EEE4103 MICROPROCESSOR AND EMBEDDED SYSTEM
COURSE CAPSTONE PROJECT PROPOSAL FORM

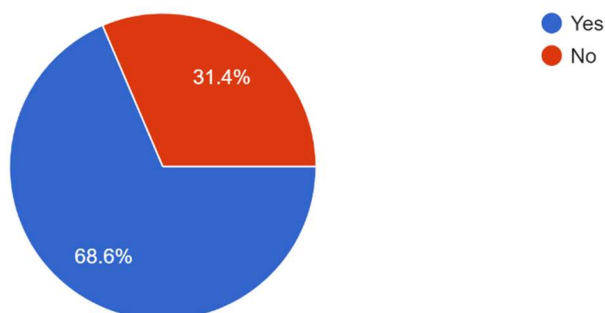**SEMESTER: SPRING 2023-2024**

PROJECT TITLE: IoT Based Patient Health Monitoring on ESP32 Web Server

SURVEY:

A survey was conducted on the response of 35-40 people on IoT-based patient health monitoring systems on an ESP32 web server. The results are shown below.
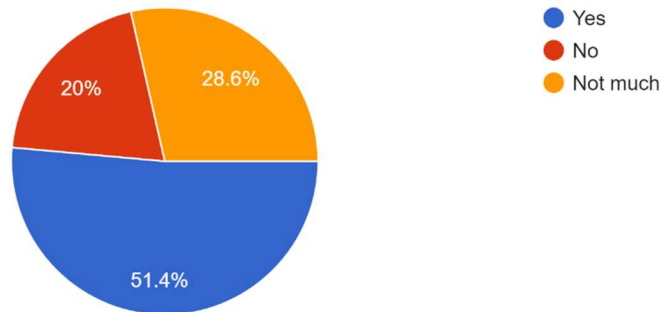
Have you ever used or interacted with a health monitoring device?
35 responses

- Yes
- No

31.4%

68.6%

Are you familiar with IoT (Internet of Things) technology?
35 responses

- Yes
- No
- Not much

20%
28.6%
51.4%

How often do you monitor your health?
35 responses

- Daily
- Weekly
- Monthly
- Yearly

40%
22.9%
11.4%
25.7%
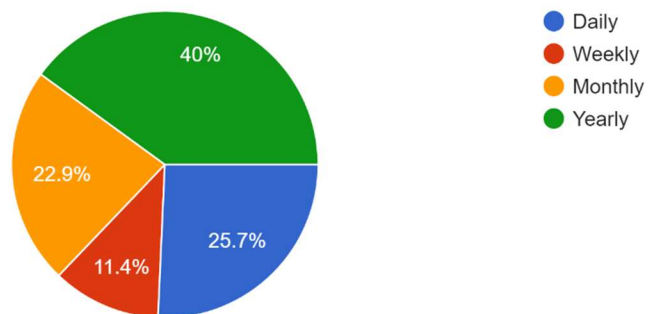
What health parameters do you typically monitor?
35 responses

- Heart Rate
- Blood Pressure
- Temperature
- Oxygen Level

17.1%
14.3%
42.9%
25.7%
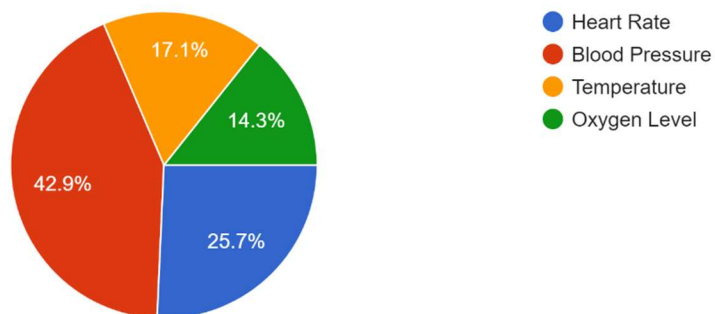
Would you be interested in using an IoT-based patient health monitoring system?

