SILIGURI INSTITUTE OF TECHNOLOGY

ELECTRONICS & COMMUNICATION ENGINEERING

COURSE FILE

7TH SEM, 4TH YEAR, 2022

PAPER DESCRIPTION :EMBEDDED SYSTEM

PAPER CODE : EC704B

Course File

Course Title : Embedded System

Code : EC 704B

Semester : 7th semester **Year :** 4th Year

Name of the Faculty: Prof. Subhamay Sarker

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Class Schedule			
Lecture		Tutorial	Practical
Monday – 2.10pm – 3.00pm	Thursday – 3.00pm – 3.50 pm & 3.50 pm - 4.40pm	NA	NA

Hours for meeting students:	
Tuesday	1.30 pm to 2.10 pm
Thursday	1.30 pm to 2.10 pm
Other days	By appointment

i) Course Objective

Students will be able todescribe the definition of Embedded System and its various components like, devices and communication buses, Program Modelling Concepts and the concept of Real Time Operation Systems. They will also be able to use various Embedded C Compilers, IDEs and simulators for programmingpopular microcontrollers used in Embedded System design.

ii) Course Outcomes

i. After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes.

The student will be able to:

		Target
CO1	**Describe** the concept of Embedded System, **Identify** the differences between Embedded system Vs General computing systems & Microprocessor and Microcontroller.[B.T. LEVEL 1]	65% marks
CO2	**Discuss** the architecture of Embedded System. **Understand** the operation of various Devices and Communication Buses used in Embedded System.[B.T. LEVEL 2]	65% marks
CO3	**Discuss** the Program Modelling Concepts and Real Time Operation Systems used in Embedded System.[B.T. LEVEL 2]	65% marks
CO4	**Use** various Embedded C Compilers, IDEs and simulators for programmingpopular microcontrollers used in Embedded System design.[B.T. LEVEL 3]	65% marks

ii. Once the student has successfully complete this course, he/she must be able to answer the following questions or perform/demonstrate the following:

Sl.	Question	BT Level
1.	**Define**Embedded System?	1
2.	**Identify**the differences between Embedded system & General computing systems.	1
3.	**Describe** thehardware architecture of the real time systems.	1
4.	**Discuss** watchdog timer, real time clock.	2
5.	**Discuss** the parallel communication network using ISA, PCI, PCT-X, Internet embedded system network protocols, USB, Bluetooth. List the ideal characteristic of op-amp.	2
6.	**Discuss** various examples of Embedded System like Mobile phones, RFID, WISENET, Robotics, Biomedical Applications, Brain machine interface etc	2
7.	**Use** MPLAB IDE to create & build an LED Blinking program using PIC microcontroller.	3

iii) Topic/Unit/Chapter Layout

Topic/Unit/Chapter	Lecture Hours
1. Introduction to Embedded System	5
2. Devices and Communication Buses	10
3. Program Modelling Concepts	5
4. Real Time Operating Systems	8
5. Examples of Embedded System	6
6. Programming concepts and embedded programming in C, C++, JAVA.	4

iv)Textbooks

1.Embedded System :Rajkamal (TMH)
2. Introduction to Embedded System :Shibu K. V. (TMH)

Reference books :

1. Embedded System : L. B. Das (Pearson).
2. Embedded System Design – A unified hardware and software introduction: F. Vahid (John Wiley)
3. Embedded System design : S. Heath (Elsevier)
6. Embedded microcontroller and processor design: G. Osborn (Pearson)

(v) Evaluation Scheme

1) Theory

Evaluation Criteria	Marks
Internal Exam*	15
Quiz / assignment	10
Attendance	5
University Exam/External Exam	70
Total	100

* Two internal examinations are conducted; based on those two tests, average of them are considered in a scale of 15.

Course target attainment levels:

Attainment Level	Inference
Attainment Level 1	50% of the students have attained more than the target level of that CO
Attainment Level 2	60% of the students have attained more than the target level of that CO
Attainment Level 3	70% of the students have attained more than the target level of that CO

Overall Course Attainment Target = 70% of the students will get “A” Grade

Target has been set on the basis of last year's performance / result by the students, student quality this year and difficulty level of the course.

University Grading System:

Grade	Marks
O	90% and above
E	80 – 89.9%
A	70 – 79.9%
B	60 – 69.9%
C	50 – 59.9%
D	40 – 49.9%
F	Below 40%

(vi) Mapping of Course Outcomes and Program Outcomes:

Course Outcomes	Program Outcomes												PSOs	
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12	1.	2.
CO1	1	1	0	0	0	0	0	0	0	0	0	0	1	1
CO2	1	1	0	0	1	0	0	0	0	0	0	0	1	1
CO3	1	1	1	0	1	0	0	0	0	0	0	0	1	2
CO4	2	2	2	0	3	0	0	0	1	0	0	0	2	3
	1.3	1.3	1.5	0.0	1.7	0.0	0.0	0.0	1.0	0.0	0.0	0.0	1.3	1.8

1 = courses in which the student will be exposed to a topic (BT level 1& 2)
2 = courses in which students will gain competency in that area (BT level 3-4)
3= courses in which students will master that skill (BT level 5-6)

CO1 to CO3minimally & CO4partially satisfies application of knowledge of mathematics and science in identifying and solving engineering problems. (PO1, PO2).

CO3 minimally and CO4 partially satisfies the condition of designing system components and solutions. (PO3).

CO2 to CO3 minimally and CO4 strongly satisfies the condition for the use of modern tool to Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex Electronics & Communication engineering activities with an understanding of the limitations.(PO5).

CO4 minimally satisfies the conditionfor functioning effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. (PO9).

