



# NANDHA ENGINEERING COLLEGE

(AUTONOMOUS)

(Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai)

ERODE – 638 052 TAMILNADU

Email : [principal@nandhaengg.org](mailto:principal@nandhaengg.org) Mobile : 73737 12234

## Criterion 3 – Research, Innovations and Extension

3.4

Research Publications and Awards

**Code of Ethics**



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## R & D CODE OF ETHICS

Nandha Engineering College (NEC) is keen to restoring and maintaining highest standards of honesty and liability in carrying out academic and research activities within the campus.

### **Objectives of Ethical Committee**

- Ensure the highest scientific and ethical standards of research at NEC.
- Ensure the highest scientific and ethical standards of research at NEC
- Normative ethics- includes determining what is right and wrong
- Compliance- includes instituted policies and regulations at the university
- Rigor and reproducibility – only kind of science that can offer social value and justify risks to subjects and financial investment in research.
- Social Value- means that research addresses problems of importance to society, generating knowledge used to solve real-world problems through new technologies or procedures.

### **Misconduct in Academic Research**

Fabrication and falsification of data, plagiarism, or dishonesty in proposing, conducting, or presenting scientific results are all examples of academic research misconduct. Academic misconduct also includes deliberate, dangerous, or negligent deviations from accepted research practice, such as flouting an agreed protocol if and when this failure provokes absurd risk or harm to people or the environment, and when it facilitates research misconduct by collusion in, or concealment of, such actions by others.

Misconduct includes (and is not limited to) the following acts:

**Plagiarism:** Premeditated replication of a manuscript, data, results, images, figures, process and ideas from others work, reproducing others results without proper consent from the original authors.

  
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**Piracy:** The deliberate exploitation of ideas from others without proper acknowledgement

**Abuse of Intellectual Property Rights:** Failure to observe legal norms regarding copyright and the moral rights of authors.

**Abuse of Research Resources:** Failure to observe the rules concerning copyright and IPR of author

**Defamation:** Failure to observe relevant legal norms governing libel and slander.

**Misinterpretation:** The deliberate attempt to represent falsely or unfairly the ideas or work of other research

**Personation:** Depredation and submitting others research as one own

**Fabrication and Fraud:** Data fabrication without doing proper experiments, falsification of experimental data and ideas without sufficient replication of experiments deliberate reporting of data with misleading interpretations

**Sabotage:** Acting to prevent others from completing their work. This includes stealing or cutting pages out of library books or otherwise damaging them; or willfully disrupting the experiments of others; or endangering institutional access to licensed research resources by willfully failing to observe their terms and conditions.

**Professorial misconduct:** Professorial acts those are arbitrary, biased or exploitative.

**Denying access to information or material:** To deny others access arbitrarily to scholarly resources or to deliberately and groundlessly impede their progress

**Misconduct in formal examinations:** Averting others from using instruments, stealing others laboratory notebooks and damaging others laboratory notebooks

Violations of proper academic practice can be divided into two categories.

  
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## I. Minor Violations:

Minor violations might arise due to inexperience or a lack of understanding of academic integrity standards, and they are generally characterised by the lack of dishonest intent on the part of the perpetrator.

They can be the result of:

- a. Weak procedures and methods that may jeopardise the integrity of the research but are not done on purpose or recklessly;
- b. Weaknesses that pose no major risks to either subjects or policies that they may influence on the whole, these minor violations can be seen as failings that reflect only poor, rather than unacceptable practices, and thus primarily require additional training and development rather than any formal disciplinaryity.

## 2. Major Violations:

Major violations are academic integrity violations that are more serious in nature or influence a larger amount or aspect of the academic work than minor violations. The following are some key examples:

- a. Deliberate, reckless, or excessively negligent behaviour that would clearly poses a significant risk to the research's integrity in some form.
- b. Conduct that may endanger subjects, the general public, the environment, or the institution's research reputation and research in general.

**Plagiarism:** Plagiarism represents unethical scientific behavior which is never acceptable. Proper acknowledgement of the work of other used in a research work must always be given. Further, it is the mandatory on part of each author to provide prompt corrections or errors in published work.

  
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## Degrees of Plagiarism:

1. Invalid source
2. Secondary source
3. Duplication
4. Paraphrasing
5. Repetitive research
6. Replication
7. Misleading attribution
8. Unethical collaboration
9. Verbatim plagiarism
10. Complete plagiarism

**Plagiarism Checker Software:** Urkund Action/Penalty against defaulters; Any violation of the rule and other issue, complaints regarding plagiarism attracts disciplinary action to be imposed by committee within one month from the day of complaint. Depending on the type of acts and violation of code of ethics, suitable penalty or punishment against defaulters shall be recommended by the review committee.

## Procedures for Investigation of Research Misconduct

### Investigation of proceedings

The Ethics Committee may carry out the following investigation proceedings

- A preliminary investigation to ascertain whether there is sufficient substance to the allegation as to warrant a more thorough investigation
- A formal inquiry which may include the consultation or involvement of external experts when needed.

  
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## Investigation

Where possible, the investigation will include examination of all relevant documentation; relevant research data; laboratory notebooks; computer files; other materials; proposals; publications; correspondence; and memoranda, insofar as this is necessary for the investigation and compatible with the institute Data Protection Policy.

The Chair of the Ethics Committee may invite internal or external experts who are not involved in the disputed matter and who are not members of the Committee to attend meetings. Interviews shall be conducted with the complainant and the respondent. All individuals interviewed during the investigation will be asked to respect the confidential nature of the investigation.

## Investigation report and recommendations

The Ethics Committee will produce a report stating: the procedures under which the formal investigation was conducted; how and, where appropriate, from whom information was obtained; the finding of the committee and the basis for these; a summary of the views of the respondent; and a description of any recommendations made by the committee.

