication Protocol: IrDA, Bluetooth, Zigbee, IEEE802.11 		
<p>Topic 4: I/O interfacing</p> <ul style="list-style-type: none"> ➤ Interface different devices to Microcontroller 89C51. ➤ Develop logic of program to work with different devices. <p>Contents: Interfacing:</p> <ul style="list-style-type: none"> Interfacing Keys, LEDs and relay and its programming with 'C'. Interfacing matrix keyboard and its programming with 'C'. Interfacing LCD and its programming with 'C'. Interfacing ADC and its programming with 'C'. Interfacing DAC and its programming with 'C' for generation of different patterns. Interfacing Stepper Motor and its programming with 'C'. Interfacing DC Motor and its programming with 'C'. 	10	24
<p>Topic 5: Embedded System Design</p> <ul style="list-style-type: none"> ➤ Classify and specify characteristics of embedded system. <p>Contents:</p> <ul style="list-style-type: none"> Embedded System: Introduction, block diagram, applications, advantages and disadvantages. Classification of Embedded System: Small scale, medium scale, sophisticated, stand-alone, reactive/real time (soft and hard real time), Networked, Mobile, Single functioned, Tightly constrained, Design Metrics/Specifications/Characteristics of Embedded System: Processor power, memory, operating system, Reliability, performance, power consumption, NRE cost, unit cost, size, flexibility, time-to-prototype, time-to-market, maintainability, correctness and safety. 	06	12
<p>Topic 6: Real Time Operating System</p> <ul style="list-style-type: none"> ➤ Define, understand and classify operating system. ➤ Define, describe and applications of real time operating system. <p>Contents: Operating System:</p> <ul style="list-style-type: none"> Operating System, functions of operating system. Architecture of Real Time Operating System (RTOS). Scheduling architecture. Multitasking. Share data problem. Semaphore. Dead lock. Inter-task Communication. 	06	16
Total	48	100

Intellectual Skills:

- 1) Use IDE for Microcontroller programming with 'C'.
- 2) Develop Logic of program.
- 3) Write 'C' Program.

Motor Skills:

- 1) Use of IDE for Microcontroller programming.
- 2) Interface Microcontroller Evaluation boards & peripherals.

List of Practical:**Write and execute 'C' Programs:**

- 1) Input and output operation via ports.
- 2) Arithmetic and logic operations on data.
- 3) Use of assembly language instruction in 'C' program.
- 4) Generation of pulse/square wave on port line/s.
- 5) Reading key status and LED ON/OFF.
- 6) Operating Relay to activate connected devices to relay.
- 7) Reading matrix keyboard.
- 8) Read ADC and display it on LCD.
- 9) Generating different patterns with DAC
- 10) Running Stepper motor with different speed (CW/CCW).

Learning Resources:**1. Books:**

Sr. No.	Author	Title	Publisher
1	Frank Vahid & Tony Givargis	EMBEDDED SYSTEM DESIGN A Unified Hardware/Software Introduction	Wiley
2	Raj Kamal	Embedded System Architecture, Programming and Design	Tata McGraw Hill
3	Dr K.V.K.K. Prasad	Embedded/Real-Time Systems: Concept, Design & Programming	Dreamtech Press
4	Jean J Labrosse	MicroC/OS-II The Real Time Kernel	CPM Books
5	Mazidi, Mazidi & McKinlay	THE 8051 MICROCONTROLLER AND EMBEDDED SYSTEM Using Assembly and C	Prentice Hall
6	Ajay V. Deshmukh	Microcontrollers (Theory and Applications)	Tata McGrawHill

2. Websites:

- 1) <http://developer.apple.com/documentation/mac/devices-313.html>
- 2) http://en.wikipedia.org/wiki/Integrated_development_environment
- 3) http://en.wikipedia.org/wiki/communication_protocol
- 4) <http://en.wikipedia.org/wiki/RS-232>
- 5) http://en.wikipedia.org/wiki/Embedded_system
- 6) http://en.wikipedia.org/wiki/Real_time_operating_system

Course Name : Diploma in Digital Electronics
Course Code : DE
Semester : Sixth
Subject Title : Digital Signal Processing (Elective)
Subject Code : 17661