(vii) Delivery Methodology

Outcome	Method	Supporting Tools	Demonstration
EC704B.1	Structured (Supervised Whole-Class Grouping)	Blackboard & Chalk, PPT.	**Identify** the differences between Embedded system Vs General computing systems.
EC704B.2	Structured (Supervised Whole-Class Grouping)	Blackboard & Chalk, PPT.	**Understand** the architecture & operation of various Devices and Communication Buses.
EC704B.3	Structured (Supervised Whole-Class Grouping)	Blackboard & Chalk, PPT.	**Discuss** the Program Modelling Concepts and Real Time Operation Systems used in Embedded System.
EC704B.4	Structured (Partially Supervised Independent work)	Hardware & Software based Based, PPT, Video Lecture.	**Use** various Embedded C Compilers, IDEs and simulators for programmingpopular microcontrollers.

(viii) Assessment Methodology

Outcome	Assessment Tool	Specific Question/activity aligned to the Outcome
EC704B.1	Internal Exam	1. (a) What is the difference between an Embedded System & General purpose computing system. (b) Briefly describe the hardware architecture of a generalized 'Embedded System'.
	Quiz	1. A Microcontroller normally has which of the following devices on-chip? a) RAM b) ROM c) I/O Ports d) all of the above.
	University Exam	1. a) What is the difference between Neuman architecture and Harvard architecture ? b) Whatr do you mean by Memory Hierarchy in anembedded system ?
EC704B.2	Internal Exam	1. Describe the operation of an alphanumeric LCD interfacing using parallel port communication.
	Quiz	1. Data Transfer using Serial Peripheral Interface (SPI) is a _____ wire operation. a) 1b) 2 c)3

		d) None of these
	University Exam	1. Compare SPI, I 2C, USART stating the possible applicationareas. How to decide the clock source and the referencevoltages for 16F877 AD module operation ?
EC704B.3	Internal Exam	1. Bring out the difference between 'Traditional Design flow' and 'Hardware/Software Co-design' with appropriate block diagram. Describe briefly what do you understand by ' Hardware Software Trade-off '. In context with Program Modeling concepts list out the various 'Program Models'.
	Quiz	1. Cyclic scheduling is best for which of the following tasks a) Aperiodic b) Sporadic c) Periodic d) None of these
	University Exam	1. a) What are the different utility in mail box, pipe and queue in RTOS ? b) What are the different management techniques adoptedand why in real time OS ?
EC704B.4	Internal Exam	1. (a) What do you mean by Cross-Compiler? (b) Using a translation hierarchy diagram, describe the functions of Compiler, Assembler, Linker and Loader.
	Quiz	1. A thread is defined as a _____. a) ISR b) Process within process c) Process d) none of the above.
	University Exam	1. What do you mean by fixed point and floating point arithmetic in connection with embedded system computation? Discuss with example. 2. Define the terms 'Transducer' and 'Actuator' in connection with embedded system design.

(ix) A. Weekly Lesson Plan

Week	Lectures	Assignment
1,2	**Discussion of Course outcome and program outcome**. Introduction to Embedded System : Embedded system Vs General computing systems, History of Embedded System, Purpose of Embedded System, Microprocessor and Microcontroller, Hardware architecture of the real time systems.	1. Describe the Difference between Von-Neumann & Harvard architecture. 2. What does the term 'Embedded System' mean? Describe the architecture of an 'Embedded System' with a generalised block diagram. 3. Compare RISC vs. CISC Architecture.
3,4,5	Devices and Communication Buses: I/o types, serial and parallel communication devices, wireless communication devices, timer and counting devices, watchdog timer, real time clock, serial bus communication protocols, parallel communication network using ISA, PCI, PCT-X, Internet embedded system network protocols, USB, Bluetooth.	1. Describe with appropriate connection diagram, the operation of a 3X3 keypad interfacing with a microcontroller using parallel port communication. 2. Explain Three modes of serial communication, 'synchronous' 'isosynchronous' and 'asynchronous' using serial devices with one example each. How do the following indicate the start and end of a byte or data frames? a) UART b) CAN c) USB
6,7	Program Modelling Concepts ; Fundamental issues in Hardware software co-design, Unified Modelling Language(UML), Hardware Software trade-offs DFG model, state machine programming model, model for multiprocessor system.	What do you mean by hardware-software co-design ? Explain it with a suitable block diagram. What do you mean by Hardware Software trade-offs ?
8,9, 10,11, 12,13	Real Time Operating Systems : Operating system basics, Tasks, Process and Threads, Multiprocessing and multitasking, task communication, task synchronization, qualities of good RTOS.	1. Explain Round robin scheduling algorithm in Embedded System. 2. With reference to the software architecture of Embedded System, describe 'Real-Time Operating Systems' (RTOS). What are its advantage & disadvantages?
14,15	Examples of Embedded System : Mobile phones, RFID, WISENET, Robotics, Biomedical Applications, Brain machine interface etc. Popular microcontrollers used in	1. Write short notes on any three of the following: a) RFID.

	Embedded System, sensors, actuators.	b) Unified Modelling Language (UML).
16,17, 18	Programming concepts and embedded programming in C, C++, JAVA.	3. What do you mean by Cross-Compiler ? What do you mean by BAUD RATE ? 4. Using a translation hierarchy diagram, describe the functions of Compiler, Assembler, Linker and Loader.

