MICRO-PROJECT REPORT

OF

Prepare a report on specific absorption rate SAR. Write hazards which can happen in using microwave

In Partial fulfillment of Diploma in Electronics and Telecommunication Engineering

(Fifth Semester)

In the subject of

Microwave and Radar (EC5471)

By

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Submitted To

Government Polytechnic, Amravati

(An Autonomous Institute of Govt. of Maharashtra)

Under the guidance of

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Head of the Department

Department of Electronics and Telecommunication Engineering
Government Polytechnic Amravati,
(2021-2022)

Government Polytechnic, Amravati.

(An Autonomous Institute of Govt. of Maharashtra)

Department of Electronics and Telecommunication

Certificate

This is to certify that **Komal Padia, Sneha Pardhe, Mukta Manoj Pathak, Mansi Patil** Identity Code. **19EC039, 19EC040, 19EC041, 19EC042** of Fifth Semester Diploma in **Electronics and Telecommunication Engineering has** satisfactorily completed the micro project entitled "**Prepare a report on specific absorption rate SAR. Write hazards which can happen in using microwave**" in **Microwave and Radar Engineering EC5471** for the academic year 2021-22 as prescribed in curriculum.

Place: Amravati

Date: 11/12/2021

Lecturer in Electronics

Dr. Gajanan G. Sarate

Department of Electronics and Telecommunication Engineering

Government Polytechnic Amravati,

(2021-2022)

Annexure-I

PART A- Plan (About 1-2 pages)

Title of Micro-Project: Prepare a report on specific absorption rate SAR. Write hazards which can happen in using microwave

1.0 Brief Introduction

This microproject briefly covers the concept of Specific Absorption Rate SAR. It includes what SAR rate is good for us and above that rate what hazards can happen. Some frequent causes as are given here due to which harmful absorption occurs in our surrounding. Importance of being knowledgeable about SAR value is also mentioned here.

2.0 Aims of the Micro-Project

This Micro-Project aims at:

- Presenting a report on specific absorption rate SAR
- Understanding the hazards that can happen due to absorption of microwave.

3.0 Course Outcomes Integrated

1) Study and analyze the advantages and disadvantages of using Microwave signal.

4.0 Actual Procedure Followed:

1) Searched what is specific absorption rate.
2) Searched information about specific absorption rate of microwave power.
3) Information about hazards that can be happened due to microwave power absorption.
4) Prepared the report on collected information.
5) Covered frequently asked questions about Specific Absorption Rate

5.0 Learning outcome of this Micro-Project:

1. To study the successive absorption rate.

6.0 Assessment by Faculty as per Rubrics

Process Assessment (03)	Product Assessment (02)	Total Marks (05)	Signature of Faculty

Annexure-II

PART B- Plan (About 1-2 pages)
Format for Micro-Project Proposal

Title of Micro Project: Prepare a report on specific absorption rate SAR. Write hazards which can happen in using microwave

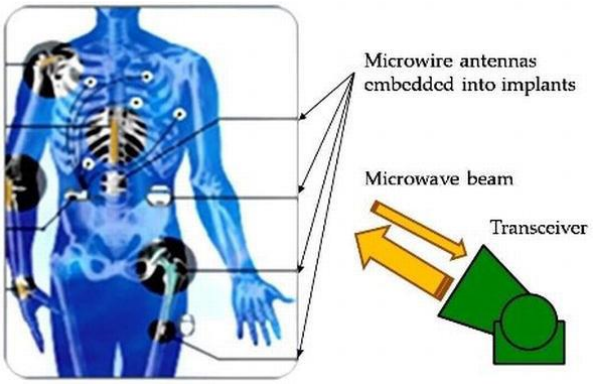
1.0 Detail Information:

✓ WHAT IS SAR?

Specific Absorption Rate (SAR) is a measure of the amount of RF power deposited in the human head or body whenever a mobile phone or other wireless radio device transmits. It is the maximum SAR value (in units of Watts/kilogram) that is measured during SAR compliance testing.

