

**LETTER OF COOPERATION
BETWEEN
VELTECH DR. RR & DR. SR UNIVERSITY, INDIA (VELTECH)
AND
UNIVERSITI TEKNOLOGI MALAYSIA (UTM)**

1. PURPOSE

The purpose of this Letter of Cooperation (LoC) is to foster academic partnership and cooperation between **Veltech Dr. RR & Dr. SR University (Vel Tech Rangarajan Dr.Sagunthala R&D Institute of Science and Technology), India (VELTECH)** and **Universiti Teknologi Malaysia (UTM)**.

2. POTENTIAL AREAS OF COOPERATION

Areas of future cooperation between VELTECH and UTM may include, but are not limited to:

- i. Student exchange;
- ii. Staff exchange;
- iii. Exchange of information and publications;
- iv. Joint research activities and teaching programmes;
- v. Joint student supervision; and
- vi. Joint seminars/conferences.

Both institutions may enter into separate Agreement as necessary, to facilitate the said collaborative activities.

3. FINANCIAL OBLIGATIONS

It is recognised that this LoC involves neither obligations nor transfer of financial resources. Under this LoC, collaborative activities will be undertaken within the limits of available resources of the respective institutions.

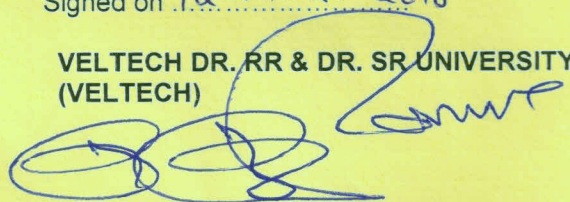
4. VALIDITY AND TERMINATION

This LoC comes into effect on the date of signing and will remain in effect for five (5) years from the date of signatures. Either institution may terminate this LoC without liability, for any reason and at any time, by giving three (3) months written notice to the other institution. However such a termination will not affect the on-going programs, to protect the interest of the students and researchers.

This LoC is intended to promote and facilitate collaborative activities for mutual benefits and shall not be construed as creating any legal obligations between the institutions.

Signed on 12-MAR.-2018

**VELTECH DR. RR & DR. SR UNIVERSITY
(VELTECH)**



.....
COL.PROF.DR. R. RANGARAJAN
FOUNDER CHANCELLOR & PRESIDENT

UNIVERSITI TEKNOLOGI MALAYSIA (UTM)



.....
PROF. DATUK IR. DR. WAHID OMAR
VICE CHANCELLOR



Vel Tech
Rangarajan Dr. Sagunthala
R&D Institute of Science and Technology
(Deemed to be University Estd. u/s 3 of UGC Act, 1956)

Universiti Teknologi Malaysia (UTM), Malaysia

Name of the Research Institute/University/ Organization	Country	Duration of the Agreement	Academic Year	Date of Signing	Date of Expiry	Purpose/Activities
Universiti Teknologi Malaysia (UTM)	Malaysia	5 Years	2017-18	12.03.2018	11.03.2023	Student & Staff Exchange; Exchange of Information and Publications; Joint Research Activities and Teaching Programmes; Joint Student Supervision; and Joint Seminars / Conferences

Actual Activities with Universiti Teknologi Malaysia (UTM), Malaysia

A.Y. 2016-17	Faculty Mobility (Incoming - Short Courses) - 1
A.Y. 2017-18	Faculty Mobility (Incoming - Short Courses) - 1


MoU Coordinator




Dean - International Relations

Dr. P. Suresh
Dean -International Relations

Vel Tech
Rangarajan Dr. Sagunthala
R&D Institute of Science and Technology
(Deemed to be University Estd. u/s 3 of UGC Act, 1956)



Veltech Dr.RR & Dr.SR University[®]
(Estd. u/s 3 of UGC Act, 1956)

**School of Electrical and Communication
Department of Electronics and Communication
Engineering**

**Specialized one credit course on
“Advanced Mobile Communication Networks
(4G Communications)”
(1157EC912)**

by

**Prof. Dr. Tharek Bin Abd. Rahman
Universiti Teknologi Malaysia(UTM), Germany**



Held on

Date: March 6 to 17, 2017

Academic Staff

Prof. Dr. Tharek Abd. Rahman

(Director)