B. Daily Lesson Plan

Lecture	TOPIC/UNIT/ CHAPTER	Plan date with day	Execution date	Details of home work/assignment/mini project/ICT used/other	Details of topics that are beyond syllabus (if any)	Remarks
1	Introduction to Embedded System: Embedded system Vs General computing systems, History of Embedded System, Purpose of Embedded System.	24-08-2022 Thursday	24-08-2022 Thursday	1. What does the term 'Embedded System' mean? Describe the architecture of an 'Embedded System' with a generalised block diagram.		
2	Introduction to Embedded System: Von-Neumann Vs Harvard architechture, RISC Vs CISC.	27-08-2022 Thursday	27-08-2022 Thursday	1. a) What is the difference between an Embedded System & General purpose computing system. b) What is the difference between Von-Neumann & Harvard architecture.		
3	Introduction to Embedded System: Microprocessor and Microcontroller, Hardware architecture of the real time systems.	31-08-2022 Monday	7-09-2022 Monday			
4	Devices and Communication Buses: I/o types, serial and parallel communication devices.	3-09-2022 Thursday	10-09-2022 Thursday	1. Describe with appropriate connection diagram, the operation of a 3X3 keypad interfacing with a microcontroller using parallel port communication.		
5	Devices and Communication Buses: wireless communication devices.	7-09-2022 Monday	10-09-2022 Thursday			
6	Devices and Communication Buses: timer and counting devices,	10-09-2022 Thursday	14-09-2022 Monday	1. Why do we need at least one		

	watchdog timer, real time clock.			timer device in an embedded system **?**		
7	Devices and Communication Buses: timer and counting devices, watchdog timer, real time clock.	10-09-2022 Thursday	17-09-2022 Thursday	1. Write short notes on any three of the following: a) Watch Dog Timer (WDT)		
8	Devices and Communication Buses: serial bus communication protocols.	14-09-2022 Monday	21-09-2022 Monday	1. Explain Three modes of serial communication, 'synchronous' 'isosynchronous' and 'asynchronous' using serial devices with one example each.	Serial communication using PIC microcontroller.	
9	Devices and Communication Buses: serial bus communication protocols.	17-09-2022 Thursday	24-09-2022 Thursday	1. Write short notes on any three of the following: a) Serial Peripheral Interface (SPI). b) I^2C c) ISA	EEPROM interfacing using PIC microcontroller.	
10	Devices and Communication Buses: parallel communication network using ISA, PCI, PCT-X.	21-09-2022 Monday	28-09-2022 Monday	1. How do the following indicate the start and end of a byte or data frames? a) CAN b) USB		
11	Devices and Communication Buses: Internet embedded system network protocols, USB, Bluetooth.	24-09-2022 Thursday	01-10-2022 Thursday			
12	Program Modelling Concepts; Fundamental issues in Hardware software co-design	28-09-2022 Monday	05-10-2022 Monday	1. What do you mean by hardware-software co-design ? Explain it with a suitable block diagram.		
13	Program Modelling Concepts; Unified Modelling Language(UML)	01-10-2022 Thursday	08-10-2022 Thursday			
14	Program Modelling Concepts; Hardware Software trade-offs, DFG	05-10-2022 Monday	12-10-2022 Monday	1. What do you mean by Hardware Software trade-offs ?		

	model					
15	Program Modelling Concepts; State machine programming model, model for multiprocessor system.	08-10-2022 Thursday	15-10-2022 Thursday			
16	Real Time Operating Systems: Operating system basics.	12-10-2022 Monday	19-10-2022 Monday	1. Explain Round robin scheduling algorithm in Embedded System.		
17	Real Time Operating Systems: Tasks, Process and Threads.	15-10-2022 Thursday	22-10-2022 Thursday	1. With reference to the software architecture of Embedded System, describe 'Real-Time Operating Systems' (RTOS). What are its advantage & disadvantages?	RTOS development using embedded C.	
18	Real Time Operating Systems: Tasks, Process and Threads.	19-10-2022 Monday	26-10-2022 Monday	1. In connection with operating system define Process/Task & Thread; also describe Task Control Block (TCB) & its importance in context switching.		
19	Real Time Operating Systems: Multiprocessing and multitasking.	22-10-2022 Thursday	29-10-2022 Thursday	1. Differentiate between different types of multitasking systems.		
20	Real Time Operating Systems: Multiprocessing and multitasking	26-10-2022 Monday	02-11-2022 Monday			
21	Real Time Operating Systems: Multiprocessing and multitasking	29-10-2022 Thursday	05-11-2022 Thursday			
22	Real Time Operating Systems: task communication, task synchronization, qualities of good RTOS.	02-11-2022 Monday	9-11-2022 Monday	1. a) What is Round robin architecture? b) What are its drawbacks? c) How Round robin with interrupt can solve the problem?		
23	Real Time Operating Systems: task communication, task	05-11-2022 Thursday	12-11-2022 Thursday	1. What do you mean by RTOS?		

	synchronization, qualities of good RTOS.			Why do we need an RTOS in an advanced embedded system?		
24	Real Time Operating Systems: task communication, task synchronization, qualities of good RTOS.	9-11-2022 Monday	16-11-2022 Monday			
25	Examples of Embedded System: Mobile phones, RFID, WISENET, Robotics, Biomedical Applications, Brain machine interface etc.	12-11-2022 Thursday	19-11-2022 Thursday	1. Describe the operation of a WISENET.		
26	Examples of Embedded System: Mobile phones, RFID, WISENET, Robotics, Biomedical Applications, Brain machine interface etc.	16-11-2022 Monday	23-11-2022 Monday		Sensor interfacing. Ex. LM35	
27	Examples of Embedded System: Popular microcontrollers used in Embedded System, sensors, actuators.	19-11-2022 Thursday	26-11-2022 Thursday		Discussion on ARM Architecture & Arduino.	
28	Examples of Embedded System: Popular microcontrollers used in Embedded System, sensors, actuators.	23-11-2022 Monday	30-11-2022 Monday	1. Describe the architecture & features of PIC16F877A, AT89S52 and Intel 8051 microcontroller		
29	Programming concepts and embedded programming in C, C++, JAVA.	26-11-2022 Thursday	03-12-2022 Thursday	1. Write a program for PIC18f2550 to interface a 16x2 alphanumeric LCD. 2. Write a program for PIC18f2550 to interface a 3x3 matrix keypad. 3. Write a program for PIC18f2550 to interface an 8x8 LED matrix.		
30	Programming concepts and embedded programming in C, C++, JAVA.	30-11-2022 Monday	07-12-2022 Monday			
31	Programming concepts and embedded programming in C, C++, JAVA.	03-12-2022 Thursday	10-12-2022 Thursday			
32	Programming concepts and embedded programming in C, C++, JAVA.	07-12-2022 Monday	14-12-2022 Thursday			

(x) Teaching Strategy / Method

- Learning by demonstration and display of Block Diagrams & flowcharts.
- Students are made aware of the application of Embedded System through discussions about small projects.
- Making students aware of how to use modern software & hardware tools for designing Embedded System through PPTs & video lectures.
- Demonstration showing Embedded C programming using IDE.
- Verification of theoretical results with practical outputs through use of simulators.
- Interactive sessions.
- Question answer sessions for most of the classes were organised.

