

**COURSE NAME : ELECTRONICS ENGINEERING GROUP**  
**COURSE CODE : ET/EJ/EN/EX/IS/IC/IE/EV/DE/MU/ED/EI/IU**  
**SEMESTER : SIXTH FOR ET/EJ/EN/EX/IS/IC/IE/EV/DE/MU AND SEVENTH FOR ED/EI/IU**  
**SUBJECT TITLE : MANAGEMENT**  
**SUBJECT CODE : 9133**

**Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme						
TH	TU	PR	PAPER HRS	TH	TEST	PR	OR	TW	TOTAL
03	--	--	03	80	20	--	--	--	100

**Rationale:**

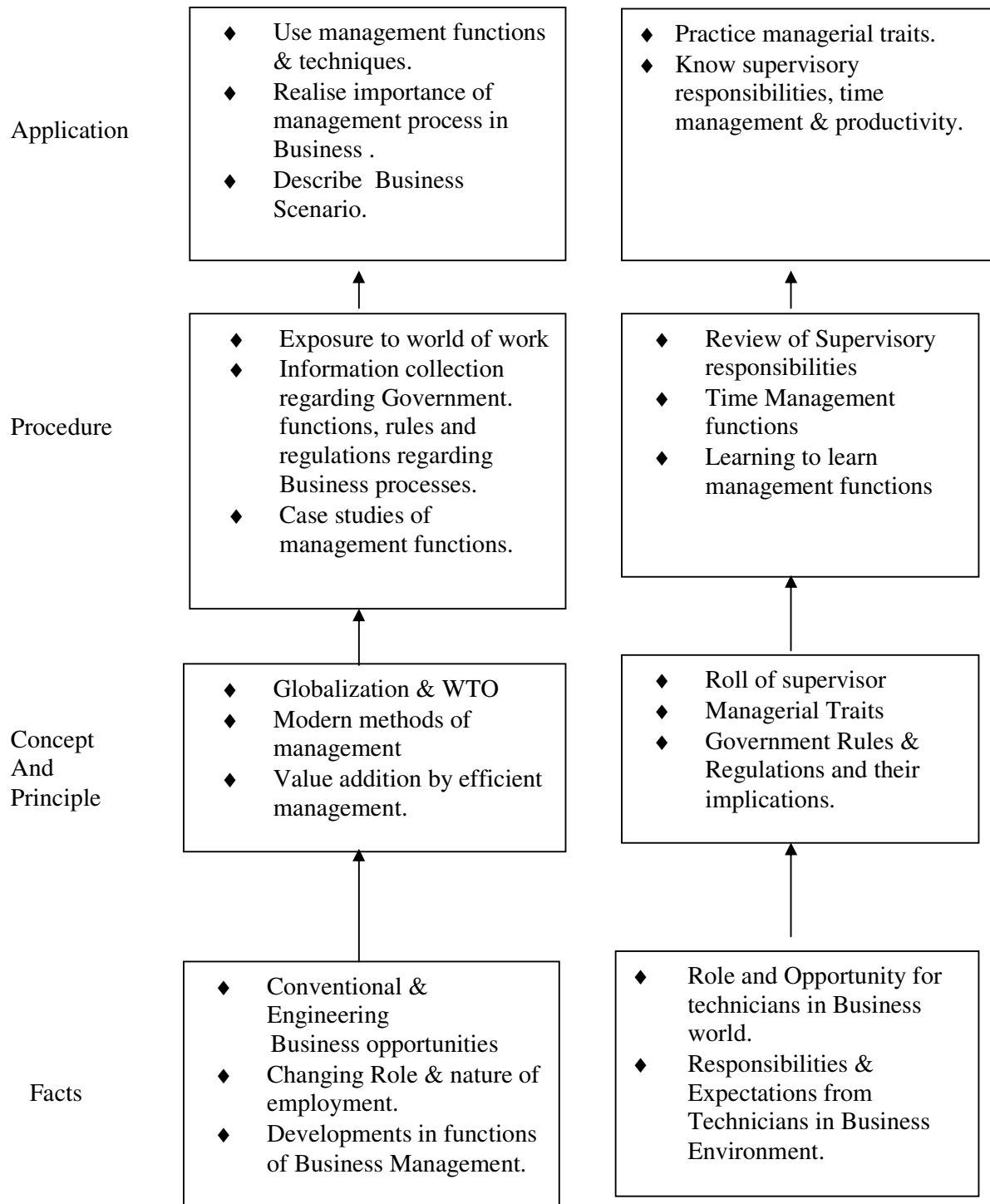
After completion of three years of technical training, Polytechnic students are expected to enter in to the World of Work. The business environment is altogether different and new to the students. A proper introduction and understanding of Business Processes is therefore essential for all Polytechnic students. Management is a subject which deals with basics of Managerial science required to understand the processes in Industrial & Commercial environment. This will enable the students of Polytechnics to become familiar and to understand various Business Organizational structures, their functioning and the Role these technicians will have to play in these setups with responsibilities.

**Objective:**

The students will able to:

1. Familiarize environment in the world of work
2. Explain the importance of management process in Business.
3. Identify various components of management.
4. Describe Role & Responsibilities of a Technician in an Organizational Structure.
5. Apply various rules and regulations concerned with Business & Social responsibilities of the Technician.

**Learning Structure:**



## Contents: Theory

Chapter	Name of the Topics	Hours	Marks
01	<b>Overview Of Business</b> 1.1. Types of Business 1.2. Industrial sectors – Textile, Engineering, Agro etc service sector – Introduction & Characteristics 1.3 Globalization- Strength & weaknesses.	02	---
02	<b>Management Process: -</b> 2.1 What is Management? Evolution , various Definitions, concept of Management- Levels of Management, Administration and Management 2.2 Principles of Management 2.3 Functions of Management: Planning , Organizing, Directing , controlling , Motivating , Coordinating , Decision Making	07	12
03	<b>Organizational Management</b> 3.1 What is organization – Definition and steps in organization. 3.2 Organization Structure - Departmentation - Division of work base Centralized / Decentralized - Authority of Responsibility base, Span of Control Forms of Organization- Line, Line – staff etc. 3.3 Forms of ownerships – Partnership, Proprietorship, Joint stock, Co-operative society , Govt. Sector etc.	07	12
04	<b>Human Resource Management</b> 4.1 Personnel Management – What is Personnel Management and Functions of Personnel Management. 4.2 Staffing – Planning & Recruitment procedure 4.3 Personnel – Training & Development Types of training – Induction, skill enhancement, Workers & Supervisors training programs Motivation . 4.4 Safety Management – Causes of Accidents, Safety Procedures, Introduction to Industrial Acts- Factory act, ESI, workman compensation, Dispute act.	08	16