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
03	--	02	03	100	--	--	25@	125

NOTE:

- **Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
- **Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).**

Rationale:

This subject is designed as a foundation course for engineers and designers who would like to work in the most challenging and emerging field of signal processing. As high speed computational machines are now available for processing; the concept and techniques allied with signal processing field assume more versatile approach. Thus the study of signals & systems has opened up a whole new era of solutions to many latest signal processing problems

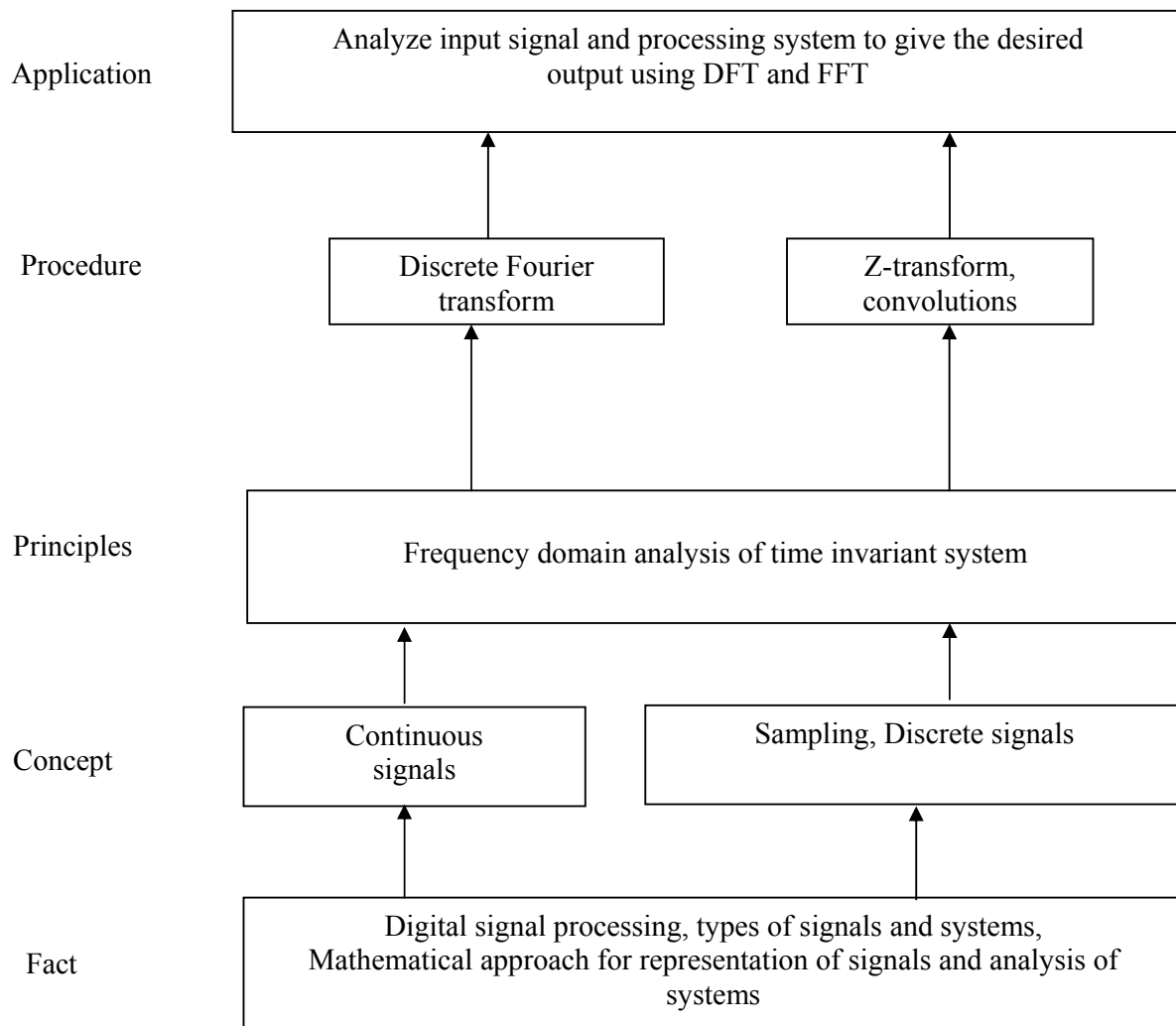
Digital signal Processing requires the pre requisites of Microprocessor, Digital Electronics and Mathematics. Students can utilize this processor and its architectural concept in image processing, digital communication, recording and error detection digital processing field.