Based on the investigation report and recommendations of the Ethics Committee, the Disciplinary Committee may decide on penalties (when considered appropriate)

## Penalties

Disciplinary actions recommended by the research committee may include but are not limited to:

1. Resubmission of an assignment or academic work
2. A failing grade for the examination or specific assigned exercise; or a failing grade for the course as a whole, depending on the importance of the work to the overall course grade

  
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3. A letter of reprimand, issued by the chair of the Disciplinary Committee, which may or may not be recorded on the scholar's file
4. Suspension from the programme (for Students)
5. Suspension of grant/contract (For faculty)
6. Revocation of a degree or certificate (For Students)

  
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## Criterion 3 – Research, Innovations and Extension

3.4

Research Publications and Awards

**3.4.1. The Institution ensures implementation of its stated Code of Ethics for research through the following:**

1. Inclusion of research ethics in the research methodology course work
2. Presence of Ethics committee
3. Plagiarism check through software
4. Research Advisory Committee

## 1. INCLUSION OF RESEARCH ETHICS IN RESEARCH METHODOLOGY COURSE WORK





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## RESEARCH METHODOLOGY (COURSE WORK)

# NANDHA ENGINEERING COLLEGE, ERODE – 638 052

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## MINUTES OF THE 10<sup>th</sup> BOARD OF STUDIES MEETING

<b>Name of the Body</b>	Board of Studies
<b>Name of the Board</b>	Management Studies
<b>Meeting No.</b>	10
<b>Date &amp; Time</b>	12 <sup>th</sup> August 2022, 10:30 AM
<b>Venue</b>	BLOCK-5, CABD LAB

# NANDHA ENGINEERING COLLEGE, ERODE – 638 052

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## Minutes of 10<sup>th</sup> Board of Studies Meeting (BOS) held on 12<sup>th</sup> August 2022

The 10<sup>th</sup> Board of Studies (BoS) meeting was held on 12<sup>th</sup> August 2022 by 10:30 am through offline mode. The members attended the meeting are given in **Annexure-I**.

The Chairman of the BOS, Dr. V. Manimegalai, Professor and Head, Management Studies welcomed the members for the meeting. Then, the items listed below were taken for discussion. The proceedings of BoS started and the minutes of the meeting are recorded as follows:

AGENDA	
Item 10.01	Welcome address and Introduction of members.
Item 10.02	Review of the 9 <sup>th</sup> BOS meeting minutes
Item 10.03	Review of the PAC and DAB meeting minutes & ATR
Item 10.04	Review of Institute Vision & Mission
Item 10.05	Review of Department Vision, Mission and PEOs
Item 10.06	Review of Correlation between the Vision and Mission statement of Institute and Department, correlation between PEOs and POs.
Item 10.07	Review of Curriculum (R22) for MBA programme
Item 10.08	Review of 1 <sup>st</sup> and 2 <sup>nd</sup> semester syllabus for MBA programme with CO –PO Mapping
Item 10.09	Suggestions and approval of “Engineering Economics and Financial Accounting” course syllabi for B.E(AIDS) course.
Item 10.10	Suggestions and approval of “Research Methodology and Intellectual Property Rights” course syllabi Open Elective for M.E courses.
Item 10.11	Review of Panel of Examiners
Item 10.12	Any other matter



Item 10.01	Welcome address and Introduction of members.	
Discussion	Dr. V. Manimegalai, Chairman, Board of Studies, welcome the Board Members and introduce the external and internal members.	
Item 10.02	Review of the 9 <sup>th</sup> BOS meeting minutes	
Discussion	Dr. V. Manimegalai, Chairman/BoS presented the 9 <sup>th</sup> BOS meeting minutes and ATR	
Resolution	Nil	
Item 10.03	Review of the PAC and DAB meeting minutes & ATR	
Discussion	Dr. V. Manimegalai, Chairman/BoS presented the PAC and DAB meeting minutes & ATR	
Resolution	Nil	
Item 10.04	Review of Institute Vision & Mission	
Discussion	Dr. B. Uma Maheswari, University Nominee and Dr. K. Balanaga Gurunathan, Expert Nominee suggested to include Entrepreneurship in the Vision and Mission of the Institute and also to modify the word "Centre of Excellence", also suggested the vision of the institute has to be much broader.	✓ Put forth Before SCAA
Resolution	It is resolved to submit the vision and mission statement to Academic Council for approval.	
Item 10.05	Review of Department Vision, Mission and PEOs	
Discussion	<ul style="list-style-type: none"> <li>• Dr. P. Thirumoorthi, Expert Nominee and Dr. K. Balanaga Gurunathan, Expert Nominee suggested that, the Vision of the department has to be much broader and include the word "Universe" hence needs to be reframed</li> <li>• In Department Mission, Dr. B. Uma Maheswari, Mr. G. Elangkavi and Dr. B. Girimurugan suggested to include the word "Faculty" and "Research" with other stake holders in mission of the department. Also suggested to reduce the contents in the Mission statement.</li> <li>• The Experts suggested that the PEOs are vague and to reduce the content in PEOs.</li> </ul>	<ul style="list-style-type: none"> <li>✓ Can be reframed</li> <li>✓ Can be reframed</li> <li>✓ Can be reframed</li> </ul>


Resolution	Resolved to reframe and submit the same to Academic Council for approval.
Item 10.06	Review of Correlation between the Vision and Mission statement of Institute and Department, correlation between PEOs and POs.
Discussion	The members suggested to check the correlation mapping between PEO and POs
Resolution	Resolved to reframe and submit the same to Academic Council for approval.
Item 10.07	Review of Curriculum (R22) for MBA programme
Discussion	<p><b>FIRST SEMESTER</b></p> <ul style="list-style-type: none"> <li>• In first semester, the experts suggested to include “Information management” instead of “Total Quality Management” and same “Total Quality Management” to be included in Operations Elective.</li> <li>• In “Statistics for Management” the credit has to be increased as 4 and one hour tutorial has to be included and in “Accounting for Decision making” one hour tutorial has to be included.</li> </ul> <p><b>SECOND SEMESTER</b></p> <ul style="list-style-type: none"> <li>• In Second semester the Credit of “Marketing Management” course has to be reduced To 3 instead of 4.</li> <li>• To include “International Business Management” in Second semester</li> </ul> <p><b>THIRD SEMESTER</b></p> <ul style="list-style-type: none"> <li>• In third Semester, instead of “International Business Management” to include “Fundamentals of Digital Marketing.”</li> </ul> <p><b>FOURTH SEMESTER</b></p> <ul style="list-style-type: none"> <li>• In fourth semester, instead of “Stress Management” the board members suggested to include “Logistics and Supply chain Management” as core paper.</li> <li>➤ The experts of the board suggested to include some recent topics in first and second semester of all subjects.</li> <li>➤ The experts suggested to include recent editions of “Book Reference” in all subjects</li> </ul>



Resolution	Resolved to submit the overall curriculum and syllabi for 1 <sup>st</sup> and 2 <sup>nd</sup> semesters before Academic Council for approval.
Item 10.08	Review of 1 <sup>st</sup> and 2 <sup>nd</sup> semester syllabus for MBA programme with CO –PO Mapping
Discussion	The experts suggested to verify the CO –PO Mapping for all courses in first and second semester
Resolution	Resolved to map as advised and put forth to Academic Council.
Item 10.09	Suggestions and approval of “Engineering Economics and Financial Accounting” course syllabi for B.E(AIDS) course.
Discussion	The Experts of the board approved the syllabus for the same
Item 10.10	Suggestions and approval of “Research Methodology and Intellectual Property Rights” course syllabi Open Elective for M.E courses.
Discussion	The Experts of the board approved the syllabus for the same and suggested to include recent editions for book reference
Resolution	It is resolved to modify and submit it to Academic Council for approval.
Item 10.11	Review of Panel of Examiners
Discussion	Approved the list of examiners for QP Setting and Valuation
Item 10.12	Any other matter
Discussion	The ED cell coordinator has Proposed the Vision, Mission and Objectives of Entrepreneurship Development Cell (EDC) for approval
Resolution	The members approved the vision, mission and objectives of Entrepreneurship Development Cell (EDC)

The Chairman thanked all the members for their active participation.