<b>05</b>	<b>Financial Management</b> 5.1. Financial Management- Objectives & Functions 5.2. Capital Generation & Management – Types of capitals, Sources of finance 5.3. Budgets and accounts – Types of Budgets & accounts, preparation of Profit & Loss Account, Balance sheet etc. 5.4. Taxes & Tax Registration – Introduction and types of Taxes – Excise Service Tax, Income Tax, VAT Sales tax.	<b>08</b>	<b>16</b>
<b>06</b>	<b>Materials Management</b> 6.1. Inventory Management – Meaning & Objectives 6.2 ABC Analysis Purchase Procedure- Purchase types , searching & Selection of sources. Global purchasing, Global outsourcing. 6.3 Economic Order Quantity: Models & Analytical Treatment 6.5 Modern Techniques of Material Management– JIT, SAP/ERP	<b>08</b>	<b>16</b>
<b>07</b>	<b>Project Management</b> 7.1 Project Management - Introduction & Meaning 7.2 Project Planning & Control – CPM/PERT Techniques Concept of Break Even Analysis 7.3 Productivity – Meaning, Means & Measures of increasing productivity, Concept of Quality Circle , 5 'S', Kaizen (waste control), 6 sigma. 7.4 I. P.R.	<b>08</b>	<b>08</b>
<b>Total</b>		<b>48</b>	<b>80</b>

### Learning Resources:

#### Books:

Sr. No	Author	Name of Book	Publisher
01	Dr. O.P. Khanna	Industrial Engg & Management	Dhanpal Rai & sons New Delhi
02	Dr. S.C. Saksena	Business Administration & Management	Sahitya Bhavan Agra
03	W.H. Newman E.Kirby Warren Andrew R. McGill	The process of Management	Prentice- Hall of India Pvt. Ltd. New Delhi - 110001

#### 2. Video Cassettes:

No	Subject	Source
1.	Business opportunity selection and guidance	Website : <a href="http://www.ediindia.org">http://www.ediindia.org</a>
2.	Planning for completion and Growth	

**Course Name** : Diploma in Medical Electronics  
**Course Code** : MU  
**Semester** : Sixth  
**Subject Title** : Medical Imaging Equipment  
**Subject Code** : 9188

**Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme						
TH	TU	PR	PAPER HRS.	TH	TEST	PR	OR	TW	TOTAL
03	01	02	03	80	20	--	25@	--	125

**Rationale:**

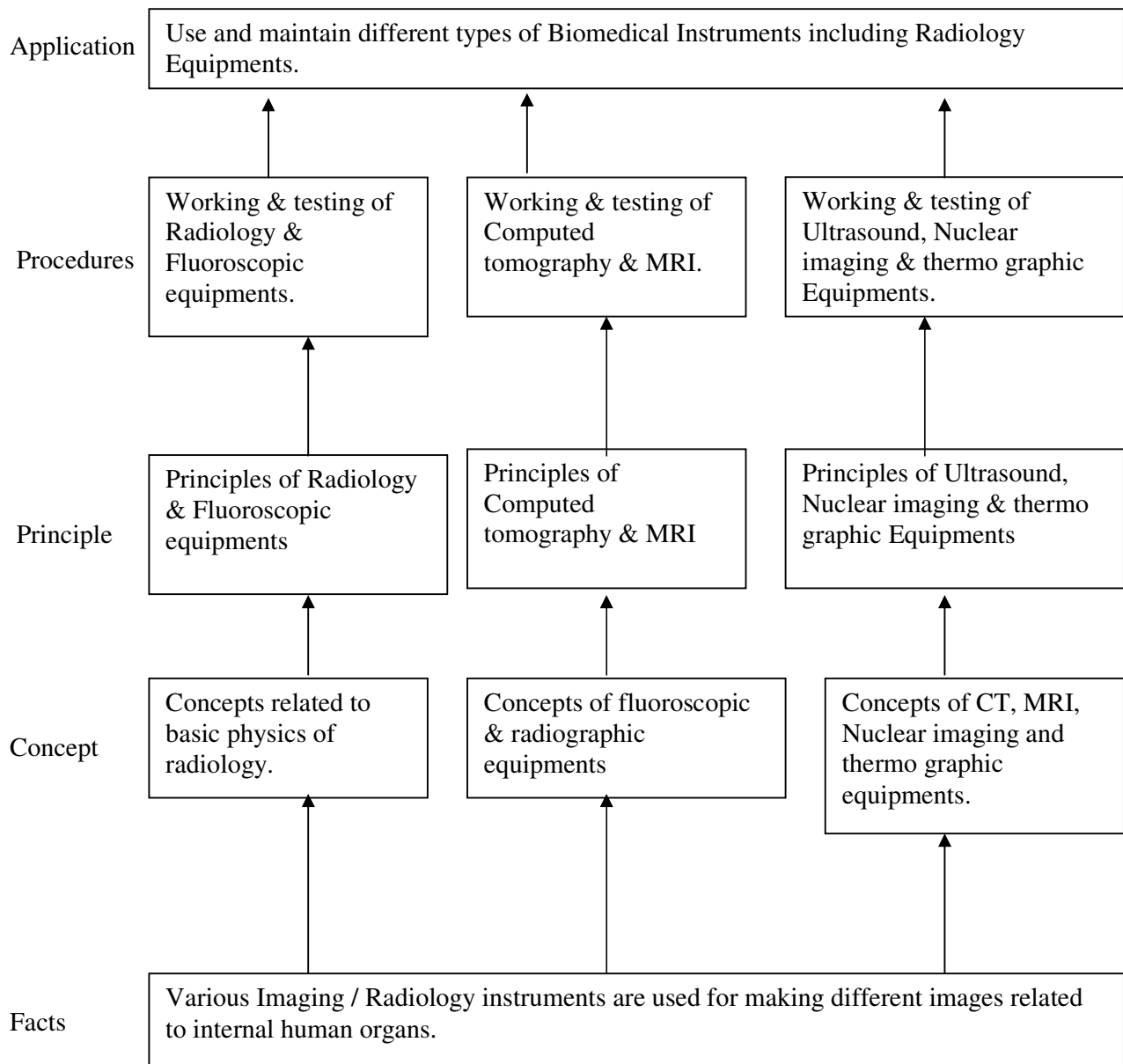
There has been tremendous development in imaging field during last few years. In old days we had only an X-ray machine to image human body. Today, we have highly sophisticated equipments like CT Scan, Ultrasound Scanner, MRI, Endoscope, etc. These equipments have completely changed the scenario of medical imaging. This subject makes the student familiar with these latest imaging systems.

**Objectives:**

Students will be able to:

1. Write technical specifications of the equipment.
2. Operate various imaging equipments.
3. Understand the principle of operation of the equipment.
4. Describe applications of equipment.