General Objectives:

The student will be able to

1. Comprehend fundamentals of continuous and discrete-time signals.
2. Understand signals & systems in frequency domain.
3. Understand Z-transform & inverse Z-transform of various systems.
4. Compare the properties of Fourier transforms and their relation with Z- transforms.

Learning Structure:



Theory:

Name of the Topic	Hours	Marks
<p>Topic 1: Signal System & Signal Processing Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Comprehend digital signal and system and its classification <p>Contents:</p> <ul style="list-style-type: none"> • Need of digital signal processing, Concept of basic elements of digital signal processing system, Advantages of digital over analog signal processing. • Classification of systems: Static and Dynamic system, Causal and non causal system, Time invariant and time variant system, Linear and nonlinear system, Invertible and non invertible system, Stable and unstable system, Lumped parameter and distributed parameter. • Classification of signals–continuous and discrete signals, Energy and power signals, Periodic and aperiodic signals, Even and odd signals, Deterministic and stochastic random signals. Numerical based on this topic. 	08	16
<p>Topic 2: Sampling</p> <ul style="list-style-type: none"> ➤ Represent continuous and discrete signal ➤ Comprehend sampling and processing of signals <p>Contents:</p> <ul style="list-style-type: none"> • Representation of continuous time signals in terms of sample, the sampling theorem – time domain, Reconstruction of signal from its samples, Effect of under sampling “aliasing”. • Sampling theorem – frequency domain, Estimation of essential bandwidth, Sampling of band pass signals, Representation of band pass signals. • Discrete time processing of continuous time signals. • Numerical based on sampling. 	08	20
<p>Topic 3: Fourier Series & Transform</p> <ul style="list-style-type: none"> ➤ Comprehend periodic signal, Fourier Transform and frequency domain analysis. <p>Contents:</p> <ul style="list-style-type: none"> • Periodic signal representation by Fourier series – trigonometric & exponential form and numerical based on it. • Fourier transforms: Properties of Fourier transform – Mathematical proofs, non periodic signal representation using the Fourier transform. Fourier transform of periodic signal – numerical based on this topic. • Frequency domain analysis of LTI system. Response to complex – exponential and sinusoidal signal. 	12	24
<p>Topic 4: Discrete Fourier Transform</p> <ul style="list-style-type: none"> ➤ Compute and define DFT, Convolution <p>Contents:</p> <ul style="list-style-type: none"> • Discrete Fourier transform: Definition, Properties of Discrete Fourier transform, Multiplication of two DFT and circular convolution, linear 	08	16

convolutions of finite duration sequences. • Efficient computation of DFT: 2, 4 point radix FFT algorithm.		
Topic 5: Z – transform ➤ Define properties of Z-transform Contents: <ul style="list-style-type: none"> • Z transform: Definition, Relation between – Z transform and Fourier transform, Properties of Z transform – mathematical proofs. • Inverse Z transform: standard function, Inverse Z transform by partial fraction, contour integration, power series, expansion. • Application of Z transform. • Transformations of stable region in s – plane into stable region in Z - plane. • Stability of discrete time system in Z-domain • To find transfer function from pole zero plot and to plot pole zero diagram from the transfer function, Interpretation of pole-zero diagram for discrete system 	12	24
Total	48	100

Practical:**Intellectual Skills:**

1. Represent continuous time signal of interest and processes it in the discrete time domain to produce output in discrete time that could be then converted into continuous time function.