Date: 16<sup>th</sup> August 2022.

  
Dr.V.Manimegalai,  
(Chairman, BoS / Prof and Head /MBA)

<b>22BAZ01 RESEARCH METHODOLOGY AND IPR</b>					
		<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>PRE REQUISITE : NIL</b>					
<b>Course Objectives</b>			<b>Course Outcomes</b>		
<b>1.0</b>	To understand the basic concepts of research and its methodologies, investigation of solutions for research problem, data collection, analysis and interpretation.	<b>1.1</b>	The student will be able to demonstrate the concepts of research and its methodologies, approaches of information investigation of solutions for research problem, data collection, analysis and interpretation.		
<b>2.0</b>	To identify the various procedures to collect literature studies approaches analysis, plagiarism, and research ethics.	<b>2.1</b>	The student will be able to formulate effective literature studies approaches, analysis, plagiarism, and research ethics.		
<b>3.0</b>	To inculcate knowledge on Effective technical writing and method to write report.	<b>3.1</b>	The student will be able to identify the design for Effective technical writing and how to write report.		
<b>4.0</b>	To provide knowledge process like drawing and drafting tools and reviewing research papers.	<b>4.1</b>	The student will be able to choose the process like drawing and drafting tools and reviewing research papers.		
<b>5.0</b>	To summarize the design for Intellectual property rights and code of ethics.	<b>5.1</b>	The student will be able to formulate the design for Intellectual property rights and code of ethics.		

<b>UNIT I RESEARCH PROBLEM FORMULATION</b>	<b>(9)</b>
Meaning of research problem- Sources of research problem, criteria characteristics of a good research problem, errors in selecting a research problem, scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, necessary instrumentations	
<b>UNIT II LITERATURE REVIEW</b>	<b>(9)</b>
Effective literature studies approaches, analysis, plagiarism, and research ethics	
<b>UNIT III TECHNICAL WRITING /PRESENTATION</b>	<b>(9)</b>
Effective technical writing, how to write report, paper, developing a research proposal, format of research proposal, a presentation and assessment by a review committee.	

<b>UNIT IV INTRODUCTION TO INTELLECTUAL PROPERTY RIGHTS (IPR)</b>	<b>(9)</b>
Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.	
<b>UNIT V INTELLECTUAL PROPERTY RIGHTS (IPR)</b>	<b>(9)</b>
Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications. New Developments in IPR: Administration of Patent System, IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.	
<b>TOTAL (L:45) :45 PERIODS</b>	

<b>REFERENCES:</b>
<ol style="list-style-type: none"> <li>1. Cooper, D. R. and Schindler, P. S., (2009), "Business Research Methods", Tata McGraw Hill, 9th Edition.</li> <li>2. Krishnaswamy, K.N., Sivakumar, A.I., and Mathirajan, M., "Management Research Methodology", Pearson Education , 2006.</li> <li>3. Halbert, "Resisting Intellectual Property", Taylor &amp; Francis Ltd, 2007.</li> </ol>

Mapping of COs with POs / PSOs								
COs	POs						PSOs	
	1	2	3	4	5	6	1	2
1	3	2	1	1	2	1	3	
2	2	3	2	1			2	1
3	2	3	2	2	1	1	2	1
4	1	3	2	2	2	1	1	2
5	1	1	2	3	2	2	1	2
<b>CO (W.A)</b>	<b>1.80</b>	<b>2.4</b>	<b>1.80</b>	<b>1.80</b>	<b>1.75</b>	<b>1.25</b>	<b>1.80</b>	<b>1.50</b>

*C. N. Ma...*





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3.4	Research Publications and Awards
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**3.4.1. The Institution ensures implementation of its stated Code of Ethics for research through the following:**

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2. Presence of Ethics committee
3. Plagiarism check through software
4. Research Advisory Committee

## 2. PRESENCE OF ETHICS COMMITTEE



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## Ethics Committee and Minutes



**NANDHA ENGINEERING COLLEGE (Autonomous)**

**Erode -52**

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**Research and Development (R&D) Cell**

09.06.2022

Submitted to the Principal

From

Dr.C.N.Marimuthu  
Professor (ECE)and Dean ( R&D)  
Nandha Engineering College  
Erode


Respected sir,

Sub: Requisition to form the ethical committee- R&D activities – Reg.

In order to provide guidance and academic support to our scholar on ethical issue in respect to teaching , research and other academic activities, we are in need to form an Ethical Committee. So I kindly request you to form an Ethical Committee for the academic year (2022-2023).

Thanking you,

Yours sincerely

  
(C.N.Marimuthu) 9/6/22



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Affiliated to Anna University Chennai + Approved by AICTE + Accredited by NBA-NewDelhi

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Website : www.nandhaengg.org

E.mail : info@nandhaengg.org

24.06.2022

## Formation of Ethics Committee - Circular

The following faculty members are nominated as Members for the Ethics Committee of our institution for the academic year (2022-2023).

S.No	Name	Designation	Department	Position
1	Dr.N.Rengarajan	Principal	ECE	Chairman
2	Dr.D.Vanathi	Professor and HOD	CSE	Member
3	Dr.C.Siva	Professor and HOD	IT	Member
4	Dr.E.K.Mohanraj	Professor and Dean	Civil	Member
5	Dr.G.Ramani	Professor and HOD	EEE	Member
6	Dr.M.Eswaramoorthi	Professor and Dean	Mech	Member
7	Dr.S.Kavitha	Professor and Dean	ECE	Member
8	Dr N.Subramanian	Professor and HOD	Chemical	Member
9	Dr.C.N.Marimuthu	Professor and Dean ( R&D)	ECE	Convener

The nomination of faculty members of the Ethics committee should endeavor to provide guidance and academic support to our scholars on ethical issues in respect of teaching, research and other academic activities of the institute.