Phone : +607-5535305 / ext. 35305

Email : tharek@fke.utm.my



Prof. Dr. Tharek Abd Rahman is a Professor at Faculty of Electrical Engineering, Universiti Teknologi Malaysia (UTM). He obtained his BSc. in Electrical & Electronic Engineering from University of Strathclyde UK in 1979, MSc in Communication Engineering from UMIST Manchester UK and PhD in Mobile Radio Communication Engineering from University of Bristol, UK in 1988. He is the Director of Wireless Communication Centre (WCC), UTM. His research interests are radio propagation, antenna and RF design and indoors and outdoors wireless communication. He has also conducted various short courses related to mobile and satellite communication to the Telecommunication Industry and Government body since 1990. He has a teaching experience in the area of mobile radio, wireless communication system and satellite communication. He has published more than 120 papers related to wireless communication in national/international journal and conference.

Prof.Tharek Bin Abd. Rahman, UTM, Malaysia

Title: 4G Mobile Networks

The promise of 4G mobile communication (LTE) as mobile broadband offers huge potential to service providers, application developers and wireless consumers. 4G (LTE and LTE Advanced) focus on speed and capacity. For example LTE Advanced for low mobility the data rate should be at 1Gbps for low mobility and 100Mbps for high mobility. The current 4G (LTE) is the leading wireless mobile broadband technology and offers high spectral efficiency, low latency and high peak data rates. To improve further the speed and spectral efficiency, LTE Advanced provide the features such as carrier aggregation, enhanced multiple input and multiple output (MIMO) and heterogeneous network. LTE Advanced has being selected by International Telecommunication Union (ITU) as the technology for IMT Advanced for future mobile broadband.

The course will cover the evolution from 2G towards 4G (LTE) and beyond 4G i.e 5G. The course will be 3 hours per day)

Day 1: Radio Frequency Spectrum and Mobile Radio Propagation

Day 2: Cellular Concept and Multiple Access Techniques

Day 3: 2G Mobile Communication

Day 4: 3G Mobile Communication

Day 5: Introduction to 4G

Day 6: 4G (LTE) Architecture

Day 7: 4G (LTE) Air Interface

Day 8: 4G (LTE) MIMO Systems

Day 9: 4G (LTE-Advanced)

Day 10: Introduction to 5G and Assessments

Veltech Dr.RR & Dr.SR University

(Estd. u/s 3 of UGC Act, 1956)

Date: 20.02.17

School of Electrical and Communication
Department of Electronics and Communication Engineering

Submitted to Vice Chancellor

Through Proper Channel

Sub: Specialized Courses offered in EVEN Semester 2017 – reg.

The following specialized courses are offered in EVEN semester for the 2015-2016 batch ECE students during the month of March 2017. The faculty experts from top Malaysian universities are offering these courses. Hence, it's requested that these courses shall be included in RAIN software to enable the students to register.

S.No	Course Code	Course Title	Credits	Name of the Faculty Member
1	1157EC901	Advanced Mobile Communication Networks	1	Professor.Tharek Bin Abd. Rahman, Director – Wireless Communication Centre (WCC), University of Technology , Malaysia (UTM)
2	1157EC902	Analog Communication Techniques	1	Dr Wee Fwen Hoon, School of Computer and Communication Engineering, Universiti Malaysia Perlis (UniMAP) Malaysia

HOD ECE



400 feet Outer Ring Road, Avadi,
 Chennai-600 062, Tamil Nadu, India.
 Landline : +044 2684 0332 / 2684 0262
 Toll Free : 1800 3070 6949
 Email : vtuv@veltechuniv.edu.in
 Website : www.veltechuniv.edu.in

