



☎ STD - 0431 - 2670142
FAX - 0431 - 2670143

DHANALAKSHMI SRINIVASAN
INSTITUTE OF TECHNOLOGY
(Approved by AICTE, New Delhi & Affiliated to Anna University)
NH - 45, Trichy - Chennai Trunk Road,
SAMAYAPURAM, TRICHY - 621 112.
E.mail: dsit2011@gmail.com Website: www.dsit.ac.in

COURSE PLAN

Subject code: BM8601	Staff Name: S.MUTHULAKSHMI
Branch/Year/Sem /Section: B.E	Academic year: 2019-2020
BME/III/VI	Batch:2017-2021
Subject Name: Diagnostic And Therapeutic	
Equipment-I	

COURSE OBJECTIVE

- Understand the devices for measurement of parameters related to cardiology.
- Illustrate the recording and measurement of EEG
- Demonstrate EMG recording unit and its uses.
- Explain diagnostic and therapeutic devices related to respiratory parameters.
- Understand the various sensory measurements that hold clinical importance.

TEXT BOOK:

T1: John G. Webster, —Medical Instrumentation Application and Design, 4th edition, Wiley India

PvtLtd, New Delhi, 2015.

T2: Joseph J. Carr and John M. Brown, —Introduction to Biomedical Equipment Technology,

Pearson

education, 2012

REFERENCES:

R1. Myer Kutz, —Standard Handbook of Biomedical Engineering & Design, McGraw Hill, 2003.

R2: L.A Geddes and L.E.Baker, —Principles of Applied Biomedical Instrumentation, 3rd Edition, 2008

R3: Leslie Cromwell, —Biomedical Instrumentation and Measurement, Pearson Education, New Delhi, 2007.

R4: Antony Y.K.Chan, Biomedical Device Technology, Principles and design, Charles Thomas Publisher Ltd, Illinois, USA, 2008.

R5: B H Brown, R H Smallwood, D C Barber, P V Lawford and D R Hose, —Medical Physics and Biomedical Engineering, 2nd Edition, IOP Publishers. 2001.

R6: R.S.KHANPUR, Hand Book of Biomedical Instrumentation.

TEACHING METHODOLOGIES:

- BB - BLACK BOARD
- VIDEO - VIDEO TUTORIAL



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- PPT - POWER POINT PRESENTATION

DEPARTMENT OF BIOMEDICAL ENGINEERING

BM8601
L T P C

DIAGNOSTIC AND THERAPEUTIC EQUIPMENT- I

3

0 0

3

UNIT I CARDIAC EQUIPMENT

9

Electrocardiograph,

Normal and Abnormal Waves, Heart rate monitor, Holter Monitor, Phonocardiography, ECG machine maintenance and troubleshooting, Cardiac Pacemaker- Internal and External Pacemaker– Batteries, AC and DC Defibrillator- Internal and External, Defibrillator Protection Circuit, Cardiac ablation catheter.

UNIT II NEUROLOGICAL EQUIPMENT

8

Clinical significance of EEG, Multi-channel EEG recording system, Epilepsy, Evoked Potential–Visual, Auditory and Somatosensory, MEG (Magneto Encephalo Graph). EEG Bio Feedback Instrumentation. EEG system maintenance and troubleshooting..

UNIT III MUSCULAR AND BIOMECHANICAL MEASUREMENTS

10

Recording and analysis of EMG waveforms, fatigue characteristics, Muscle stimulators, nerve stimulators, Nerve conduction velocity measurement, EMG Bio Feedback Instrumentation. Static Measurement – Load Cell, Pedobarograph. Dynamic Measurement – Velocity, Acceleration, GAIT, Limb position.

UNIT IV RESPIRATORY MEASUREMENT SYSTEM

10 Instrumentation for measuring the mechanics of breathing – Spirometer -Lung Volume and vital

capacity, measurements of residual volume, Pneumotachometer – Airway resistance measurement, Whole body Plethysmograph, Intra-Alveolar and Thoracic pressure measurements, Apnoea Monitor. Types of Ventilators – Pressure, Volume, and Time controlled. Flow, Patient Cycle Ventilators, Humidifiers, Nebulizers, Inhalators..

UNIT V SENSORY MEASUREMENT

8

Psychophysiological Measurements – polygraph, basal skin resistance (BSR), galvanic skin resistance (GSR), Sensory responses - Audiometer-Pure tone, Speech, Eye Tonometer, Applanation Tonometer, slit lamp, auto refractometer..

TOTAL: 45

PERIODS

Topic No	Topic Name	Books For reference	Page No	Teaching Methodology	No of periods required	Cumulative periods
UNIT I CARDIAC EQUIPMENT					9	
1.	Electrocardiograph, Normal and Abnormal Waves	T1	147-158	BB	1	1
2.	Heart rate monitor, Holter Monitor	R1	158-162	BB	1	1
3.	Phonocardiography	T1	138-139	BB	1	1
4.	ECG machine maintenance and troubleshooting	T2	237-243	BB	1	1
5.	Cardiac Pacemaker- Internal and External Pacemaker	R6	709-730	BB	1	1
6.	Batteries	R6	720-727	BB	1	1
7.	AC and DC Defibrillator- Internal	T1	606-611	PPT	1	1
8.	External, Defibrillator Protection Circuit,	R6	731-736	PPT	1	1

