



**NATIONAL ENGINEERING COLLEGE, K.R.NAGAR, KOVILPATTI – 628 503**  
(An Autonomous Institution, Affiliated to Anna University, Chennai)  
**RESEARCH & DEVELOPMENT**

**Date: 24/09/2022**

**Minutes of the Meeting**

The first Research Advisory Board (RAB) Meeting for the academic year 2022-23 was convened on 09/09/2022 (Friday) at 11.00 AM in the Conference Hall. The following members participated in the meeting,

S.No	Name	Address	Particulars
<b>Internal Members</b>			
1.	Dr. K, Kalidasa Murugavel	Principal, NEC, Kovilpatti	Chairman
2.	Dr. S. Shanmugavel	Director, NEC, Kovilpatti	Management
3.	Dr. M.A. Neelakantan	Dean R&D, NEC, Kovilpatti	Member
4.	Dr. V. Gomathi	Professor & HOD/CSE, NEC, Kovilpatti	Member
5.	Dr. T.S. Arun Samuel	Professor/ECE, NEC, Kovilpatti	Member
6.	Dr. R. Harichandran	Professor/MECH, NEC, Kovilpatti	Member
<b>External Members</b>			
7.	Dr. R. Brakaspathy	R&D Advisor, IIT- Madras, Chennai	Member
8.	Dr. Debasis Samanta	Associate Professor. CSE, IIT- Kharagpur.	Member
9.	Dr. J Klutto Milleth	Chief Technologist /CEWiT, Adjunct Faculty/Electrical Engineering, IIT- Madras	Member
10.	Dr. Murugan Karuppiah	Scientist "E"/ARCI, Hyderabad	Member
<b>Special Invitees</b>			
11.	Dr. S. Tamil Selvi	Dean Academics & Professor-ECE	Special Invitee
12.	Dr. K.G. Srinivasagan	Dean (TCP) & HOD-IT	Special Invitee
13.	Dr. D. Manimegalai	COE & Professor-CSE	Special Invitee
14.	Dr. K. Manisekar	HOD-MECH	Special Invitee
15.	Dr. C. Puthiya Sekar	HOD-Civil	Special Invitee
16.	Dr. A. Shenbagavalli	HOD-ECE	Special Invitee
17.	Dr. M. Willjuice Iruthayarajan	HOD-EEE	Special Invitee

The meeting was convened with the following agenda

- Road map of R&D activities
- Any other item with the permission of the Chair

**The following points were discussed**

- The principal welcomed the external and internal members of the committee.
- Dean R&D presented the R&D Ecosystem adopted at NEC and the targets and achievements for 2021-22.



Dr. J. Klutto Milleth emphasized the following points

- ✓ The scope of the Research area specified by each department found to be wide and suggested to narrow down. He added that the identification of Research area by faculty are to be very specific and state of the art.
- ✓ He appreciated the Seed money for Faculty as a good start-up.
- ✓ He continued by saying that actions related to product development should not be limited to proof of concept and technology transfer. Prior market research and product viability studies must be completed in order to considerably shorten the time required for product commercialization. Another method of commercialization is to quest for a start-up model.
- ✓ He advised to approach Railways, DRDO, and Industries for Consultancy.
- ✓ He insisted that in every department, one or two emerging areas must be identified for research funding, leading to a Centre of excellence.
- ✓ He appreciated the efforts taken for MoUs, which must be reflected in sponsored projects and consultancy.
- ✓ Interdisciplinary teams are to be framed based on the expertise available in emerging areas such as AI, ML & IoT and have collective efforts to get funded projects.
- ✓ PMRF funding shall be sought for external PhD Scholars to improve the research quality.

Dr. Debasis Samanta accentuated the below-listed points

- ✓ The research area has to be multi-disciplinary in the emerging fields and more streamlined
- ✓ He insisted on going for external funding to expand good research facilities and establish facilities for experimentation and data collection.
- ✓ Industry/academic collaborative research must be encouraged, which will help the students to get exposure to different areas.
- ✓ He recommended QIP at IIT / IISC for Faculty to undergo PhD.
- ✓ A good track record of patents filed was appreciated and advised to sell to agencies for developing the product to generate money.
- ✓ Application-oriented research has to be fortified as per the Government's vision of projects leading to products that are helpful for the society
- ✓ He added that outreach programs such as expert talk online twice or thrice a year can disseminate the trending area.
- ✓ Seed money funding, Incentive for publications, and Registration fees for conferences provided to Faculty were appreciated.





- ✓ He added international reputation could be brought in collaboration with international institutions.

Dr. K. Murugan highlighted the below-listed points

- ✓ Research collaboration within the departments has to be instigated, and CSE & Mech collaborative research programs must be steered.
- ✓ He congratulated the team efforts of NEC towards R&D and extended collaboration with ARCI for research proposals in coating
- ✓ He assured that the characterization facility could be provided at ARCI.
- ✓ He insisted for the Projects review committee for checking the quality of the proposals
- ✓ He added that for Product and technology development, a technical steering committee should be formulated.

Dr. R. Brakaspathy emphasized the following points

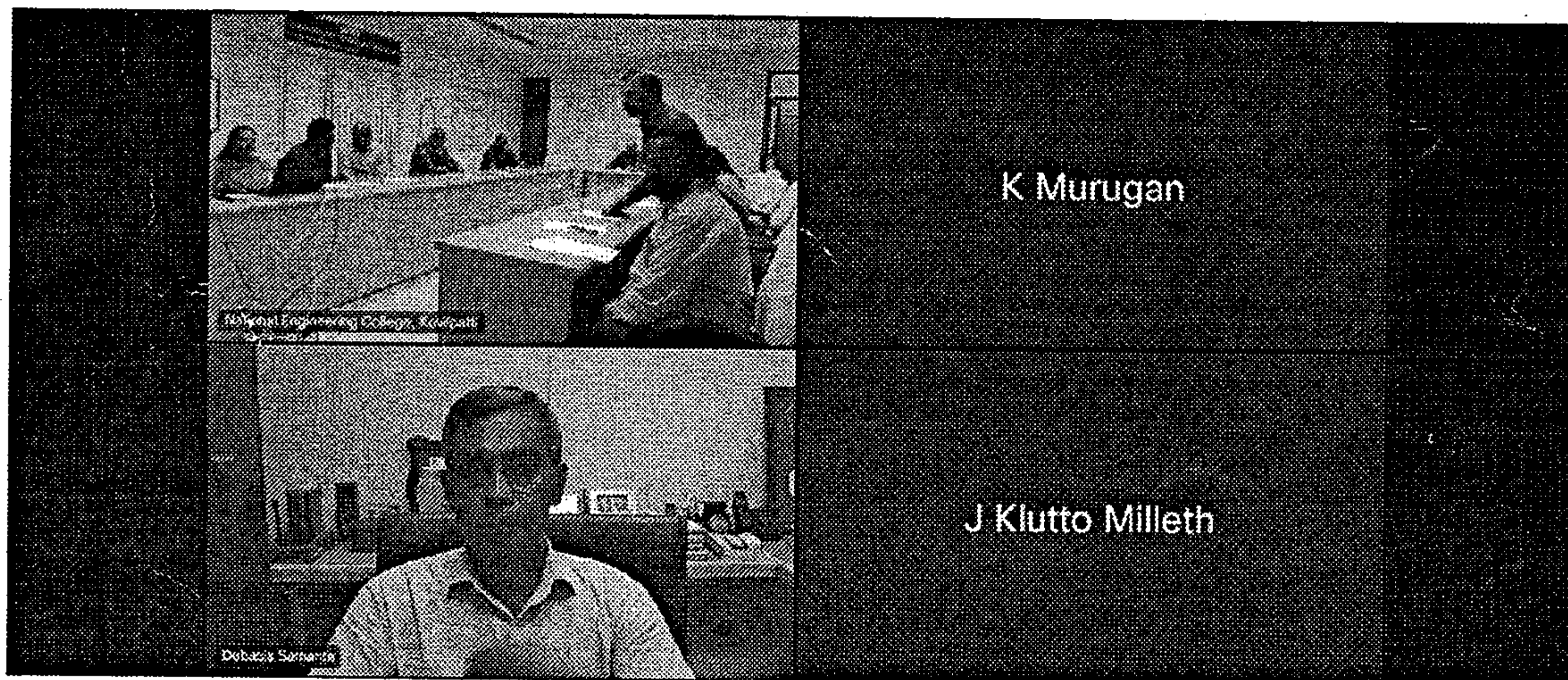
- ✓ He appreciated the efforts of NEC and the NIRF ranking Status
  - ✓ He insisted that the PhD Pursuing Faculty in future may be motivated to register with IITs and NITs
  - ✓ He added that the number of full-time scholars in the campus shall be increased.
  - ✓ He suggested that changing from discipline-based research to theme-based research is necessary for the current trend. He added that IoT, AI, and Energy are different disciplines to address a common theme which shall be focused on funding.
  - ✓ Alumni contributions need to be tapped towards research.
  - ✓ He indicated that Faculty has to identify a specific area and collaborate with IITs so that Ideas of the centre of excellence will evolve independently.
  - ✓ He demanded the Market status for Product development activities to be considered along with the economic aspects and efficiency of the products.
  - ✓ He advised IIT incubation (2 weeks) shall (Gururaj Deshpande incubation center) be approached to find out the commercial feasibility of a product.
- HOD/Mech briefed the product commercialization of candy making machine. He also briefed on Industry consultancy, Innovation and start-ups in NEC.
  - Dean R&D briefed the R&D facilities in the departments, funding received from the various agencies, and funding for International conferences and GIAN program participation by Faculty.



- HOD/MECH briefed the facilities available for Bio-inspired composites testing.
- HOD/CSE briefed the details of MoUs with industries through alumni.
- The feasibility of funding for establishing the centre of excellence was discussed
- Director briefed the funding allotted for the same from the management
- The principal added that the target was fixed in high only for proposal submission, for the question of high targets proposed.
- Dean R&D thanked the committee members, and Dr. R.V.Maheswari, the Research Coordinator, proposed the vote of thanks.