Copy to

1. All HoD's to circulate among their faculty members
2. R&D Cell
3. Ethics Committee members concerned
4. The administrative manager
5. File

Principal  
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**Ethics Committee**

Ref. No. NEC/EC/ 001 / 2022-23

Date: 16.07.2022

It is proposed to have a Ethics Committee meeting at 2.00 PM on 23-07-2022 @ NEC Conference Hall. The principal will address the meeting.

The agenda of the meeting is

1. Welcome of the Chairman and members
2. Address by the Chairman
3. To review ethical breaches and the counteraction for the previous academic year
4. To discuss about the Code of Ethics (CoE)
5. To review and approve the modifications in CoE
6. To make recommendations to the internal Disciplinary Committee on what action, if any, should be taken as a result of the investigations.
7. Any other matter

Ethics Committee Member details

S.No	Name	Designation	Department	Position
1	Dr.N.Rengarajan	Principal	ECE	Chairman
2	Dr.D.Vanthi	Professor and HOD	CSE	Member
3	Dr.C.Siva	Professor and HOD	IT	Member
4	Dr.E.K.Mohanraj	Professor and DEAN	Civil	Member
5	Dr.G.Ramani	Professor and HOD	EEE	Member
6	Dr.M.Eswaramoorthi	Professor and DEAN	Mech	Member
7	Dr.S.Kavitha	Professor and DEAN	ECE	Member
8	Dr N.Subramanian	Professor and HOD	Chemical	Member
9	Dr.C.N.Marimuthu	Professor, DEAN and R&D coordinator	ECE	Convener

*C.N. Marimuthu*  
Dean (R&D) 16/7/2022

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1. Principal Office
2. Ethics Committee members concerned
3. All HoD's to circulate among their faculty members
4. The administrative manager
5. File



# NANDHA ENGINEERING COLLEGE (Autonomous)

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Ref. No. NEC / EC-MoM/ 001 /2022-23

Date: 23-07-2022

## Minutes of Meeting

Date of meeting	23-07-2022
Venue	NEC Conference hall
Duration	1 hour
Reference	Ref. No. NEC/EC/ 001 / 2022-23 circular dated 16.07.2022

### **Meeting Agenda:**

1. Welcome of the Chairman and members
2. Address by the Chairman
3. To review ethical breaches and the counteraction for the previous academic year
4. To discuss about the Code of Ethics (CoE)
5. To review and approve the modifications in CoE
6. To make recommendations to the internal Disciplinary Committee on what action, if any, should be taken as a result of the investigations.
7. Any other matter

### **Minutes and Resolutions:**

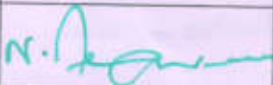

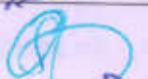

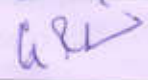

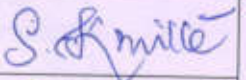
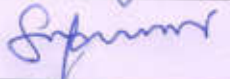
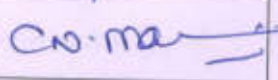
1. The members of the committee addressed ethical violations from the previous academic year, as well as the remedies for ethical breaches caused by following CoE.
2. It has been decided that no changes to CoE are recommended; hence the current CoE will be maintained for the new academic year.
3. It has been decided to distribute the CoE to students, faculties, and non-teaching employees.
4. The members of the committee decided that the convener should collect and process all required information about ethical breaches and remedies against ethical breaches.
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6. The members made recommendations to the internal Disciplinary Committee, which will determine if the claim is serious enough to merit an Ethics Committee investigation. If the allegation is leveled at a PhD researcher. This responsibility may also be allocated by the Principal to the Department Head (s). The allegation's originator will be made to submit the allegation's justification in writing.

The Ethics Committee has the authority to:

- A preliminary investigation to evaluate whether the claim has enough merit to warrant a more thorough investigation.
- When necessary, a formal investigation may involve the consulting or involvement of external experts.

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2	Dr.D.Vanathi	Professor and HOD	Member	
3	Dr.C.Siva	Professor and HOD	Member	
4	Dr.E.K.Mohanraj	Professor and Dean	Member	
5	Dr.G.Ramani	Professor and HOD	Member	
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7	Dr.S.Kavitha	Professor and Dean	Member	
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Abstract

In this article describes an integrated invert U-shape Complementary array (IIUCA) with defected ground structure (DGS) antenna for biomedical applications. The proposed antenna is operated at a focus frequency of 2.45 GHz, at the bandwidth of 0.22 GHz. The achieved frequency spectrum provides the complete health care monitoring (HCM) applications. A flexible cotton dielectric material with a relative permittivity of 2.1 is used to build an integrated invert U-shaped complementary array antenna. The dimension of the proposed IIUCA antenna structure is  $33 \times 36 \times 2.8 \text{ mm}^3$ , as assessed by TL model derivatives. The overall gain of the proposed IIUCA antenna is 3.16 dB, also it is fabricated and verified the real-time performance by using VNA in various conditions. Based on this analysis, the measured values agree well with the simulated values.

Keywords – Cotton, HCM, IIUCA, TL-model, DGS

### Introduction

In the modern era wireless communication the simulation of microstrip patch antenna is considered to be mandatory one because without this patch antenna [1] the wireless communication, biomedical applications in modern world is impossible [2]. In present scenarios the word biomedical getting more familiar and considered to be one of the emerging fields in this world so [5] most of the researchers in electromagnetic started to simulate the antenna to operate in ISM bands which covers biomedical applications [16]. This sudden drastic changes took place because one can able [4] to monitor patient through wirelessly all we know that in this pandemic this method of treating the patients one of the best preferred methods in most of the countries. This is happened in real time by two types of devices wearing device or implantable device [14] but this letter focuses on wearable devices because here the proposed antenna structure is simulated and fabricated [3] using cotton dielectric material with relative permittivity of 2.1. In Simulation of patch antenna the permittivity and tangent loss are considered to be critical parameters [7]. The appropriate selection of dielectric material for the patch antenna is important so the chosen dielectric material plays the prominent role [10] in proposed patch antenna structure to achieve desired frequency resonance [8] at biomedical applications. Therefore the proposed an integrated complementric split ring array antenna [19] can be wear by the humans by placing on the dress because of its flexibility nature and its compactness achieved in overall dimension [9, 13]. This proposed design is made successful in desired frequency is due to the combination of two techniques SRR (Split Ring Resonator), CSRR ( Complementary Split Ring Resonators) [6] and implementing Array structure in ground plane, radiating patch of the proposed antenna respectively. In most of the microstrip patch antenna an array structure is preferred to be good one which can help to reduce the side lobes in patch antenna and also can achieve gain enhancement [15]. Another most important advantage is can able to avoid interference by steering the beam in signal transmission so can achieve improved overall performance rate of the patch antenna [18]. Due to the simple geometry & ease of fabrication SRR and CSRR structures are widely used in the microstrip patch antenna in recent days. By implementing these techniques in patch antenna, the miniaturization is achieved in overall dimension and able to achieve desired resonance frequency with less signal scattering. The miniaturization in overall dimension in microstrip antenna is happened by reducing the copper usage [19, 20], so can able to achieve some weight reduction in the antenna when compared to other antennas. The SRR and CSRR structures implemented in the proposed design can be termed it in single word as metamaterial technique. The term metamaterial is applicable where the resonators and capacitors are in parallel so here this metamaterial structure is loaded on radiating patch and also in ground plane [6]. The microstrip patch antenna with metamaterial structures has been proving that it is the one of the best structures by achieving enhanced frequency bandwidth, gain and radiation efficiency of the particular antenna via its reactive coupling [17]. The metamaterial technique is described in sixth paper by Surendar U in 2015 under the title "An UWB metamaterial antenna for WLAN applications" as title describes the author of the corresponding paper designed the microstrip patch antenna for WLAN applications by achieving the frequency resonance at 5.5 GHz with very less signal scattering in transmission of -28.5 dB by implementing the metamaterial structure in ground plane. Finally after



