

First Year Curriculum Syllabus for B.Voc.
Degree Programme in
Medical Image Technology

(Dr Babasaheb Ambedkar Technological University, Lonere)

**Regulation, Scheme and syllabus for B.Voc Degree Programme in
Medical Image Technology**

(Dr Babasaheb Ambedkar Technological University, Lonere)

Semester I

Sr. No	Course Code	Name of the Course	Teaching Scheme			Evaluation Scheme			Credits	Total Marks	
			L	T	P	IA	MSE	ESE			
General Education											
			Theory								
1	BVMIC101	Communication Skill	3	0	0	25	0	25	3	50	
2	BVMIC102	Applied Physics	3	0	0	25	0	25	3	50	
3	BVMIC103	Applied Biology	3	0	0	25	0	25	3	50	
4	BVMIC104	Basic Electronics	3	0	0	25	0	25	3	50	
		Total							12	200	
Skill Components											
			Lab/Practical								
5	BVMIL105	Applied Physics Lab	0	0	2	25	0	25	1.5	50	
6	BVMIL106	Basic Electronics Lab	0	0	2	25	0	25	1.5	50	
On-Job-Training (OJT)											
			Evaluation Sheet								
						IA		ESE			
7	BVMIE 117	Applied Physics Labs/Physics Industry	50			150			15	200	
		Electronics Lab/Electronics Industry									
		Biology Lab/Bioscience Department									
		Total							18	300	

Semester II

Sr. No	Course Code	Name of the Course	Teaching Scheme			Evaluation Scheme			Credits	Total Marks	
			L	T	P	IA	MSE	ESE			
General Education											
			Theory								
1	BVMIC201	Tools, Equipment's & Safety Measures	3	0	0	25	0	25	3	50	
2	BVMIC202	Basic Electricity	3	0	0	25	0	25	3	50	
3	BVMIC203	Electronic Measurement & Instrumentation	3	0	0	25	0	25	3	50	
4	BVMIC204	Information Technology	3	0	0	25	0	25	3	50	
Total									12	200	
Skill Components											
			Lab/Practical								
5	BVMIL205	Basic Electricity-Lab	0	0	2	25	0	25	1.5	50	
6	BVMIL206	Information Technology-Lab	0	0	2	25	0	25	1.5	50	
On-Job-Training (OJT)											
			Evaluation Sheet								
						IA		ESE			
7	BVMIE217	MSEB/Solar Plant/Electricity Generation	50			150			15	200	
		Computer Lab/I.T Sector									
		Tool Manufacturing Company/Service Centers									
Total									18	300	

Syllabus

Name of the Course: B. Voc (Medical Image Technology)

Semester I

Subject Name: Communication Skill	
Course Code : BVMIC101	Semester: I
Weekly Teaching Hours: TH: 03 Tut: 00	Scheme of Marking TH: 25 , IA: 25 , Total: 50
TH Exam Duration: 01 Hours	Scheme of Marking PR: --
Credit: 3	
Objective: To understand the essentials of the communication process, identify potential communication problems, construct productive approaches to communication, and develop strategies to develop effective communication skills.	

Content		Hours
Unit – I	Fundamentals of Communication	09
	Definitions of Communication, Communication Cycle (Sender, Idea, Encoding, Message, Channel, Receiving, Receiver, Feedback, etc), Process of Communication, Principles of Effective Communication, Types of Communication, Barriers of Communication.	
Unit – II	Body Language & Non-Verbal Communication	09
	Non-Verbal Codes of Communication , (Kinesics, Proxemics, Chronemics, Haptics, Vocalics, Artefacts), Aspects of Body Language (Facial Expressions, Eye Contact, Gesture, Posture, Dress & Appearance, Silence, Voice Modulations, etc).	
Unit – III	Phonetics & Effective Speaking	09
	Phonetics: A. B. C., Organs of Speech, List of Phonetic Alphabets, Pronunciation Techniques (Volume, Pace, Pitch, Articulation, Pauses, Fluency, etc.), The Art of Public Speaking, Telephone Etiquettes.	
Unit – IV	Drafting Skills	09
	Job Application & Resume, Office Drafting (Notice, Memo, Email), Letter Writing (Inquiry, Order, Complaint & Adjustment), Report Writing (Progress Report, Accident Report, etc).	