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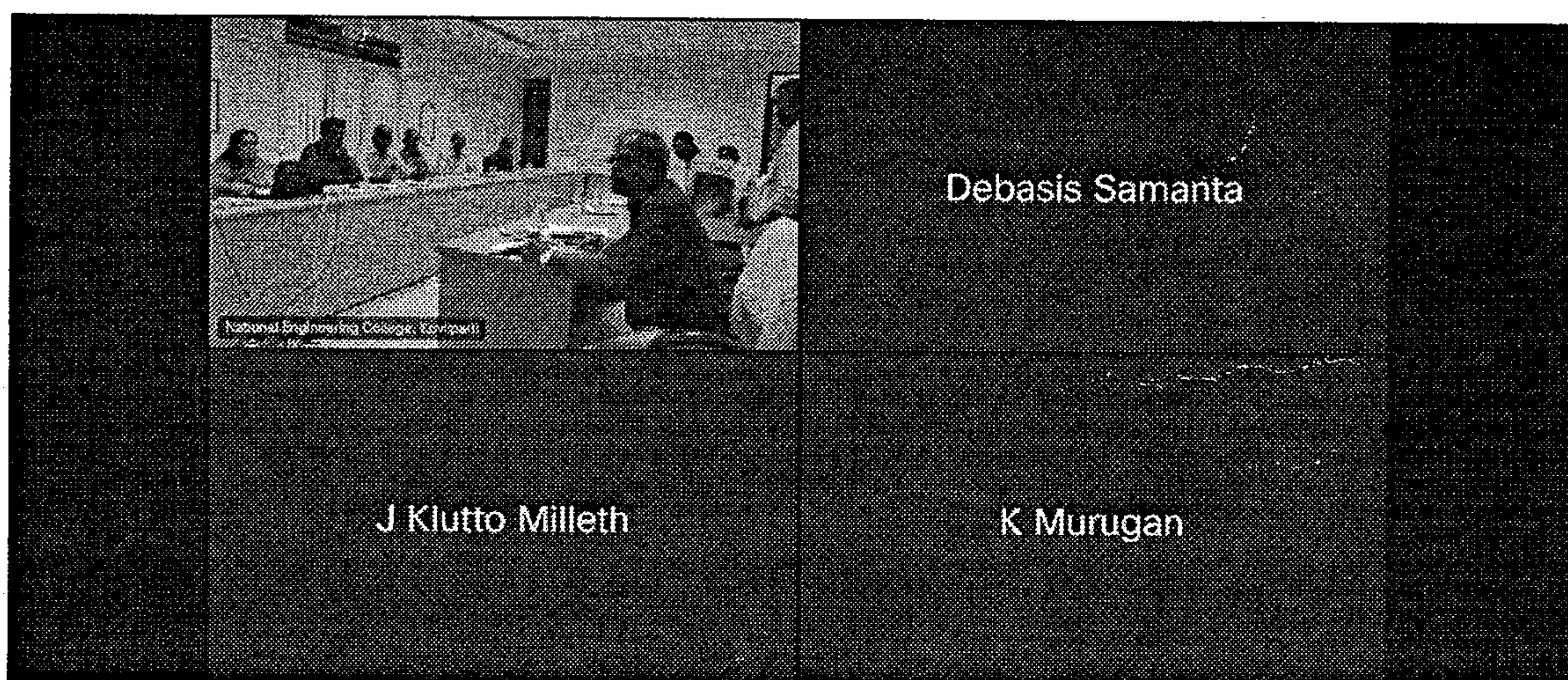
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*[Handwritten Signature]*  
 Dean R&D

*[Handwritten Signature]*  
 24/9  
 PRINCIPAL

*[Handwritten Signature]*  
 24/9/22  
 DIRECTOR

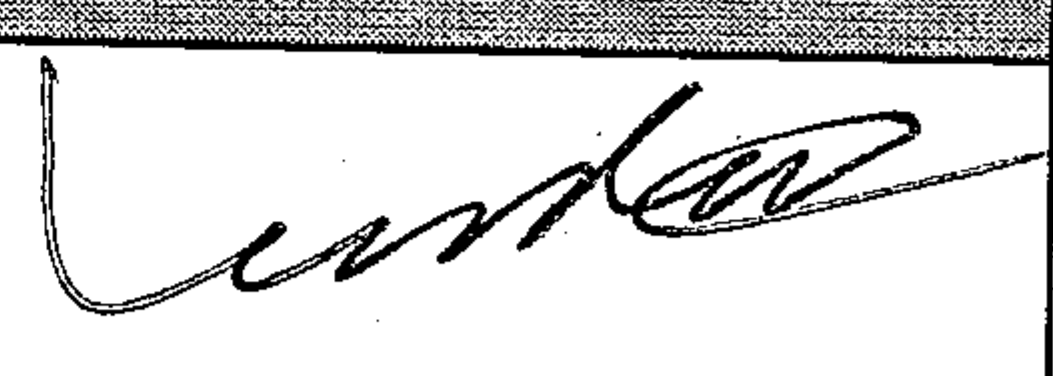
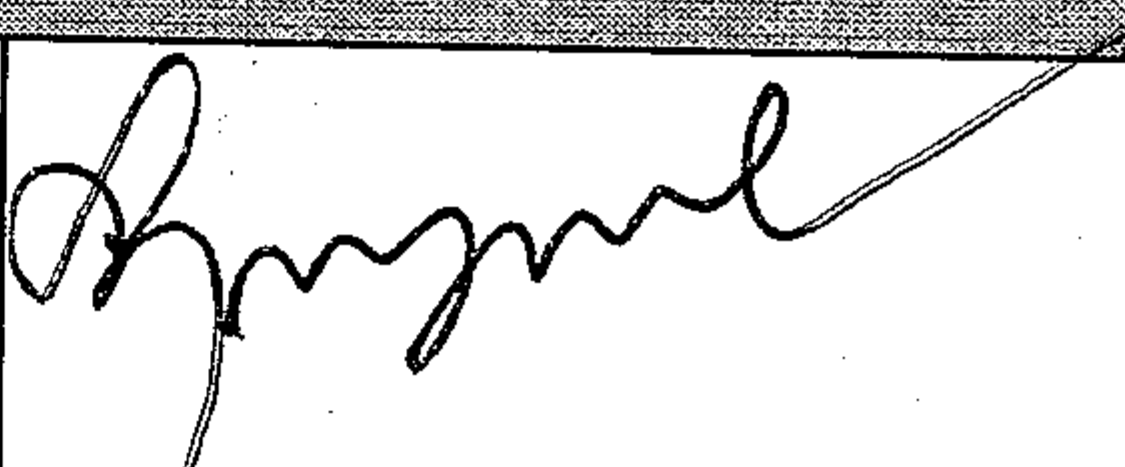
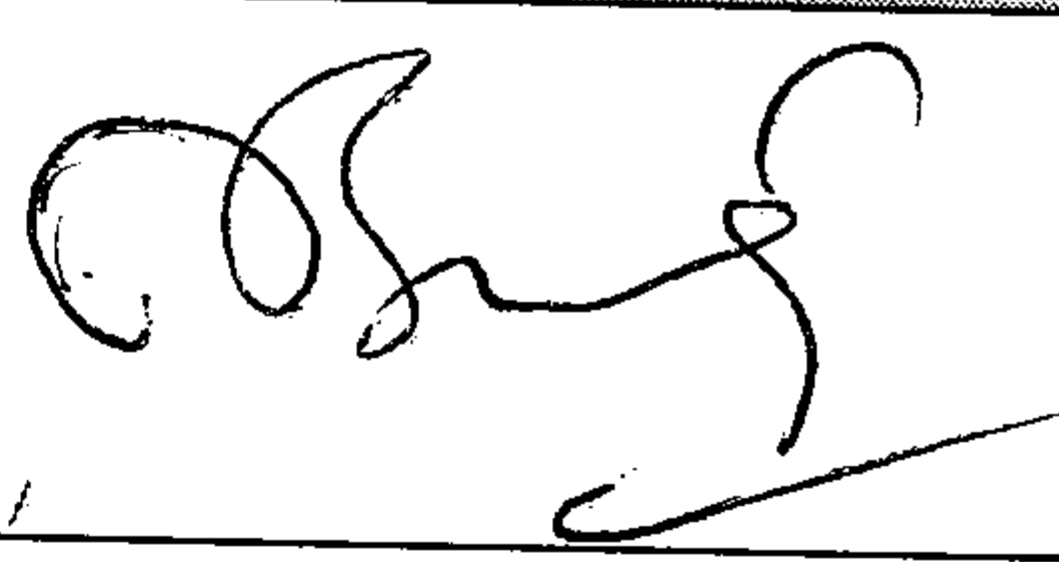

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The research targets and achievements of 2021-22 were presented to the committee. The research targets for 2022-23 were discussed and based on the suggestions, the targets were finalized.

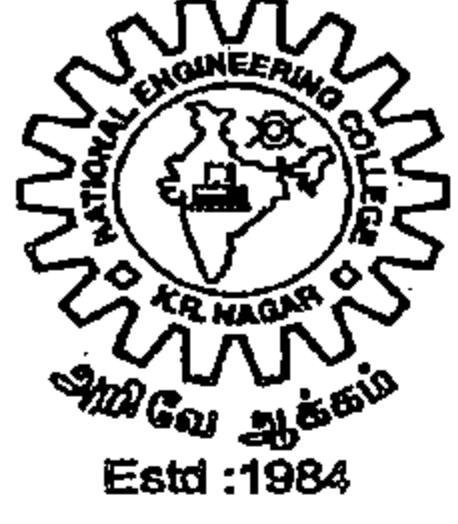
Dr. R.V. Maheswari, Professor & Research Coordinator thanked all the members for their kind cooperation and the meeting came to an end.

**Members Present**

<b>CHAIRMAN</b>		
1.	<b>Dr. K. Kalidasa Murugavel, Ph.D.,</b> Principal, NEC, Kovilpatti	
<b>Member Management</b>		
2.	<b>Dr. S. Shanmugavel, Ph.D.,</b> Director, NEC, Kovilpatti	
<b>EXTERNAL MEMBERS</b>		
3.	<b>Dr. R. Brakaspathy</b> R&D Advisor IITM - Chennai	
4.	<b>Dr. Debasis Samanta</b> Associate Professor Department of Computer Science & Engineering IIT, Kharagpur.	Online
5.	<b>Dr. J. Klutto Milleth</b> Chief Technologist Center of Excellence in Wireless Technology (CEWiT) Adjunct Faculty/Electrical Engineering IITM - Chennai	Online
6.	<b>Dr. Murugan Karuppiah</b> Scientist "E" International Advanced Research Centre for Powder Metallurgy and New Materials – (ARCI), Hyderabad	Online
<b>INTERNAL MEMBERS</b>		
7.	<b>Dr. M.A. Neelakantan,</b> Dean R&D, NEC, Kovilpatti	



8.	Dr. V. Gomathi, Ph.D., Professor & Head, Dept of CSE, NEC, Kovilpatti	V. Gomathi
9.	Dr. T. S. Arun Samuel Associate Professor, Dept of ECE NEC/ Kovilpatti	T. S. Arun Samuel
10.	Dr. R. Harichandran Associate Professor, Dept of MECH NEC/ Kovilpatti	R. Harichandran
<b>SPECIAL INVITEE</b>		
11.	Dr.S.Tamilselvi Dean (Academic)	S. Tamilselvi
12.	Dr D.Manimegalai Controller of examination	D. Manimegalai
13.	Dr. K.Manisekar HOD/MECH	K. Manisekar
14.	Dr. C.PuthiyaSekar HOD/Civil	C. PuthiyaSekar
15.	Dr. K.G.Srinivasagan Dean (TCP)/ HOD/IT	K. G. Srinivasagan
16.	Dr. A.Shenbagavalli HOD/ECE	A. Shenbagavalli
17.	Dr. M.WilljuiceIruthayarajan HOD/ EEE	M. WilljuiceIruthayarajan
<b>DEAN R&amp;D</b>		
18.	Dr. M.A. Neelakantan	M. A. Neelakantan



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**RESEARCH & DEVELOPMENT**

**Ref:- NEC/ Dean R&D / 2022-2023 / 3**

**03/09/2022**

**Circular**

It is to inform you that the first Research Advisory Board (RAB) Meeting is scheduled on 09/09/2022 (Friday) at 11.00 AM under the Chairmanship of Dr. K. Kalidasa Murugavel, Ph.D., Principal, National Engineering College, Kovilpatti. All the members are requested to make it convenient to attend the meeting.