fabrication and testing process author concluded that proposed antenna is suitable WLAN application in real time also and this is due to negative effect (metamaterial) of the antenna [6].

## Design Analysis

An integrated invert U-shape Complementary array (IIUCA) with defected ground structure (DGS) antenna for biomedical applications with an overall dimension of  $33 \times 36 \times 2.8 \text{ mm}^3$  is simulated using Cotton dielectric material of 2.1 relative permittivity with the help of ANSYS EM suite and the snap of simulated top and bottom view of the proposed antenna is represented in Figure 1. Strip line feed techniques were used in this work, along with a novel shape of CSRR loaded array patch structure. In proposed design  $1 \times 2$  array patch is drawn on the radiating layer to improve the gain and to suppress the side lobes of the patch antenna. To achieve the desired frequency resonance at biomedical application and to make the proposed design a unique structure further optimization is carried out in patch layer by implementing CSRR structure in array of the proposed antenna, in other words the ring structure is drawn on the radiating layer and implemented the defected ground structure in the ground plane of the proposed antenna by drawing the split ring resonator in it. From the most of the antenna design in previous years the metamaterial structure is only implemented in ground structure, but in this design the metamaterial structure is implemented in ground plane as well as in patch to achieve the narrow bandwidth with less power consumption and structures proposed in IIUCA antenna is also called as double negative material. The proposed antenna structure is analyzed with all electromagnetic parameters in ANSYS EM suite version 21 and it is discussed.

Figure 1 Represents Snap of the proposed IIUCA antenna

## Result Analysis

In this proposed research work, an integrated invert U-shape Complementary array (IIUCA) with defected ground structure (DGS) antenna is reported for biomedical applications. The simulation result of the proposed IIUCA antenna is analyzed using the ANSYS EM. This section discusses the obtained simulated electromagnetic results by plotting them in 2D and 3D plots.

Once entering into this part the most important electromagnetic parameter and first to be analyzed for the microstrip patch antenna is Return Loss because this electromagnetic parameter helps to prove that the simulated structure is suitable for the desired applications by giving information on frequency resonance. From the analysis the proposed IIUCA antenna structure

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resonates at center frequency of 2.47 GHz with the return loss of -26 dB

so achieved minimal scattering of signal in transmission and the signal can reach the destination without any issues.

Figure 2 Represents S11 parameter of the proposed IIUCA antenna

Figure 3 represents the gain of the proposed IIUCA antenna in 3D plot. This electromagnetic parameter helps to describe how fast the patch antenna can able to convert the input power into electromagnetic waves. According to the analysis, the proposed simulated integrated invert U-shape Complementary array antenna has a gain of 3.16 dB, indicating that it is capable of efficiently converting input power to electromagnetic waves for signal transmission process.

Figure 3 represents the gain of the proposed IIUCA antenna

Figure 4 represents the directivity of the proposed IIUCA antenna in 3D plot. The importance of analyzing the directivity parameter in microstrip patch antenna can able to study the strength of the beam produced by the corresponding antenna. From the analysis obtained directivity value of proposed integrated invert U-shape Complementary array with defected ground structure (DGS) antenna for biomedical applications is 4.27 dB. From the obtained value it proves that the proposed IIUCA antenna is producing the strengthen signal beam which is capable to transmit the signal to its destination.

Figure 4 represents the directivity of the proposed IIUCA antenna

From the obtained values of gain and directivity the radiation efficiency of the patch antenna can be calculated from mathematical equation and it is represented below.

$$\text{Efficiency } (\eta) = \text{Gain} / \text{Directivity} \times 100$$

$$\eta = 3.16/4.27 \times 100$$

Efficiency = 74%

To check that the calculated value is correct proposed integrated invert U-shape Complementary array with defected ground structure (DGS) antenna structure is analyzed in the ANSYS Electromagnetic suite and place the 2D graph plot below. From the graphical representation the value of radiation efficiency at 2.45 GHz is 77 percent. Both the calculated value and simulated value of radiation efficiency of the proposed antenna tabulated in table 1, both the obtained values are similar. Radiation Efficiency (%) Calculated Simulated 74 77 Table 1 represents calculated and simulated radiation efficiency values of proposed IIUCA antenna

Figure 5 represents the radiation efficiency of the proposed IIUCA antenna

The analyzing of the radiation pattern in patch antenna is considered to be the mandatory because it describes the polarization by analyzing the elevation and azimuth angle of the patch antenna. The proposed integrated invert U-shape Complementary array with defected ground structure (DGS) antenna for biomedical applications is analyzed with the radiation pattern in zero and ninety degree at 2.45 GHz and it is represented in figure 6. At both the degree the proposed IIUCA antenna produces the circular polarization so can achieve minimal power consumption because it splits up the power equally.

Figure 6 represents the radiation pattern of the proposed IIUCA antenna

The proposed integrated invert U-shape Complementary array with defected ground structure (DGS) antenna is simulated for wearable biomedical applications by designing it in cotton substrate material so it is mandatory to analyze Specific Absorption Rate (SAR) for the proposed antenna. From the analysis obtained SAR value of the proposed IIUCA antenna is 0.14 which in acceptable range. This obtained SAR value of the proposed IIUCA antenna will not produce harmful radiation to the human beings.