## Learning Structure:



**Contents: Theory**

<b>Chapter</b>	<b>Name of the Topic</b>	<b>Hours</b>	<b>Marks</b>
<b>01</b>	<b>Basic Physics of Radiology</b> 1.1 Physical properties, density, mass, kinetics 1.2 Electromagnetic radiation, types of radiation, wavelengths and properties 1.3 Introduction to X-rays 1.4 X-ray spectrum, properties, production, stationary & relatives	<b>08</b>	<b>08</b>
<b>02</b>	<b>X-ray Techniques</b> 2.1 Fluoroscopy :-Image, performance parameters, operating system with feedback control, specifications 2.2 Radiography: - Image, contrast & image quality, MA, KV & second controls	<b>06</b>	<b>12</b>
<b>03</b>	<b>X-Ray Equipment</b> 3.1 Types of X-ray tubes, construction & specifications, operation; X-ray tube rating - electrical & thermal. 3.2 X-ray generator (1Ø & 3Ø) supply frequency, high frequency generator 3.3 Control circuit: - High voltage (kv), filament control & tube current (mA), exposure timing & switching, interlocks of circuits 3.4 X-RAY machine: - X-ray tube, head assembly, grid & collimators, X-ray table, bucky, trays, cassatas, dark room, film processing., technical specifications and block diagram	<b>12</b>	<b>18</b>
<b>04</b>	<b>Image Intensifier and Angiography</b> 4.1 Types of fluoroscopy, image intensifier, television camera, image recording. Block diagram of fluoroscopy system. 4.2 Angiography techniques, block diagram	<b>06</b>	<b>10</b>
<b>05</b>	<b>CT &amp; MRI</b> 5.1 Principles of CT, CT numbers, X-ray detection & data acquisition. Block diagram of CT machine 5.2 MRI- NMR, MRI image, MRI scanner, block diagram	<b>06</b>	<b>12</b>
<b>06</b>	<b>Ultrasound</b> 6.1 Introduction, properties of ultrasound, Ultrasound transducer, pulse-echo technique, ultrasonic field 6.2 ultrasound imaging: - <ul style="list-style-type: none"> <li>• A-scan, B-scan, TM-scans &amp; real time B-scan.</li> <li>• Sequential/linear &amp; phased array transducers</li> </ul> 6.3 Technical specifications, block diagram of ultrasound scanner	<b>06</b>	<b>12</b>
<b>07</b>	<b>Nuclear Imaging, Thermography &amp; Endoscopy</b> 7.1 Principle of nuclear imaging, radio isotope, gamma camera, nuclear transducer (cent illation counter, Geiger miller tube) 7.2 Principle & block diagram of thermography machine 7.3 Principle & block diagram of endoscopy machine	<b>04</b>	<b>08</b>
<b>Total</b>		<b>48</b>	<b>80</b>

**Practical:**

Skills to be developed:

Intellectual Skills:

1. Know the function of various equipment.
2. Decide about the time setting to run the equipment.
3. Interpret the instructions.

Motor Skills:

1. Operate the machines as per instructions.
2. Check the output for accuracy.
3. Appropriate setting of the equipment.

List of Practical: (Any Six)

1. Study of construction of stationery anode x-ray tube.
2. Study of construction of rotating anode x-ray tube.
3. Study of construction of x-ray tube head.
4. Study & measurement on X-ray timer circuit.
5. Study & measurement of filament circuit.
6. Study of X-ray film.
7. Study of linear array transducer.
8. Study of phased array transducer.
9. Transmission & reception of sequential pulses for linear array.
10. Study of CCTV system used in fluoroscopy.

**DEMO: - (Any four)**

1. Demonstration of X-ray fluoroscopy.
2. Demonstration of X-ray radiography.
3. Demonstration of CT scanner.
4. Demonstration of ultrasound scanner.
5. Demonstration of MRI.
6. Demonstration of image intensifier.
7. Demonstration of gamma camera.

**Learning Resources:****Books:**

Sr. No.	Author	Title	Publisher
01	Peter Carter, Audry Paterson, Mike Thornton, Andrew Hyatt	Cheney's equipment for student radiographer	Blackwell scientific publication
02	David S. Dowseff, Patric A. Kenny, R. Eugene Johnnton	The physics of diagnostic imaging	Chapman & hall medical publication
03	A.G. Patil	Medical Electronics	Excel Books
04	Christen Sen's Thomas S. Curry Jamis E. Dowdey Robert C. Murry	Introduction to physics of diagnostic radiology	Lea & febiger publication
05	Robert E. Molleoy	Medical electrical equipment	B.I. publication
06	John G. Webster, Eiditor	Medical instrumentation- application & design	John Wiley and Sons (Asia)

**Course Name : Diploma in Medical Electronics**

**Course Code : MU**

**Semester : Sixth**

**Subject Title : Therapeutic Equipment**

**Subject Code : 9189**

**Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme						
TH	TU	PR	PAPER HRS.	TH	TEST	PR	OR	TW	TOTAL
03	--	02	03	80	20	50#	--	25@	175

**Rationale:**

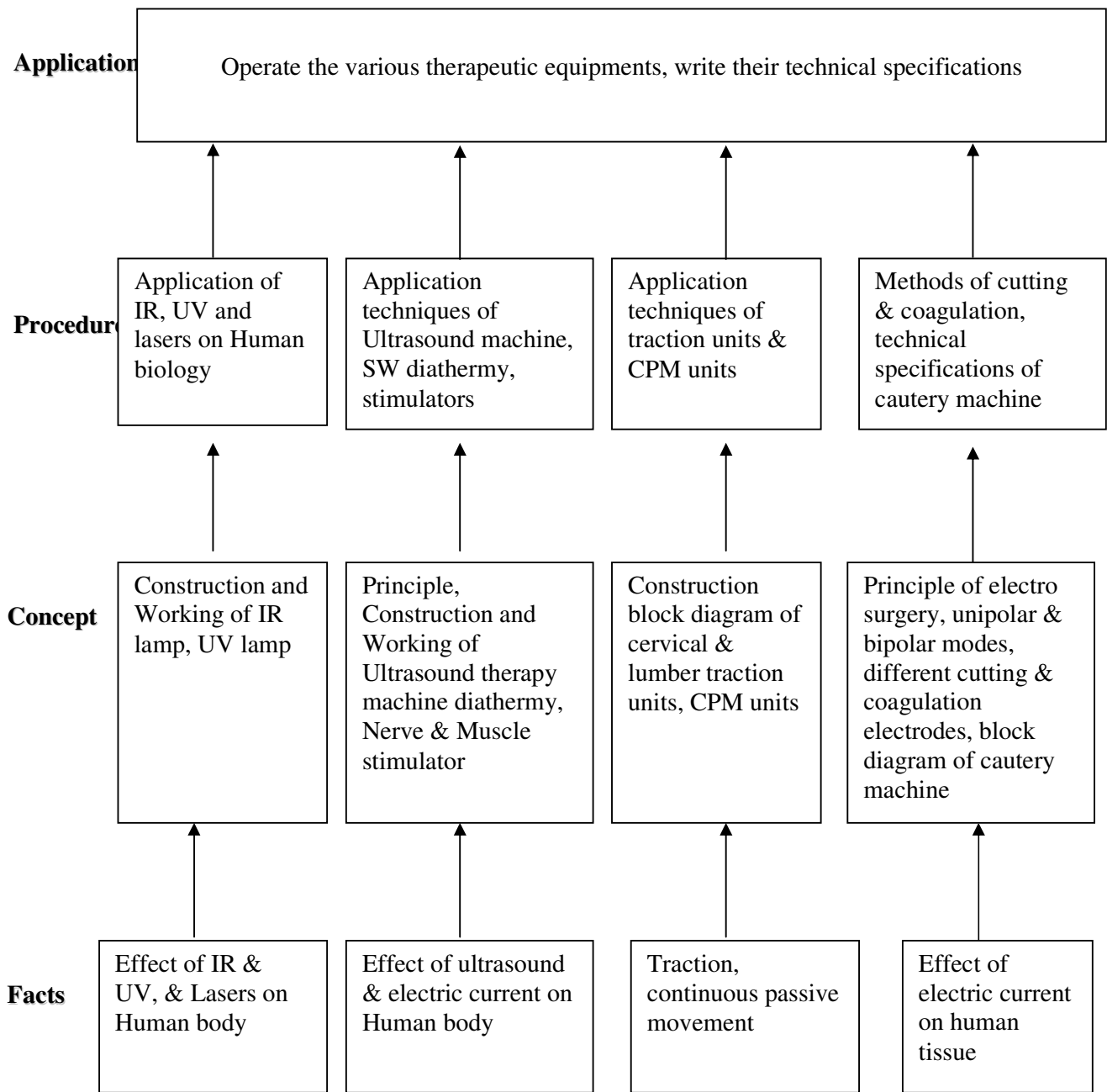
Physiotherapy in recent years has developed so explosively that, it is now used not only in hospitals but in sport medicine and even at home. It has become a part of day to day life. This subject covers physiotherapy and surgical equipments. Today, we have advanced physiotherapy equipment based on electrical stimulation, heat radiation, ultrasound and even laser. Student will become familiar with these latest equipments, used for physiotherapy and surgery through this subject.