Motor Skills:

2. Analyze digitally represented input samples.

List of Practicals:

1. Linear convolution of finite duration sequence.
2. Circular convolution of finite duration sequence.
3. Fourier transform of standard functions.
4. Verify any four properties of Fourier transform.
5. Discrete Fourier transform of finite duration sequences
6. Determine 4 point discrete Fourier transform for a finite duration sequences
7. Verify 2 radix FFT for the example performed in practical 5.
8. Verify 4 radix FFT for the example performed in practical 5.
9. Derive Z-transform of standard functions.
10. Verify the properties of Z-transform..

Learning Resources:**Books:**

Sr. No.	Author	Title	Publisher
1	John G. Proakis Dimistris G. Manolakis	Digital Signal Processing	Prentice Hall India
2	Roman Kuc	Digital Signal Processing	McGraw International
3	James Bnesh	Digital Signal Processing	Penaram
4	S. C. Goyal	Signals & systems	Technical Publications
5	Stephen J. Champman	Matlab programming for engineers	Thompson learning, Australia 2002.

Course Name : Diploma in Digital Electronics
Course Code : DE
Semester : Sixth
Subject Title : Data Communication Networking (Elective)
Subject Code : 17662

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
03	--	02	03	100	--	--	25@	125

NOTE:

- **Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
- **Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).**

Rationale:

Data communication and network plays the important role in communication and information technology. It deals with signal propagation and information encoding, decoding, error correcting techniques. Data communication covers protocols, Open systems Interconnection, asynchronous modes, and synchronous optical networks, architectures of protocols, wireless applications.

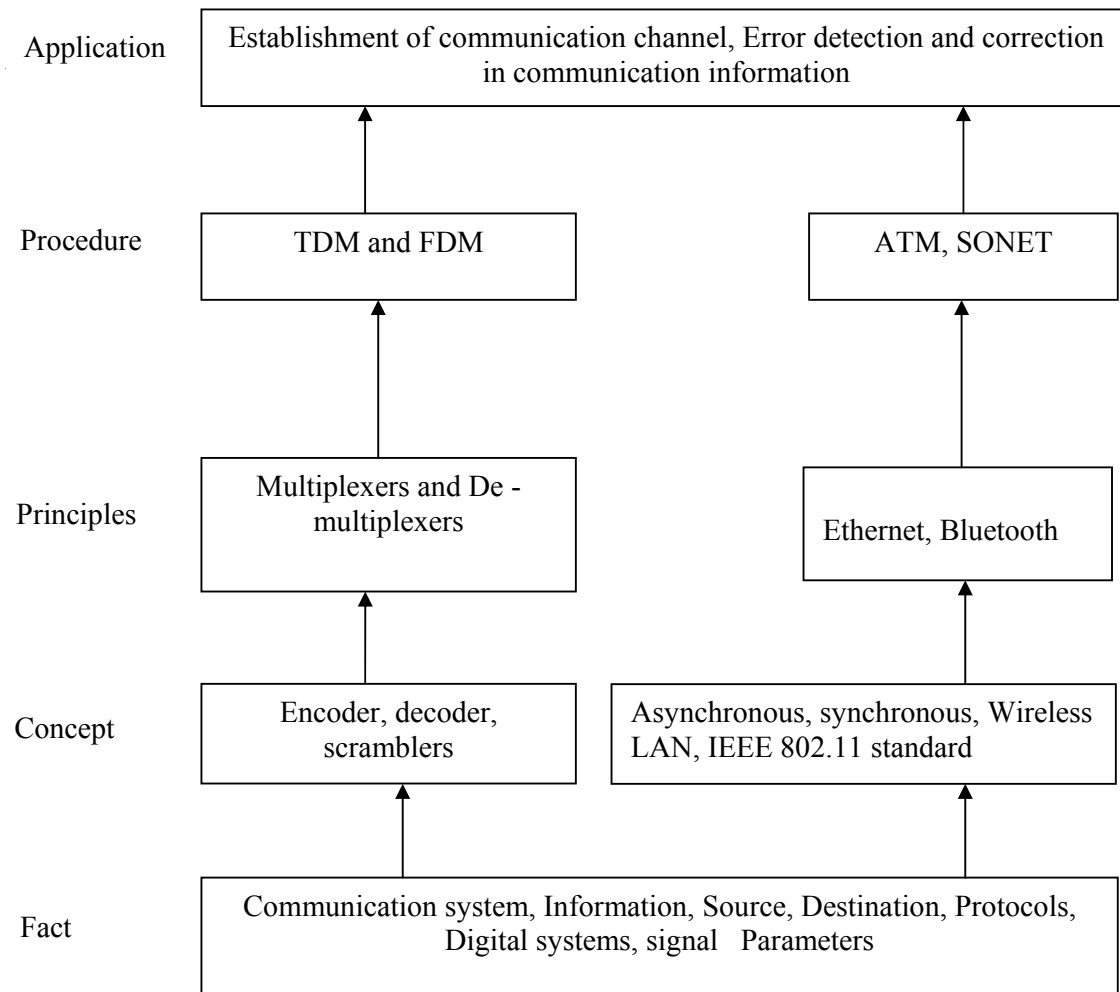
Data communication and networking requires the pre requisites of computer networks, communication fundamentals. Students can utilize these communication methods and error detection in information transmission and receiving application,