S.No	Name	Address	Particulars
1.	Dr. K, Kalidasa Murugavel	Principal, NEC, Kovilpatti	Chairman
2.	Dr. S. Shanmugavel	Director, NEC, Kovilpatti	Management
3.	Dr. M.A. Neelakantan	Dean R&D, NEC, Kovilpatti	Member
4.	Dr. R. Brakaspathy	R&D Advisor, IIT- Madras, Chennai	Member
5.	Dr. Debasis Samanta	Associate Professor. CSE, IIT- Kharagpur.	Member
6.	Dr. J Klutto Milleth	Chief Technologist /CEWiT, IIT- Madras	Member
7.	Dr. Murugan Karuppiah	Scientist "E"/ARCI, Hyderabad	Member
8.	Dr. V. Gomathi	Professor & HOD/CSE, NEC, Kovilpatti	Member
9.	Dr. T. S. Arun Samuel	Professor/ECE, NEC, Kovilpatti	Member
10.	Dr. R. Harichandran	Professor/MECH, NEC, Kovilpatti	Member
11.	Dean (Academic), COE & All HODs	Special Invitees	

**Agenda:-**

- Road map of R&D activities
- Any other item with the permission of Chair

**Venue: - Conference Hall**

  
3.9.22  
**Senior Dean**

  
3/9  
**Principal**

  
3/9/22  
**Director**

**Copy to:** Deans (Academic, TCP), COE, PS to Principal,  
HoDs (MECH, ECE, CSE, EEE, IT, CIVIL, S&H),  
Research Advisory Board Members, File





RESEARCH & DEVELOPMENT

Date: 03.09.2022

BUDGET PROPOSAL

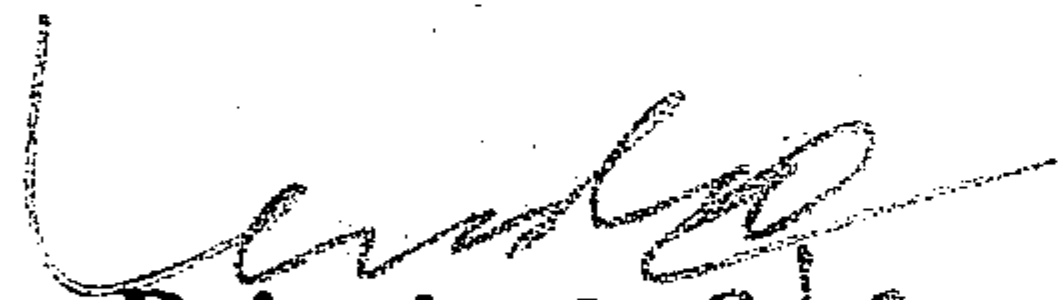
Submitted to the Chairman

The first Research Advisory meeting is planned to conduct on 09/09/2022 at 11.00 A.M. The following external experts are willing to attend the meeting through hybrid mode (online/offline). In this connection, it is required to pay sitting fee, incidental charges and traveling allowances for the experts. The details of approximate expenditure are given below.

S. No.	Description	Sitting Fee (Rs.)	Mode of Participation	Total (Rs.)
1.	<b>Dr. R Brakaspathy</b> R&D Advisor Indian Institute of Technology – Madras Chennai	10,000	(offline)	10,000
2.	<b>Dr. Debasis Samanta</b> Associate Professor Department of Computer Science & Engineering, Indian institute of Technology, Kharagpur.	5,000	(online)	5,000
3.	<b>Dr. Murugan Karupiah</b> Scientist "E" International Advanced Research Centre for Powder Metallurgy and New Materials Balapur P.O., Hyderabad: 500 005	5,000	(online)	5,000
4.	<b>Dr. J Klutto Milleth</b> Chief Technologist CEWiT, Indian Institute of Technology – Madras, Chennai	5,000	(online)	5,000
5.	Refreshment (Lunch & Snacks)			2,000
	Miscellaneous			1,000
<b>TOTAL</b>				<b>28,000</b>

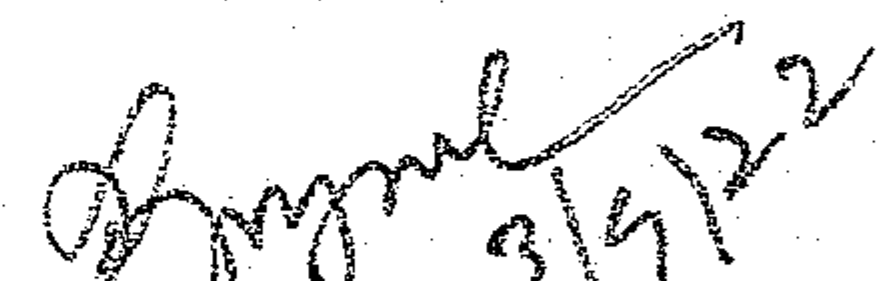
Permission may please be granted and the amount of Rs.28,000/- (Rupees Twenty Eight Thousand only) may please be sanctioned for the same.

Recommended

  
Principal 3/9

  
Senior Dean (I&FA)

Forwarded

  
Director 3/9/22

Approved / Sanctioned

  
Chairman / Correspondent



**NATIONAL ENGINEERING COLLEGE, K.R.NAGAR, KOVILPATTI – 628 503**  
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**RESEARCH & DEVELOPMENT**

**04.09.2019**

**1.1 INSTITUTIONAL ETHICS COMMITTEE (IEC)**

Research and Development Center of National Engineering College, K. R. Nagar, Kovilpatti has reconstituted the Institutional Ethics Committee for ethical study process to discourse the necessary ethical considerations. Researchers involving with study of rights, safety, dignity and well-being of research participants has to get IEC approval. IEC approval also promotes the ethical research related to potential benefit to participants and society. The ethical approval from IEC will ensure that the research conducted is of high ethical standard, sound integrity along with good research governance and legal requirements.

**1.2 THE ETHICS COMMITTEE MEMBERS 2021**

<b>S. No</b>	<b>Name of the Member along with designation</b>	<b>Position of the Member</b>
1.	Dr. M. G. Sethuraman M. Sc., Ph.D Professor/ Dept.of Chemistry Gandhigram Rural Institute, Dindigul – 624302 E-mail: mgsethu@rediffmail.com Mobile: 9443021565	Chairman
<b>Sources of Data</b>		
2.	<b>Dr. S.Shanmugavel, Ph.D.,</b> National Engineering College K.R.Nagar, Kovilpatti Email: director@nec.edu.in	Director
3.	Dr. K, Kalidasa Murugavel, Ph.D., National Engineering College K.R.Nagar, Kovilpatti Email: director@nec.edu.in	Principal
4.	Dr. M.A. Neelakantan, Ph.D., National Engineering College, K.R.Nagar, Kovilpatti Email: deanrd@nec.edu.in Mobile: 9442505839	Dean, Research and Development
<b>External Members</b>		
5.	<b>Dr. N,Sivakumaran Ph.D.,</b> Associate Professor Dept. of Instrumentation and control Engineering National Institute of Technology, Trichy-620015 E-mail: nsk@nitt.edu Mobile: 9443745705	Medical Scientist



6.	Dr. P.Balan M.D. Rhytham Hospital 12, Muthananpuram 2 <sup>nd</sup> Street Kovilpatti- 628501 Mobile: 9842131459	Clinician
7.	Mr. S.V.Sampath Kumar B.Com., L.L.B. Advocate & Notary Public 111, Market Road, Kovilpatti – 628501 Mobile: 9443312951	Legal Expert
8.	Dr.M.Ramakrishnan Ph.D., Professor/Head, Dept. of Sociology M.S.University, Tirunelveli- 627012 Mobile: 9843626462	Social Scientist
9.	Mr. D.Jawahar M.A., B.D., M.Phil., B.L. Faculty Member / Director, Social Action Co-ordination Tamilnadu Theological Seminary, Arasaradi, Madurai – 625016 Mobile: 9486852435	Theologian
10.	Mr. M.Balasubramanian Electrical Technician Lakshmi Ammal Polytechnic College K.R.Nagar, Kovilpatti – 628503 Mobile: 9600738573	Lay Person
11.	Dr. R. V. Maheswari Professor, Dept. of EEE, NEC, Kovilpatti	Member Secretary

### 1.3 RESPONSIBILITIES OF IEC MEMBERS

IEC members have to attend the meeting arranged at National Engineering College, Kovilpatti to review research proposals for reviewing the research proposals with regard to ethical concerns after receiving the request from the candidate for approval.

### 1.4 REQUIREMENTS FOR ETHICAL APPROVAL FOR PROJECT SUBMISSION

Principal investigator/s and Co-investigator is solo responsible to get ethical approval prior to project submission or any data collection/analysis process. Applications with proper format (ANNEXURE I with necessary documents) for ethical approval must be submitted to Dean, Research and Development center along with necessary attachments. Approval from IEC is need got the following cases:

#### 1.4.1 SOURCES OF DATA

All research work involving with data from human participants and/or any pre-existing personal data. The data collection process includes all forms like experimental procedures /



retreatment / intervention, focus group, survey, observation, personal interviews, or self-administered questionnaire, etc. including physical settings, whose concealment needs to be safeguarded.

Usage of pre-existing personal data refers to readily available personal data from existing documents/records for secondary analysis, irrespective of whether or not the data are publicly available, whether or not the data originally collected or intentionally for research purpose.

#### **1.4.2 Risk**

If research work involves with any possible risk like minimal physical and /or psychological stress/pain/discomfort to participants, then the participants' rights and interests must be ensured. Undertaking must be obtained from participants after informing the type and degree of the risk to the participants. Measures taken to reduce risk, remedial support for risk participants, how their personal data will be deployed in research, and how long the data will be kept safely should be informed to participants. Participants' privacy and confidentiality must be safeguarded

#### **1.4.3 Informed Consent**

Principal investigators and co-investigators must get informed consent assuring the voluntary participation of the participant after providing sufficient duration to consider whether or not to participate, and minimizing the possibility of compulsion, undue influence, or harassment.

#### **1.4.4 Parental Consent**

In the research work involves children under 18 must get written consent from parents as well as from students themselves children even in cases where children were able to decline participation.