**Objectives:**

The student will be able to:

1. Write technical specifications of the equipment.
2. Operate various therapeutic equipments.
3. Understand the principle of operation of the equipment.
4. Describe applications of equipment.

**Learning Structure:**



## Contents: Theory

Chapter	Name of the Topic	Hours	Marks
01	<b>Thermo and Laser Therapy</b> 1.1 Effect IR & UV on human body, hyperemia, pain relief through IR & UV. 1.2 Construction & working of IR lamp. 1.3 Construction, assembly, circuit and principle of operation of UV lamp 1.4 Application of lasers on human body, He -Ne & diode lasers, safely aspects.	06	12
02	<b>Ultrasound Therapy &amp; Short Wave Diathermy</b> 2.1 Effect of ultrasound on human body 2.2 Construction of ultrasound therapy transducer 2.3 Technical specifications, circuit diagram & principal of operation of ultrasound therapy machine 2.4 Effect of SW on human body, capacitive & inductive field, applications techniques 2.5 Technical specifications, circuit diagram and principle of operation of short wave diathermy	16	22
03	<b>Electrotherapy</b> 3.1 Effect of electric current on nerves & muscles, stimulation of nerves & muscles 3.2 Application techniques of electrotherapy, technical specifications, circuit diagram, principle of operation of nerve & muscle stimulator 3.3 Principle of interference therapy	08	16
04	<b>Traction &amp; CPM</b> 4.1 Need of traction unit 4.2 Construction, block diagram, principle of operation of cervical & lumber traction units 4.3 Continues passive movement, introduction to knee & shoulder CPM units	08	12
05	<b>Electro surgery</b> 5.1 Effect of electric current on human tissue, principle of electro surgery, unipolar & bipolar modes 5.2 Methods of cutting & coagulation. 5.3 Technical specifications, circuit diagram & principle of operation of valve type cautery 5.4 Principle, technical specifications, block diagram of solid-state cautery machine 5.5 Patients safety in cautery machine. 5.6 Different types of cutting & coagulation electrodes	10	18
<b>Total</b>		<b>48</b>	<b>80</b>

**Practical:**

Skills to be developed:

Intellectual Skills:

1. Understand testing procedure.
2. Use of appropriate machine.
3. Interpretation of results.

Motor Skills:

1. Testing of machines.
2. Observational skills.
3. Application of proper procedure.

**PRACTICAL: - (Any EIGHT)**

1. Testing & study of UV lamp & its circuit.
2. Study of construction of ultrasound therapy transducer.
3. Performance testing of ultrasound therapy machine & study of its circuit.
4. Study of application technique of short wave diathermy in condenser/ inductive fields & its controls
5. Observation of various waveforms of nerve & muscle stimulator on dummy patient.
6. Study of electrodes of Electro-surgical Unit (ESU).
7. Performance testing of ESU on dummy patient with unipolar & bipolar modes.
8. Generation & testing of coagulation/cutting waveforms of solid state cautery
9. Generation of IG & faradic waveforms using electronic circuit.
10. Generation of 1MHz frequency waveform for ultrasound therapy using electronic circuit.

**DEMO: - (Any two)**

- Study of leaser therapy.
- Study of interference therapy
- Study of traction machine
- Study of CPM.

**Learning Resources:****Books:**

Sr. No.	Author	Title	Publisher
1	A.G. Patil	Medical Electronics	Excel Books
2	R. S. Khandpur	Handbook of biomedical instrumentation	Tata McGraw Hill
3	Lesli P Cromwell, Fred J. Weibell, Erich A. Pfeiffer	Biomedical instrumentation & measurements	Prentice hall of India
4	Carr Joseph J., Brown J.M	Introduction to biomedical equipment technology	Pearson education
5	John G. Webster, Eiditor	Medical instrumentation- application & design	John Wiley and Sons (Asia)

**Course Name : Diploma in Medical Electronics**

**Course Code : MU**

**Semester : Sixth**

**Subject Title : Installation, Maintenance and Servicing of Medical Equipment**

**Subject Code : 9190**

**Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme						
TH	TU	PR	PAPER HRS.	TH	TEST	PR	OR	TW	TOTAL
03	--	02	03	80	20	--	25@	--	125

**Rationale:**

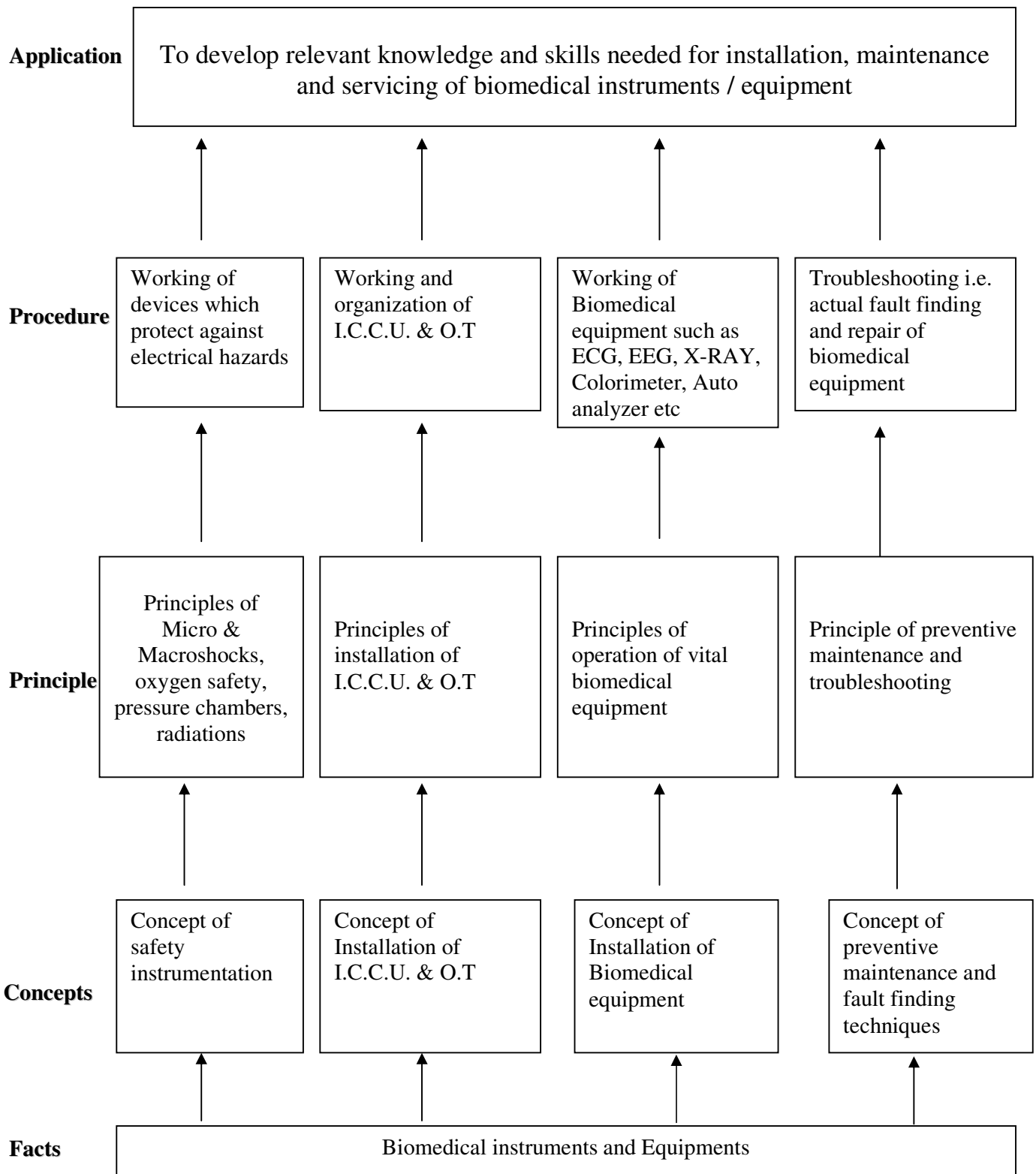
Use of medical equipment is oriented with the specific purpose like diagnostic, therapeutic or analyzing equipments. But while bringing equipment in use we have to maintain some conditions like environmental, electrical etc. to carry out optimum performance of equipment without trouble. We have to maintain some conditions & be sure about that during installation of equipment. We have to carry out servicing of medical equipments for its untroubled use and for expected performance. Equipment mechanism oriented with individual or combination of mechanical, electrical or pneumatic systems. Therefore wear & tear, friction, locking, worn parts etc. problems are created inside equipment. To avoid future failure of equipment & bringing equipment in use we have to carry out maintenance. Student must become skillful about checking, calibrating, and troubleshooting medical equipment by using specific procedure, troubleshooting methods, thumb-rule techniques so as to easily troubleshoot the problem in minimum time & in fewer efforts. Subject is oriented with keen knowledge about installation, troubleshooting, servicing & maintenance of medical equipment and patient safety.