SNo	Stu_Id	Stu_Name	Stu_Branch	u_Test_SubjectCo	Stu_Test_SubjectName	_Subject_Pass	Stu_Grade	Stu_Result_Final
1	VTU6135	PYREDDY KALYAN ASHOK KUMAR RED	ECE	1157EC912	Advanced Mobile Communication Networks	Pass	C	FIRST CLASS
2	VTU6137	DOMMARAJU BHAVANA	ECE	1157EC912	Advanced Mobile Communication Networks	Pass	C	FIRST CLASS
3	VTU6146	CHITIRALA NAGA PRIYANKA	ECE	1157EC912	Advanced Mobile Communication Networks	Pass	C	FIRST CLASS
4	VTU6154	DUSANAPUDI VAMSIRISHNA	ECE	1157EC912	Advanced Mobile Communication Networks	Pass	A	DISTINCTION
5	VTU6158	KUKATI VENKATA RAMANA	ECE	1157EC912	Advanced Mobile Communication Networks	RA	RA	Reappear
6	VTU6186	VENUMBABA SAI NISHANTH	ECE	1157EC912	Advanced Mobile Communication Networks	Pass	C	FIRST CLASS
7	VTU6309	THATHIREDDY HARI SREE	ECE	1157EC912	Advanced Mobile Communication Networks	Pass	C	FIRST CLASS
8	VTU6319	ALLI MAMATHA	ECE	1157EC912	Advanced Mobile Communication Networks	Pass	B	FIRST CLASS
9	VTU6353	MADANAPU SUJITHA	ECE	1157EC912	Advanced Mobile Communication Networks	Pass	D	SECOND CLASS
10	VTU6392	KOVI GOPI	ECE	1157EC912	Advanced Mobile Communication Networks	RA	RA	Reappear
11	VTU6417	PENETI ROOPA	ECE	1157EC912	Advanced Mobile Communication Networks	Pass	D	SECOND CLASS
12	VTU6443	SATYA GOVIND	ECE	1157EC912	Advanced Mobile Communication Networks	Pass	B	FIRST CLASS
13	VTU6471	GARIMALLA SHANMUKHA SRINIVAS	ECE	1157EC912	Advanced Mobile Communication Networks	Pass	B	FIRST CLASS
14	VTU6479	KANIGIRI ASHOK KUMAR	ECE	1157EC912	Advanced Mobile Communication Networks	Pass	C	FIRST CLASS
15	VtU6521	DEVARASETTY AKHIL	ECE	1157EC912	Advanced Mobile Communication Networks	Pass	A	DISTINCTION
16	VTU5985	BONDADA HARIKA	ECE	1157EC912	Advanced Mobile Communication Networks	Pass	B	FIRST CLASS
17	VTU6022	BACHU VENKATA THARUN KUMAR	ECE	1157EC912	Advanced Mobile Communication Networks	Pass	D	SECOND CLASS
18	VTU6035	RAMPA THERESA	ECE	1157EC912	Advanced Mobile Communication Networks	RA	RA	Reappear
19	VTU6061	BOOSA SRAVYA MEENAKSHI	ECE	1157EC912	Advanced Mobile Communication Networks	Pass	D	SECOND CLASS
20	VTU6084	RAPARTHI RAJ KUMAR	ECE	1157EC912	Advanced Mobile Communication Networks	Pass	C	FIRST CLASS
21	VtU6547	GADDIPATI POOJITHA	ECE	1157EC912	Advanced Mobile Communication Networks	Pass	C	FIRST CLASS
22	VTU6576	BODAPATI MANOHAR	ECE	1157EC912	Advanced Mobile Communication Networks	Pass	C	FIRST CLASS
23	VtU6660	PODAVALA VENKATA SUNIL KUMAR YA	ECE	1157EC912	Advanced Mobile Communication Networks	Pass	B	FIRST CLASS
24	VtU6666	NIDAMANURI UMA MAHESWARI	ECE	1157EC912	Advanced Mobile Communication Networks	Pass	D	SECOND CLASS
25	VTU8131	UMA DURGA RAM PRASAD B	ECE	1157EC912	Advanced Mobile Communication Networks	Pass	C	FIRST CLASS

Veltech Dr.RR & Dr.SR University

(Estd. u/s 3 of UGC Act, 1956)

S.Sivaperumal

Date: 13.03.2017

Director International Relations

Our Ref. No: 2017/VF6/6

Your Ref. No:

DINT | 03-17 | 04

Submitted for the Approval:

Name of the Professor: Prof. Tharek bin Abd. Rahman

University & Country: UTM, Malaysia

Course Title: 4G

Department: Electronics & Communication Engineering

Students: ECE II Year

Training Program date: March 6 to 17, 2017

Sl.No	Description	Amount in INR
1	Course Honorarium (Rs.3000 * 30Hrs) (Net Amount & Tax Free)	90,000 ✓
2	Flight Charges (727.59 RM) ✓ (Equivalent as on 23.01.2017, 1RM=15.34INR) ✓ (Booked by the Professor, Ticket attached)	11,166
3	Visa Processing Charges (250RM) ✓ (No Bill)	3,722
Total		1,04,888