35 responses

- Yes
- No
- Maybe

8.6%

22.9%

68.6%
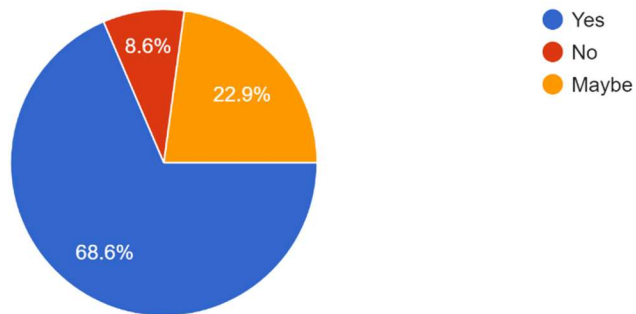
What features would you like to see in such a system?

35 responses

- Real-time alerts
- Historical data analysis
- Others

22.9%

8.6%

68.6%
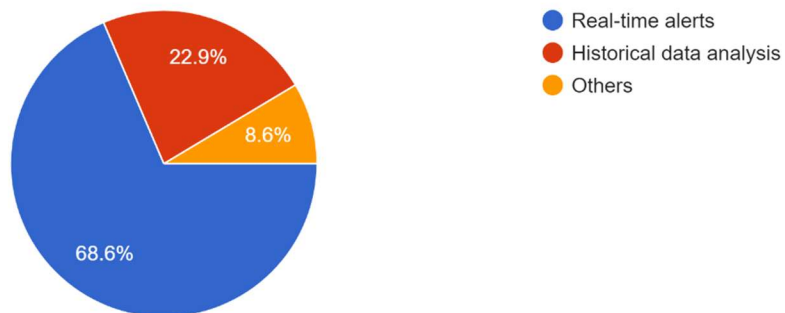
How concerned are you about the privacy and security of your health data?

35 responses

- High
- Moderate
- Low

25.7%

74.3%
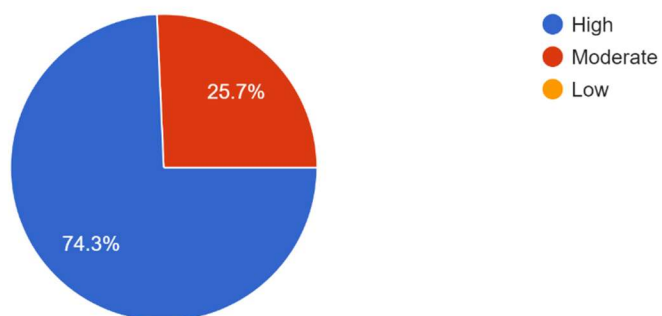
Are you comfortable with sharing your health data with healthcare professionals for monitoring and analysis?

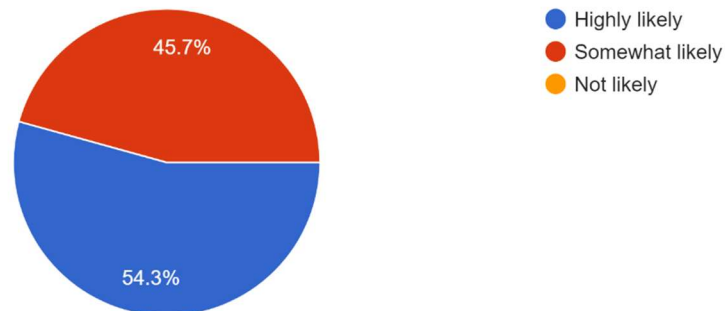How likely are you to recommend an IoT-based patient health monitoring system to others?
35 responses

- Highly likely
- Somewhat likely
- Not likely

45.7%

54.3%

AIMS AND OBJECTIVES OF THE PROJECT:

With so many new healthcare technology start-ups, IoT is rapidly changing the healthcare industry. Because of our busy lives and daily responsibilities, it may be difficult to keep an eye on your patient's health when they are at home. Elderly patients need to be regularly monitored. As a result, we provide a unique strategy that makes this process readily automated. Our device provides an advanced Web Server-based patient health tracking system that lets you keep an eye on your body temperature, heart rate, and blood oxygen level, among other crucial signs.