**Objectives:**

The student will be able to:

1. Highlighting importance about reliability aspects of electronic equipment with special reference to maintenance.
2. Learning systematic fault finding techniques, troubleshooting procedures, component replacement procedure for developing troubleshooting skills.
3. To bring awareness about common problems, operating conditions, precautions & installation procedures of medical equipment and patient safety
4. Giving knowledge about optimum performance tests, calibration tests, operating modes, front & rear panel controls of different medical equipments.

**Learning Structure:**



**Contents: Theory**

<b>Chapter</b>	<b>Name of the Topic</b>	<b>Hours</b>	<b>Marks</b>
<b>01</b>	<b>Introduction &amp; Fundamental of Trouble Shooting</b> 1.1 Definition of Installation, maintenance & servicing 1.2 Reliability aspects, equipment failure & cause of failure 1.3 Reliability prediction, maintenance policy 1.4 Tools & aids for troubleshooting 1.5 Trouble shooting techniques, procedure, grounding system and trouble-shooting check 1.6 Corrective & preventive maintenance	<b>06</b>	<b>08</b>
<b>02</b>	<b>Installation Procedure</b> 2.1 Equipment- X-ray machine, Auto analyzer, Electro surgery unit and Incubator 2.2 OT & ICCU :-over view, location, space requirement, design, isolation, light system, equipment sterilization.	<b>08</b>	<b>12</b>
<b>03</b>	<b>Performance, Test &amp; Calibration Of Medical Equipment</b> 3.1 Analytical equipment: pH meter, calorimeter, spectrophotometer and flame photometer 3.2 Diagnostic equipment: pulse oxymeter, audiometer and ECG, 3.3 Intensive care equipment: external pacemaker, defibrillator, bedside monitor 3.4 Therapeutic equipment: ultrasound therapy, short wave diathermy, electro surgery 3.5 Imaging: X-ray.	<b>12</b>	<b>16</b>
<b>04</b>	<b>Trouble Shooting &amp; Fault Finding Procedure of Medical Equipment</b> 4.1 Trouble shooting & fault finding procedure 4.2 Preparation of fault finding tree / chart for following equipments <ul style="list-style-type: none"> <li>• Analytical equipment: - pH meter, spectrophotometer, flame photometer, auto-analyzer centrifuge, oven</li> <li>• Diagnostic equipment: - pulseoxymeter, audiometer ECG, EEG, nerves &amp; muscle stimulator.</li> <li>• Intensive care equipment: - pacemaker, defibrillator, suction apparatus, bedside monitor, baby incubator, boils apparatus</li> <li>• Therapeutic equipment: -UV lamp, ultrasound therapy , short wave diathermy, nerves &amp; muscle stimulator, electrocautery, CPM</li> <li>• Imaging equipment - X-ray</li> </ul>	<b>16</b>	<b>32</b>
<b>05</b>	<b>Safety Instrumentation</b> 5.1 Introduction 5.2 Causes of electrical shock micro & macro shock 5.3 Physiological effects of electrical shock 5.4 Electrical hazards in hospital environment & leakage current 5.5 Methods of accident prevention 5.6 Test of grounding system in patient care area, chassis leakage current	<b>06</b>	<b>12</b>
<b>Total</b>		<b>48</b>	<b>80</b>

**Practical:**

Skills to be developed:

Intellectual Skills:

1. Applications of various instruments.
2. Know installation procedure.

Motor Skills:

1. Trouble shooting.
2. Operation of instruments.
3. Check graphs/ waveforms for accuracy and correctness.

**List of Practical:** (Any eight)

Test the equipment for optimum performance & locate the fault of equipment.

1. pH meter
2. Colorimeter
3. Spectrophotometer
4. Flame photometer
5. Pulse oxymeter
6. Bedside monitor
7. DC Defibrillator
8. External pacemaker
9. Ultrasound therapy
10. Short wave diathermy
11. Electro-surgery
12. X-ray machine
13. ECG machine

**Learning Resources:****Books:**

<b>Sr. No.</b>	<b>Author</b>	<b>Title</b>	<b>Publisher</b>
01	A. G. Patil	Medical Electronics	Excel Books
02	R. S. Khandpur	Handbook of biomedical instrumentation	Tata McGraw Hill
03	Lesli P Cromwell, Fred J. Weibell, Erich A. Pfeiffer	Biomedical instrumentation & measurements	Prentice hall of India
04	Carr Joseph J., Brown J.M	Introduction to biomedical equipment technology	Pearson Education
05	John G. Webster, Eiditor	Medical instrumentation-application & design	John Wiley and Sons (Asia)

**Course Name : Diploma in Medical Electronics**

**Course Code : MU**

**Semester : Sixth**

**Subject Title : Intensive Care Equipment**

**Subject Code : 9191**

**Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme						
TH	TU	PR	PAPER HRS.	TH	TEST	PR	OR	TW	TOTAL
03	--	02	03	80	20	--	25#	25@	150