Figure 7 represents the SAR for the proposed IIUCA antenna The proposed IIUCA patch antenna is undergone for Surface current analysis. Because this parameter analysis is important to find power wastage in patch antenna and can help to design patch antenna without the power wastage. From the analysis obtained surface current in patch and ground of the IIUCA antenna is represented in pictorial format. From the figure 8 the power from the feed line is spread with an equal amount throughout the patch and ground of the proposed antenna so the power wastage in the proposed design is not evident and also there will be minimal power consumption.

Figure 7 represents the Surface Current (J-surf) for the proposed IIUCA antenna

The power range of the proposed IIUCA antenna is analyzed and the obtained value is represented in 2D graph plot in figure 8. In the graph plot the obtained power values are represented in dBm so obtained values are converted to the watts and the converted values are tabulated. The obtained accepted power for the proposed IIUCA antenna at 2.45 GHz is 29.9 dBm and the radiated power obtained for the proposed antenna design is 28.8 dBm.

Frequency

2.45 GHz

Accepted Power

29.9 dBm

0.9772 Watts

Radiated Power

28.8 dBm

0.7586 Watts

Table 2 represents the power value of the proposed IIUCA antenna

From the tabulation the obtained values reported here are below range of 1 watts so the proposed antenna consumes minimal range of power.

Figure 8 represents the power of the proposed IIUCA antenna

The proposed integrated invert U-shape Complementary array (IIUCA) with defected ground structure (DGS) antenna is fabricated in real time on flexible cotton dielectrics as per the values calculated during the simulation process so the overall dimension of the fabricated IIUCA antenna is also 33x36x2.8mm<sup>3</sup>.

Figure 9 represents the fabricated piece of the proposed IIUCA antenna

The MATLAB simulated results of permittivity proposed structure is plotted in figure 10, to prove that the metamaterial effect is produced in the proposed integrated invert U-shape Complementary array (IIUCA) antenna. From the simulated values the proposed IIUCA antenna structure achieve pure negative value in permittivity.

Figure 10 shows the metamaterial effect of permittivity

The fabricated IIUCA antenna is tested in real time using the Anritsu Vector Network Analyzer and placed the comparative 2D plot in figure 11. The fabricated piece of the proposed IIUCA antenna is measured two conditions initially it is measure without the 30 degree bend and secondly it is measured with 30 degree bend. From the analysis both the measured results shows the good agreement with the simulated result.

Figure 11 represents the comparative results of the proposed IIUCA antenna

IIUCA Frequency GHz RL dB VSWR Gain dB Directivity dB %

Simulated Measured

Normal 30deg Simulated Measured

2.47 2.49 2.38 -26.5 -23.1 -23 1.01 3.16 4.27 77

Table 3 represents the overall obtained values of the proposed IIUCA antenna

## Conclusion

A novel integrated invert U-shape Complementary array (IIUCA) with defected ground structure (DGS) antenna was designed to operate at 2.45 GHz is reported in this article and discussed in detail by analyzing all the electromagnetic parameters. From the obtained values of all analyzed electromagnetic parameters proves that the proposed IIUCA antenna is suitable for the desired biomedical applications so it is also fabricated in real time using flexible cotton dielectric of thickness 2.8 mm. The fabricated IIUCA antenna SMA is connected to the Anritsu Vector Network Analyzed for the testing process in real time. In the testing the proposed IIUCA antenna is measured the values in two conditions (i,e) in 30 degree bend and in normal condition and found all the measured values are in similar to the simulated results. The testing process carried out by the fabricated IIUCA antenna can prove the flexible nature so this proposed and fabricated antenna is best suitable for wearable biomedical applications in modern wireless communication.

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Xiao, "Capacitively Loaded Circularly Polarized Implantable Patch Antenna for ISM Band Biomedical Applications,"

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IEEE Transactions on Antennas and Propagation, vol. 62, no. 5, pp. 2407-2417, May 2014,

doi: 10.1109/TAP.2014.2307341.

[17]

100%

**MATCHING BLOCK 8/9**

SA

Synopsis (1).pdf (D112175615)

M. Vinoth and R. Vallikannu, "A compact triple slotted Rectangular Microstrip Patch Antenna with Metamaterial ground for Sub-6 GHz/5G communication," 2020 Fifth International Conference on Research in Computational Intelligence and Communication Networks (ICRCICN), 2020, pp. 34-38, doi: 10.1109/ICRCICN50933.2020.9296184. [18]

H. Yang et al., "A New Strategy to Design Microstrip Antenna Array With Low Side-Lobe Level and High Gain," in IEEE Access, vol. 7, pp. 152715-152721, 2019, doi: 10.1109/ACCESS.2019.2948098.

[19] M. I. Hussein, E. Serria and A. Hakam, "SRRs effect on circular antenna with elliptical rings for ultra-wide-band," 2016 16th Mediterranean Microwave Symposium (MMS), 2016, pp. 1-4, doi: 10.1109/MMS.2016.7803843.

[20]

69%

**MATCHING BLOCK 9/9**

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1570762629 paper.pdf (D114735382)

Yuliyus Maulana, Y., Wahyu, Y., Oktafiani, F., Perdana Saputra, Y., & Setiawan, A. (2016). Rectangular Patch Antenna Array for Radar Application. TELKOMNIKA (Telecommunication

Computing Electronics and Control), 14(4), 1345. <https://doi.org/10.12928/telkomnika.v14i4.4742>.

  
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## Hit and source - focused comparison, Side by Side


**Submitted text** As student entered the text in the submitted document.  
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<b>1/9</b>	<b>SUBMITTED TEXT</b>	98 WORDS	<b>100% MATCHING TEXT</b>	98 WORDS
<p>Mr.E.Krishna Kumar#1, Dr.C.N.Marimuthu*2 # Department of ECE, Hindusthan Institute of Technology 1            krishnakumar287@gmail.com * Department of ECE, Nandha Engineering College 2            muthu_me2005@yahoo.co.in Abstract</p>		<p>Mr.E.Krishna Kumar#1, Dr.C.N.Marimuthu*2 # Department of ECE, Hindusthan Institute of Technology 1            krishnakumar287@gmail.com * Department of ECE, Nandha Engineering College 2            muthu_me2005@yahoo.co.in Abstract:</p>		
<p><b>SA</b> Krishnakumar article Corrected copy.doc (D68542410)</p>				

<b>2/9</b>	<b>SUBMITTED TEXT</b>	15 WORDS	<b>83% MATCHING TEXT</b>	15 WORDS
<p>resonates at center frequency of 2.47 GHz with the return loss of -26 dB</p>				
<p><b>SA</b> Koushick - 12516 - Thesis Final - Print.pdf (D110096841)</p>				