The main goal of this project is to use sensors and an ESP32 microcontroller to design and build an extensive Internet of Things patient health monitoring system. To monitor critical health metrics like heart rate, blood pressure, and temperature, this entails building the hardware architecture, choosing the right sensors, and creating the firmware required to gather, process, and send the data to the ESP32 web server.

The goal is to visualize the health data on a user-accessible web interface and to implement real-time data transmission from the ESP32 device to the web server. To show the health metrics in real-time, this entails connecting the ESP32 to Wi-Fi, setting up communication protocols for data transmission, and creating an intuitive web interface with HTML, CSS, and JavaScript.

The project's goal is to analyses the gathered medical data to offer insights into the patients' current state of health as well as long-term trends. To enable healthcare providers to make knowledgeable judgements and give patients individualized treatment, this entails putting data analytics algorithms to use in order to find patterns, anomalies, and correlations in the health data. The system could also include capabilities like storing and visualizing past data.

LITERATURE REVIEW

1. IOT BASED HEALTH MONITORING SYSTEM USING ARDUINO UNO (May 2023 IARJSET 10(6)DOI:10.17148/IARJSET.2023.10638)
    https://www.researchgate.net/publication/371547710_IOT_BASED_HEALTH_MONITORING_SYSTEM_USING_ARDUINO_UNO
2. E PATIENT MONITORING SYSTEM USING ARDUINO (Volume:03/Issue:07/July-2021)
    https://www.irjmets.com/uploadedfiles/paper/volume3/issue_7_july_2021/15030/1628083583.pdf

3. Analysis of Patient Health Using Arduino and Monitoring System (Published:22/02/2024)
   https://journaljerr.com/index.php/JERR/article/view/1090/2166
4. IMPLEMENTATION OF IOT BASED PATIENT HEALTH MONITORING SYSTEM USING ESP32 WEB SERVER
   https://www.researchgate.net/publication/372268729_IMPLEMENTATION_OF_IOT_BASED_PATIENT_HEALTH_MONITORING_SYSTEM_USING_ESP32_WEB_SERVER
5. MICROCONTROLLER BASED SMART REAL-TIME HEALTHCARE MONITORING SYSTEM USING INTERNET OF THINGS (IOT)
   https://www.researchgate.net/publication/373247214_MICROCONTROLLER_BASED_SMART_REAL-TIME_HEALTHCARE_MONITORING_SYSTEM_USING_INTERNET_OF_THINGS_IOT_AN_OVERVIEW

EXPERIMENTAL BLOCK DIAGRAM:
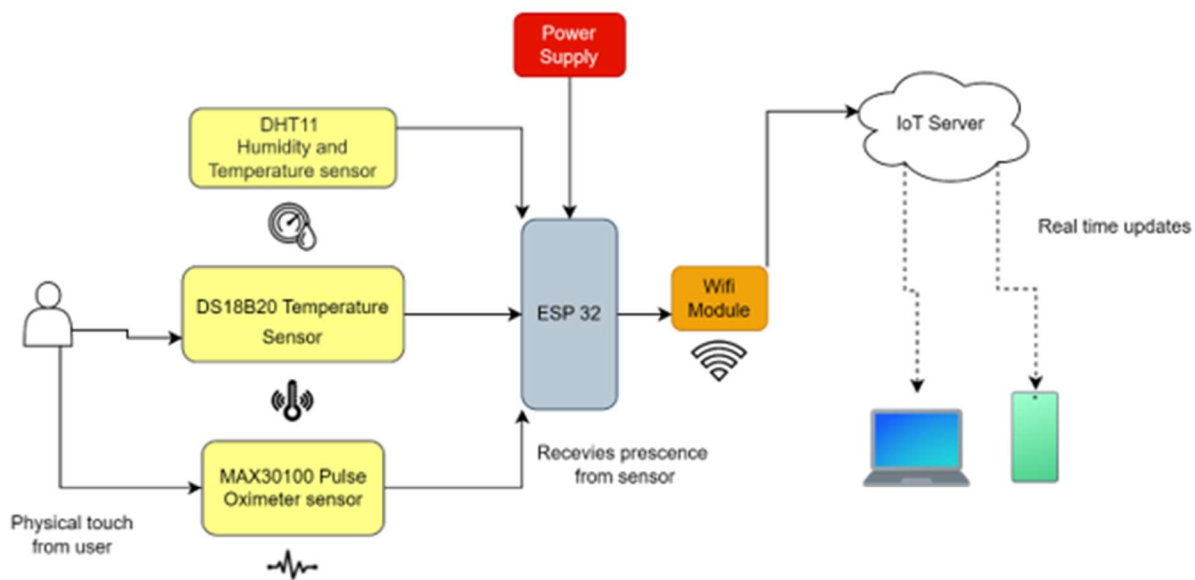
Fig: IoT Based Patient Health Monitoring on ESP32 Web Server