**Rationale:**

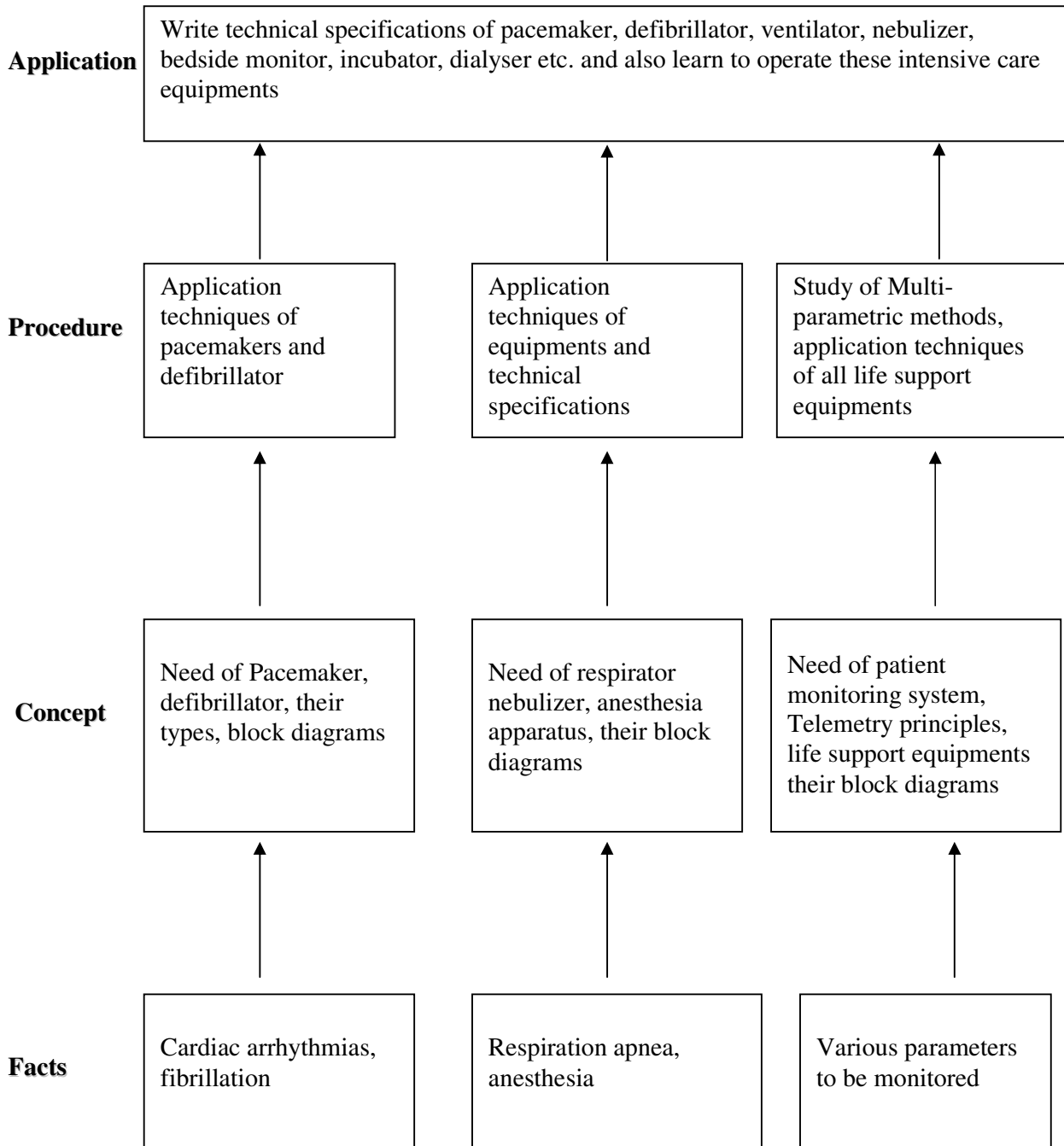
In the hospital environment intensive care is a special unit, oriented with emergency and special case services. Biomedical equipments are used in ICU having special importance than routine equipments, like pacemaker, defibrillator, ventilator, nebulizer, etc. having specific application as per need. These equipments work on various principles; it measures & controls various physiological parameters. The topics under this subject cover detail study of equipment's working principle, operating modes, block diagrams for understanding their effective use.

**Objectives:**

The student will be able to:

1. Write technical specifications of the equipment.
2. Operate various intensive – care equipments.
3. Understand the principle of operation of the equipment.
4. Describe applications of equipment.

**Learning Structure:**



**Contents: Theory**

<b>Chapter</b>	<b>Name of the Topic</b>	<b>Hours</b>	<b>Marks</b>
<b>1</b>	<b>Pacemaker</b> 1.1 Cardiac arrhythmias - Heart block & need of cardiac pacemaker 1.2 Types of pacemaker – Internal & external; fixed, demand & programmable 1.3 Endocardial & myocardial leads 1.4 Technical specifications, block diagrams, circuit diagrams of fixed-implantable pacemaker 1.5 Technical specifications, block diagram & principle of external pacemaker with fixed & demand modes	<b>12</b>	<b>20</b>
<b>2</b>	<b>Defibrillator</b> 2.1 Fibrillation of heart, need of defibrillator, application techniques, instant & sync modes, electrodes 2.2 Technical specifications & principle of DC -Defibrillator 2.3 Simplified circuit diagrams of charging & discharging sections of DC-Defibrillator	<b>10</b>	<b>16</b>
<b>3</b>	<b>Ventilator, Nebulizer and Suction Apparatus</b> 3.1 Respiration & Apnea, need & application techniques of respirator / ventilator, nebulizer, suction apparatus & anesthesia apparatus 3.2 Technical specifications block diagram & principle of operation of ventilators/ respirator, nebulizer, suction apparatus & boils apparatus.	<b>08</b>	<b>12</b>
<b>4</b>	<b>Patient Monitoring Systems &amp; Telemetry</b> 4.1 Need of bed side & central monitor 4.2 Multi-parameter monitor 4.3 Technical specifications block diagram & principle of operation of patient monitor and central monitor. 4.4 Principle of telemetry 4.5 Technical specifications, block diagram & principle of operation of single & multi channel telemetry systems	<b>10</b>	<b>16</b>
<b>5</b>	<b>Life Support Equipments</b> 5.1 Need of heart - lung bypass machine, oxygenator, artificial heart pump & heat exchanger 5.2 Need of artificial kidney & dialyser 5.3 Block diagram & principle of operation of hemodialysis system 5.4 Need of incubator, technical specifications, block diagram & principle of operation of baby incubator 5.5 Circuit diagram of temperature control & indicator used is baby incubator.	<b>08</b>	<b>16</b>
<b>Total</b>		<b>48</b>	<b>80</b>

**Practical:**

Skills to be developed:

Intellectual Skills:

1. Know the operation of various equipments
2. Know their appropriate use

Motor Skills:

1. Operate various instruments as per instructions
2. Check the waveforms for their correctness
3. Draw graphs

**PRACTICAL: - (Any five)**

- 1) Study construction of pacemaker leads
- 2) Testing & measurement on external pacemaker with dummy patient
- 3) Study of construction of defibrillator assembly
- 4) Testing of charging, discharging & energy control in dc defibrillators with instant & sync mode
- 5) Monitoring of ECG on patient and study of its controls
- 6) Temperature control characteristic of baby incubator
- 7) Installation and testing of single channel telemetry
- 8) To perform and testing of blood leak detector
- 9) Study of construction of bubble oxygenator.