(xa) Strategy to support weak students

- Weak students are encouraged to ask questions and participate in all the discussions.
- In some cases specific groups are formed with a weak student and with a bright student.
- Special classes are arranged if required.

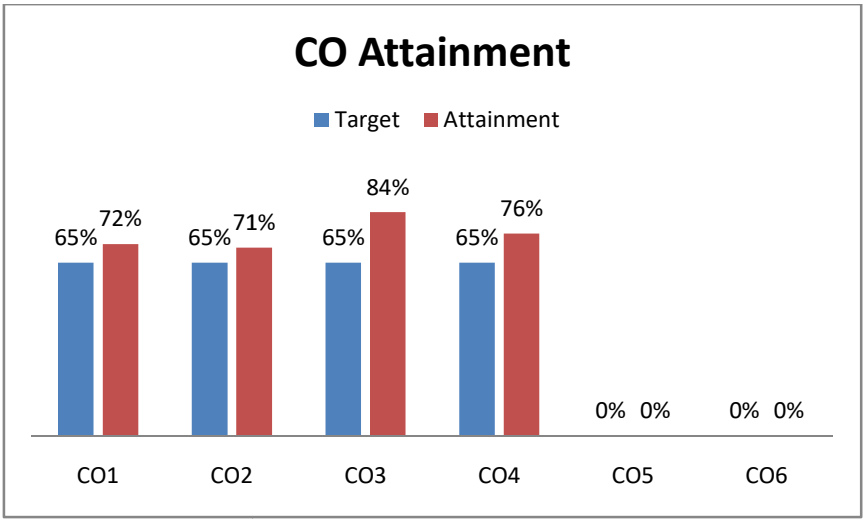
(xb) Strategy to encourage bright students

- Bright students are encouraged to discuss advanced topics related with the latest developments in the field of Embedded System.
- Such students are asked to write research papers on some specific topics.

(xc) Efforts to keep students engaged

- After discussing a topic, surprise quiz is floated on that topic in the next available class.
- Students are also encouraged to make practical circuits using the electronic components and showcase them in different technical fests.

(xi) Analysis of Students performance in the course (Internal Results)

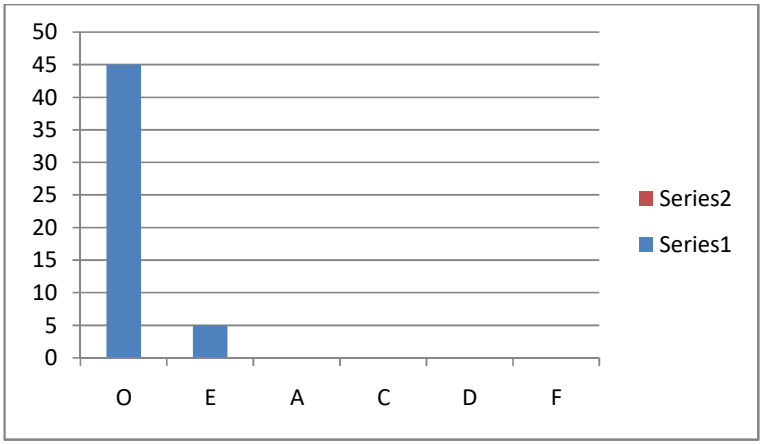


- 72% students have attained the set target of 65% marks for CO1
- 71% students have attained the set target of 65% marks for CO2
- 84% students have attained the set target of 65% marks for CO3
- 76% students have attained the set target of 65% marks for CO4

(xii) Analysis of Students performance in the course (university results)

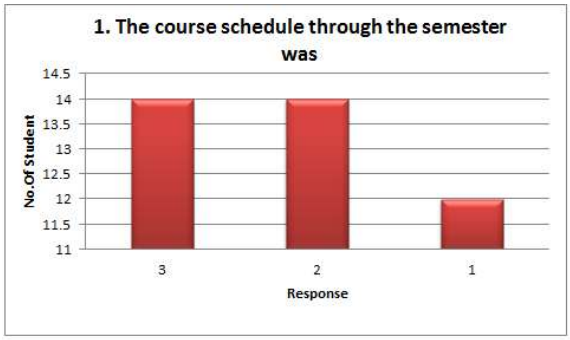
As per NBA SAR Example given in 3.2.2: Record of Attainment Level of A Course through University and Internal Assessments					
	Target Course Outcome%	TOTAL STUDENTS	TOTAL STUDENT WHO ATTAINED OUTCOME	% STUDENTS WHO ATTAINED THE OUTCOME	Attainment Level
Internals	65%	50	38	76%	3
University	70%	50	50	100%	3
Overall Attainment of Course Outcome=70% University +30% Internals					3.0