POSSIBLE OUTCOMES OF THE PROJECT:

IoT is fast transforming the healthcare market with a plethora of new healthcare technology start-ups. This project can help society and improve the culture of the society to a greater extent. This project will be helpful in

Real-time Health Monitoring: Patients' vital signs such as heart rate, blood pressure, temperature, and oxygen saturation can be continuously monitored in real-time, providing instant feedback to healthcare providers.

Remote Monitoring: Healthcare professionals can remotely access patients' health data through the web server, enabling them to monitor multiple patients simultaneously from any location with internet access.

Early Detection of Health Issues: By continuously monitoring patients' health parameters, any abnormalities or deviations from the normal range can be detected early, allowing for prompt intervention and prevention of complications.

Data Visualization: The ESP32 Web Server can visualize patients' health data using graphs, charts, or dashboards, providing a clear overview of their health status over time. This visualization can aid in easier interpretation and analysis of the data by healthcare providers.
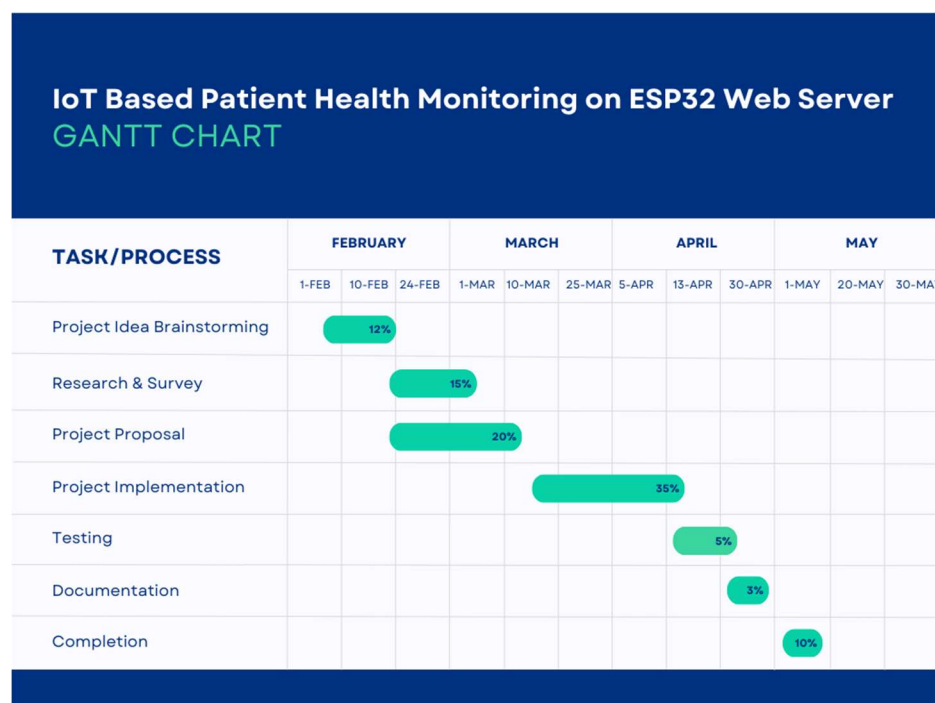
Alerts and Notifications: The system can be programmed to generate alerts and notifications in case of critical health conditions or emergencies, ensuring timely response and intervention by healthcare providers or caregivers.