**DEMO: - (Any three)**

1. Demonstration of suction apparatus.
2. Demonstration of nebulizer.
3. Demonstration of central monitor.
4. Demonstration of boils apparatus / anesthesia system..
5. Demonstration of hemodialysis system.
6. Demonstration of ventilator.

**Learning Resources:****Books:**

Sr. No.	Author	Title	Publisher
1	A.G. Patil	Medical Electronics	Excel Books
2	R. S. Khandpur	Handbook of biomedical instrumentation	Tata McGraw Hill
3	Lesli P Cromwell, Fred J. Weibell, Erich A. Pfeiffer	Biomedical instrumentation & measurements	Prentice Hall of India
4	Carr Joseph J., Brown J.M	Introduction to biomedical equipment technology	Pearson education
5	John G. Webster, Eiditor	Medical instrumentation-application & design	John Wiley and Sons (Asia)

**Course Name : Electronics Engineering Group**

**Course Code : ET/EJ/EN/EX/DE/IE/IC/IS/EV/MU/ED/EI/IU**

**Semester : Sixth for ET/EJ/EN/EX/DE/IS/IC/IE/EV/MU and Seventh for ED/EI/IU**

**Subject Title : Industrial Projects**

**Subject Code : --**

**Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme						
TH	TU	PR	PAPER HRS	TH	TEST	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.

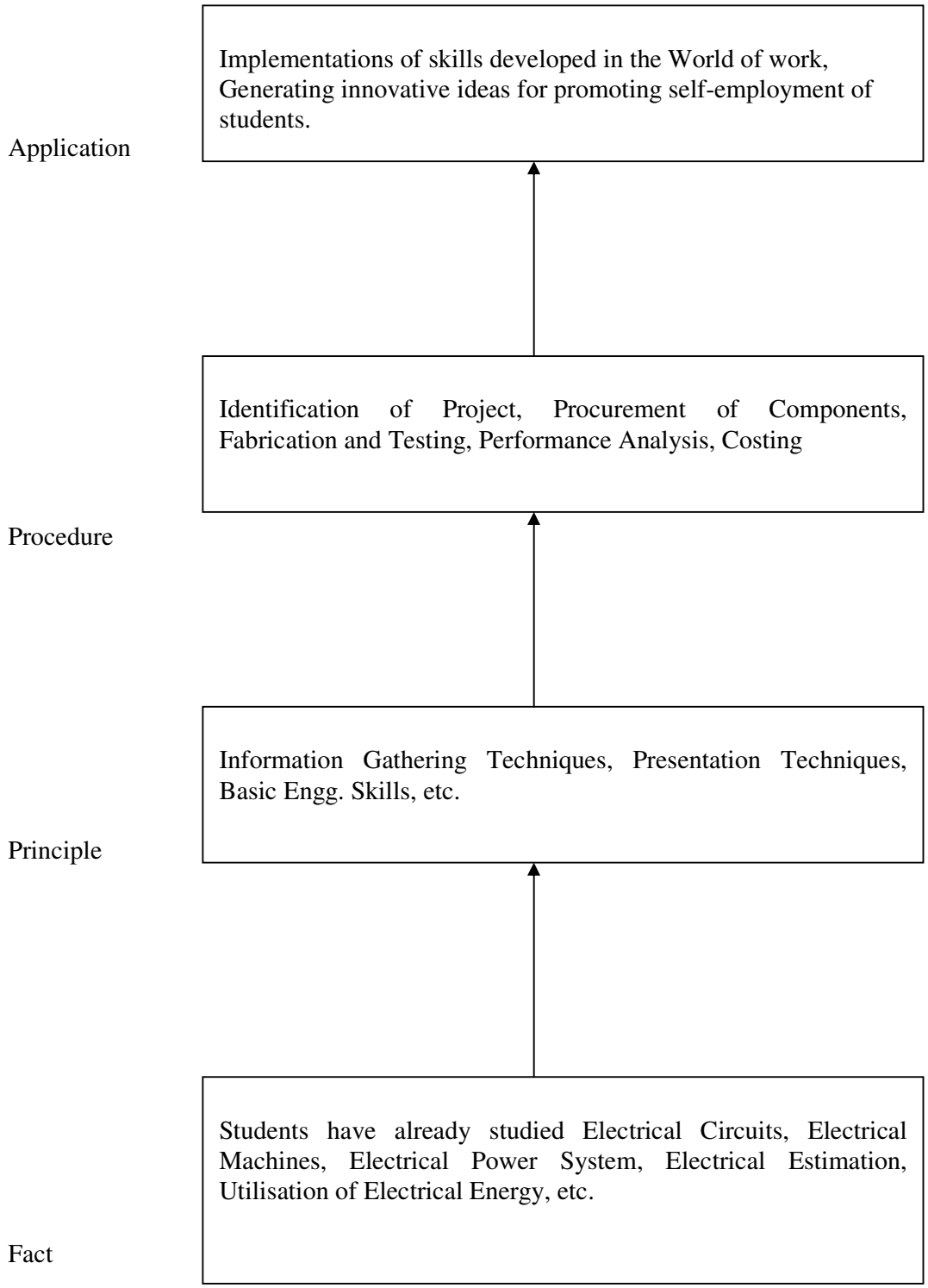
This subject is intended to teach students to understand facts, concepts and techniques of electrical equipments, its repairs, fault finding and testing, estimation of cost and procurement of material, fabrication and manufacturing of various items used in electrical field. This will help the students 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.

**Learning Structure:**



**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:**

Sr. No.	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.

**Course Name : Diploma in Medical Electronics**

**Course Code : MU**

**Semester : Sixth**

**Subject Title : Professional Practices-VI**

**Subject Code : --**

**Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme						
TH	TU	PR	PAPER HRS	TH	TEST	PR	OR	TW	TOTAL
--	--	05	--	--	--	--	--	50@	50

**Rationale:**

Most of the diploma holders are employed in industries. Due to globalization and competition in the industrial and service sectors the selection for the job is based on campus interviews or competitive tests.

While selecting candidates a normal practice adopted is to see general confidence, ability to communicate and attitude, in addition to basic technological concepts.

