

## COURSE PROSPECTUS

Name of the Group: *VLSI*

Name of the Course: *Diploma-Medical Ultrasound service Engineer*

Course Code: *US100*

Starting Date: *06/04/2015*

Duration: *200 Hours*

### Preamble:

Ultrasound is currently an INR 1000 Crores market in India and is growing at the annual rate of 17.5%. At present, there are nearly 1,00,000 ultrasound installations in India where as the number is as high as 1,00,00,000 worldwide. All the systems need maintenance at regular intervals to keep hold of their performance so as to provide accurate diagnosis. At present, around 10,000 ultrasound systems fail per year in India alone. The number of installations in India and the rest of the world show the immense job opportunities across the boundaries a candidate can get after the completion of **Diploma – Medical Ultrasound Service Engineer** course. A minimum of 100 people are recruited by MNCs each year whereas a minimum of 300 people are recruited by MNC associates such as dealers, franchise, etc. This course is a must for all (Bio) Medical Electronics students, hospital technicians, etc. and will be an inevitable add-on to their career.

### Objective of the Course:

Education in universities and colleges are severely lagging in meeting the specific needs of Ultrasound industry and this in turn is creating a big gap between the industry and the candidates graduating each year. **Diploma –Medical Ultrasound Service Engineer** offers subjects closely related to the ultrasound industry and is a well thought-out course that will help in bridging the industry-academia gap, with a focus on advanced technical and personal skill development.

The course has been designed following the instructions of renowned experts of Ultrasound industry with decades of experience working with various MNCs such as GE, Toshiba, Aloka, Siemens, Mindray, Philips, Samsung Medison etc and is built on the basic concepts in Ultrasound, advanced techniques and methodologies. The course helps

in transforming a fresh candidate into a capable Ultrasound system professional with excellent technical and soft skills as required by the industry.

## Outcome of the Course:

*This course is frequently updated in synchronization with the industry to provide the trainees in-depth knowledge and skills required by ULTRASOUND markets around the globe. It provides comprehensive understanding about the fundamental principles, methodologies and industry practices.*

*This uniquely hybrid course makes the successful participants readily employable in multiple roles available in ULTRASOUND industries. For people interested in entrepreneurship this would be an excellent launch pad. In addition the course also serves as a concrete platform for people involved in ultrasound research, consultancy and product development in both industry and academia.*

*Course Structure: The US100 contains four modules. The students are required to do an internship in ULTRASOUND Industry for a minimum duration of 92 hours to be eligible for issue of Diploma -MEDICAL ULTRASOUND Service Engineer.*

US100	Module Name	Duration
US 101	Introduction to ultrasound machines-Theory and Familiarization	18 Hours
US 102	Instrumentation	30 Hours
US 103	Ultrasound system configuration-Clinical Applications and Doppler Principles	30 Hours
US 104	3D/4D ultrasound systems-Ultrasound Models and Quality Assurance	30 Hours
US 105	Internship	92 Hours

## Other Contents

### a. Course Fees :

**General Category Applicants: Rs 25000/- + Service Tax**

**SC/ST Category Applicants : Nil (Rs. 1750/- towards caution deposit and will be refunded after successful completion of the course)**

- b. Eligibility: *Diploma/B.Sc/MSc in Electronics/Electrical/Computer Science, B.E/B.Tech/M.E/M.Tech in Electrical/Electronics/Electronics & Communication/Bio-Medical Engineering/Medical Electronics/Electronics & Instrumentation/Computer Science and allied branches, Experienced Professionals like Bio-Medical Engineers in Hospitals.*

*Ongoing students of above courses can apply.\**

- c. Number of Seats : 30

- d. How to Apply :

Students are advised to apply in the prescribed Application Form available with the course brochure/course prospectus or downloaded from our website. Filled-in application forms along with a Demand Draft towards advance fee of ` 1,000/- drawn in favour of Director, NIELIT, Calicut, Payable at State Bank of India, NIT Campus Branch (code: 2207), Chathamangalam should be sent to the **Training Officer, NIELIT, P. B. No. 5, NIT Campus Post, CALICUT – 673 601, Kerala.** The Name of the Course Applied for should be super scribed on the top of the cover in which the application form is forwarded.