#### **1.4.5 Privacy and Confidentiality of Data**

Researchers must maintain the confidentiality of data related to individual research participants. Except by public observation, researchers should clearly indicate the purpose of the collection of data and the method to ensure the confidentiality of collected data. Researchers must also avoid use of any personal identifiers such as individual names and addresses in their research reports which could lead to the human participants being identified.

#### **1.4.6 Benefits**

Prospective participants should not be adversely induced by financial reward or be pressured to participate in research. All reimbursement of expenses, such as traveling expenses, should be commensurate with standard practice and be reasonable.



### **1.4.7 Studies Involving External Parties**

If an external party involved in co-organizing the research project (e.g. in recruitment or data collection), a formal contract/letter of agreement or consent form should be signed before commencement of the project, and such document should be submitted together with the ethical application.

## **1.5 APPROVAL PROCESS**

### **Approved:**

A letter of approval will be issued to the PI with indication of the ethics approval period granted.

### **Conditionally Approved:**

The approval letter will be issued with comments/concerns need to be satisfactorily addressed.

### **Not Approved:**

The Committee will specify its comments/recommendations on the notification to the PIs of protocols which are not approved.

### **Reconsideration of Decision:**

The Committee will further consider the resubmitted proposals according to the Committee's recommendations.



Dean R&D



Principal



**NATIONAL ENGINEERING COLLEGE, K.R.NAGAR, KOVILPATTI – 628 503**  
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**RESEARCH & DEVELOPMENT**

07.09.2016

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<b>Sources of Data</b>		
2.	Dr. S.Shanmugavel, Ph.D., National Engineering College K.R.Nagar, Kovilpatti Email: <a href="mailto:director@nec.edu.in">director@nec.edu.in</a>	Principal
3.	Dr. M.A. Neelakantan, Ph.D., National Engineering College, K.R.Nagar, Kovilpatti Email: <a href="mailto:deanrd@nec.edu.in">deanrd@nec.edu.in</a> Mobile: 9442505839	Dean, Research and Development
<b>External Members</b>		
4.	Dr. N,Sivakumaran Ph.D., Associate Professor Dept. of Instrumentation and control Engineering National Institute of Technology, Trichy-620015 E-mail: <a href="mailto:nsk@nitt.edu">nsk@nitt.edu</a> Mobile: 9443745705	Medical Scientist



5.	Dr. P.Balan M.D. Rhytham Hospital 12, Muthananpuram 2 <sup>nd</sup> Street Kovilpatti- 628501 Mobile: 9842131459	Clinician
6.	Mr. S.V.Sampath Kumar B.Com., L.L.B. Advocate & Notary Public 111, Market Road, Kovilpatti – 628501 Mobile: 9443312951	Legal Expert
7.	Dr.M.Ramakrishnan Ph.D., Professor/Head, Dept. of Sociology M.S.University, Tirunelveli- 627012 Mobile: 9843626462	Social Scientist
8.	Mr. D.Jawahar M.A., B.D., M.Phil., B.L. Faculty Member / Director, Social Action Co-ordination Tamilnadu Theological Seminary, Arasaradi, Madurai – 625016 Mobile: 9486852435	Theologian
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The Committee will specify its comments/recommendations on the notification to the PIs of protocols which are not approved.

**Reconsideration of Decision:**

The Committee will further consider the resubmitted proposals according to the Committee's recommendations.



Dean R&D



Principal



**RESEARCH AND DEVELOPMENT**

Ref:- NEC/ Dean R&D / 2021-2022 / 1

05/05/2021

**Circular**

The Research Advisory Board (RAB) has been constituted to strengthen National Engineering College's research ambience, enhance the quality of scholarly endeavours, and develop research programs' growth. The following members constitute the Research Advisory Board

S.No	Name	Address	Particulars
<b>Internal Members</b>			
1	Dr. K, Kalidasa Murugavel, Ph.D.,	Principal National Engineering College K.R.Nagar, Kovilpatti	Chairman
2	Dr. S. Shanmugavel, Ph.D.,	Director National Engineering College K.R.Nagar, Kovilpatti	Management
3	Dr. M.A. Neelakantan, Ph.D.,	Dean R&D National Engineering College, K.R.Nagar, Kovilpatti	Member
4	Dr. V. Gomathi, Ph.D.,	Professor & Head, Dept of CSE National Engineering College, K.R.Nagar, Kovilpatti	Member
5	Dr. T. S. Arun Samuel	Associate Professor, Dept of ECE National Engineering College, K.R.Nagar, Kovilpatti	Member
6	Dr. R. Harichandran	Associate Professor, Dept of MECH National Engineering College, K.R.Nagar, Kovilpatti	Member
<b>External Members</b>			
7	Dr. R Brakaspathy	R&D Advisor Indian Institute of Technology – Madras Chennai	Member
8	Dr. Debasis Samanta	Associate Professor Dept of Computer Science & Engineering Indian Institute of Technology, Kharagpur.	Member
9	Dr. J Klutto Milleth	Chief Technologist Center of Excellence in Wireless Technology (CEWiT) Indian Institute of Technology – Madras Chennai	Member
10	Dr. Murugan Karupiah	Scientist "E" International Advanced Research Centre for Powder Metallurgy and New Materials (ARCI), Balapur P.O., Hyderabad: 500 005	Member



## **Roles & Responsibilities**

- The primary role of the Research Advisory Board (RAB) is to guide in establishing research ambience with adequate state-of-art infrastructures at recognized research centers of the Institution.
- The RAB comprises the Director, Principal as Chairperson, Dean, Research and Development, Three internal members, and Four external members from scientific R&D Labs, Industries, and academic leadership with research competency in emerging research fields related to the specializations of each research centre with three years term.
- The RAB shall meet once per semester or as needed.
- The RAB will review R&D proposals and collaborative outreach projects yearly, including half-year meetings.
- The RAB will provide recommendations on extending Institutional Seed Money support for R&D project ideas based on their scientific merits, such as objectives, the feasibility of the study, the principal investigator's previous track record, and expected outcomes in alignment with the Institution's short-term strategic plan.
- The RAB members will provide critical and constructive feedback for the research supervisors based on the research scholar's progress and accomplishments.



**Dean R&D**



**Principal**

**Copy to:-**

- 1. The Chairman**
- 2. Individual Members**
- 3. HODs of all Department**



## **RESEARCH AND DEVELOPMENT**

### **Research Advisory Board**

National Engineering College (NEC), established in 1984, has made concerted efforts to establish state-of-art research ambience, persuade sponsored and collaborative research, enhance industry interaction and consultancy, develop augmented research laboratories, and foster industrial need research works.

### **External Members**

	<p><b>Dr. R Brakaspathy</b> has close to 30 years of experience in R&amp;D Project Management. He worked for the Department of Science and Technology (DST), Government of India and handled various programs, including the establishment of centres of excellence, identification of emerging areas, formulation of new schemes and development of human resources. He superannuated as Secretary, Science and Engineering Research Board (SERB), an autonomous research funding body of the DST. He is presently working as R&amp;D Advisor at the Indian Institute of Technology-Madras, Chennai.</p>
<p><b>Dr. R Brakaspathy</b> R&amp;D Advisor Indian Institute of Technology – Madras Chennai <a href="https://in.linkedin.com/in/r-brakaspathy-34665518">https://in.linkedin.com/in/r-brakaspathy-34665518</a></p>	
	<p><b>Dr. Debasis Samanta</b> is currently involved in Research Areas like Human-Computer Interaction, Brain Computing, Biometric Security, Data Analytics, and Software Testing. He is the recipient of Best Article of the Year by Computer Society of India (1998), Best Paper award by 8th ADCOM Conference, IIT Guwahati (2006), and Microsoft Valued Professional award by Microsoft, USA (2007). He has published 71 refereed journals, four books, guiding 12+11(Ongoing) Ph. D scholars and 14+1(Ongoing) MS scholars. He has filed ten patents, completed Rs. 582.99 lakhs worth of projects, and currently, he has Rs. 193.64 lakhs worth of ongoing projects.</p>
<p><b>Dr. Debasis Samanta</b> Associate Professor Department of Computer Science &amp; Engineering Indian Institute of Technology, Kharagpur. <a href="https://cse.iitkgp.ac.in/~dsamanta/">https://cse.iitkgp.ac.in/~dsamanta/</a></p>	





**Dr. J Klutto Milleth**  
Chief Technologist  
Center of Excellence in Wireless  
Technology (CEWiT)  
Indian Institute of Technology – Madras  
Chennai  
<https://cewit.org.in/management-team/>

**Dr. J Klutto Milleth** is a Chief Technologist at CEWiT, IIT Madras. His research focuses mainly on the L1, L2, and L3 layers of 4G and 5G Broadband Wireless Communication system technology. He has lead the collaborative research project in 5G with IISc Bangalore, IIT Madras, IIT Bombay, IIT Hyderabad, IIT Delhi, IIT Kanpur, and SAMEER Chennai. His research activity has led to 25 publications in leading national/international journals and conferences. He has 25+ US and 15+ Indian patents already granted and filed another 05+ US and 35+ Indian patents under examination. He has received the TSDSI FELLOW 2020, the Hall of Fame 2020 award by TSDSI for his contribution to 5Gi technology.



**Dr. Murugan Karuppiah**  
Scientist “E”  
International Advanced Research Centre  
for Powder Metallurgy and New Materials  
(ARCI),  
Balapur P.O.,  
Hyderabad: 500 005  
[https://www.arci.res.in/people-  
pages/1558957770 K%20M%20CV%  
2016052019.pdf](https://www.arci.res.in/people-pages/1558957770_K%20M%20CV%2016052019.pdf)

**Dr. Murugan Karuppiah** is involved in research areas like antireflective, anti-tarnishing, self-cleaning, metal-dielectric nano-composites thin film synthesis by sol-gel chemical methods for energy and environmental applications. His work includes thin films characterization using advanced material characterization techniques and ellipsometry data analysis. He received Platinum best group awards at the Asia Nanotech Camp 2011, Seoul, South Korea, for Sustainable Nanotechnology for saving water. He has published 29 refereed journals. He has been granted three patents and two more patents in process. He completed Rs. 166 lakhs worth projects, Rs. 27 lakhs worth consultancy. He is currently working to develop a pack and slurry aluminising process for high-temperature oxidation and corrosion resistance and slurry coatings for various engineering and domestic applications (ongoing) projects.





# NATIONAL ENGINEERING COLLEGE

(An Autonomous Institution Affiliated to Anna University, Chennai)

K.R.Nagar, Kovilpatti - 628 503, Thoothukudi Dist., Tamilnadu.

**Dr. K. KALIDASA MURUGAVEL** M.E.,Ph.D.,  
Principal

Phone : +91 9385976684, 04632 - 222502,

Email : [principal@nec.edu.in](mailto:principal@nec.edu.in),

Fax : 04632 - 232749

Web: [www.nec.edu.in](http://www.nec.edu.in)

05.05.2021

To

Dr. R Brakaspathy,  
R&D Advisor,  
Indian Institute of Technology – Madras,  
Chennai.