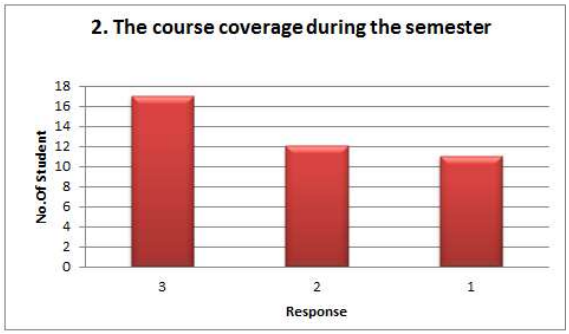
Theory Result Analysis _ University

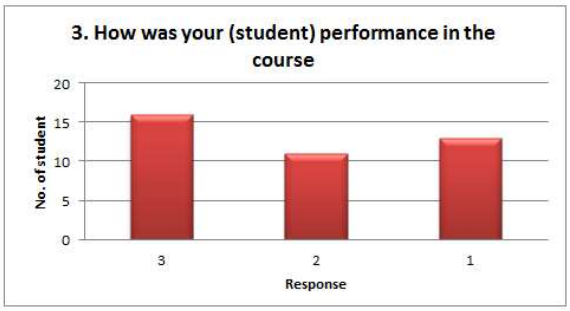


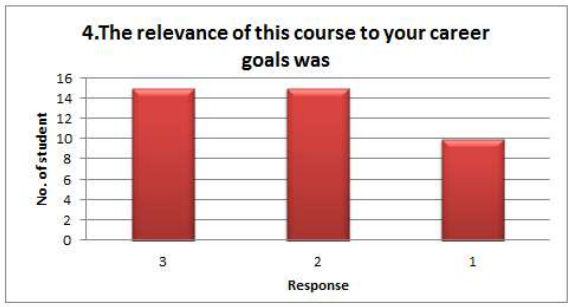
(xiii) Analysis of Student Feed Back

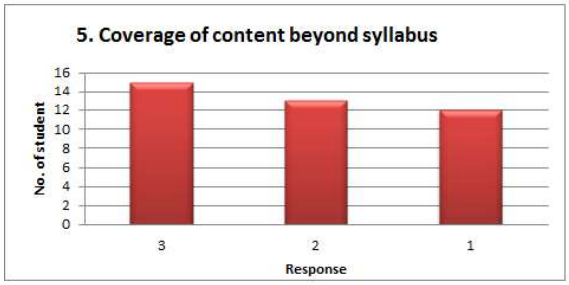
Feedback - CO based:

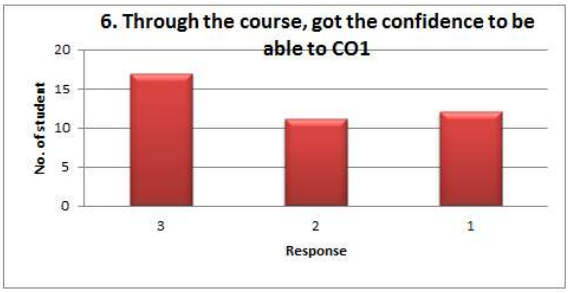


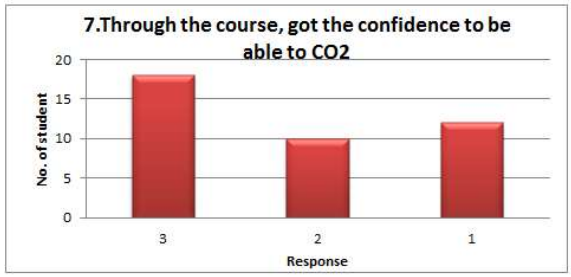


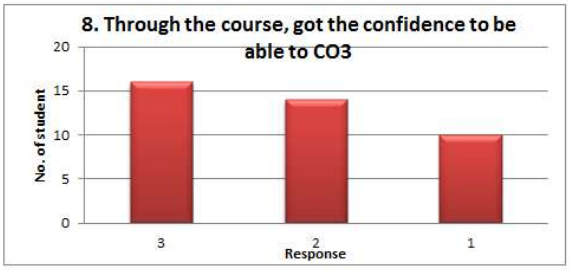


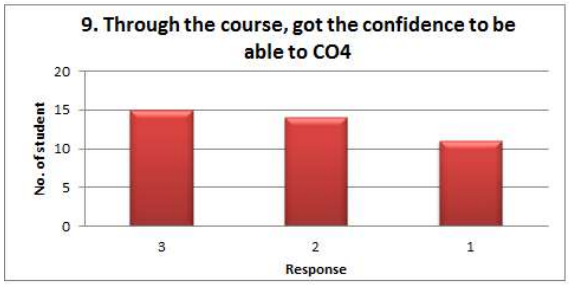


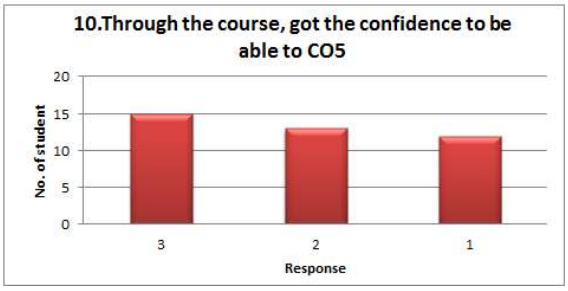


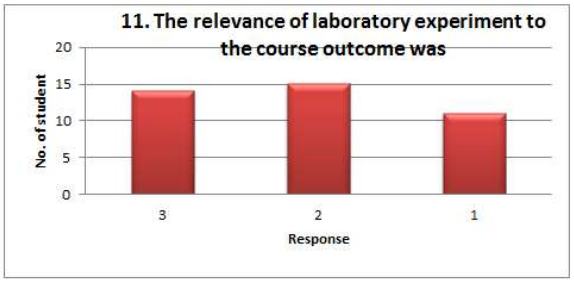


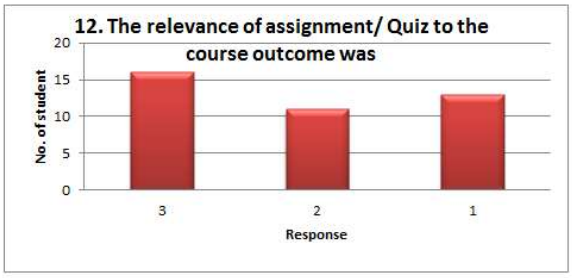


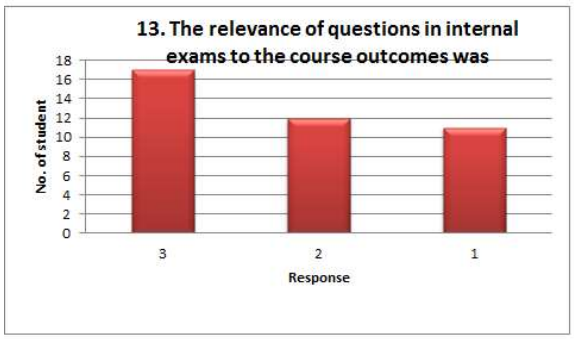


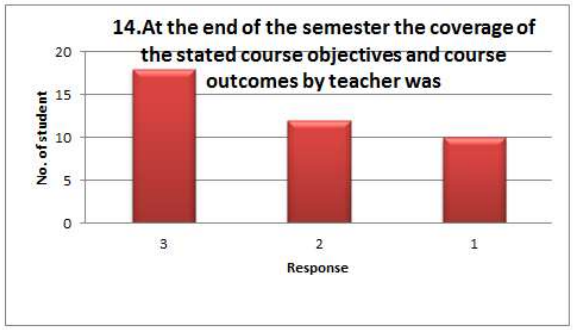


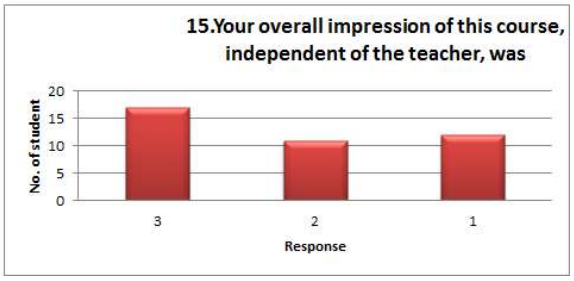


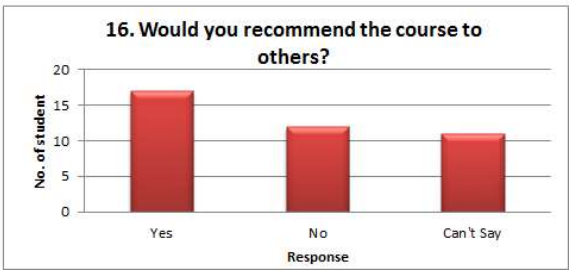












(xiv) Teacher Self-Assessment (at the completion of course)

From the graphical analysis of the results it is found that most of the course outcomes have been achieved successfully by the students. The set target for C04 and CO5 has not been achieved due to lack of practice and clarity of basic concepts. So, more stress is to be given on review based tutorials.

(xiv) Recommendations/Suggestions for improvement by faculty

The lecture should be slower so that the poor students can get time to listen and simultaneously take down notes.

INTERNAL ASSESMENT RECORD

Subject with code: Embedded System**(EC 704B)** Semester**: 7THsem, 2022**

Discipline:ELECTRONICS & COMMUNICATION ENGINEERING

Sl.	Roll No.	Name	Attendance		Internal Examination			Assignment / Quiz	Total
			Total	Marks	1st	2nd	Avg.		
1	11900317004	Vivek Kumar Thakur	82%	4	19	25	11	8.0	23
2	11900317005	Vishal Choudhury	87%	4	24	24	12	8.0	24
3	11900317006	TanmoyBhowmick	79%	3	24	24	12	9.0	24
4	11900317007	Tamajit Das	95%	5	19	18	9.25	9.0	23
5	11900317008	Supratim Nag	79%	3	20	22	10.5	9.0	23
6	11900317011	SoumodeepSaha	76%	2	21	20	10.25	8.0	20
7	11900317012	SooumodiptaBasu Majumder	87%	4	16	21	9.25	9.0	22
8	11900317013	Sohini Sarkar	79%	3	21	23	11	9.0	23
9	11900317014	Sneha Chakraborty	79%	3	14	17	7.75	4.0	15
10	11900317015	Shraddha Das	79%	3	22	26	12	8.0	23
11	11900317016	Shalini Das	84%	4	16	22	9.5	7.0	21
12	11900317017	SamitDebnath	76%	2	23	23	11.5	6.0	20
13	11900317019	Rahul Biswas	95%	5	21	22	10.75	7.0	23
14	11900317020	Preety Prasad	76%	2	20	23	10.75	8.0	21
15	11900317021	Pratik Goutam	71%	1	18	19	9.25	7.0	17
16	11900317022	PranabSingha	82%	4	19	20	9.75	8.0	22
17	11900317023	ParnaMajumdar	87%	4	23	19	10.5	6.0	21
18	11900317024	Nitish Kumar Sah	74%	1	11	21	8	7.0	16
19	11900317025	Nitin Raj	95%	5	22	23	11.25	5.0	21
20	11900317026	NibeditaBanik	76%	2	19	25	11	6.0	19
21	11900317027	Lohit Sarkar	76%	2	23	26	12.25	8.0	22
22	11900317028	KomalKantiGanguly	82%	4	20	24	11	7.0	22
23	11900317029	Joy Sarkar	76%	2	19	25	11	7.0	20
24	11900317030	JipsyIndra	95%	5	14	24	9.5	8.0	23
25	11900317031	Indrabati Chowdhury	76%	2	21	23	11	7.0	20
26	11900317032	HaimantikaMitra	74%	1	22	24	11.5	9.0	22
27	11900317033	GourabDewan	71%	1	25	24	12.25	8.0	21
28	11900317034	GargiKarmakar	76%	2	18	22	10	9.0	21
29	11900317035	Eshita Roy	79%	3	19	23	10.5	10.0	24
30	11900317036	Dilip Kumar Sah	79%	3	21	23	11	9.0	23
31	11900317037	Dikhsha Deb	82%	4	22	23	11.25	10.0	25
32	11900317038	DibyasreePramanik	76%	2	23	21	11	6.0	19
33	11900317039	Debojit Ghosh	92%	5	23	20	10.75	7.0	23
34	11900317040	DebanjonaBhattacharjya	82%	4	14	21	8.75	10.0	23
35	11900317041	BudhadityaDey	82%	4	25	20	11.25	8.0	23
36	11900317042	BrintikMajumder	76%	2	24	21	11.25	5.0	18