***Mode of Payment:***

1	Demand Draft to be drawn in favor of Director, NIELIT, Payable at State Bank of India, Calicut NIT Branch (2207). The DD should reach here before the last date to apply.
2	Through any branch of SBI (where this format is accepted) using the pay in slip available in our web site. The <b>original counterfoil</b> should reach here before the last date to apply.

3	<p>The fees can be paid directly into our account from any bank where core banking facility is available. The details required for direct payment are as given below.</p> <ul style="list-style-type: none"> <li>• Savings Account No: <b>31329537747</b></li> <li>• Bank Name: SBI, NIT Chathamangalam</li> <li>• Bank Code: 2207</li> <li>• IFSC No: SBIN0002207</li> <li>• MICR : <b>673002012</b></li> </ul> <p>The depositor should obtain the UTR Number/Journal No from the branch while depositing cash directly into our account. Depositor should also obtain the counterfoil duly filled up and signed by the staff with seal of the bank through which the amount was deposited. The following details should reach here before the last date to apply. Name of the Depositor</p> <ol style="list-style-type: none"> <li>1. Name of the Student</li> <li>2. Date of Payment</li> <li>3. Amount Deposited</li> <li>4. Name of Bank/branch through which amount deposited</li> <li>5. Purpose – Course ID – Advance Deposit/Hostel Rent/Installment Fee etc.</li> <li>6. Proof of Deposit (counterfoil/acknowledgement <b>in original</b>)</li> <li>7. UTR Number</li> </ol>
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The Institute will not be responsible for any mistakes done by either the bank concerned or by the depositor while remitting the amount into our account.

- e. Selection of candidates: *Candidates will be selected based on their marks in their qualifying examination subject to eligibility and availability of seats.*
- f. Test/Interview (if applicable) : *Not Applicable*
- g. Counseling/Admission : *on 06/04/2015*
- h. Admission Procedure :  
Students who have been selected for test/interview/counseling/admission are required to report to the Institute on the prescribed day by 9:30 hrs along with the following
  1. Attested Copies of Proof of Age, Qualifications, etc
  2. Original Certificate of the above
  3. Two copies of photograph and one stamp size photograph for identity card.
  4. SC/ST Certificate (if applicable)
  5. Income Certificate (if applicable)

The students on reaching the Institute are required to meet the Front Office Councilor (FOC). The FOC then directs the student to the Course Coordinator. The student gets the enrollment form verified by the Course Coordinator and then meets the FOC who shall direct the student to the Accounts for payment of fees. A student is thus admitted.

- i. Discontinuing the course: No fees under any circumstances shall be refunded in the event of a student discontinuing the course. A student can however, be eligible for module certificates (applicable only for courses which provide for modular admission) which he has successfully completed provided he has paid the entire course fees.
- j. Course Timings: *As per course schedule. Course schedule can be had from the course coordinator.*
- k. Location and how to reach :  
NIELIT Calicut is located very close to NIT campus and is about 22Kms from the Calicut (Kozhikode) city. A number of buses (Buses to NIT via Kunnamangalam) are available from "Palayam Bus Stand and KSRTC Bus Stand". The bus stop at our Institute is called "Panthrand" and is one stop before NIT. The bus fare is around ₹15/- from Calicut City to NIELIT.  
  