General Objectives:

The student will be able to

1. Comprehend communication system and its different elements, parameters, Network protocol
2. Understand pros and cons of Communication modes and multiplexing technologies.
3. Learn the connectivity between source and destination.
4. Understand Asynchronous technology in data transmission, standard protocol and its architecture, wireless techniques, Synchronous optical network.

Learning Structure:



Theory:

Name of the Topic	Hours	Marks
<p>Topic 1: Communication System Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Draw and describe block diagram of digital communication system. <p>Contents:</p> <ul style="list-style-type: none"> • Review of Digital communication system: information source, sources encoder, decoder channel, modulator, demodulator, channel encoder and decoder, equalizer, clock recovery networks, scrambler, unscramble, modem, data terminal equipment, Analog and digital signal, signal propagation. • Amplitude, period, frequency, phase and Bandwidth of signal, Data transmission rate and the bandwidth 	06	12
<p>Topic 2: Modes of Data Communication</p> <ul style="list-style-type: none"> ➤ Comprehend pros and cons of Communication modes and multiplexing technologies. <p>Contents:</p> <ul style="list-style-type: none"> • Parallel and serial communications • Data transmission model (simplex, duplex), digital and analog transmission. • Comparison of analog and digital communications, synchronous and asynchronous transmission, Isochronous and comparison • Multiplexing: TDM and FDM • Standards organizations :ISO, ITU-T, ANSI, IEEE, EAI, FCC 	10	16
<p>Topic 3: Basic Networking and Wireless LAN</p> <ul style="list-style-type: none"> ➤ Interpret Network protocols. <p>Contents:</p> <ul style="list-style-type: none"> • Network Protocols: TCP / IP (Transmission Control / Internet protocol): Layers, IP addresses, logical addresses. • ARP (Address Resolution Protocol), RARP (Reverse Address Resolution Protocol), ICMP (Internet Control message protocol) • Domain name system, E mail, File transfer protocol,, Trivial file Transfer protocol, Remote login (Telnet) 	08	16
<p>Topic 4: ATM, Ethernet and blue tooth</p> <ul style="list-style-type: none"> ➤ Realize standard protocol and its architecture, wireless techniques <p>Contents:</p> <ul style="list-style-type: none"> • Asynchronous Transfer Mode (ATM) - Introduction, Overview of ATM, Packet Size, ATM Cells, Switching, ATM layers, • Ethernet – Introduction, Properties, and Ethernet frame • IEEE 802.11 - Architecture- BSS, ESS; Physical layer - FHSS, DSSS, OFDM; MAC layer - DCF, PCF, • Bluetooth - Architecture; Bluetooth layers - Media layer, base band layer, physical links, L2 CAP 	08	20
<p>Topic 5: Fibre Optic communication and SONET</p> <ul style="list-style-type: none"> ➤ Draw and describe optical communication component ➤ Describe synchronous optical network <p>Contents:</p> <ul style="list-style-type: none"> • Nature of light, electromagnetic spectrum, refraction and reflection • Fiber Cables - Construction, Preposition effect, Fiber optic cable 	08	20