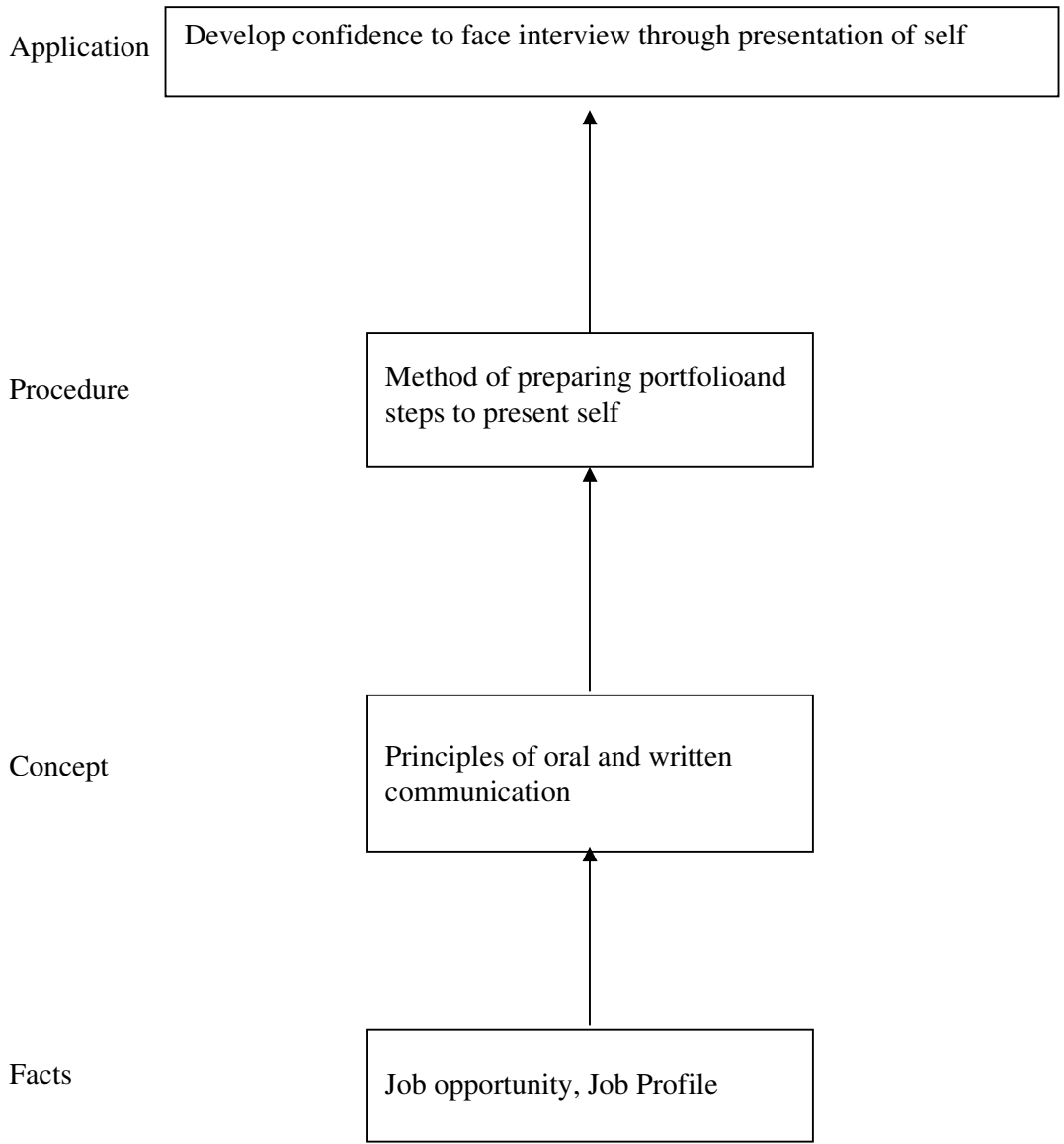
The purpose of introducing professional practices is to provide opportunity to students to undergo activities, which will enable them to develop confidence. Industrial visits, expert lectures, seminars on technical topics and group discussion are planned in a semester so that there will be increased participation of students in learning process.

**Objectives:**

Student will be able to:

1. Acquire information from different sources.
2. Prepare notes for given topic.
3. Present given topic in a seminar.
4. Interact with peers to share thoughts.
5. Prepare a report on industrial visit, expert lecture.

**Learning Structure:**



Activity	Content	Hours
01	<p><b>Industrial Visits</b>            Structured industrial visits be arranged and report of the same should be submitted by the individual student, to form part of the term work.            The industrial visits may be arranged in the following areas :</p> <ul style="list-style-type: none"> <li>i) Super Specialty Hospital</li> <li>ii) Calibration Laboratory for Medical equipment</li> <li>iii) Maintenance Unit</li> <li>iv) Any other relevant area.</li> </ul>	21
02	<p><b>Lectures by Professional / Industrial Expert to be organized from any of the following areas:</b></p> <ul style="list-style-type: none"> <li>i. New equipment in Medical Field</li> <li>ii. Operation and Maintenance of special purpose equipment</li> <li>iii. Carrier guidance and interviewing techniques</li> <li>iv. Self-employment.</li> <li>v. Any other relevant topic</li> </ul>	16
03	<p><b>Information Search :</b>            Students should prepare a report as a part of term work how they are searching and collecting the information regarding their final project/ industrial project .</p>	12
04	<p><b>Seminar</b>            Each student will deliver a seminar on some technical Topic. It could on his project, a topic which will give information about new trends in technology, Topic of a subject which is being taught in the sixth semester. OR Any other topic</p>	16
05	<p><b>Group Discussion :</b>            The students should discuss in a group of six to eight students and write a brief report on the same as a part of term work. The faculty members may select the topic group discussions. Some of the suggested topics are</p> <ul style="list-style-type: none"> <li>i. Advance technology Boon or Curse.</li> <li>ii. Any other topic.</li> </ul>	15
	<b>Total</b>	80

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI																	
TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES																	
COURSE NAME : ELECTRONICS ENGINEERING GROUP																	
COURSE CODE : EJ/EN/ET/ EX/ED/EI																	
DURATION OF COURSE : SIX SEMESTERS FOR ET/EJ/EN/EX AND EIGHT SEMESTERS FOR ED/EI WITH EFFECT FROM 2008-09																	
SEMESTER : SIXTH FOR ET/EJ/EN/EX AND SEVENTH SEMESTER FOR ED/EI DURATION : 16 WEEKS																	
FULL TIME / PART TIME: FULL TIME SCHEME : C																	
SR. NO.	SUBJECT TITLE	SUBJECT CODE	TEACHING SCHEME			EXAMINATION SCHEME											
			TH	TU	PR	PAPER HRS	TH		TEST	TOTAL		PR		OR		TW	
							Max	Min		Max	Min	Max	Min	Max	Min		
1	Management	9133	03	--	--	3	80	28	20	100	40	--	--	--	--	--	--
2	Control Systems	9171	03	--	02	03	80	28	20	100	40	--	--	--	--	25@	10
3	Advance Communication System	9172	03	--	02	03	80	28	20	100	40	--	--	25#	10	25@	10
4	Industrial Project	--	--	--	04	--	--	--	--	--	--	--	--	50#	20	50@	20
5	Professional Practices-VI	--	--	--	05	--	--	--	--	--	--	--	--	--	--	50@	20
<b>Elective – I (Any One)</b>																	
6	Mobile Communication	9173	03	--	02	03	80	28	20	100	40	--	--	25@	10	--	--
6	VLSI Design	9174	03	--	02	03	80	28	20	100	40	--	--	25@	10	--	--
<b>Elective – II (Any One)</b>																	
7	Embedded System	9168	03	--	02	03	80	28	20	100	40	--	--	25#	10	25@	10
7	Telematics	9175	03	--	02	03	80	28	20	100	40	--	--	25#	10	25@	10
<b>TOTAL</b>			<b>15</b>	<b>--</b>	<b>17</b>	<b>--</b>	<b>400</b>	<b>--</b>	<b>100</b>	<b>500</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>125</b>	<b>--</b>	<b>175</b>	<b>--</b>
STUDENT CONTACT HOURS PER WEEK(FORMAL TEACHING) : <b>32 HRS.</b>																	
<b>THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.</b>																	
@ - INTERNAL ASSESSMENT , # - EXTERNAL ASSESSMENT																	
<b>TOTAL MARKS : 800</b>																	
ABBREVIATIONS : TH – THEORY , TU – TUTORIAL , PR – PRACTICALS , OR –ORAL, TW – TERMWORK																	
<b>All Practical, Oral and Term Work to be done as per the prevailing norms for curriculum implementation and assessment.</b>																	