<b>3/9</b>	<b>SUBMITTED TEXT</b>	11 WORDS	<b>100% MATCHING TEXT</b>	11 WORDS
<p>Microstrip Patch Antenna for Broadband Application, Journal of Physics: Conference</p>				
<p><b>SA</b> Koushick - 12516 - Thesis Final - Print.pdf (D110096841)</p>				

<b>4/9</b>	<b>SUBMITTED TEXT</b>	34 WORDS	<b>100% MATCHING TEXT</b>	34 WORDS
<p>Liton Chandra Paul, Md. Sarwar Hosain, Sohag Sarker, Makhluq Hossain Prio, Monir Morshed, Ajay Krishno Sarkar. The Effect of Changing Substrate Material and Thickness on the Performance of Inset Feed Microstrip Patch Antenna.</p>				
<p><b>SA</b> paperaddicollege.docx (D43300526)</p>				

  
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<b>5/9</b>	<b>SUBMITTED TEXT</b>	14 WORDS	<b>100% MATCHING TEXT</b>	14 WORDS
<p>International Conference on Emerging Electrical Energy, Electronics and Computing Technologies 2019 (ICE4CT 2019) (</p> <p><b>SA</b> Koushick - 12516 - Thesis Final - Print.pdf (D110096841)</p>				

<b>6/9</b>	<b>SUBMITTED TEXT</b>	14 WORDS	<b>100% MATCHING TEXT</b>	14 WORDS
<p>Xiao, "Capacitively Loaded Circularly Polarized Implantable Patch Antenna for ISM Band Biomedical Applications,"</p> <p><b>SA</b> BJIT-D-17-00672.pdf (D37269423)</p>				

<b>7/9</b>	<b>SUBMITTED TEXT</b>	15 WORDS	<b>100% MATCHING TEXT</b>	15 WORDS
<p>IEEE Transactions on Antennas and Propagation, vol. 62, no. 5, pp. 2407-2417, May 2014,</p> <p>IEEE Transactions On Antennas And Propagation, vol. 62, no. 5, pp. 2407 – 2417, May 2014.17.</p> <p><b>SA</b> PAPER2 URKUND CORRECTED.doc (D55717545)</p>				

<b>8/9</b>	<b>SUBMITTED TEXT</b>	46 WORDS	<b>100% MATCHING TEXT</b>	46 WORDS
<p>M. Vinoth and R. Vallikannu, "A compact triple slotted Rectangular Microstrip Patch Antenna with Metamaterial ground for Sub-6 GHz/5G communication," 2020 Fifth International Conference on Research in Computational Intelligence and Communication Networks (ICRCICN), 2020, pp. 34-38, doi: 10.1109/ICRCICN50933.2020.9296184. [18]</p> <p><b>SA</b> Synopsis (1).pdf (D112175615)</p>				

<b>9/9</b>	<b>SUBMITTED TEXT</b>	24 WORDS	<b>69% MATCHING TEXT</b>	24 WORDS
<p>Yuliyus Maulana, Y., Wahyu, Y., Oktafiani, F., Perdana Saputra, Y., &amp; Setiawan, A. (2016). Rectangular Patch Antenna Array for Radar Application. TELKOMNIKA (Telecommunication</p> <p><b>SA</b> 1570762629 paper.pdf (D114735382)</p>				

  
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P Vinith Kumar<sup>1\*</sup>, C.N.Marimuthu<sup>2</sup>, S.Sivaranjani<sup>3</sup>, Punitha S<sup>4</sup>  
1, Assistant Professor, Nandha College of Technology, Erode, Tamilnadu - 638052, India  
2 Professor, Nandha Engineering College, Erode, Tamilnadu-638052.

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## Criterion 3 – Research, Innovations and Extension

3.4	Research Publications and Awards
-----	----------------------------------

**3.4.1. *The Institution ensures implementation of its stated Code of Ethics for research through the following:***

1. Inclusion of research ethics in the research methodology course work
2. Presence of Ethics committee
3. Plagiarism check through software
4. Research Advisory Committee

## 4. RESEARCH ADVISORY COMMITTEE



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## **Research Advisory Committee – Constitution and Meeting Minutes**



# NANDHA ENGINEERING COLLEGE

(Autonomous)

Affiliated to Anna University Chennai and Approved by AICTE

Pitchandampalayam (P.O), Vaikkalmedu, Erode-Perundurai Road, ERODE -638 052.

Phone: 04294-225585, 223711, 223722, 226393, Fax: 04294-224787

Date: 18-08-2022

## CIRCULAR

Classification	ROUTINE	IMMEDIATE
Research and Development	Originator: PRINCIPAL	Circulated to Deans & HODs

### Sub: Composition of Research Advisory Committee - Reg.

\*\*\*\*\*

The following senior faculty members are designated as Research Advisory Committee members for our Institution to improve and monitor the progress of research activities for the academic year (2022-2023).

S.No	Name of the Staff	Designation	Position
1	Dr.N.Rengarajan	Principal	Chairman
2	Dr.J.Senthil	Professor - CSE	Member
3	Dr.C.N.Marimuthu	Professor - ECE	Member Secretary
4	Dr.E.K.Mohanraj	Professor - Civil	Member
5	Dr.S.Kavitha	Professor - ECE	Member
6	Dr.G.Ramani	Professor - EEE	Member
7	Dr.M.Eswaramoorthi	Professor - Mech.	Member
8	Dr.C.Siva	Professor - IT	Member
9	Dr.P.Sukumar	Professor - BME	Member
10	Dr.D.Vanathi	Professor - CSE	Member
11	Dr.N.Subramanian	Professor - Chemical Engg.	Member
12	Dr.V.Manimegalai	Professor - MBA	Member
13	Dr.E.K.Vellingiriraj	Professor - MCA	Member
14	Dr.T.Jayanalina	Professor - Physics	Member



*N. Rengarajan*  
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Phone: 04294-225585, 223711, 223722, 226393, Fax: 04294-224787

## Minutes of Research Advisory Committee

Venue	Principal Cabin			
Date & Time	06.07.2022 & 02.30 PM			
Attendees:	S.NO	Name of the staff	Designation	Signature
	1.	Dr.N.Rengarajan	Principal	
	2.	Dr.J.Senthil	Professor - CSE	
	3.	Dr.C.N.Marimuthu	Professor - ECE	
	4.	Dr.E.K.Mohanraj	Professor - Civil	
	5.	Dr.S.Kavitha	Professor - ECE	
	6.	Dr.G.Ramani	Professor - EEE	
	7.	Dr.M.Eswaramoorthi	Professor - Mech.	
	8.	Dr.C.Siva	Professor - IT	
	9.	Dr.P.Sukumar	Professor - BME	
	10.	Dr.D.Vanathi	Professor - CSE	
	11.	Dr.N.Subramanian	Professor - Chemical Engg.	
	12.	Dr.V.Manimegalai	Professor - MBA	
	13.	Dr.E.K.Vellingiriraj	Professor - MCA	
14.	Dr.T.Jayanalina	Professor - Physics		

### Minutes of the Meeting are as Follows:

Item : 01	Review of Department Wise Consultancy work completion report for the academic year (2021-2022)
Discussion	Department Wise Consultancy work completion report for the academic year (2021-2022) is discussed with respect to the following data sheet.