Books		
Name of Authors	Title of the Book	Publisher
Meenakshi Raman and Sangeeta Sharma	Technical Communication Principles and Practice, Third Edition.	OXFORD University Press, New Delhi, 2015.
Rutherford	Basic Communication Skills, ,	A Pearson Education, New Delhi.
R. C. Sharma and Krishna Mohan,	Business Correspondence and Report Writing,	Tata McGraw Hill.

Subject Name: Applied Physics	
Course Code : BVMIC102	Semester: I
Weekly Teaching Hours: TH: 03 Tut: 00	Scheme of Marking TH: 25 , IA: 25 , Total: 50
TH Exam Duration: 01 Hours	Scheme of Marking PR: --
Credit: 3	
Objectives:	
<ol style="list-style-type: none"> 1. To know the unit & dimensions for physical quantities 2. To understand the basics of heat 3. To understand the basics of ultrasonic waves 4. To understand the basics of optics 5. To understand the basics of illumination 6. To understand the basics of radiation 	

Content		Hours
Unit – I	Unit and dimensions	04
	M.K.S. fundamentals & derived units, S.I. base units supplementary units and derived units, Dimensions of various physical quantities, uses of dimensional analysis.	
Unit – II	Heat	06
	Temperature and its measurement, thermoelectric, platinum resistance thermometers and pyrometers. Conduction through compound media and laws of radiations.	
Unit – III	Ultrasonic	05
	Productions of ultrasonic waves by magnetostriction and piezo-electric effect, application of ultrasonics in industry.	
Unit – IV	Optics	06
	Nature of light, reflection and refraction of a wave from a plane surface. Overhead projector and Epidiascope, introduction to X-rays, properties and application in industry and medical field.	
Unit – V	Illumination	07
	Introduction of Light, Types of illumination, Lighting systems, Lighting Scheme, Measurement of Light, Laws of illumination.	
Unit – VI	Radiation	08
	Principle of radiation detection-Basic principles of ionization chambers, proportional counters, G.M counters and scintillation detectors.	

Books		
Name of Authors	Title of the Book	Publisher
Sanjay D Jain and Sunil M Pande	Applied Physics	University Press
Jack L. Lindsey	Applied Illumination Engineering	The Fairmont Press
Dr. P.G, Kshirsagar	Engineering Physics	S.Chand publication

Subject Name: Applied Biology

Course Code : BVMIC103	Semester: I
Weekly Teaching Hours: TH: 03 Tut: 00	Scheme of Marking TH: 25 , IA: 25 , Total: 50
TH Exam Duration: 01 Hours	Scheme of Marking PR: --
Credit: 3	
Objectives: <ol style="list-style-type: none">1. To understand the basics of cell2. To know anatomy & physiology of human body	

Content		Hours
Unit – I	Cell	08
	The Unit of Life Cell theory and cell as the basic unit of life: Structure of prokaryotic and eukaryotic cells; Plant cell and animal cell; cell envelope; cell membrane, cell wall; cell organelles - structure and function; endomembrane system, endoplasmic reticulum, Golgi bodies, lysosomes, vacuoles; mitochondria, ribosomes, plastids, micro bodies; cytoskeleton, cilia, flagella, centrioles (ultrastructure and function); nucleus.	
Unit – II	Anatomy & Physiology of Human Body	06
	Definition, Anatomical terms (Sectional planes, Anatomical relationships/terminology) position (supine, prone. Recumbent, lithotomy, coronal, sagittal Tissues, Glands and membranes, Homeostasis.	
Unit – III	Cardiovascular and respiratory system	08
	Structure and physiology of Human Heart, cardiac muscles and cardiac cycle Respiratory System Physiological Anatomy of respiratory tract, physiology of respiration, different pulmonary volumes, Artificial Respiration.	
Unit – IV	Digestive System	08
	Introduction, structure and function of digestive organs Pharynx, esophagus, Stomach, Intestines, Liver & Pancreas.	
Unit – V	Endocrinology and Reproductive System	06
	Hormones, Homeostasis, Pituitary Gland, Thyroid Gland, Parathyroid Gland, and Endocrine function of pancreas, Adrenal hormones, Local Hormones Male reproductive system, Female reproductive system, Menstrual Cycle, Fertility Control.	