(Rupees One lakh four thousand eight hundred and eighty eight only)

In this regard, I request your approval for transferring the equivalent Malaysian Ringgit (MYR) to the Following Account,

Name: Prof. Tharek bin Abd. Rahman

Bank name: Maybank

Account No: 151306725133

Swift Code: MBBEMYKL

Thank You,

S.Sivaperumal

14/03/17

(Signature)

046



400 feet Outer Ring Road, Avadi,
Chennai-600 062, Tamil Nadu, India.

Mobile : +91 96000 40255

Email : dint@veltechuniv.edu.in

Website : www.veltechuniv.edu.in

Consolidated Marks:

S NO	VTU NO	NAME OF THE STUDENT	TEST MARKS
1	VTU6319	ALLI MAMATHA	39
2	VTU6137	BHAVANA	35
3	VTU6576	BODAPATI MANOHAR	35
4	VTU5985	BONDADA HARIKA	36
5	VTU6061	BOOSA SRAVYA MEENAKSHI	25
6	VTU6146	CHITIRALA NAGA PRIYANKA	34
7	VTU6521	DEVARASETTY AKHIL	45
8	VTU6154	DUSANAPUDI VAMSI KRISHNA	44
9	VTU6547	GADDIPATI POOJITHA	35
10	VTU6471	G. SHANMUKHA SRINIVAS	36
11	VTU6309	HARI SREE	32
12	VTU6479	KANIGIRI ASHOK KUMAR	35
13	VTU6392	KOVI GOPI	12
14	VTU6158	KUKATI VENKATA RAMANA	19
15	VTU6353	MADANAPU SUJITHA	25
16	VTU6666	NIDAMANURI UMA MAHESWARI	28
17	VTU6417	PENETI ROOPA	25
18	VTU6135	PYREDDY KALYAN ASHOK KUMAR	34
19	VTU6035	RAMPA THERESA	19
20	VTU6084	RAPARTHI RAJ KUMAR	34
21	VTU6443	SATYA GOVIND	38
22	VTU6660	SUNIL KUMAR YADAV	36
23	VTU6022	THARUN KUMAR	27
24	VTU6186	VENUMBAKA SAI NISHANTH	30
25	VTU8131	UMA DURGA RAM PRASAD	31



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(Estd. u/s 3 of UGC Act, 1956)

School of Electrical & Communication
Department of Electronics & Communications
Engineering

Specialized one credit course on
“4G and 5G Mobile communications”
(1157EC911)

by

Prof. Dr. Tharek bin Abd. Raman
Universiti Teknologi Malaysia (UTM), Malaysia



Held on

Date: March 12 to 16, 2018

Academic Staff

Prof. Dr. Tharek Abd. Rahman

(Director)

Phone : +607-5535305 / ext. 35305

Email : tharek@fke.utm.my



Prof. Dr. Tharek Abd Rahman is a Professor at Faculty of Electrical Engineering, Universiti Teknologi Malaysia (UTM). He obtained his BSc. in Electrical & Electronic Engineering from University of Strathclyde UK in 1979, MSc in Communication Engineering from UMIST Manchester UK and PhD in Mobile Radio Communication Engineering from University of Bristol, UK in 1988. He is the Director of Wireless Communication Centre (WCC), UTM. His research interests are radio propagation, antenna and RF design and indoors and outdoors wireless communication. He has also conducted various short courses related to mobile and satellite communication to the Telecommunication Industry and Government body since 1990. He has a teaching experience in the area of mobile radio, wireless communication system and satellite communication. He has published more than 120 papers related to wireless communication in national/international journal and conference.

Course Contents:

Title: 4G and 5G Mobile Communication

Synopsis : This course introduces students on mobile communication including 4G and 5G. The course will focus on 4G in more detail. In the beginning students will be introduced related to mobile propagation and cellular concept. This topic will be extended to evolution of 2G towards 4G. It will follow related to 4G Network Architecture, Air Interface and Multiple Input and Multiple Output (MIMO). Finally overview of 5G mobile communication and Internet of Things (IOT) will also be covered..