Historical Data Analysis: The collected health data can be stored on the web server for historical analysis. Healthcare providers can review past trends and patterns in patients' health parameters to make informed decisions about their treatment plans.

Patient Empowerment: Patients can also access their own health data through the web server, empowering them to take an active role in managing their health and making informed decisions about their lifestyle and treatment options.

Improved Accessibility of Healthcare: Remote patient monitoring can make healthcare services more accessible, especially for those in rural areas or with limited mobility.

PROJECT TIMELINE (GANTT CHART):

IoT Based Patient Health Monitoring on ESP32 Web Server
GANTT CHART

TASK/PROCESS	FEBRUARY			MARCH			APRIL			MAY		
	1-FEB	10-FEB	24-FEB	1-MAR	10-MAR	25-MAR	5-APR	13-APR	30-APR	1-MAY	20-MAY	30-MAY
Project Idea Brainstorming		12%										
Research & Survey			15%									
Project Proposal			20%									
Project Implementation						35%						
Testing								5%				
Documentation									3%			
Completion										10%		

REFERENCES:

1) Richa, Anwesha Das, Ajeet Kumar Kushwaha and Prof. Mini Sreejith "An IoT based Health Monitoring System using Arduino Uno" IJERT Vol 10 Issue 03 March 2021

2) Prajna Valsalan1, Tariq Ahmed BarhamBaomar, Ali Husain Omar Baabood, "IOT BASED HEALTH MONITORING SYSTEM", Journal of Critical Reviews, ISSN- 2394-5125 Vol 7, Issue 4, 2020

3) IMPLEMENTATION OF IOT BASED PATIENT HEALTH MONITORING SYSTEM USING ESP32 WEB SERVER Jannatun Ferdous, Boyidhanath Roy, Motalab Hossen and Prof. Md. Mehedi Islam Article DOI:10.21474/IJAR01/17119

Instructions:
1. Must follow the mentioned instructions properly.
2. Fill in the form accurately with all necessary information.
3. Make a color print of this form.
4. Figures, tables, charts, circuit diagrams, block diagrams, and wave shapes must be color printed.

FOR FACULTY USE ONLY

COMMENTS BY COURSE TEACHER:

COURSE TEACHER'S NAME   COURSE TEACHER'S SIGNATURE   DATE

GROUP MEMBERS

(Maximum <mark>6 students</mark> are permitted to carry out a single Project. However, depending on the capability of the students, <mark>4 students</mark> may be allowed but not less than that)

NAME: **MD. SHOHANUR RAHMAN SHOHAN** **ID #: 22-46013-1** **PROGRAM: CSE** **EMAIL: 22-46013-1@student.aiub.edu**	**NAME**: MD. ASHIKUZZAMAN ABIR **ID #:22-47006-1** **PROGRAM: CSE** **EMAIL: 22-47006-1@student.aiub.edu**
NAME: MD. JAHID HASAN **ID #: 22-47010-1** **PROGRAM: CSE** **EMAIL: jahid.hasan1217@gmail.com**	**NAME**: FARJANA YESMIN OPI **ID #: 22-47018-1** **PROGRAM: CSE** **EMAIL: 22-47018-1@student.aiub.edu**
NAME: MD. ABU TOWSIF **ID #: 22-47019-1** **PROGRAM: CSE** **EMAIL: 22-47019-1@student.aiub.edu**	**NAME**: A. F. M. RAFIUL HASSAN **ID #: 22- 47048-1** **PROGRAM: CSE** **EMAIL: 22-47048-1@student.aiub.edu**
REMARKS (for OFFICE use only)	

Course Name:	Microprocessor and Embedded System	**Course Code:**	EEE 4103
Semester:	Spring 2023-2024	**Sec:**	**J**
Faculty Member:	Md. Shaoran Sayem		

Capstone Project Title:	IoT Based Patient Health Monitoring on ESP32 Web Server
Project Group No.	04