Books

Name of Authors	Title of the Book	Publisher
Priya Ranganath Leelavathy N	Basic in Human Anatomy	Jaypee
Govind Chavhan	Cross Sectional Anatomy CT and MRI	Jaypee
B.D.Chaurasia	Human Anatomy	CBS
Ross & Wilson	Anatomy & Physiology	Elsevier

Subject Name: Basic Electronics

Course Code : BVMIC104	Semester: I
Weekly Teaching Hours: TH: 03 Tut: 00	Scheme of Marking TH: 25 , IA: 25 , Total: 50
TH Exam Duration: 01 Hours	Scheme of Marking PR: --
Credit: 3	

Objectives:

1. To know basics of CRO & its application
2. To understand the basics of semiconductor devices
3. To understand the working and application of transistor
4. To familiarize with soldering & de-soldering of electronic devices

Content	Hours	
Unit – I	Overview of atomic particles and CRO	06
	Brief History of Electronics. Atom and its elements, Electron, Force, Field intensity, Potential, Energy, current Electric field, Magnetic field, Motion of charged particles in electric and magnetic field. Overview of CRO, Electronic and Magnetic deflection in CRO, Applications.	
Unit – II	Semiconductor Devices.	08
	Semiconductor materials, Metals and Semiconductors and Photo- electric emission. N -type and P-type semiconductor, Effects of temperature on Conductivity of semiconductor. PN junction diode, depletion layer, Forward & Reverse bias, V-I Characteristic, Effects of temperature, Zener diode, Types and applications of diode. Diode as a rectifier, Half wave and full wave rectification, Zener diode Regulator. Introduction to Filters, Clippers, Clampers.	
Unit – III	Bipolar junction transistor	08
	Operation of NPN and PNP transistors, Biasing of BJT. CB, CE and CC configuration. Introduction to FET, JFET, MOSFET, CMOS and VMOS	
Unit – IV	Transistor amplifier and applications	06
	Introduction, Single and Multi-stage amplifiers Introduction to Oscillators Introduction to Thyristors, PNP diode, SCR, LASCR, DIAC, TRIAC.	
Unit – V	Soldering and De-soldering basic components	08
	Soldering tools, different types of soldering guns related to temperature and wattages, Soldering materials and their grading, soldering and De soldering components on PCB , Safety precautions while Soldering & De soldering, join the PCB track and test, check for continuity of PCB, PCB applications.	

Books

Name of Authors	Title of the Book	Publisher
R.S. Sedha	Applied Electronics	S. Chand
Bruce R. Archambeault and James Drewniak	PCB Design for Real-World EMI Control	Springer Science
Kraig Mitzner	Complete PCB Design Using OrCad Capture and Layout	Newnes Pub
V.K. Mehta, Rohit Mehta	Principles of Electronics	S. Chand

Subject Name: Applied Physics-Lab

Course Code : BVMIL105	Semester: I
Weekly Practicals: PR: 02 Tut: 00	Scheme of Marking TH: --
TH Exam Duration: --	Scheme of Marking PR: 25 , IA: 25 , Total: 50
Credit: 1.5	

Content

Objectives:

1. To know the unit & dimensions for physical quantities
2. To understand the basics of heat
3. To understand the basics of ultrasonic waves
4. To understand the basics of optics
5. To understand the basics of illumination
6. To understand the basics of radiation

List of Practical: (Perform any 10 practical)

1. To get familiarize with laboratory and its equipment's.
2. Find the length ,diameter of the specimen by vernier caliper
3. To find the area of cross section using micro meter screw gauge
4. Calibration of thermocouple
5. Determine thermal conductivity of conductor using thermocouple.
6. Determination of thermal conductivity of a good conductor by Forbe's method
7. Determination of Velocity of Ultrasonic waves in a given liquid using Ultrasonic Interferometer
8. Determination of wavelength of ultrasonic waves using Kundt's tube method
9. Determination of focal spot size of diagnostic X-ray tube
10. Conduct illumination level assessment in workplace using lux meter.
11. Fit the given lamp in the selected mounting.
12. Interpret the polar curves of the given type of lamp and verify it using the lux meter
13. Measure the illumination output of different lamps and compare it with their wattage.
14. Congruence of Radiation and Optical field and beam.
15. Consistency of Radiation Output.