Day 1: Mobile Radio Propagation and Cellular Concept

Day 2: Evolution of Mobile Communication: 2G and 3G

Day 3: Overview of 4G LTE and Architecture

Day 4: 4G LTE Air Interface and MIMO

Day 5: Introduction to 5G and IOT

DA/4986
20/12/2018



Vel Tech
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R&D Institute of Science and Technology
(Deemed to be University Estd. u/s 3 of UGC Act, 1956)

DINT/12-17/017
VTV/ECE/2017-18/DA 91

IR221

Office of International Programmes
Visiting Professor Programmes

Details of Professor & Course:

Name of the Professor	Prof. Tharek bin Abd. Raman (CV Attached) ✓
University & Country	Universiti Teknologi Malaysia (UTM), Malaysia ✓
Title of the Course	4G and 5G Mobile Communication ✓
Department	Electronics & Communication Engineering ✓
Dates of the Course	March 12 to 16, 2018 ✓
Total No. of Hours	20 ✓
No. of Credits	1 ✓
Course Contents	Attached ✓

Prepared by: *[Signature]* 29/12/18

Coordinator – Office of Intl. Pgms

Forwarded by: *[Signature]* 29/12/17.

Director – Office of Intl. Pgms

Dr. S. Sivaperumal
Director International Relations

Vel Tech
Rangarajan Dr. Sagunthala
R&D Institute of Science and Technology
(Deemed to be University Estd. u/s 3 of UGC Act, 1956)

Vice Chancellor

[Signature]
HoD

[Signature] 21/1/18
Dean

[Signature]
Director (Academic)

Prof. Dr. techn. Koteswara Rao Anne
Director Academics

Vel Tech
Rangarajan Dr. Sagunthala
R&D Institute of Science and Technology
(Deemed to be University Estd. u/s 3 of UGC Act, 1956)

UCC-080

SNo	Stu_Id	Stu_Name	Stu_Branch	Stu_Test_SubjectCode	Stu_Test_SubjectName	Stu_Subject_PassFail	Stu_Grade
1	VTU6003	THOTAKURA YASWANTH PAVAN KUMAR	ECE	1157EC911	4G and 5G Mobile Communication	Pass	D
2	VTU6441	GANDIKOTA PALETAMMA SAI CHARAN	ECE	1157EC911	4G and 5G Mobile Communication	Pass	D
3	VTU6212	NARADASU BALA SUBRAMANYAM	ECE	1157EC911	4G and 5G Mobile Communication	Pass	D
4	VTU6546	ERLA SREE LATHA	ECE	1157EC911	4G and 5G Mobile Communication	Pass	D
5	VTU8233	SHINDE NANDKISHOR BANKATRAO	ECE	1157EC911	4G and 5G Mobile Communication	Pass	C
6	VTU5979	SANGEETHA A P	ECE	1157EC911	4G and 5G Mobile Communication	Pass	C
7	VTU8160	MANOHAR REDDY D	ECE	1157EC911	4G and 5G Mobile Communication	Pass	C
8	VTU6297	BOYAPATI SIVA SAI DURGA RAGHAVA CHOWDARY	ECE	1157EC911	4G and 5G Mobile Communication	Pass	C
9	VTU6356	DARIMADUGU YAMUNA	ECE	1157EC911	4G and 5G Mobile Communication	Pass	C
10	VtU6533	ANIL SINGH	ECE	1157EC911	4G and 5G Mobile Communication	Pass	C
11	VTU6426	CHENNAM VENKATA SAI SREE	ECE	1157EC911	4G and 5G Mobile Communication	Pass	B
12	VtU6623	SUJEET SINGH	ECE	1157EC911	4G and 5G Mobile Communication	Pass	B
13	VTU6160	THEJESHWINI J	ECE	1157EC911	4G and 5G Mobile Communication	Pass	A