	S.No	Department	Target in Rs.	Achievement in Rs.
	1.	CSE	1,00,000.00	15000
	2.	CIVIL	1,00,000.00	268000
	3.	ECE	1,00,000.00	11350
	4.	EEE	1,00,000.00	-
	5.	MECHANICAL	1,00,000.00	366232
	6.	ITCA	1,00,000.00	-
	7.	MBA	50,000.00	56000
	8.	Chemical	25000.00	-
	9.	Agri	25000.00	-
	10.	BME	25000.00	-
Resolution	Reviewed and resolved to improve the revenue generation under Consultancy in EEE, ITCA, Agri, Chemical and BME departments.			
Item : 02	Review of Department Wise faculty publications in referred journal.			
Discussion	The number of papers published by faculty and students in referred journal for the academic year (2021-2022) are discussed with respect to the following data sheet.			
	S.No	Description	Number Articles	
	1.	Papers published in journal notified in UGC website.	35	
	2.	Papers published conferences and other journals.-	134	
Resolution	Reviewed and resolved to improve the Faculty research publications in referred journals with high impact factor.			
Item :03	Review of the PhD research Scholars enrolled and completed in our research centers during the Academic year (2021-2022) .			
Discussion	The PhD research Scholars enrollment and completion status of our three Anna university recognized departments (ECE,CSE and Mech departments) are discussed as per the following table			
	S.No	Description	Number Articles	
	1.	Number of Research scholars Pursuing for the AY(2021-2022)	40	
	2.	Number of Research scholars Enrolled for the AY (2021-2022)	2	
Resolution	The committee members had suggested increasing more numbers of PhD enrollments in each research centre.			
Item : 04	Review of the Research grant applied to the various funding agencies and grant received from various funding agencies for the Academic year (2021-2022).			



Discussion	<p>The Research grant applied and grant received from various funding agencies for the Academic year (2020-2021) are discussed.</p> <ol style="list-style-type: none"> <li>1. The committee has appreciated the ECE Department for getting one AICTE RPS grant of Rs 15,04,500 with the title of "Designing a Fully Textile Fractal Monopole Wearable Antenna for Medical Imaging Applications"</li> <li>2. The committee has also appreciated the IT Department for getting TNSCST Capacity building training scheme grant of RS 1,50,000 with the title of "Science and Technology for industrial needs"</li> <li>3. Further the committee has also appreciated the EEE Department for getting seminar grant of RS 20,000 with the title of "Emerging advancements in Battery technology for future Electric Vehicle Applications"</li> </ol>
Resolution	The committee members had suggested concentrating on more number of proposal submissions and granting sanction for each department.
Item : 05	To review about proposed Research Policy
Discussion	The committee had discussed about the proposed Research Policy for this academic year (2022-23) and made changes in the Clause I of Sponsored project under the heading of Remuneration policy for Consultancy, Testing and sponsored research projects.
Resolution	<p>The committee members had recommended the Clause I of Sponsored project under the heading of Remuneration policy for Consultancy, Testing and sponsored research projects as follows</p> <p><u>Clause I</u></p> <ul style="list-style-type: none"> <li>➤ Faculty members who do sponsored research are entitled to get remuneration as per the guidelines of Sponsoring Agencies.</li> <li>➤ The maximum remuneration is capped at Rs 1.00 Lakh per project per faculty.</li> </ul>
Item : 06	Any other points
Discussion	<ol style="list-style-type: none"> <li>1. Reviewed about the status of Two ongoing AICTE-RPS project of " Design and Development of Proton Exchange Membrane Fuel Cell with Novel Cathode flow Field For Better Water Management and High Performance " and " Experimental Investigation and modeling of WO<sub>3</sub>, ZnO and Graphene Nano particles in the field of Bio Medical applications "</li> <li>2. Reviewed the research papers published by our faculty members in Scopus / web of Science indexed and UGC CARE list journal for the AY(2021-22)</li> </ol>
Resolution	<ol style="list-style-type: none"> <li>1. The committee members had satisfied with the outcome of the proposal by published paper and patent as per the requirement of funding agency.</li> <li>2. The committee members had recommended the research Seed money to the faculty members based on their quality publication in Scopus / web of Science indexed and UGC CARE list journal in order to promote research. .</li> </ol>

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C.N.M.A. 6/7/2022  
Dean (R&D)





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(An Autonomous Institution affiliated to Anna University Chennai and approved by AICTE, New Delhi)

## Minutes of Research Advisory Committee

Venue	Principal Cabin			
Date & Time	06.01.2023 & 10.00 AM			
Attendees:	<b>S.No</b>	<b>Name</b>	<b>Designation</b>	<b>Signature</b>
	1.	Dr.N.Rengarajan	Principal	
	2.	Dr.J.Senthil	Professor - CSE	
	3.	Dr.C.N.Marimuthu	Professor - ECE	
	4.	Dr.E.K.Mohanraj	Professor - Civil	
	5.	Dr.S.Kavitha	Professor - ECE	
	6.	Dr.G.Ramani	Professor - EEE	
	7.	Dr.M.Eswaramoorthi	Professor - Mech.	
	8.	Dr.C.Siva	Professor - IT	
	9.	Dr.P.Sukumar	Professor - BME	
	10.	Dr.D.Vanathi	Professor - CSE	
	11.	Dr.N.Subramanian	Professor - Chemical Engg.	
	12.	Dr.V.Manimegalai	Professor - MBA	
	13.	Dr.E.K.Vellingiriraj	Professor - MCA	ABSENT
14.	Dr.T.Jayanalina	Professor - Physics		

### Minutes of the Meeting are as Follows:

Item : 1	Review of Department Wise Consultancy work completion, Proposal submission and Research Scholar enrollment.
Item : 2	Discussed about the status of faculty research publication in refereed journals and the committee has recommended the amount of Rs.7,000/- and Rs. 5000/- for each article WoS and Scopus respectively as an incentive to the faculty members.
Item: 3	The committee members had advised to make more MoUs belongs to CII registered industries.

Dean (R&D)

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