modes, Refractive indexes in fiber cores; Snell's Law <ul style="list-style-type: none"> • Light Sources – Light emitting diodes, lasers; Optical detectors • Fiber Cable Losses - Connector and cable misalignment, Effects of bends in the cable, Absorption losses & scattering • Optical fiber communication system block diagram and description • Introduction to SONET/SDH 		
Topic 6: Transmission Errors- Detection and Correction <ul style="list-style-type: none"> ➤ Classify errors in digital communication and correct errors. Contents: <ul style="list-style-type: none"> • Error classification – Delay distortion, Attenuation, Noise; • Types of Errors; Error detection - Parity check, Vertical redundancy check; longitudinal redundancy check; Cyclic redundancy check; Hamming code • Recovery from errors - Stop & Wait, Go-back-in, Sliding Windows • Analytical problems on error detection and correction based on above techniques 	08	16
Total	48	100

Practical:**Intellectual Skills:**

1. Realize the role of optical devices such as LED, LASER in optical communication.
2. Comprehend Multiplexing and de multiplexing of information on single channel.

Motor Skills:

1. Use the experimental setup for characteristics measurement in optical communication devices and perform data communication experiments.
2. Detect and correct the error in received data.

List of Practicals:

1. Measurement of NA of given optical fiber.
2. Draw the Radiation pattern of LED / Laser.
3. Determine Optical detector characteristics.
4. Measurement of fiber losses.
5. Switching in data Networks.
6. TCP/IP – IP addresses and domains
7. TDM
8. FDM
9. Problem on error detection & recovery of corrected data.

Learning Resources:**1. Books:**

Sr. No.	Author	Title	Publisher
1	Achyut S Godbole	Data communications and Networks	Tata McGraw
2	Behrouz A Furouzan	Data communications and Networks	Tata McGraw
3	Dr. Sidnie Feit	“TCP/IP”	Tata McGraw
4	William Stallings	Data and Computer Communications	Pearson Education
5	Craig Zacker	Networking: The Complete Reference	Tata McGraw-Hill
6	Microsoft Press	MCSE Training Kit: Networking Essentials Plus	PHI

2. Websites:

- www.mhhe.com/dcn2
- www.mhhe.com/mandal

Course Name : Electronics Engineering Group
Course Code : ET/EN/EJ/IE/IS/IC/DE/EV/MU/IU/ED/EI
Semester : Sixth for ET/EN/EX/EJ/IE/IS/IC/DE/EV/MU and Seventh for IU/ED/EI
Subject Title : Simulation Software
Subject Code : 17807

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
--	--	02	--	--	--	--	25@	25

Rationale:

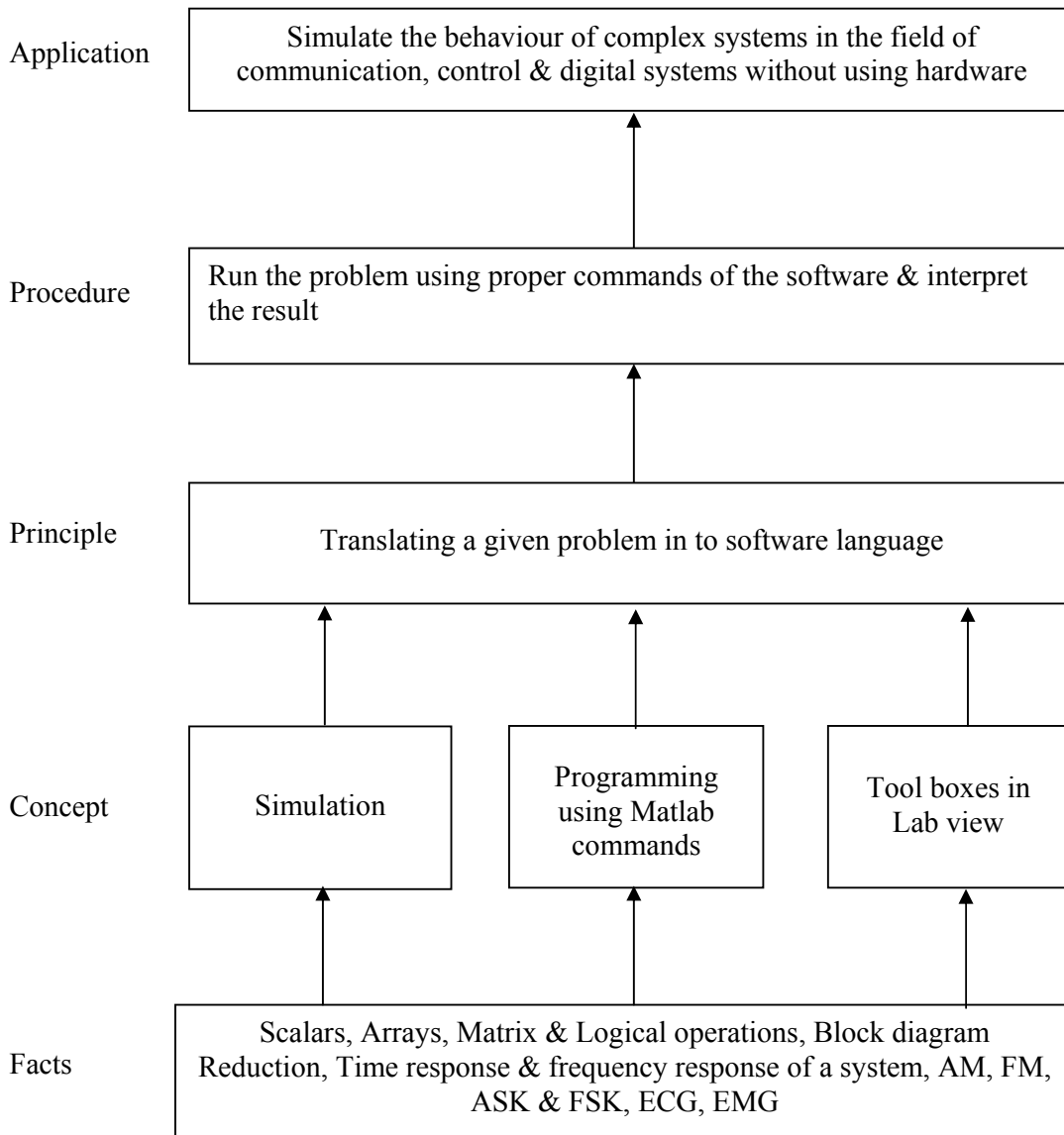
Recent development in technology has put a lot of emphasis on awareness of analytical tools available in the market. The ready to use library functions available in different simulation software enable the user to design circuits without knowing the complex mathematical details. Under this subject students will be taught softwares like Labview & MATLAB which are commonly used by electronics engineers, worldwide.

General Objectives:

Students will be able to:

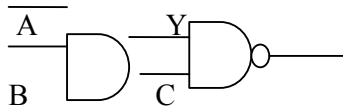
1. Learn the use of various library functions available in the software.
2. Construct given circuit diagram using these library functions.
3. Study the working of the circuit for various inputs.

Learning Structure:



List of Experiments

1. Verify simple mathematical operations of all elements in row/column vector. Using MATLAB
 - a. Sum
 - b. Mean
 - c. Length
 - d. Max
 - e. Min
 - f. Prod
 - g. Sign
 - h. Round
 - i. Sort
 - j. Fix
2. Use commands to
 - a. convert centigrade to Fahrenheit
 - b. Given the radius of circle. Find the circumference & its area
3. Calculate the output for all the eight conditions of A,B,C



4. Use of commands to
 - a. Find the determinant, inverse & transpose of the given 2X2 matrix
 - b. Evaluate the following expression

$$Y = 1 + \frac{x^2}{2} + \frac{x^3}{3} + \frac{x^4}{4} + \frac{x^5}{5}$$

5. Calculate the natural frequency of oscillators for the given RLC circuit. Assume L=0.01mH, R=100Ω & C varying from 0.1 to 0.5 in steps of 0.1 μF using following equation

$$F = \sqrt{\frac{1}{LC} - \frac{R^2}{4C^2}}$$

6. A series R-L-C circuit connected across 100V peak, 50 Hz supply, consists of R=10Ω, L=0.2H, C=100μF. Write a MATLAB script to determine the resonant frequency & current at resonance

$$[\text{hint: } f = \frac{1}{2\pi\sqrt{LC}} ; I = \frac{V}{R} ; V_{\text{rms}} = \frac{V_{\text{peak}}}{\sqrt{2}}]$$