14	VTU6201	M.JAGDISH	ECE	1157EC911	4G and 5G Mobile Communication	Pass	A
15	VTU6082	KALLURU VENU MADHAV	ECE	1157EC911	4G and 5G Mobile Communication	NE	NE
16	VTU6200	PAPPU MANJUNADH	ECE	1157EC911	4G and 5G Mobile Communication	NE	NE
17	VTU6317	YEDDULA SIDDA REDDY	ECE	1157EC911	4G and 5G Mobile Communication	NE	NE
18	VTU8157	RAGHURAM YAKKALI	ECE	1157EC911	4G and 5G Mobile Communication	NE	NE
19	VtU7359	PEDDINTI POOJA SREE	ECE	1157EC911	4G and 5G Mobile Communication	RA	RA
20	VtU7453	SALE JYOTHIR MAI	ECE	1157EC911	4G and 5G Mobile Communication	RA	RA
21	VtU7340	CHERUKURU KAMAKSHIAH	ECE	1157EC911	4G and 5G Mobile Communication	RA	RA
22	VtU7473	OBILI LOKESH REDDY	ECE	1157EC911	4G and 5G Mobile Communication	RA	RA
23	VtU7339	IMMADI JANAKI SAI LAKSHMAN SUMANTH	ECE	1157EC911	4G and 5G Mobile Communication	Pass	D
24	VtU8075	SHAIK SADEEK	ECE	1157EC911	4G and 5G Mobile Communication	Pass	D
25	VtU7263	AKKISSETTY AKSHAY KUMAR	ECE	1157EC911	4G and 5G Mobile Communication	Pass	D
26	VtU7306	SINGIREDDY BABJI	ECE	1157EC911	4G and 5G Mobile Communication	Pass	D
27	VtU7355	GURRE HEMANTH REDDY	ECE	1157EC911	4G and 5G Mobile Communication	Pass	D

28	VtU7396	NEERUKATTU KALYAN KUMAR	ECE	1157EC911	4G and 5G Mobile Communication	Pass	D
29	VtU7399	KETHIREDDY KRISHNA SUMANTH	ECE	1157EC911	4G and 5G Mobile Communication	Pass	D
30	VtU8072	JOULI SRIKANTH	ECE	1157EC911	4G and 5G Mobile Communication	Pass	D
31	VtU7357	KADAPA AMEER BABU	ECE	1157EC911	4G and 5G Mobile Communication	Pass	D
32	VtU7961	NANDIMANDALAM KOMALA VENKATA KESAVANANDH	ECE	1157EC911	4G and 5G Mobile Communication	Pass	D
33	VtU7356	MADALA PRASANNA KUMAR	ECE	1157EC911	4G and 5G Mobile Communication	Pass	C
34	VtU7329	MARIMUTHU RAMKUMAR	ECE	1157EC911	4G and 5G Mobile Communication	Pass	C
35	VtU8191	SADIVE LAKSHMI PRASAD REDDY	ECE	1157EC911	4G and 5G Mobile Communication	Pass	B
36	VtU8076	NARAYANA NELLURI VENKATESH	ECE(S.S)	1157EC911	4G and 5G Mobile Communication	RA	RA



Vel Tech

Rangarajan Dr. Sagunthala
R&D Institute of Science and Technology
(Deemed to be University Estd. as of UGC Act, 1956)

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Our Ref. No: 2017/VF 22 43

Your Ref. No:

Submitted for the Approval:**Name of the Professor:** Prof. Dr. Tharek bin Abd. Rahman**University & Country :** Universiti Teknologi Malaysia (UTM), Malaysia**Course Title :** 4G and 5G Mobile Communication**Department :** Electronics and Communication Engineering**Students :** 2016-2020, 15 Students
2015-2019, 15 Students**Training Program date :** 12th to 16th March, 2018

Sl.No	Description	Amount in INR	Amount in MYR
1	Course Honorarium (Rs.3000 * 20 Hrs) (Net Amount & Tax Free)	60000	3605
2	Flight Ticket (Kuala Lumpur to Chennai and Return) (Reimbursement 1 MYR = 15.776 INR as on 03.01.2018)	31369	1988.38
	Total	91369	5593.38

(Rupees ninety one thousand three hundred and sixty nine only)

In this regard, I request your approval for transferring the amount in MYR to the following Account,

Name : Tharek bin Abd. Rahman**Account No:** 151306725133**Bank NAME:** MAYBANK**SWIFT Code:** MBBEMYKL

Thank You

S. Sivaperumal

S. Sivaperumal
Director International Relations
Vel Tech
Rangarajan Dr. Sagunthala
R&D Institute of Science and Technology
(Deemed to be University Estd. as of UGC Act, 1956)