Subject Name: Basic Electronics Lab

Course Code : BVMIL106	Semester: I
Weekly Practicals: PR: 02 Tut: 00	Scheme of Marking TH: --
TH Exam Duration: --	Scheme of Marking PR: 25 , IA: 25 , Total: 50
Credit: 1.5	

Content

Objectives:

1. To know basics of CRO & its application
2. To understand the basics of semiconductor devices
3. To understand the working and application of transistor
4. To familiarize with soldering & de-soldering of electronic devices

List of Practical: (Perform any 10 practical)

1. Study of Resistance measurement using color code
2. Measurement of accuracy of voltage using power supply and digital millimeters
3. Measure current, voltage and resistance measurement using of Multi-meter
4. Study of working principle of Signal Generator and measurement of amplitude, time period and Frequency of signal using Oscilloscope.
5. Study of V-I Characteristic of Zener Diode. And use of Zener Diode as voltage regulator.
6. Test the performance of half wave rectifier with and without filter circuit.
7. Test the performance of Full wave rectifier with and without filter circuit.
8. Study CE configuration for NPN and PNP transistors and measurement of voltage and current gain.
9. Study CB configuration for NPN and PNP transistors and measurement of voltage and current gain.
10. Study CC configuration for NPN and PNP transistors and measurement of voltage and current gain.
11. Study of working of single layer PCB manufacturing
12. Test and troubleshoot the given PCB.
13. Perform soldering and disordering of components on PCB
14. Perform soldering and disordering of SMD's

On-Job-Training (OJT)

Subject Name: Applied Physics Labs/Physics Industry Electronics Lab/Electronics Industry Biology Lab/Bioscience Department	
Course Code : BVMIE117	Semester: I
Weekly Skilling Hours: PR: 24 Tut: 00	Scheme of Marking TH: 00 , IA: 00 , Total: 00
PR Exam Duration: 06 Hours	Scheme of Marking PR: 200 , IA: 00 , Total: 200
Credit: 15	

Syllabus

Name of the Course: B. Voc (Medical Image Technology)

Semester II

Subject Name: Tools, Equipment's & Safety Measures	
Course Code : BVMIC201	Semester: II
Weekly Teaching Hours: TH: 03 Tut: 00	Scheme of Marking TH: 25 , IA: 25 , Total: 50
TH Exam Duration: 01 Hours	Scheme of Marking PR: --
Credit: 3	
Objectives:	
<ol style="list-style-type: none"> 1. To know the basics of cables & connectors 2. To use tools & equipment's for measuring human physical parameter 3. To know the ESD clothing 	

Content	Hours
Unit – I	09
Cables & Connectors	
Non-Metallic Sheathed Cable Un grounded & Grounded Power Supply Cable.Metallic Sheathed Cable.Multi-Conductor Cable. Coaxial Cable. Unshielded Twisted Pair Cable. Shielded twisted pair cable. Ribbon Cable. Armored & Unarmored Cable. Twin-Lead Cable. Twin axial Cable. Optical fiber cable, Connectors.	
Unit – II	09
Tools & Equipment	
Types of tools & equipment required and deployed in manufacturing, installing & servicing, General maintenance of tools/equipment and recalibration of Test equipment, General safety and common-sense safety.	
Unit – III	09
ESD Clothing	
What to wear, how to wear, PPE, Usage & benefits of PPE, Types & usage of various PPE, Maintenance of PPE.	
Unit – IV	09
Clean Room Environment	
Do's and Don't ,Shop Floor Discipline.	

Books		
Name of Authors	Title of the Book	Publisher
----	Cable Assemblies, Cables, Connectors and Passive Microwave Components: Screening Attenuation Measurement by the Reverberation Chamber Method	International Electro technical Commission
William G. Duff	Cables and Connector	IET Digital Library

Subject Name: Basic Electricity

Course Code : BVMIC202	Semester: II
Weekly Teaching Hours: TH: 03 Tut: 00	Scheme of Marking TH: 25 , IA: 25 , Total: 50
TH Exam Duration: 01 Hours	Scheme of Marking PR: --
Credit: 3	

Objectives:

1. To know the basics of electricity
2. To understand basic laws of d.c. circuits
3. To understand the basics of electromagnetic effect
4. To understand the working of a.c. circuits