Respected Sir,

National Engineering College (NEC), established in 1984, has made concerted efforts to establish state-of-art research ambience, persuade sponsored and collaborative research, enhance industry interaction and consultancy, develop augmented research laboratories, and foster industrial need research works. To strengthen the research activities, Research Advisory Board (RAB) has been constituted in our college.

In this regard, we are pleased to appoint Dr R Brakaspathy, R&D Advisor, Indian Institute of Technology – Madras, as external advisory board members. This appointment tenure is for three years.

The prime role of RAB includes peer review of R&D and collaborative outreach research activities, the recommendation for institutional seed money support at each half-year meeting.

Looking forward to your expertise to achieve excellence in research.

Thanking you

With regards

Principal



# NATIONAL ENGINEERING COLLEGE

(An Autonomous Institution Affiliated to Anna University, Chennai)  
K.R.Nagar, Kovilpatti - 628 503, Thoothukudi Dist., Tamilnadu.

**Dr. K. KALIDASA MURUGAVEL** M.E.,Ph.D.,  
Principal

Phone : +91 9385976684, 04632 - 222502,  
Email : principal@nec.edu.in,  
Fax : 04632 - 232749  
Web: www.nec.edu.in

05.05.2021

To

Dr. J Klutto Milleth,  
Chief Technologist,  
Center of Excellence in Wireless Technology (CEWiT),  
Indian Institute of Technology – Madras,  
Chennai.

Respected Sir,

National Engineering College (NEC), established in 1984, has made concerted efforts to establish state-of-art research ambience, persuade sponsored and collaborative research, enhance industry interaction and consultancy, develop augmented research laboratories, and foster industrial need research works. To strengthen the research activities, Research Advisory Board (RAB) has been constituted in our college.


In this regard, we are pleased to appoint Dr. J Klutto Milleth, Chief Technologist, Center of Excellence in Wireless Technology (CEWiT), Indian Institute of Technology – Madras, as one of the research advisory board members. This appointment tenure is for three years.

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Thanking you

With regards

  
Principal







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Email : principal@nec.edu.in,  
Fax : 04632 - 232749  
Web: www.nec.edu.in

05.05.2021

To

Dr. Debasis Samanta,  
Associate Professor,  
Department of Computer Science & Engineering,  
Indian Institute of Technology,  
Kharagpur.

Respected Sir,

National Engineering College (NEC), established in 1984, has made concerted efforts to establish state-of-art research ambience, persuade sponsored and collaborative research, enhance industry interaction and consultancy, develop augmented research laboratories, and foster industrial need research works. To strengthen the research activities, Research Advisory Board (RAB) has been constituted in our college.

In this regard, we are pleased to appoint Dr. Debasis Samanta, Associate Professor , Department of Computer Science & Engineering, Indian Institute of Technology – Kharagpur, as one of the research advisory board members. This appointment tenure is for three years.

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Looking forward to your expertise to achieve excellence in research.

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With regards

  
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Email : principal@nec.edu.in,  
Fax : 04632 - 232749  
Web: www.nec.edu.in

05.05.2021

To

Dr. Murugan Karuppiah,  
Scientist "E",  
International Advanced Research Centre  
for Powder Metallurgy and New Materials (ARCI),  
Balapur P.O.,  
Hyderabad: 500 005.

Respected Sir,

National Engineering College (NEC), established in 1984, has made concerted efforts to establish state-of-art research ambience, persuade sponsored and collaborative research, enhance industry interaction and consultancy, develop augmented research laboratories, and foster industrial need research works. To strengthen the research activities, Research Advisory Board (RAB) has been constituted in our college.

In this regard, we are pleased to appoint Dr. Murugan Karuppiah, Scientist E, International Advanced Research Centre for Powder Metallurgy and New Materials (ARCI) - Hyderabad, as one of the research advisory board members. This appointment tenure is for three years.

The prime role of RAB includes peer review of R&D and collaborative outreach research activities, the recommendation for institutional seed money support at each half-year meeting.

Looking forward to your expertise to achieve excellence in research.

Thanking you

With regards

Principal



**NATIONAL ENGINEERING COLLEGE, K.R.NAGAR, KOVILPATTI – 628 503**  
(An Autonomous Institution, Affiliated to Anna University, Chennai)




**RESEARCH & DEVELOPMENT**

**04.09.2019**

**1.1 INSTITUTIONAL ETHICS COMMITTEE (IEC)**

Research and Development Center of National Engineering College, K. R. Nagar, Kovilpatti has reconstituted the Institutional Ethics Committee for ethical study process to discourse the necessary ethical considerations. Researchers involving with study of rights, safety, dignity and well-being of research participants has to get IEC approval. IEC approval also promotes the ethical research related to potential benefit to participants and society. The ethical approval from IEC will ensure that the research conducted is of high ethical standard, sound integrity along with good research governance and legal requirements.

**1.2 THE ETHICS COMMITTEE MEMBERS 2021**

<b>S. No</b>	<b>Name of the Member along with designation</b>	<b>Position of the Member</b>
1.	Dr. M. G. Sethuraman M. Sc., Ph.D Professor/ Dept.of Chemistry Gandhigram Rural Institute, Dindigul – 624302 E-mail: mgsethu@rediffmail.com Mobile: 9443021565	Chairman
<b>Sources of Data</b>		
2.	Dr. S.Shanmugavel, Ph.D., National Engineering College K.R.Nagar, Kovilpatti Email: director@nec.edu.in	Director 
3.	Dr. K, Kalidasa Murugavel, Ph.D., National Engineering College K.R.Nagar, Kovilpatti Email: director@nec.edu.in	Principal 
4.	Dr. M.A. Neelakantan, Ph.D., National Engineering College, K.R.Nagar, Kovilpatti Email: deanrd@nec.edu.in Mobile: 9442505839	Dean, Research and Development 
<b>External Members</b>		
5.	Dr. N,Sivakumaran Ph.D., Associate Professor Dept. of Instrumentation and control Engineering National Institute of Technology, Trichy-620015 E-mail: nsk@nitt.edu Mobile: 9443745705	Medical Scientist

**M. E. – COMPUTER SCIENCE AND ENGINEERING**

**SEMESTER – I**

S. No.	Course Category	Course Code	Course Title	L	T	P	C	QP
<b>THEORY</b>								
1	SFC	19CT11C	Mathematical Foundations for Computer Professionals	3	1	0	4	A
2	PCC	19CT12C	Advanced Data Structures	3	0	0	3	A
3	PCC	19CT13C	Research Methodology and IPR	2	0	0	2	B
4	PEC	E1	Elective - I	3	0	0	3	A
5	PEC	E2	Elective - II	3	0	0	3	A
6	AC		Audit Course - I	2	0	0	0	D
<b>PRACTICAL</b>								
7	PCC	19CT14C	Advanced Data Structures Laboratory	0	0	3	1.5	-
8	PEC	E3	Elective I Laboratory	0	0	3	1.5	-
<b>Total</b>				<b>16</b>	<b>1</b>	<b>6</b>	<b>18</b>	

**SEMESTER – II**

S. No.	Course Category	Course Code	Course Title	L	T	P	C	QP
<b>THEORY</b>								
1	PCC	19CT21C	Advanced Algorithms	3	0	0	3	A
2	PCC	19CT22C	Machine Learning Techniques	3	1	0	4	A
3	PEC	E4	Elective - III	3	0	0	3	A
4	PEC	E5	Elective - IV	3	0	0	3	A
5	AC		Audit Course - II	2	0	0	0	D
<b>PRACTICAL</b>								
6	PCC	19CT23C	Machine Learning Laboratory	0	0	3	1.5	-
7	PEC	E6	Elective - III Laboratory	0	0	3	1.5	-
8	PCC	19CT24C	Mini Project with Seminar	0	0	4	2	
<b>Total</b>				<b>14</b>	<b>1</b>	<b>10</b>	<b>18</b>	<b>-</b>



19CT13C

RESEARCH METHODOLOGY AND IPR

L T P C QP

2 0 0 2 B

### COURSE OUTCOMES

Upon completion of this course, the student will be able to

CO1: Understand research problem formulation. (K2)

CO2: Analyze research related information. (K4)

CO3: Understand the research ethics. (K2)

CO4: Understanding that when IPR would take such important place in growth of individuals & Nation. (K2)

CO5: Recognize the importance of Report writing. (K2)

### UNIT I RESEARCH FORMULATION AND DESIGN 6

Defining and formulating the research problem, selecting the problem, necessity of defining the problem, importance of literature review in defining a problem, literature review - primary and secondary sources, reviews, monograph, patents, research databases, web as a source, searching the web, critical literature review, identifying gap areas from literature and research database, development of working hypothesis.

### UNIT II DATA COLLECTION AND ANALYSIS 6

Method validation, observation and collection of data, methods of data collection, sampling methods, data processing and analysis strategies and tools, data analysis with statistical package (Sigma STAT, SPSS for student t-test, ANOVA, etc.), hypothesis testing.

### UNIT III RESEARCH ETHICS, IPR AND SCHOLARLY PUBLISHING 6

Ethics - ethical issues, ethical committees (human & animal); IPR- intellectual property rights and patent law, commercialization, copy right, royalty, trade related aspects of intellectual Property rights (TRIPS); scholarly publishing - IMRAD concept and design of research paper, citation and acknowledgement, plagiarism, reproducibility and accountability.

### UNIT IV CONTEMPORARY ISSUES IN IPR 6

Interface between IPR and Human Rights -Interface between IPR and Competition Law -IPR and sustainable development – Impact of Internet on IPR - IPR of Biological systems & E-Commerce.

### UNIT V INTERPRETATION AND REPORT WRITING 6

Meaning of Interpretation, Technique of Interpretation, Precaution in Interpretation, Significance of Report Writing, Different Steps in Writing Report, Layout of the Research Report, Types of Reports, Oral Presentation, Mechanics of Writing a Research Report, Precautions for Writing Research Reports.

**L: 30; TOTAL: 30 PERIODS**

### REFERENCES

1. Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K., "An introduction to Research Methodology", RBSA Publishers, 2015.
2. Kothari, C.R., "Research Methodology: Methods and Techniques", New Age International, 2018 (Unit 1 ,Unit 2,Unit 5).
3. Wadehra, B.L. "Law relating to patents, trade marks, copyright designs and geographical indications". Universal Law Publishing, Reprint, 2011. (Unit 3, Unit 4)
4. Anthony, M., Graziano, A.M. and Raulin, M.L.. Research Methods: A Process of Inquiry, Allyn and Bacon 2012.
5. Carlos, C.M., Intellectual property rights, the WTO and developing countries: the TRIPS agreement and policy options. Zed Books, New York, 2000.