Sl #	Student ID #	Student Name	Obtained Marks
1.	**22-46013-1**	MD. SHOHANUR RAHMAN SHOHAN	
2.	**22-47006-1**	MD. ASHIKUZZAMAN ABIR	
3.	**22-47010-1**	MD. JAHID HASAN	
4.	**22-47018-1**	FARJANA YESMIN OPI	
5.	**22-47019-1**	MD. ABU TOWSIF	
6.	**22-47048-1**	A. F. M. RAFIUL HASSAN	

Assessment Materials and Marks Allocation:

COs	Assessment Materials	POIs	Marks
CO3	Course Capstone Proposal Form	P.c.2.C6	30

Assessment Rubrics:

KPIs	Excellent [2]	Proficient [1.5]	Good [1]	Acceptable [0.5]	Unacceptable [0]	No Response [0]	Secured Marks
Project Title	The title reflects an issue related to complex engineering problems showing targets and methods with possible outcomes.	The title reflects an issue related to complex engineering problems showing targets and methods but some missing issues.	The title reflects an issue related to the course capstone project but there may be some missing issues.	The title reflects an issue related to the course capstone project but is not complete or specific.	The title does not reflect any issues related to the course capstone project.	No Response at all/ copied from others /identical submissions with gross errors/ image file printed	
Comments						**Total Marks (2)**	

KPIs	Excellent [5]	Proficient [4]	Good [3]	Acceptable [2]	Unacceptable [1]	No Response [0]	Secured Marks
Survey	The survey developed as a process for complex engineering problems considering cultural and societal factors has superior variables, targets, measures, and the implementation process is clear and challenging for future project implementation with several possible outcomes having good impacts.	The survey developed as a process for complex engineering problems considering cultural and societal factors has good variables, targets, measures, and the implementation process is clear and challenging for future project implementation with some possible outcomes with little impact.	The survey developed as a process for complex engineering problems considering cultural and societal factors has moderate variables, targets, measures, and the implementation process is clear and challenging for future project implementation with a few possible outcomes with impacts.	The survey developed as a process for complex engineering problems considering cultural and societal factors has good variables, targets, measures, and the implementation process is somewhat clear for future project implementation with very few possible outcomes with little impact.	The survey developed as a process for complex engineering problems considering cultural and societal factors has poor variables, targets, measures, and the implementation process is very unclear for future project implementation with a few possible outcomes but no impacts.	No Response at all/ copied from others /identical submissions with gross errors/ image file printed	
Comments						**Total Marks (5)**	

KPIs	Excellent [3]	Proficient [2.5]	Good [2]	Acceptable [1]	Unacceptable [0.5]	No Response [0]	Secured Marks
Aims and Objectives	Aims and objectives are written to solve complex engineering problems considering cultural and societal factors with specific targets, measurement, and implementation processes that are clear and challenging and have several possible outcomes having very good impacts.	Aims and objectives are written to solve complex engineering problems considering cultural and societal factors with general targets, measurement, and implementation processes that are not clear and challenging and have some possible outcomes having good impacts.	Aims and objectives are written to solve complex engineering problems considering a few cultural and societal factors with narrow targets; measurement, and implementation processes are clear and challenging and have a few possible outcomes having some impacts.	Aims and objectives are written to solve complex engineering problems considering cultural or societal factors with a very target; measurement and implementation processes are not clear or challenging and have little possible outcome having no impact.	Aims and objectives are written to solve complex engineering problems but do not consider cultural and societal factors with any targets; measurement, and implementation processes are not clear and challenging and no possible outcomes have no impacts.	No Response at all/ copied from others /identical submissions with gross errors/ image file printed	
Comments						**Total Marks (3)**	