Content		Hours
Unit – I	Current Electricity:	05
	Definition of Resistance, Voltage, Current, Power, Energy and their units, Temperature variation of resistance, Difference between AC and DC voltage and current.	
Unit – II	D.C. Circuits:	07
	Ohm's Law, Series – parallel resistance circuits, calculation of equivalent resistance, Kirchoff's Laws and their applications.	
Unit – III	Electric Cell	06
	Primary cell, wet cell, dry cell, battery, Li-ion battery, series and parallel connections of cells, Secondary cells, Lead Acid Cell, Discharging and recharging of cells, preparation of electrolyte, care and maintenance of secondary cells.	
Unit – IV	Capacitors:	06
	Capacitor and its capacity, Concept of charging and Discharging of capacitors, Types of Capacitors and their use in circuits, Series and parallel connection of capacitors, Energy stored in a capacitor.	
Unit – V	Electromagnetic Effects:	06
	Permanent magnets and Electromagnets, their construction and use, Polarities of an electromagnet and rules for finding them. Faraday's Laws of Electromagnetic Induction, dynamically induced e.m.f., inductance and its unit. Mutually induced e.m.f., its magnitude and direction, Energy stored in an inductance. Principles and construction of dynamo	
Unit – VI	A.C Circuits	06
	Generation of A.C. voltage, its generation and wave shape. Cycle, frequency, peak value capacitance, Q factor of R.L.C. series circuits. R.M.S. value, form factor, crest factor, Phase difference, power and power factor, A.C. Series Circuits with (i) resistance and inductance (ii) resistance and capacitance and (iii) resistance inductance and	

Books

Name of Authors	Title of the Book	Publisher
A Text book of Electrical technology Vol-I	Theraja B.L , Theraja A.K	S.Chand
Basic Electrical Engineering	Mittile V.N	Tata McGraw Hill
Fundamentals of Electrical Engg.	Ashfaq Husan	Dhanpat Rai & Co.

Subject Name: Electronic Measurement & Instrumentation

Course Code : BVMIC203	Semester: II
Weekly Teaching Hours: TH: 03 Tut: 00	Scheme of Marking TH: 25 , IA: 25 , Total: 50
TH Exam Duration: 01 Hours	Scheme of Marking PR: --
Credit: 3	

Objectives:

1. To know the measurement error
2. To understand the working of analog & digital meters
3. To understand low resistance measuring instruments
4. To know the concept of instrument calibration

Content		Hours
Unit – I	Unit, dimensions and standards	06
	Scientific notations and metric prefixes. SI electrical units, SI temperature scales, Other unit systems, dimension and standards.	
Unit – II	Measurement Errors	06
	Gross error, systematic error, absolute error and relative error, accuracy, precision, resolution and significant figures, Measurement error combination, basics of statistical analysis.	
Unit – III	Analog meters & Digital meters	06
	PMMC instrument, galvanometer, DC ammeter, DC voltmeter, series ohm meter Transistor voltmeter circuits, AC electronic voltmeter. Current measurement with electronic instruments, probes Digital voltmeter systems, digital millimeters, digital frequency meter system.	
Unit – IV	Wheatstone bridge, low resistance measurements	06
	Low resistance measuring instruments AC bridge theory, capacitance bridges, Inductance bridges, and Q meter.	
Unit – V	CRO Construction	06
	CRT, wave form display, time base, dual trace oscilloscope.	
Unit – VI	Instrument calibration	06
	Comparison method, digital multi-meters as standard instrument, calibration Instrument Recorders: X-Y recorders, plotters.	

Books

Name of Authors	Title of the Book	Publisher
Kalsi H S	Electronic Instrumentation	Mcgraw Higher Ed
Albert D. Helfrick, William David Cooper	Modern Electronic Instrumentation and Measurement	PHI
A Course in Electrical and Electronic Measurements and Instrumentation	A. K. Sawhney, Puneet Sawhney	Rai

Subject Name: Information Technology

Course Code : BVMIC204	Semester: II
Weekly Teaching Hours: TH: 03 Tut: 00	Scheme of Marking TH: 25 , IA: 25 , Total: 50
TH Exam Duration: 01 Hours	Scheme of Marking PR: --
Credit: 3	

Objectives:

1. To know computer organization and operating system
2. To know the concept of network and its security
3. To know & learn the office automation tools and multimedia design
4. To troubleshoot hardware, software and networking issues

Content		Hours
Unit – I	Computer Organization & OS: User perspective.	04
	Understanding of Hardware. Basics of Operating System.	
Unit – II	Networking and Internet	06
	Network Safety concerns, Network Security tools and services, Cyber Security, Safe practices on Social networking.	
Unit – III	Office automation tools:	05
	Spreadsheet, Word processing, Presentation.	
Unit – IV	Multi Media Design: (Open Source Design Tools).	06
	Interface and Drawing Tools in GIMP, Applying Filters, Creating and handling multiple layers, Using Stamping and Smudging tools, Importing pictures.	
Unit - V	Troubleshooting: Hardware, Software and Networking.	07
	Commonly encountered problems,(Monitor: No display, KB/Mouse not responding, monitor giving beeps, printer not responding, check for virus, delete temporary files if system is slow, adjust mouse speed).	
Unit - VI	Work Integrated Learning IT – ISM	08
	Identification of Work Areas, Work Experience.	

Books

Name of Authors	Title of the Book	Publisher
Computer fundamental	Goel .Anita	Pearson Education
Computer fundamental	Dr. Rajjendra kawale	Devrao publication
Microsoft office 2010 for windows	Schwartz Steve	Pearson Education

Subject Name: Basic Electricity-Lab

Course Code : BVMIL205	Semester: II
Weekly Practicals: PR: 02 Tut: 00	Scheme of Marking TH: --
TH Exam Duration: --	Scheme of Marking PR: 25 , IA: 25 , Total: 50
Credit: 1.5	

Content

Objectives:

1. To know the basics of electricity
2. To understand basic laws of d.c. circuits
3. To understand the basics of electromagnetic effect
4. To understand the working of a.c. circuits

List of Practical: (Perform any 10 practical)

1. To know electrical laboratory
 - a) Layout of electrical laboratory
 - b) Prepare charts of electrical safety and to use electrical tools.
2. Verification of ohms law.
3. Verification of KVL and KCL.
4. Study of series resistive circuits.
5. Study of parallel resistive circuits.
6. Study of series and parallel connection of cells in circuits.
7. Preparation of Electrolyte for lead acid battery and its charging and measurement of Specific gravity with the help of hydrometer.
8. In the series connected circuit determine the equivalent capacitance.
9. In the parallel connected circuit determine the equivalent capacitance.
10. Charging and Discharging of a capacitor.
11. Verification of Faraday's Laws of electromagnetic induction.
12. Verification of Torque development in a current carrying coil in magnetic field.
13. Study of R.L. series circuit and measurement of power and power factor.
14. Study of R.C. series circuit and measurement of power and power factor.
15. Study of R.L.C. series circuit and measurement of power and power factor.
16. Study of R.L.C. series circuit for calculation of inductive reactance, capacitive reactance, impedance and Q- Factor.

Subject Name: Information Technology-Lab

Course Code : BVMIL206	Semester: II
Weekly Practicals: PR: 02 Tut: 00	Scheme of Marking TH: --
TH Exam Duration: --	Scheme of Marking PR: 25 , IA: 25 , Total: 50
Credit: 1.5	

Content

Objectives:

1. To know computer organization and operating system
2. To know the concept of network and its security
3. To know & learn the office automation tools and multimedia design
4. To troubleshoot hardware, software and networking issues

List of Practical:

1. Create Spreadsheets.
2. Create Word sheet by using paragraph ,bullets
3. Create slide Presentation.
4. Create slide presentation with table charts
5. Identify various input/output devices, connection of computer system.
6. Multimedia Design
7. Manage files and folders : create, copy, rename delete , moves files and folders
8. Troubleshooting
9. Use internet for different web services.
10. Configure internet connection.

On-Job-Training (OJT)

Subject Name:

MSEB/Solar Plant/Electricity Generation

Computer Lab/I.T Sector

Tool Manufacturing Company/Service Centers

Course Code : BVMIE217	Semester: I
Weekly Skilling Hours: PR: 24 Tut: 00	Scheme of Marking TH: 00 , IA: 00 , Total: 00
PR Exam Duration: 06 Hours	Scheme of Marking PR: 200 , IA: 00 , Total: 200
Credit: 15	