**SEMESTER I**

S. No.	Course Category	Course Code	Course Title	L	T	P	C	Question pattern
<b>THEORY AND INTEGRATED COURSES</b>								
1.	PCC	19ES11C	ARM CortexM3 Architecture	3	0	0	3	A
2.	PCC	19ES12C	Design of Embedded System	3	0	0	3	A
3.	PCC	19ES13C	Research Methodology and IPR	2	0	0	2	B
4.	PEC		Elective – I	3	0	0	3	A
5.	PEC		Elective – II	3	0	0	3	A
6.	AC-1		Audit Course – I	2	0	0	0	D
<b>PRACTICAL COURSES</b>								
7.	PCC	19ES14C	Microcontroller Interfacing Laboratory	0	0	4	2	-
8.	PCC	19ES15C	Device Driver Programming Laboratory	0	0	4	2	-
<b>Total</b>				<b>16</b>	<b>0</b>	<b>8</b>	<b>18</b>	

**SEMESTER II**

S. No.	Course Category	Course Code	Course Title	L	T	P	C	Question pattern
<b>THEORY AND INTEGRATED COURSES</b>								
1.	PCC	19ES21C	Embedded Linux	3	0	0	3	A
2.	PCC	19ES22C	Software for Embedded system	3	0	0	3	A
3.	PEC		Elective – III	3	0	0	3	A
4.	PEC		Elective – IV	3	0	0	3	A
5.	AC-2		Audit Course – II	2	0	0	0	D
<b>PRACTICAL COURSES</b>								
6.	PCC	19ES23C	Embedded LINUX Programming Laboratory	0	0	4	2	-
7.	PCC	19ES24C	Machine Learning Laboratory	0	0	4	2	-
8.	PCC	19ES25C	Mini Project with Seminar	0	0	4	2	-
				<b>14</b>	<b>0</b>	<b>12</b>	<b>18</b>	

PCC – Programme Core Course, PEC – Programme Elective Course, OEC – Open Elective Course, AC – Audit Course



**19ES13C RESEARCH METHODOLOGY AND IPR**

**L T P C QP**  
**2 0 0 2 B**

**COURSE OUTCOMES**

Upon completion of this course, the students will be able to

CO1: Understand research problem formulation. (K2)

CO2: Analyze research related information. (K4)

CO3: Understand the research ethics. (K2)

CO4: Understanding that when IPR would take such important place in growth of individuals & Nation. (K2)

CO5: Recognize the importance of Report writing. (K2)

**UNIT I RESEARCH FORMULATION AND DESIGN 6**

Defining and formulating the research problem, selecting the problem, necessity of defining the problem, importance of literature review in defining a problem, literature review - primary and secondary sources, reviews, monograph, patents, research databases, web as a source, searching the web, critical literature review, identifying gap areas from literature and research database, development of working hypothesis.

**UNIT II DATA COLLECTION AND ANALYSIS 6**

Method validation, observation and collection of data, methods of data collection, sampling methods, data processing and analysis strategies and tools, data analysis with statistical package (Sigma STAT, SPSS for student t-test, ANOVA, etc.), hypothesis testing.

**UNIT III RESEARCH ETHICS, IPR AND SCHOLARLY PUBLISHING 6**

Ethics - ethical issues, ethical committees (human & animal); IPR- intellectual property rights and patent law, commercialization, copy right, royalty, trade related aspects of intellectual Property rights (TRIPS); scholarly publishing - IMRAD concept and design of research paper, citation and acknowledgement, plagiarism, reproducibility and accountability.

**UNIT IV CONTEMPORARY ISSUES IN IPR 6**

Interface between IPR and Human Rights -Interface between IPR and Competition Law -IPR and sustainable development – Impact of Internet on IPR - IPR of Biological systems & E-Commerce.

**UNIT V INTERPRETATION AND REPORT WRITING 6**

Meaning of Interpretation, Technique of Interpretation, Precaution in Interpretation, Significance of Report Writing, Different Steps in Writing Report, Layout of the Research Report, Types of Reports, Oral Presentation, Mechanics of Writing a Research Report, Precautions for Writing Research Reports.

**L: 30; TOTAL: 30 PERIODS**

**REFERENCES**

1. Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K., "An introduction to Research Methodology", RBSA Publishers, 2015.
2. Kothari, C.R., "Research Methodology: Methods and Techniques", New Age International, 2018.
3. Wadehra, B.L. "Law relating to patents, trademarks, copyright designs and geographical indications". Universal Law Publishing, Reprint, 2011.
4. Anthony, M., Graziano, A.M. and Raulin, M.L., Research Methods: A Process of Inquiry, Allyn and Bacon 2012.
5. Carlos, C.M., Intellectual property rights, the WTO and developing countries: the TRIPS agreement and policy options. Zed Books, New York, 2000.

**SEMESTER – I**

S. No.	Course Category	Course Code	Course Title	L	T	P	C	QP
1.	PCC	19EN11C	Advanced Thermal Engineering	3	2	0	4	A
2.	PCC	19EN12C	Renewable Energy Sources Conversion and Technology	3	0	0	3	A
3.	GEN	19EN13C	Research Methodology and IPR	2	0	0	2	B
4.	PEC		Elective – I	3	0	0	3	A
5.	PEC		Elective – II	3	0	0	3	A
6.	AC		Audit Course – 1	2	0	0	0	D
7.	PCC	19EN14C	Energy Laboratory-I	0	0	4	2	-
<b>Total</b>				<b>16</b>	<b>2</b>	<b>4</b>	<b>17</b>	<b>-</b>

**SEMESTER – II**

S. No.	Course Category	Course Code	Course Title	L	T	P	C	QP
1.	PCC	19EN21C	Solar Energy and Utilization	3	0	0	3	A
2.	PCC	19EN22C	Bio Energy Engineering	3	0	0	3	A
3.	PCC	19EN23C	Energy Efficient Buildings	3	0	0	3	A
4.	PEC		Elective – III	3	0	0	3	A
5.	PEC		Elective - IV	3	0	0	3	A
6.	AC-2		Audit Course – 2	2	0	0	0	D
7.	PCC	19EN24C	Energy Laboratory-II	0	0	4	2	-
8.	PCC	19EN25C	Mini Project with Seminar	0	0	4	2	-
<b>Total</b>				<b>17</b>	<b>0</b>	<b>8</b>	<b>19</b>	<b>-</b>



**19EN13C****RESEARCH METHODOLOGY AND IPR****L T P C QP  
2 0 0 2 B****COURSE OUTCOMES**

Upon completion of this course, the students will be able to

CO1: Understand research problem formulation. (K2)

CO2: Analyze research related information. (K4)

CO3: Understand the research ethics. (K2)

CO4: Understanding that when IPR would take such important place in growth of individuals & Nation. (K2)

CO5: Recognize the importance of Report writing. (K2)

**UNIT I RESEARCH FORMULATION AND DESIGN****6**

Defining and formulating the research problem, selecting the problem, necessity of defining the problem, importance of literature review in defining a problem, literature review - primary and secondary sources, reviews, monograph, patents, research databases, web as a source, searching the web, critical literature review, identifying gap areas from literature and research database, development of working hypothesis.

**UNIT II DATA COLLECTION AND ANALYSIS****6**

Method validation, observation and collection of data, methods of data collection, sampling methods, data processing and analysis strategies and tools, data analysis with statistical package (Sigma STAT, SPSS for student t-test, ANOVA, etc.), hypothesis testing.

**UNIT III RESEARCH ETHICS, IPR AND SCHOLARLY PUBLISHING****6**

Ethics - ethical issues, ethical committees (human & animal); IPR- intellectual property rights and patent law, commercialization, copy right, royalty, trade related aspects of intellectual Property rights (TRIPS); scholarly publishing - IMRAD concept and design of research paper, citation and acknowledgement, plagiarism, reproducibility and accountability.

**UNIT IV CONTEMPORARY ISSUES IN IPR****6**

Interface between IPR and Human Rights -Interface between IPR and Competition Law -IPR and sustainable development – Impact of Internet on IPR - IPR of Biological systems & E-Commerce.

**UNIT V INTERPRETATION AND REPORT WRITING****6**

Meaning of Interpretation, Technique of Interpretation, Precaution in Interpretation, Significance of Report Writing, Different Steps in Writing Report, Layout of the Research Report, Types of Reports, Oral Presentation, Mechanics of Writing a Research Report, Precautions for Writing Research Reports.

**L: 30; TOTAL: 30 PERIODS****REFERENCES**

1. Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K., "An introduction to Research Methodology", RBSA Publishers, 2015.
2. Kothari, C.R., "Research Methodology: Methods and Techniques", New Age International, 2018.
3. Wadehra, B.L. "Law relating to patents, trademarks, copyright designs and geographical indications". Universal Law Publishing, Reprint, 2011.
4. Anthony, M., Graziano, A.M. and Raulin, M.L.. Research Methods: A Process of Inquiry, Allyn and Bacon 2012.
5. Carlos, C.M., Intellectual property rights, the WTO and developing countries: the TRIPS agreement and policy options. Zed Books, New York, 2000.

**SEMESTER – I**

S. No.	Course Category	Course Code	Course Title	L	T	P	C	QP
<b>THEORY</b>								
1	SFC	19HE11C	Mathematical Foundations of High Voltage Engineering	3	0	0	3	A
2	PCC	19HE12C	High Voltage Engineering and its Application	3	0	0	3	A
3	PCC	19HE13C	Research Methodology and IPR	2	0	0	2	B
4	PEC		Elective – I	3	0	0	3	A
5	PEC		Elective – II	3	0	0	3	A
6.	AC		Audit Course - I	2	0	0	0	D
<b>PRACTICAL</b>								
7	PCC	19HE14C	High Voltage Laboratory – I	0	0	4	2	-
8	PEC		Elective - I Laboratory	0	0	4	2	-
<b>TOTAL</b>				<b>16</b>	<b>0</b>	<b>8</b>	<b>18</b>	

**SEMESTER – II**

S. No.	Course Category	Course Code	Course Title	L	T	P	C	QP
<b>THEORY</b>								
1	PCC	19HE21C	Insulation Technology	3	0	0	3	A
2	PCC	19HE22C	High Voltage Testing Techniques	3	0	0	3	A
3	PEC		Elective – III	3	0	0	3	A
4	PEC		Elective – IV	3	0	0	3	A
5	AC		Audit Course – II	2	0	0	0	D
<b>PRACTICAL</b>								
6	PCC	19HE23C	High Voltage Laboratory - II	0	0	4	2	-
7	PCC	19HE24C	Mini project with Seminar	0	0	4	2	
8	PEC		Elective – II Laboratory	0	0	4	2	-
<b>TOTAL</b>				<b>14</b>	<b>0</b>	<b>12</b>	<b>18</b>	



19HE13C

RESEARCH METHODOLOGY AND IPR

L T P C QP  
2 0 0 2 B

### COURSE OUTCOMES

Upon completion of this course, the students will be able to

CO1: Understand research problem formulation. (K2)

CO2: Analyze research related information. (K4)

CO3: Understand the research ethics. (K2)

CO4: Understanding that when IPR would take such important place in growth of individuals & Nation. (K2)

CO5: Recognize the importance of Report writing. (K2)

### UNIT I RESEARCH FORMULATION AND DESIGN 6

Defining and formulating the research problem, selecting the problem, necessity of defining the problem, importance of literature review in defining a problem, literature review - primary and secondary sources, reviews, monograph, patents, research databases, web as a source, searching the web, critical literature review, identifying gap areas from literature and research database, development of working hypothesis.