Accompanied by the booming of wireless technology, electromagnetic field (EMF) exposure is now ubiquitous in everyday life. Safety concerns for public and occupational exposure have promoted extensive studies on biological effects induced by EMF in recent decades. Previous studies demonstrated that the brain is one of the most sensitive organs to EMF radiation. Under certain conditions, EMF exposure is considered to be associated with altered blood-brain barrier (BBB) permeability , memory and learning function and physiological indexes.

Electromagnetic radiation is emitted by many natural and man-made sources and is a fundamental aspect of our lives. We are warmed by electromagnetic radiation emitted from the sun and our eyes can detect the visible light portion of the electromagnetic spectrum. Radiofrequency (RF) fields fall within a portion of the electromagnetic spectrum with frequencies ranging from 3 kHz to 300 GHz, below that of visible light and above that of extremely low frequency electromagnetic fields. RF fields are produced by many man-made sources including cellular (mobile) phones and base stations, television and radio broadcasting facilities, radar, medical equipment, microwave ovens, RF induction heaters as well as a diverse assortment of other electronic devices within our living and working environments.



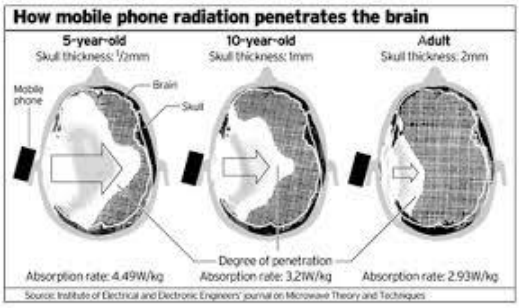
The rate and distribution of RF energy absorption depend strongly on the frequency, strength and orientation of the incident fields as well as the body size and its constitutive electrical properties (dielectric constant and conductivity). Absorption of RF energy is commonly

described in terms of the specific absorption rate (SAR), which is a measure of the rate of energy deposition per unit mass of body tissue and is usually expressed in units of watts per kilogram (W/kg). Based on a large amount of scientific knowledge, national and international exposure limits have been established to protect the general public against all adverse effects associated with RF field exposures.

✓ Hazards that can happen using microwave:

It is known, however, that exposure to non-ionizing radio frequency radiation may produce serious biological effects. As high frequency radio frequency radiation, i.e., microwave radiation, penetrates the body, the exposed molecules move about and collide with one another causing friction and, thus, heat. This is known as the thermal effect. If the radiation is powerful enough, the tissue or skin will be heated or burned. Such health effects may or may not be reversible, depending on the particular tissue or organ that is exposed, the intensity of the radiation, the frequency and duration of the exposure, the environmental temperature and humidity, and the body's efficiency in dissipating the heat. Following are some causes for these hazards……

- Exposure to mobile phones



people who have used mobile phones for more than 10 years have a clearly higher risk of brain tumors. Those who are accustomed to using their mobile phone

- Industrial exposure

In long-term epidemiological investigations of large population with occupational exposure, the results have not been consistent. significant psychiatric symptoms were observed in people who worked in these areas. In particular, somatization, obsessive compulsivity, paranoid ideation and psychoticism were reported

- Effect of Microwave oven

Mechanical abuse, a build-up of dirt, or simple wear and tear of continued use can cause door seals to be less effective. Theoretically, there will be small amounts of leakage through the viewing glass.

- Military exposure

Standard devices used by military personnel that may pose electromagnetic hazards include radars and missile systems. The visual reaction time and short-term memory of healthy male and female workers at a radar site with a frequency range of 2–18 GHz was recorded with a simple blind computer-assisted-visual reaction time test or modified Wechsler Memory Scale test. The results indicated that radar microwave radiation leads to a decreased reaction time and lower short-term memory performance.