37	11900317043	Bidyut Kumar Barman	95%	5	19	19	9.5	8.0	23
38	11900317044	AvishekhSutradhar	95%	5	14	24	9.5	8.0	23
39	11900317045	Ashu Prasad Shah	76%	2	21	23	11	7.0	20
40	11900317046	Arpan Banerjee	74%	1	22	24	11.5	9.0	22
41	11900317047	Arijit Ghosh	71%	1	25	24	12.25	8.0	21
42	11900317048	AniketChhetri	76%	2	18	22	10	9.0	21
43	11900317049	Amrita Ghosh	79%	3	19	23	10.5	10.0	24
44	11900317050	AkshetaSarma	79%	3	21	23	11	9.0	23
45	11900317051	Abhradeep Das	82%	4	22	23	11.25	10.0	25
46	11900317052	Abhishek Aich	71%	1	22	20	10.5	8.0	20
47	11900317053	Prabir Paul	74%	1	20	21	10.25	6.0	17
48	11900318001	Debolina Chatterjee	76%	2	11	16	6.75	5.0	14
49	11900318002	Chirayata Sarkar	76%	2	24	20	11	8.0	21
50	11900318003	Ayush Chakraborty	74%	1	21	27	12	9.0	22

ATTENDANCE SHEET (Lecture)

Subject with code: Embedded System**(EC 704B)** Semester: **7TH sem, 2022**

Discipline:ELECTRONICS & COMMUNICATION ENGINEERING

SL. No.	DATES																		
	MONTH	AUG								SEPT					OCT				
	Lectures	2	1	2	2	1	2	1	2	1	2	1	2	1	2	1	2	1	
1	Vivek Kumar Thakur	2	0	2	2	1	2	1	2	1	0	1	0	1	2	1	2	1	
2	Vishal Choudhury	2	1	0	2	1	2	1	2	0	2	1	0	1	2	1	2	1	
3	TanmoyBhowmick	2	1	0	2	1	2	1	2	0	0	1	0	1	2	1	2	1	
4	Tamajit Das	2	1	2	2	1	2	1	2	1	2	1	2	1	2	1	2	1	
5	Supratim Nag	2	1	2	0	1	2	1	2	1	2	1	0	1	2	0	2	0	
6	SoumodeepSaha	2	0	2	2	1	2	1	0	1	0	1	2	1	2	1	2	1	
7	SooumodiptaBasuMajumder	2	1	0	2	1	2	1	2	0	2	1	0	1	2	1	2	1	
8	Sohini Sarkar	2	1	0	2	1	2	1	2	0	0	1	0	1	2	1	2	1	
9	Sneha Chakraborty	2	1	2	0	1	2	1	2	1	2	1	0	1	2	0	2	0	
10	Shraddha Das	2	0	2	0	1	2	1	2	1	2	1	0	0	2	1	2	1	
11	Shalini Das	2	1	2	2	1	2	1	0	0	2	1	0	1	2	1	2	0	
1																			

13	Rahul Biswas	2	1	2	2	1	2	1	2	1	2	1	2	1	2	1	2	1	
14	Preety Prasad	2	0	2	0	1	2	1	2	1	2	1	0	0	2	1	2	1	
15	Pratik Goutam	0	1	0	2	1	2	1	2	1	2	1	0	0	2	0	2	1	
16	PranabSingha	0	1	2	2	1	2	1	2	1	2	0	2	1	2	0	2	1	
17	ParnaMajumdar	2	1	0	2	1	2	1	2	0	2	1	0	1	2	1	2	1	
18	Nitish Kumar Sah	2	1	0	2	1	2	1	2	0	2	1	0	1	2	1	2	1	
19	Nitin Raj	2	1	2	2	1	2	1	2	1	2	1	2	1	2	1	2	1	
20	NibeditaBanik	2	1	2	2	1	2	1	0	0	2	1	2	1	2	1	2	1	
21	Lohit Sarkar	2	0	2	2	1	2	1	0	1	2	1	0	1	2	1	2	1	
22	KomalKantiGanguly	2	1	0	2	1	2	1	0	0	2	1	0	1	2	1	2	1	
23	Joy Sarkar	2	1	0	2	1	2	1	0	1	0	1	2	1	2	1	2	1	
24	JipsyIndra	2	1	2	2	1	2	1	2	1	2	1	2	1	2	1	2	1	
25	Indrabati Chowdhury	2	0	2	0	1	2	1	2	1	2	1	0	0	2	1	2	1	
26	HaimantikaMitra	2	0	2	0	1	0	1	2	1	0	1	2	1	2	1	2	1	
27	GourabDewan	2	0	2	2	0	2	0	0	1	2	1	2	1	2	1	0	1	
28	GargiKarmakar	0	1	2	2	1	2	1	2	1	2	0	0	0	2	0	2	1	
29	Eshita Roy	2	1	2	0	1	2	1	0	1	2	1	2	1	2	0	2	0	
30	Dilip Kumar Sah	2	1	2	2	1	2	1	2	1	2	1	2	0	0	1	0	1	
31	Dikhsha Deb	2	1	2	2	0	0	0	0	1	2	1	2	0	2	1	2	1	