### UNIT II DATA COLLECTION AND ANALYSIS 6

Method validation, observation and collection of data, methods of data collection, sampling methods, data processing and analysis strategies and tools, data analysis with statistical package (Sigma STAT, SPSS for student t-test, ANOVA, etc.), hypothesis testing.

### UNIT III RESEARCH ETHICS, IPR AND SCHOLARLY PUBLISHING 6

Ethics - ethical issues, ethical committees (human & animal); IPR- intellectual property rights and patent law, commercialization, copy right, royalty, trade related aspects of intellectual Property rights (TRIPS); scholarly publishing - IMRAD concept and design of research paper, citation and acknowledgement, plagiarism, reproducibility and accountability.

### UNIT IV CONTEMPORARY ISSUES IN IPR 6

Interface between IPR and Human Rights -Interface between IPR and Competition Law -IPR and sustainable development – Impact of Internet on IPR - IPR of Biological systems & E-Commerce.

### UNIT V INTERPRETATION AND REPORT WRITING 6

Meaning of Interpretation, Technique of Interpretation, Precaution in Interpretation, Significance of Report Writing, Different Steps in Writing Report, Layout of the Research Report, Types of Reports, Oral Presentation, Mechanics of Writing a Research Report, Precautions for Writing Research Reports.

**L: 30; TOTAL: 30 PERIODS**

### REFERENCES

1. Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K., "An introduction to Research Methodology", RBSA Publishers, 2015.
2. Kothari, C.R., "Research Methodology: Methods and Techniques", New Age International, 2018.
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**SEMESTER – I**

S. No.	Course Category	Course Code	Course Title	L	T	P	C	QP
<b>THEORY COURSES</b>								
1.	CFC	19IC11C	Quantization and Number theory	2	2	0	3	A
2.	PCC	19IC12C	Advanced Data Structures	3	0	0	3	A
3.	PCC	19IC13C	Research Methodology and IPR	2	0	0	2	B
4.	PEC		Elective - I	3	0	0	3	A
5.	PEC		Elective – II	3	0	0	3	A
6.	AC	AC	Audit Course - I	2	0	0	0	D
<b>PRACTICAL COURSES</b>								
7.	PCC	19IC14C	Advanced Data Structures Laboratory	0	0	4	2	-
8.	PEC		Laboratory (Based on Electives)	0	0	4	2	-
<b>Total</b>				<b>15</b>	<b>2</b>	<b>8</b>	<b>18</b>	<b>-</b>

**SEMESTER – II**

S. No.	Course Category	Course Code	Course Title	L	T	P	C	QP
<b>THEORY COURSES</b>								
1.	PCC	19IC21C	Cloud Computing Technologies	3	0	0	3	A
2.	PCC	19IC22C	Advanced Databases	3	0	0	3	A
3.	PEC		Elective - III	3	0	0	3	A
4.	PEC		Elective – IV	3	0	0	3	A
5.	AC		Audit Course - II	2	0	0	0	D
<b>PRACTICAL COURSES</b>								
6.	PCC	19IC23C	Mini Project with Seminar	0	0	4	2	-
7.	PCC	19IC24C	Cloud Computing Technologies Laboratory	0	0	4	2	-
8.	PEC		Laboratory (Based on Electives)	0	0	4	2	-
<b>Total</b>				<b>14</b>	<b>0</b>	<b>12</b>	<b>18</b>	<b>-</b>

PCC – Programme Core Course  
AC-Audit Course

PEC – Programme Elective Course



19IC13C

**RESEARCH METHODOLOGY AND IPR**

**L T P C QP**  
**2 0 0 2 B**

**COURSE OUTCOMES**

Upon completion of this course, the students will be able to

CO1: Understand research problem formulation. (K2)

CO2: Analyze research related information. (K4)

CO3: Understand the research ethics. (K2)

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CO5: Recognize the importance of Report writing. (K2)

**UNIT I RESEARCH FORMULATION AND DESIGN**

**6**

Defining and formulating the research problem, selecting the problem, necessity of defining the problem, importance of literature review in defining a problem, literature review - primary and secondary sources, reviews, monograph, patents, research databases, web as a source, searching the web, critical literature review, identifying gap areas from literature and research database, development of working hypothesis.

**UNIT II DATA COLLECTION AND ANALYSIS**

**6**

Method validation, observation and collection of data, methods of data collection, sampling methods, data processing and analysis strategies and tools, data analysis with statistical package (Sigma STAT, SPSS for student t-test, ANOVA, etc.), hypothesis testing.

**UNIT III RESEARCH ETHICS, IPR AND SCHOLARLY PUBLISHING**

**6**

Ethics - ethical issues, ethical committees (human & animal); IPR- intellectual property rights and patent law, commercialization, copy right, royalty, trade related aspects of intellectual Property rights (TRIPS); scholarly publishing - IMRAD concept and design of research paper, citation and acknowledgement, plagiarism, reproducibility and accountability.

**UNIT IV CONTEMPORARY ISSUES IN IPR**

**6**

Interface between IPR and Human Rights -Interface between IPR and Competition Law -IPR and sustainable development – Impact of Internet on IPR - IPR of Biological systems & E-Commerce.

**UNIT V INTERPRETATION AND REPORT WRITING**

**6**

Meaning of Interpretation, Technique of Interpretation, Precaution in Interpretation, Significance of Report Writing, Different Steps in Writing Report, Layout of the Research Report, Types of Reports, Oral Presentation, Mechanics of Writing a Research Report, Precautions for Writing Research Reports.

**L: 30; TOTAL: 30 PERIODS**

**REFERENCES**

1. Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K., "An introduction to Research Methodology", RBSA Publishers, 2015.
2. Kothari, C.R., "Research Methodology: Methods and Techniques", New Age International, 2018.
3. Wadehra, B.L. "Law relating to patents, trademarks, copyright designs and geographical indications". Universal Law Publishing, Reprint, 2011.
4. Anthony, M., Graziano, A.M. and Raulin, M.L.. Research Methods: A Process of Inquiry, Allyn and Bacon 2012.
5. Carlos, C.M., Intellectual property rights, the WTO and developing countries: the TRIPS agreement and policy options. Zed Books, New York, 2000.



# NATIONAL ENGINEERING COLLEGE

(An Autonomous Institution Affiliated to Anna University, Chennai)

## MANAGING COMMITTEE

K.R.NAGAR, KOVILPATTI - 628 503.  
THOOTHUKUDI DISTRICT.



**CHENNAMMAL RAMASAMY**

CHAIRMAN

**R.ARUNACHALAM**

CORRESPONDENT

Phone : +91 93859 76624, 93859 76674  
04832 - 222 502, 230 227  
Email : principal@nec.edu.in  
Fax : 04832 - 232 749

22.09.2023.

To,  
The Chief Manager,  
Indian Overseas Bank,  
Tuticorin.

Sir,

Sub: - Payment by Swift – Regarding.  
Ref: - **M/s. GRAMMARLY INC USA – USD 1100.**  
\*\*\*

With the reference to the above, kindly arrange to send the payment by swift for the supply of item as per Invoice.No.21633 dt.15.09.2023. The details are as follows,

- Names and Address of the Suppliers : **M/s. GRAMMARLY, INC**  
**548 MARKET STREET, STE 35410,**  
**SAN FRANCISCO CA 94104.**  
**UNITED STATES.**
- Invoice No : 21633 dt.15.09.2023.
- Total Amount : USD 1100
- Name of the bank : **CITIBANK N.A.**  
**260, CALIFORNIA STREET,**  
**SAN FRANCISCO, CA, 94111.**  
**INTL SWIFT CODE : CITIUS33.**

We have herewith enclosed the A2 Form.

Thanking You,

For NATIONAL ENGINEERING COLLEGE,

  
Correspondent.

**Encl:-**

1. As above.

Conv to: The Manager. Indian Overseas bank. K. Ramasamy Nagar.



**INDIAN OVERSEAS BANK**  
(Form A2-cum-Application for Outward Remittance)

**FORM A2**

(To be completed by the applicant)  
(For payments other than imports of goods and remittances covering intermediary trade)

SOL ID	
AD CODE	
Form No. (To be filled in by the Authorised Dealer)	

Currency	Amount	Equivalent to Rs.
USD	1100	
Amount in words	ONE THOUSAND ONE HUNDRED	
(To be completed by the Authorised Dealer)		

**Application for Remittance Abroad**

(1) I/We NATIONAL ENGINEERING COLLEGE

(Name of applicant remitter)

PAN No.

A	A	A	T	N	1	1	6	0	A
---	---	---	---	---	---	---	---	---	---

Address K.R. NAGAR, KOVILPATTI – 628503.

authorize INDIAN OVERSEAS BANK, TUTICORIN MAIN BRANCH

(Name of AD branch)

To debit my Savings Bank/Current/RFC/EEFC a/c. no:

1	7	4	9	0	2	0	0	0	0	0	0	0	5	0	1
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

together with their charges and

\* a) Issue a draft: Beneficiary Name: \_\_\_\_\_

Address \_\_\_\_\_

\* b) Effect the foreign exchange remittance directly-

1) Beneficiary's Name: GRAMMARLY, INC

Address : 548 MARKET STREET STE 35410  
SAN FRANCISCO CA 94104  
UNITED STATES.

2) Name and address of the bank: CITIBANK N.A  
260 CALIFORNIA ST. SAN FRANCISCO,  
CA 94111

3) Account No: 207546797

\* c) Issue travelers cheques for \_\_\_\_\_

\* d) Issue foreign currency notes for \_\_\_\_\_

Amount (specify currency) USD 1100  
\*(strike out whichever is not applicable) for the purpose/s indicated below

(2) To be filled in by residents only if the remittance is made under LRSS

Sr. No.	Whether under LRS (Yes/No)	Purpose Code	Description

(3) Payment for import of services (Purpose Group Nos.02, 03, 05, 06, 07,08, 09,10, 11, 15, 16 or 17), please indicate:

"Name of the country providing ultimate services: ....."  
(Remitter should put a tick( ) against an appropriate purpose code. In case of doubt/ difficulty, the AD bank should be consulted).

**Declaration**  
(Under FEMA 1999)

1. We NATIONAL ENGINEERING COLLEGE (Name) hereby declare that the total amount of foreign exchange purchased from or remitted through, all sources in India during the financial year including this application is as per the extant FEMA Regulations and certify that the source of funds for making the said remittance belongs to me and the foreign exchange will not be used for prohibited purposes/ Foreign exchange purchased from you is for the purpose indicated above.