KPIs	Excellent [5]	Proficient [4]	Good [3]	Acceptable [2]	Unacceptable [1]	No Response [0]	Secured Marks
Literature Review	Specific formats are maintained to review and cite the literature with recent publications. Identified and analyzed the problem correctly.	Specific formats are maintained to review and cite the literature with recent publications. Identified and analyzed the problem correctly, but all issues were not addressed with relevant or intended work.	Specific formats are maintained to review and cite the literature with recent and past publications. Identified and analyzed the problem correctly, but all issues were not addressed with relevant or intended work.	Specific formats are maintained to review and cite the literature with recent and past publications. Identified but could not analyze all the problems correctly, and all issues were not addressed with relevant or intended work.	No specific formats are maintained to review and cite the literature with recent publications. Could not identify and analyze all the problems correctly, and all issues are not addressed with relevant or intended work at all.	No Response at all/ copied from others/ identical submissions with gross errors/ image file printed	
Comments						**Total Marks (5)**	

KPIs	Excellent [4]	Proficient [3]	Good [2]	Acceptable [1]	Unacceptable [0.5]	No Response [0]	Secured Marks
Experimental Block Diagram	The block diagram is drawn to show the connections of all the possible components or sub-systems to show their interdependence with all possible flows of signals from inputs to outputs.	The block diagram is drawn to show the connections of all of the possible components or sub-systems to show their interdependence with a few missing flows of signals from inputs to outputs.	The block diagram is drawn to show the connections of most of the possible components or sub-systems to show their interdependence with a few missing flows of signals from inputs to outputs.	The block diagram is drawn to show the connections of a few possible components or sub-systems to show their interdependence with some missing flow of signals from inputs to outputs.	The block diagram is not drawn to show the connections of all possible components or sub-systems to show their interdependence and flow of signals from inputs to outputs.	No Response at all/ copied from others /identical submissions with gross errors/ image file printed	
Comments						**Total Marks (4)**	

KPIs	Excellent [4]	Proficient [3]	Good [2]	Acceptable [1]	Unacceptable [0.5]	No Response [0]	Secured Marks
Possible Outcomes	Outcomes are written to achieve complex engineering problems' solutions considering cultural and societal factors and showing measurement, and implementation processes to attain the outcomes with all possible impacts.	Outcomes are written to achieve complex engineering problems' solutions considering cultural and societal factors and showing measurement, and implementation processes to attain the outcomes with some impacts.	Outcomes are written to achieve complex engineering problems' solutions considering cultural and societal factors and do not show measurement, and implementation processes to attain the outcomes without showing any impacts.	Outcomes are written to achieve complex engineering problems' solutions but do not consider cultural and societal factors and do not show measurement, and implementation processes to attain the outcomes without showing any impacts.	Outcomes are not written to achieve complex engineering problems' solutions do not consider cultural and societal factors and do not show measurement, and implementation processes to attain the outcomes without showing any impacts.	No Response at all/ copied from others /identical submissions with gross errors/ image file printed	
Comments						**Total Marks (4)**	

KPIs	Excellent [5]	Proficient [4]	Good [3]	Acceptable [2]	Unacceptable [1]	No Response [0]	Secured Marks
Gantt Chart	Specific formats are maintained to draw the Gantt chart and there is the order of workflow with all work to be done.	Specific formats are maintained to draw the Gantt chart and there is the order of workflow with a few works missing.	Specific formats are maintained to draw the Gantt chart and there is the order of workflow with some works missing.	No specific formats are maintained to draw the Gantt chart and there is little order of workflow with some works missing.	No specific formats are maintained to draw the Gantt chart and there is no order of workflow with the most important works missing.	No Response at all/ copied from others/ identical submissions with gross errors/ image file printed	
Comments						**Total Marks (5)**	

KPIs	Excellent [2]	Proficient [1.5]	Good [1]	Acceptable [0.5]	Unacceptable [0]	No Response [0]	Secured Marks
References	Specific formats are maintained to write the references, and all are recently published journal and conference papers having no missing information.	Specific formats are maintained to write the references, and all are journal and conference papers, but some old papers have missing information.	No specific formats are maintained to write the references, and many are internet sources with several missing information and very old references.	No specific formats are maintained to write the references and most of them are internet sources with missing information.	No specific formats are maintained to write the references, and all are internet sources with missing information.	No Response at all/ copied from others /identical submissions with gross errors/ image file printed	
Comments						**Total Marks (2)**	