- Effects of microwave radiation on children

Because a child's nervous system is growing and their head is more vulnerable to radiation energy, studies that have specifically addressed whether the nervous systems of children are more susceptible to electromagnetic radiation have been performed. However, there is also scientific evidence to demonstrate that children are more sensitive to electromagnetic radiation than adults

✓ **Here are some solutions that can be executed to overcome the hazardous effect of microwave absorption**

- Employers must ensure that potentially exposed microwave and radio wave radiation workers have a safe and healthful workplace. This means that employers should implement engineering controls to minimize or eliminate potential exposure, conduct comprehensive training about the potentially hazardous working conditions, and institute medical surveillance programs.
- The most effective way to eliminate or minimize occupational exposure to radio frequency microwave and radio wave radiation is through the use of engineering controls. For example, the source of the potential problem, i.e., the radiation-emitting equipment, should be enclosed or effectively shielded or the worker should be separated from the source. This requirement is equally important to all workers exposed to microwave and radio wave radiation.
- Where engineering controls cannot be implemented, personal protective equipment such as protective clothing and eyewear should be provided and utilized.
- In addition, employers should provide comprehensive training regarding potentially hazardous working conditions. Such a program might consist of written and/or audio/visual materials that detail potential safety and health dangers, health effects of exposure, methods of control, first aid procedures, the use of hazard warning signs and labels, and the identification of restricted areas.
- People who are not workers in the respective industries should also take care of themselves by having a routine checkups and required treatment if necessary.

✓ Frequently asked questions about Specific Absorption Rate

Que 1 What is the importance of SAR value?

- While SAR values are an important tool in judging the maximum possible exposure to RF energy from a particular model of cell phone, a single SAR value does not provide sufficient information about the amount of RF exposure under typical usage conditions to reliably compare individual cell phone models.

Que 2 What is good SAR value for the mobile phones?

- 1.6 W/Kg
- According to US Federal Communications Commission (FCC), phones with a SAR level of 1.6 W/Kg for body or below are deemed safe. The same measurement is followed in India. In Europe, the government agencies require that the phone should have a SAR value of less than 2W/kg. India also recommends the SAR value limit given by FCC.

Que 3 How the food gets heated by microwaves?

- The short answer to this question is that when the molecules in food absorb microwaves, they vibrate and the resulting friction between the molecules heats up the food.

Que 4 How phone radiation affects the brain?

- The radiation made the cells in blood vessel walls shrink – allowing potentially harmful substances in the blood to 'leak' into the brain. Repeated exposure, the study found, could make the blood-brain barrier more permeable, leading to increased brain damage

2.0 Aim of the Micro-Project

This Micro-Project aims at:

- Presenting a report on specific absorption rate SAR
- Understanding the hazards that can happen due to absorption of microwave.
- Suggesting solution for the hazardous effects of microwave absorption

3.0 Action Plan

S.N.	Details of activity	Planned start date	Planned Finish date	ID. Code of Team Members
1.	Collected the information about SAR	2.12.2021	11.12.2021	19EC039
2.	Searched required images.	2.12.2021	11.12.2021	19EC040
3.	Searched the information and prepared the report file	2.12.2021	11.12.2021	19EC041
4.	Collected the information about hazards happen due to microwave.	2.12.2021	11.12.2021	19EC042

4.0 Conclusion

- Specific absorption should not be more than 1.6 W/Kg.
- Close contact of children and Microwave frequency signals should be avoided.

5.0 Resources Required (major resources such as raw material, some machining facility, software etc)

S.N.	Name of Resource/material	Specifications	Qty	Remarks
2	Laptop	---	1	

4.0 Names of Team Members with Identity Code:

Sr. No.	Name	ID code
1.	Komal Padia	19EC039
2.	Sneha Pardhe	19EC040
3.	Mukta Manoj Pathak	19EC041
4.	Mansi Patil	19EC042