7. Connect three sine wave sources of given amplitude and frequency but with a phase shift of 0, $2\pi/3$, and $-2\pi/3$ to a 3X1 multiplexer and observe the waveforms on scope. Also, demultiplex these waveforms and observe on the scope.
8. Create a VI that produces a sine wave with a specified frequency and displays the data on a Waveform chart until stopped by the user.

9. Simulation of amplitude and frequency modulation
10. Design a low pass filter with $R = 1 \text{ K } \Omega$ and $C = 0.1 \text{ } \mu\text{F}$ and calculate the cut off frequency.

Course Specific Simulation Programs (using either Matlab / Labview / Open source free downloadable software)

For Instrumentation Course

1. Observe step & impulse response of first & second order system & calculate time response parameters- t_d , t_r , t_p , M_p , t_s , e_{ss}
2. Characteristics equation of a system is given by $S^5 + 2S^4 + 4S^3 + 8S^2 + 3S + 1$ Check their stability with routh Hurwitz criterion
3. Observe the characteristics of linear, equal percentage and quick opening control valves

For Electronics and Industrial Electronics Course

1. Simulation of R-L-C series circuit
2. Single phase half wave phase controlled converter
3. Observe step & impulse response of first & second order system

For Medical Electronics Course

1. Calculate Body Mass Index, given the height and weight
2. Given the Heart Rate and display whether the person is having tachicardia and bradycardia
3. Design a scope for patient monitoring with at least four different parameters and observe the waveform by changing these parameters.

For EJ/ET/EX/EV Courses

1. Simulation of Sampling theorem
2. Simulation of Amplitude shift keying
3. Simulation of TDM

Course Name : Electronics Engineering Group
Course Code : ET/EN/EJ/IE/IS/IC/DE/EV/MU/IU/ED/EI
Semester : Sixth for ET/EN/EX/EJ/IE/IS/IC/DE/EV/MU and Seventh for IU/ED/EI
Subject Title : Industrial Project
Subject Code : 17808

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
--	--	04	--	--	--	50#	50@	100

Rationale:

Diploma holder need to be capable of doing self-Study throughout their life as the technology is developing with fast rate. Student will be able to find out various sources of technical information and develop self-study techniques to prepare a project and write a project report.

This subject is intended to teach students to understand facts, concepts and techniques of electrical equipments, its repairs, fault finding and testing, estimation of cost and procurement of material, fabrication and manufacturing of various items used in electrical field. This will help the students to acquire skills and attitudes so as to discharge the function of supervisor in industry and can start his own small-scale enterprise.

Objectives:

The students will be able to,

1. Work in Groups, Plan the work, and Coordinate the work.
2. Develop leadership qualities.
3. Analyse the different types of Case studies.
4. Develop Innovative ideas.
5. Develop basic technical Skills by hands on experience.
6. Write project report.
7. Develop skills to use latest technology in Electronics field.

Contents:

During fifth semester students will collect information, analyse the information and select the project. They will also prepare the List of the components required, PCB design, Testing

Procedure, Design of the Cabinet or Box or Board as the case may be. They will also prepare a synopsis of the project.

So at sixth semester they have to execute the project. A tentative Schedule is proposed below:

Proposed Schedule:	Weeks
Procuring components, component testing and circuit testing	02
PCB making and onboard testing	06
Trouble shooting and cabinet making	04
Documentation	04

References: Books/Magazines:

Name of the Magazines

1. Industrial Automation
2. Electronics for You
3. Electronics Projects
4. Computer World
5. Chip
6. Any Journal Related to Electronics/Computer/Information Technology

Website:

Using any search engine, such as <http://www.google.co.in/> the relevant information can be searched on the Internet.