Calicut (Kozhikode) is well connected by Rail, Road and Air from different parts of the country. The maximum and minimum temperatures range between 35°C and 20°C.
- l. Course enquiries :  
Students can enquire about the various courses either on telephone or by personal contact between 9.15 A.M. to 5.15 P.M. (Lunch time 1.00 pm to 1.30 pm).

m. Important Dates :

<i>Last date for receiving completed application forms</i>	<b>First selection list will be prepared based on the applications received on or before 13<sup>th</sup> March 2015.</b> <b>The additional selection list will be prepared based on the applications received on or before 31<sup>st</sup> March 2015, and excluding the applicants, included in the first selection list.</b>
<i>Publication of first selection list in the Website <a href="http://www.calicut.nielit.in/">http://www.calicut.nielit.in/</a></i>	<b>16<sup>th</sup> Mar 2015.</b>
<i>Last date for taking provisional admission by paying the fees, for applicants in the first</i>	<b>31<sup>th</sup> March 2015.</b>

<i>selection list</i>	
<i>Publication of <b>additional selection list</b> in our website (if there are vacant seats)</i>	<b>01<sup>st</sup> April 2015.</b>
<i>Counseling date</i>	<b>06<sup>th</sup> April 2015.</b>
<i>Class Commencement date</i>	<b>07<sup>th</sup> April 2015.</b>
<i>Payment of fees for applicants in <b>first selection list</b></i>	<b>31<sup>th</sup> March 2015.</b>
<i>Payment of fees for applicants in <b>additional selection list</b></i>	<b>On or before 06<sup>th</sup> April 2015.</b>

n. Placement : *Not applicable*

o. Hostel facilities :

Hostel accommodation is available for boys and girls on daily or monthly chargeable basis. *The hostel fee varies from ` 850/- to ` 1,300/- (for boys) per month and ` 1000/- to ` 1,400/- (for Girls) per month depending on the location of accommodation.* However, students are required to pay the hostel fees for the duration of the course for which they are seeking admission at the time of joining the course.

p. Canteen facilities :

The Institute has a canteen functioning at the main campus and food at reasonable rates is available for breakfast, lunch, and dinner

q. Course Contents :

## MODULE - 1 (18 Hours)

**Introduction to ultrasound machines:** Introduction to Ultrasound and Ultrasound Machines, Importance of Ultrasound Machines, Trends in Ultrasound Machines, Blocks in Ultrasound Machines.

**Theory behind ultrasound – Physics & Maths:** Introduction, Waves, Frequency, Speed, Wavelength & Pressure, Radiation, force, Reflection, Refraction, Attenuation, Absorption, Scattering, Ultrasound Beams and Pulses, Focusing, Trigonometry, Matrices.

**Transducers types and functions:** Different types of Transducers and its Applications, Different Modes of Display, Features of Transducers and Transducer Elements, Working Principle, Transducer beam Characteristics: Beam Profiles, Pulsed

Ultrasonic Field, Visualization and mapping of Ultrasonic Field, Axial and Lateral resolution, focusing, A Mode and B mode Imaging, Beam Forming, Speckle, Image Quality and M Mode

## **Ultrasound Machine Familiarization**

### **MODULE - 2: (30 Hours)**

**Instrumentation:** Block diagram, Transmitter, Receiver, Beamformer, Different types of Transducer Arrays and applications, Transducer Array Familiarization, Power modules, Peripheral interfacing.

### **MODULE - 3: (30 Hours)**

**Doppler principles:** Importance of Doppler, Definition of Doppler Effect, CW Doppler and PW Doppler, Doppler Displays, Ultrasound Signals received by the Transducer, CW and PW Signal Processor, Features of Doppler Systems, Machine Learning and Knobology Familiarization

#### **Clinical application training and anatomy**

**Ultrasound system configuration:** Machine installation procedures, System Software base and application, Software loading and HDD Replacement, System Upgradation, Software reloading practice

### **MODULE - 4: (30 Hours)**

**3d/4d ultrasound systems:** Scanning and visualization, Application, Phantom Test basic and 3D Phantom

**Survey of evolution of ultrasound equipment models:** GE, SIEMENS, THOSHIBA, ALOKA, MINDRAY

**Quality assurance-stds and guidance, clinical and technical assessment:** Relative performance measures, Absolute performance measures, Doppler testing Quality check listing procedures

### **INTERNSHIP (92 Hours)**

Practice on assisting technicians on repairing, maintenance and refurbishment, onsite technical support  
Hands on experience on independent refurbishment