**Details of the remittance made/transaction effected under the Liberalized Remittance Scheme in the current financial year (April - March)-----"**

Sr. No.	Date	Amount	Name and address of AD branch/FFMC through which the transaction has been effected

**For NATIONAL ENGINEERING COLLEGE**

*A. Anand Kumar*  
Chairman / Correspondent.

Signature of the Applicant  
Date:

**Certificate by the Authorized Dealer**

This is to certify that the remittance is not being made by/to ineligible entities and that the remittance is in conformity with the instructions by the Reserve Bank from time to time under the scheme.

Name and Designation of the authorized official: NETHAJI R, NONPCEL-10CLINE  
Stamp and seal

Signature: *Nethaji R*

Date: 22/09/2013





**Other Details of Outward Remittance:**

I/We request you to make the outward remittance of USD 1100 as per my/our Form A2 dated 21.09.2023

We furnish below the additional details required in this regard:

**1. Details of Correspondent bank charges:**

OURS                      BEN (BENEFICIARY)                       SHA(SHARING)   
(Charges will be SHA if option not specified)

**2. SWIFT & SORT code details of beneficiary Bank**

SWIFT code (or) routing Number for remittance to any other country	CITIUS33
IBAN for remittance made to UK, Europe, Bahrain, Saudi Arabia & UAE	
Sort Code for remittance to UK (or) BSB code for remittance to Australia.	

**3. Intermediary Bank Details:**

Furnish the following details of correspondent Bank if the Foreign Currency is sent to a country other than the home country of the currency

Swift Code	Correspondent Bank Name (or) Intermediary bank Name

**4. Remittance Information (In case of remittance for Education purpose):**

Student ID*	
Student Name	
Passport number (in case of student)	
Other Details (if any)	

\*Student details mandatory in case of Education fees payment to University)

**5. Any other information:**

**Declaration-cum-undertaking**  
**(Under Section 10 (5), Chapter III of FEMA)**

- i. I/We hereby declare that the transaction, the details of which are specifically mentioned in the schedule hereunder does not involve and is not designed for the purpose of any contravention or evasion of the provisions of the aforesaid act of any rule, regulation, notification, direction or order made thereunder.
- ii. I/We also hereby agree and undertake to give such information/documents as will reasonably satisfy you about the transaction in terms of the above declaration.

- iii. I/We also undertake that if I/We refuse to comply with any such requirements or make only unsatisfactory compliance there with, the bank shall refuse in writing to undertake the transaction and shall, if it has reason to believe that any contravention/evasion is contemplated by me/us, report the matter to the RBI.
- iv. I/We further declare that the undersigned has/have the authority to give this declaration and undertaking on behalf of the firm/company.

**Other Declarations**

- a. The total amount of foreign exchange purchased from all sources in India during this financial year including the or remitted through application is within USD \_\_\_\_\_ (USD \_\_\_\_\_ ) the annual limit prescribed by the Reserve Bank of India for the purpose.
- b. I/We agree that in the event of transaction could not be executed/debited to my/our account after submitting the request for processing to the bank on account of insufficient/unclear balance at the time of execution of the transaction in my/our account, any exchange losses incurred in this connection due to reversal of the Forex deal can be charged to my/our Indian Overseas Bank (IOB) account.
- c. I/we agree that in the event the transaction is cancelled or revoked by me/us after submitting the request for processing to the bank, any exchange losses incurred in this connection can be charged to my/our account. I/we further agree that once the fund remitted by me/us has been transmitted by IOB to the correspondent and/or beneficiary banks, IOB shall not be responsible for any delays in the disbursement of such funds including the withholding of such funds by the correspondent and/or beneficiary banks.
- d. I/We further agree that once the funds remitted by me/us have been transmitted by IOB, intermediary bank charges may be levied by Correspondent and/or Beneficiary Banks, which may vary from bank to bank.
- e. I/We agree that in the event the transaction being rejected by the beneficiary bank because of incorrect information submitted by me, any charges levied by the beneficiary bank or exchange losses incurred in this connection can be charged to my IOB account.
- f. I/We also agree that the exchange rate will be applicable at the time of deal booking and may vary from the rate prevailing when the request is submitted. I/We also understand that the rate communicated to us (if any) is an indicative rate and the actual rate may be different from the same.

**In case remittance from NRO accounts**

- g. I/We understand that the said remittance is sought to be made out of the balance held in the account arising from my/our legitimate receivables in India and not by borrowing from any person or a transfer from any other NRO account and if such is found to be the case, I/We will be liable for penal action under FEMA.

I/We authorize you to remit outward remittance as per details provided in the application.  
**For NATIONAL ENGINEERING COLLEGE**

  
 Chairman / Correspondent

**Signature of the Applicant**

**Date:**





# NATIONAL ENGINEERING COLLEGE

(An Autonomous Institution Affiliated to Anna University, Chennai)

## MANAGING COMMITTEE

K.R.NAGAR, KOVILPATTI - 628 503.  
THOOTHUKUDI DISTRICT.



### CHENNAMMAL RAMASAMY

CHAIRMAN

### R.ARUNACHALAM

CORRESPONDENT

Phone : +91 93859 76684, 93859 76674  
04632 - 222 502, 230 227  
Email : principal@nec.edu.in  
Fax : 04632 - 232 749

22.09.2023

To,

The Branch Manager,  
Indian Overseas Bank,  
K.R.Nagar.

Sir,

Sub: Payment by Swift to M/s. GRAMMARLY INC USA - USD 1100 - Applicability of Form 15CA and 15CB- Reg.

\* \* \*

We make payment in foreign currency for Annual subscription of software already procured for our college. The above foreign currency payment does not attract any TDS Provisions as the payment does not relate to any services, Royalty, Interest payment etc. Hence the submission of Form 15CA and Form 15CB does not arise in our case of foreign currency payment.

For **National Engineering College,**

**Correspondent.**



Grammarly, Inc.  
 548 Market Street, Ste 35410  
 San Francisco CA 94104  
 United States  
 IN GSTIN: 9921USA29005OSK

# Tax Invoice

Invoice #: 21633  
 Invoice Date: 9/15/2023  
 Due Date: 10/15/2023  
 Payment Terms: Net 30  
 Currency: USD

**Bill To**  
 National Engineering College  
 K.R.Nagar, Kovilpattl  
 Nallatinputhur Tamil Nadu 628503  
 India

**End Customer :**  
 National Engineering College

**Ship To**  
 National Engineering College  
 K.R.Nagar, Kovilpattl,  
 Nallatinputhur 628503  
 India (State Code:)

**PO #:**  
**Customer VAT/GST Number:** EDU entity

Item	Description	HSN	Start Date	End Date	Qty	Rate	Amount	Tax Rate	Tax Amt	Gross Amt
Grammarly EDU. University/Co llege	Grammarly EDU, University/ College	998439	10/1/2023	9/30/2024	20	\$55.00	\$1,100.00	0%	\$0.00	\$1,100.00

**Subtotal** \$1,100.00  
**Tax Total** \$0.00  
**Total** \$1,100.00

This service is liable to VAT under the reverse charge where applicable.

**E-payment details:**

Bank Name: Citibank N.A.  
 Bank Address: 260 California St, San Francisco, CA 94111  
 Account Name: Grammarly, Inc.  
 Account Number: 207546797  
 Account Status: Open  
 ABA or Bank Routing Number: 321171184  
 INTL SWIFT Code: CITIUS33  
 Currency: USD

**Check remittance:**

548 Market Street #35410  
 San Francisco, CA 94104-5401

Our preferred method of payment is E-Payment. Please refer invoice number in your payment.

**Invoice Inquiries:**  
 AR@grammarly.com

**Credit Card Payment Link:**

[https://app.suitesync.io/payments/acct\\_1IGZVllcq4IflyXN/custinvc/2824816](https://app.suitesync.io/payments/acct_1IGZVllcq4IflyXN/custinvc/2824816)



Signature of the Supplier



21633

For NATIONAL ENGINEERING COLLEGE

*A. Manure...*  
 Chairman / Correspondant.



### Delivery Report

<b>Delivery</b>		
Network :	SWIFT	
Session Holder :	PNBPUS3NXNYC	
Session :	9210	
Sequence :	921339	
Delivery Status :	Network Ack	
ACK Date (dd/mm/yy) :	230922	
ACK Time (hh:mm) :	20:29GMT	
<b>MESSAGE HEADER</b>		
<b>Swift Input :</b>	<b>FIN 103 Single Customer Credit Transfer</b>	
Sender Bank :	INDIAN OVERSEAS BANK INDIAN OVERSEAS BANK CENTRAL OFFICE ANNEX BUILDING FLOOR 4 763 ANNA SALAI 763 ANNA SALAI INDIA	
RECEIVER BANK :	WELLS FARGO BANK NA FORMERLY KNOWN AS WACHOVIA BANK, NA 375 PARK AVENUE NY 4080 NEW YORK,NY 10152 (NEW YORK INTERNATIONAL BRANCH)	
<b>MESSAGE TEXT</b>		
20--- Sender's Reference	Sender's Reference	010010223000677
32A-- Value Date/Currency/Interbank Settled Amount	Date(YMMDD)	230922
32A-- Value Date/Currency/Interbank Settled Amount	Currency	USD
32A-- Value Date/Currency/Interbank Settled Amount	Amount	1100
33B-- Currency/Instructed Amount	Currency	USD
33B-- Currency/Instructed Amount	Amount	1100
50K-- Ordering Customer	Account	17490200000501
50K-- Ordering Customer	Name & Address	NATIONAL EDUCATIONAL AND CHARITABLE NEC K RAMASAMYNAGAR KOVILPATTI 628503 INDIA
52A-- Ordering Institution	Bank Identifier code(BIC)	BIC CODE: IOBAINBB100 BIC DESCRIPTION: INDIAN OVERSEAS BANK (TUTICORIN, TAMILNADU) 21, VICTORIA ROAD, TUTICORIN 628001,

57A-- Account With Institution	A/c with Institution BIC	BIC CODE: CITIUS33 BIC DESCRIPTION: CITIBANK N.A. 111 WALL STREET, NEW YORK,NY 10043,
59--- Beneficiary Customer	Account	207546797
59--- Beneficiary Customer	Name and Address	GRAMMARLY INC 548 MARKET STREET STE 35410 SAN FRANCISCO CA 94104 UNITED STATES OF AMERICA
70--- Remittance Information	Remittance Information	INV NO 21633 DATED 15.09.2023
71A-- Details of Charges	Details of Charges	SHA



**Dr. K. Kalidasa Murugavel, M.E., Ph.D.,**  
PRINCIPAL  
NATIONAL ENGINEERING COLLEGE  
K.R. NAGAR, KOVILPATTI - 628 503.  
THOOTHUKUDI-DIST