

1	Name of Course	<b>Certificate Course in <i>ECG &amp; ICU Instruments</i> (301109)</b>																																								
2	Max. Nos. of Student	25 Students																																								
3	Duration	6 Months																																								
4	Type	Part Time																																								
5	Nos. of Days / Week	6 Days																																								
6	Nos. of Hours /Days	4 Hrs																																								
7	Space Required	Theory Class Room – 200 sqft Practical – 400 sqft																																								
8	Entry Qualification	H.S.C. (Science)																																								
9	Objective Of Syllabus/ introduction	Should be able to Operate the ECG & ICU Instruments Contents. <ul style="list-style-type: none"><li>• Should be able to test electrical earth, test &amp; replace faulty power chord, test patient cables, test &amp; replace battery, charge battery</li><li>• Should be able to do performance test and study symptoms on ECG Recorders, ECG Monitors, Pulse Oximeter, and NIBP Machine.</li><li>• Should able to dismantle the equipment</li><li>• Should be able to do identify the faulty PCB's &amp; Fuses in ECG Recorders, ECG Monitors, Pulse Oximeter, NIBP Machine and replace them</li><li>• Test components and replace faulty electronic components</li></ul>																																								
10	Employment Opportunity	Self Employment / May get job in Establishment																																								
11	Teacher's Qualification	Diploma in eloelectronics , I.T.I. N.C.V.T. (Electronics)																																								
12	Training System	<b>Training System Per Week</b> <table><tr><td>Theory</td><td>Practical</td><td>Total</td></tr><tr><td>6 hrs</td><td>18hrs</td><td>24hrs</td></tr></table>						Theory	Practical	Total	6 hrs	18hrs	24hrs																													
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13	Exam. System	<table><tr><th>Sr. No.</th><th>Paper Code</th><th>Name of Subject</th><th>TH/PR</th><th>Hours</th><th>Max. Marks</th><th>Min. Marks</th></tr><tr><td>1</td><td>30110911</td><td>ECG &amp; ICU Instruments</td><td>TH</td><td>3 hrs</td><td>100</td><td>35</td></tr><tr><td>2</td><td>30110921</td><td>Basic Electronics</td><td>PR-I</td><td>3 hrs</td><td>100</td><td>50</td></tr><tr><td>3</td><td>30110922</td><td>Maintenance of ECG &amp; ICU Instruments</td><td>PR-II</td><td>6 hrs</td><td>200</td><td>100</td></tr><tr><td></td><td></td><td>TOTAL</td><td></td><td></td><td>400</td><td>185</td></tr></table>						Sr. No.	Paper Code	Name of Subject	TH/PR	Hours	Max. Marks	Min. Marks	1	30110911	ECG & ICU Instruments	TH	3 hrs	100	35	2	30110921	Basic Electronics	PR-I	3 hrs	100	50	3	30110922	Maintenance of ECG & ICU Instruments	PR-II	6 hrs	200	100			TOTAL			400	185
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# SYLLABUS

## Theory

### ECG & ICU Instruments

1. Electrical and personal safety, dangers and preventions
2. Multimeter and its application
3. Basics of electricity – define DC, AC /practical measuring units of voltage, current, resistance.
4. Testing of earth using test lamp
5. Testing of earth using multimeter
6. fuse – types, use, testing
7. Basic Electronics – passive and active components, testing of components,
8. Op-Amp – Introduction, applications, construction, differential amplifier, biomedical amplifier, filters – integrator, differentiator, notch filters, comparators
9. Digital electronics – gates and its application, multiplexers, de-multiplexers, counters
10. Human anatomy (Basics), list out the different bioelectric signals & physiological parameters,
11. Physiology of heart, ECG signal and its component, Electrode placement, ECG Leads
12. Blood pressure measurement. - invasive and non-invasive, NIBP measurement methods
13. NIBP Machine:- Specifications, Front Panel controls , Patient Cable, cuff placement , working principle, Operation, care and maintenance .
14. Defibrillator:- Specifications Front Panel control, Patient Cable, Electrodes used, working principle, Operation, care and maintenance
15. Precautions and prevention of transmission of diseases, minimizing infections
16. Operation of ECG Recorders, Operation of ECG Monitors, defibrillator, pulse oximeter, NIBP Machine
17. block diagram of ECG recorder, Common PCB's and identification of PCB's, fuses in the PCB
18. performance of ECG Recorder – study of symptoms and finding out the faulty PCB, fuses in the PCB
19. block diagram of ECG Monitor, Common PCB's and identification of PCB's, fuses in the PCB
20. performance of ECG Monitor – study of symptoms and finding out the faulty PCB, fuses in the PCB
21. block diagram of pulse Oximeter , Common PCB's and identification of PCB's, fuses in the PCB
22. performance of Pulse Oximeter – study of symptoms and finding out the faulty PCB, fuses in the PCB
23. block diagram of NIBP Machine , Common PCB's and identification of PCB's, fuses in the PCB
24. performance of Pulse Ox meter – study of symptoms and finding out the faulty PCB, fuses in the PCB

## **Practical – I**

### **Basic Electronics**

1. Practice procedures for safety and health hazards measures
2. Operate Multi meter & Measure Resistance, voltage, current
3. Use tools & Perform soldering and de-soldering
4. Perform power chord maintenance of equipments
5. Test earth using test lamp or multi meter
6. Perform cable maintenance
7. Open equipment
8. replace fuses which are outside the equipment
9. Operate Single-Channel ECG recorder & Multi-Channel ECG Recorder.
10. Test the ECG recorder
11. Operate Cardiac Monitor, Defibrillator, Pulse Ox meter & NIBP Machine.

## **Practical - II**

### **Maintenance of ECG & ICU Instruments**

1. Test the performance of ECG Recorder , study symptoms & Identify the faulty PCB
2. Test the performance of ECG Monitor, study symptoms & Identify the faulty PCB
3. Test the performance of pulse oximeter, study symptoms & Identify the faulty PCB
4. Test the performance of NIBP Machine, study symptoms & Identify the faulty PCB
5. List out the tools required for performing intermediate level maintenance
6. Follow dismantling procedure open the equipment and replace the faulty board
7. Remove, test and replace blown fuse in the PCB

### **Resources**

#### **List of Equipment :**

1. ECG recorder – single channel (Manual)
2. ECG recorder – single channel (Automatic)
3. ECG recorder – multi channel
4. ECG Monitor
5. Pulse Oxi meter
6. NIBP Machine
7. Defibrillator
8. . Multi meter
9. . Soldering Iron
10. . De-soldering gun
11. . regulated power supply
12. . ECG Monitor cable
13. . Pulse Oxi meter cable
14. . Defibrillator cables

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