9.	Cardiac ablation catheter	R6	736-746	BB	1	1
UNIT II NEUROLOGICAL EQUIPMENT						8
10.	Clinical significance of EEG,	T1	140-144	BB	1	1
11.	Multi-channel EEG recording system	T2	398-400	PPT	1	1
12.	Epilepsy and Evoked Potential	R6	183-187	BB	1	1
13.	Visual, Auditory and Somatosensory	T2	405-406	BB	1	1
14.	MEG (Magneto Encephalo Graph)	T1	181-182	PPT	1	1
15.	EEG Bio Feedback Instrumentation	R6	183-186	BB	1	1
16.	EEG system maintenance	T1	182-183	BB	1	1
17.	troubleshooting..	T1	183-185	BB	1	1
LEARNING OUTCOME:						
UNIT III MUSCULAR AND BIOMECHANICAL MEASUREMENTS						10
18	Recording and analysis of EMG waveforms	T1	144-146	BB	1	1
19	fatigue characteristics	R6	187-192	BB	1	1
20	Muscle stimulators, nerve stimulators	R6	791-799	PPT	1	1
21	Nerve conduction velocity measurement	R6	799-804	BB	1	1
22	EMG Bio Feedback Instrumentation	R3	305-306	BB	1	1
23	Static Measurement	R3	306-308	BB	1	1
24	Load Cell, Pedobarograph	R3	308-309	BB	1	1

25	Dynamic Measurement	R3	309-311	BB	1	1
26	Velocity, Acceleration	R3	312-314	BB	1	1
27	GAIT, Limb position	R3	311-312	BB	1	1
UNIT IV RESPIRATORY MEASUREMENT SYSTEM						
						10
28.	Instrumentation for measuring the mechanics of breathing	T2	324-335	BB	1	1
29.	Spirometer	T2	341-342	PPT	1	1
30.	Lung Volume and vital capacity, measurements of residual volume	T2	342-343	BB	1	1
31.	Pneumotachometer	R6	412-415	VIDEO	1	1
32.	Airway resistance measurement	R6	415-418	BB	1	1
33.	Whole body Plethysmograph	R6 T1	213-215 404-411	BB	1	1
34.	Intra-Alveolar and Thoracic pressure measurements	R6	402-407	BB	1	1
35.	Apnoea Monitor	R6	241-244	BB	1	1
36.	Types of Ventilators – Pressure, Volume, and Time controlled. Flow	T1	619-620	BB	1	1
37	Patient Cycle Ventilators, Humidifiers, Nebulizers, Inhalators	T1	620-622	BB	1	1
UNIT V SENSORY MEASUREMENT						
38.	Psychophysiological Measurements	R3	308315	BB	1	1
39.	polygraph, basal skin resistance (BSR),	R3	304-308	BB	1	1

40.	galvanic skin resistance (GSR)	R6	192-194	PPT	1	1
41.	Sensory responses - Audiometer	R6	499-508	BB	1	1
42.	Pure tone	R6	508-508	BB	1	1
43.	Speech	R6	508-511	BB	1	1
44.	Eye Tonometer and Applanation Tonometer	R3	237-238	PPT	1	1
45.	slit lamp, auto refractometer	R3	151-153	PPT	1	1

LEARNING OUTCOME:

At the end of unit , the students will be able to

COURSE OUTCOME:

Explain the devices used in measurement of parameters related to cardiology and neurology

Explain about cardiac assist devices and its continuous monitoring and transmission

Summarize the usage and significance of parameters of neurological equipments

Explain the origin and instrumentation involved in skeletal muscle response

Explain the given methods and parameters involved in respiratory measurement system

CONTENT BEYOND THE SYLLABUS

Patient monitoring system

CONTINUES INTERNAL ASSESSMENT DETAILS

ASSESMENT NUMBER	I	II	MODEL
TOPIC NO.(UNIT)	1-17 (1 st & 2 nd units)	18-37(3 rd & 4 th units)	1-45 (units 1-5)

ASSIGNMENT DETAILS

ASSIGNMENT NUMBER	I	II	III
TOPIC NUMBER FOR REFERENCE	1-18 (1 st & 2 nd units)	18-37 (3 rd & 4 th units)	1-45 (units 1-5)
DEAD LINE			

ASSIGNMENT NUMBER	BATCH	DESCRIPTIVE QUESTIONS/TOPIC (Minimum of 8 Pages)
I	B1 (R.Nos 1-3, 5, 7-16, 18-22)	Explain in detail about holtermonitor as a ambulatory device.
	B1 (R.Nos 23-41)	Explain cardiac pacemakers in detail.
	B3 (R.Nos 42-54, 56-58, 60-61)	Explain in detail about defibrillators.
II	B1 (R.Nos 1-3, 5, 7-16, 18-22)	What is the significance? What is multichannel EEG? What are the types of epilepsy?
	B1 (R.Nos 23-41)	What is evoked potential? What is somatosensory response? Define EEG.
	B3 (R.Nos 42-54, 56-58, 60-61)	What is EEG feedback? Define biofeedback instrumentation. What are the applications of MEG in medical field?
III	B1 (R.Nos 1-3, 5, 7-16, 18-22)	Discuss about bedside patient monitors.
	B1 (R.Nos 23-41)	Discuss the advantages of modern patient monitoring system over traditional patient monitors
	B3 (R.Nos 42-54, 56-58, 60-61)	Explain in detail about configuration of patient monitoring system