32	DibyasreePramanik	2	1	2	0	1	2	1	2	1	0	1	0	1	2	1	2	1	
33	Debojit Ghosh	2	1	2	2	1	2	1	2	1	2	1	0	0	2	1	2	1	
34	DebanjonaBhattacharjya	2	1	2	2	1	2	1	0	1	0	1	2	1	2	1	2	0	
35	BudhadityaDey	2	1	0	2	1	2	1	0	0	2	1	0	1	2	1	2	1	
36	BrintikMajumder	2	1	0	2	1	2	1	0	1	0	1	2	1	2	1	2	1	
37	Bidyut Kumar Barman	2	1	2	2	1	2	1	2	1	2	1	2	1	2	1	2	1	
38	AvishekhSutradhar	2	0	2	0	1	2	1	2	1	2	1	0	0	2	1	2	1	
39	Ashu Prasad Shah	2	0	2	0	1	0	1	2	1	0	1	2	1	2	1	2	1	
40	Arpan Banerjee	2	0	2	2	0	2	0	0	1	2	1	2	1	2	1	0	1	
41	Arijit Ghosh	2	1	0	2	1	2	1	0	1	0	1	2	1	2	1	2	1	
42	AniketChhetri	0	1	2	2	1	2	1	2	1	2	0	0	0	2	0	2	1	
43	Amrita Ghosh	2	1	0	2	1	2	1	0	0	2	1	0	1	2	1	2	1	
44	AkshetaSarma	2	1	0	2	1	2	1	0	1	0	1	2	1	2	1	2	1	
45	Abhradeep Das	2	1	2	2	1	2	1	2	1	2	1	2	1	2	1	2	1	
46	Abhishek Aich	2	0	2	0	1	2	1	2	1	2	1	0	0	2	1	2	1	
47	Prabir Paul	2	0	2	0	1	0	1	2	1	0	1	2	1	2	1	2	1	
48	Debolina Chatterjee	2	0	2	2	0	2	0	0	1	2	1	2	1	2	1	0	1	
49	Chirayata Sarkar	2	1	0	2	1	2	1	0	1	0	1	2	1	2	1	2	1	
50	Ayush Chakraborty	2	1	0	2	1	2	1	0	1	0	1	2	1	2	1	2	1	

ATTENDANCE SHEET (Lecture)

Subject with code: Embedded System**(EC 704B)** Semester**: 7THsem, 2022**

Discipline:ELECTRONICS & COMMUNICATION ENGINEERING

SL. No.	DATES																	
	MONTH	NOV								TOTAL								
	Lectures	2	1	1	1					31	Percentage							
1	Vivek Kumar Thakur	2	0	1	0					24	77.42%							
2	Vishal Choudhury	2	1	1	1					26	83.87%							
3	TanmoyBhowmick	2	1	1	0					23	74.19%							
4	Tamajit Das	2	1	1	1					31	100.00%							
5	Supratim Nag	2	1	1	1					25	80.65%							
6	SoumodeepSaha	2	0	1	0					24	77.42%							
7	SooumodiptaBasuMajumder	2	1	1	1					26	83.87%							
8	Sohini Sarkar	2	1	1	0					23	74.19%							
9	Sneha Chakraborty	2	1	1	1					25	80.65%							
10	Shraddha Das	2	1	1	1					25	80.65%							
11	Shalini Das	2	1	1	1					25	80.65%							
12	SamitDebnath	2	1	1	1					24	77.42%							
13	Rahul Biswas	2	1	1	1					31	100.00%							
14	Preety Prasad	2	0	1	1					24	77.42%							
15	Pratik Goutam	2	1	1	1					23	74.19%							
16	PranabSingha	2	1	0	1					26	83.87%							
17	ParnaMajumdar	2	1	1	1					26	83.87%							
18	Nitish Kumar Sah	2	1	1	0					25	80.65%							
19	Nitin Raj	2	1	1	1					31	100.00%							
20	NibeditaBanik	0	1	1	1					26	83.87%							
21	Lohit Sarkar	2	0	1	0					24	77.42%							

22	KomalKantiGanguly	2	1	1	1					24	77.42%							
23	Joy Sarkar	2	1	0	0					23	74.19%							
24	JipsyIndra	2	1	1	1					31	100.00%							
25	Indrabati Chowdhury	2	0	1	1					24	77.42%							
26	HaimantikaMitra	2	0	1	1					23	74.19%							
27	GourabDewan	2	1	1	1					24	77.42%							
28	GargiKarmakar	2	1	1	1					24	77.42%							
29	Eshita Roy	2	1	1	1					25	80.65%							
30	Dilip Kumar Sah	2	1	0	1					25	80.65%							
31	Dikhsha Deb	2	1	1	1					24	77.42%							
32	DibyasreePramanik	2	1	1	0					24	77.42%							
33	Debojit Ghosh	2	1	1	1					28	90.32%							
34	DebanjonaBhattacharjya	2	1	0	0					24	77.42%							
35	BudhadityaDey	2	1	1	1					24	77.42%							
36	BrintikMajumder	2	1	0	0					23	74.19%							
37	Bidyut Kumar Barman	2	1	1	1					31	100.00%							
38	AvishekhSutradhar	2	0	1	1					24	77.42%							
39	Ashu Prasad Shah	2	0	1	1					23	74.19%							
40	Arpan Banerjee	2	1	1	1					24	77.42%							
41	Arijit Ghosh	2	1	0	0					23	74.19%							
42	AniketChhetri	2	1	1	1					24	77.42%							
43	Amrita Ghosh	2	1	1	1					24	77.42%							
44	AkshetaSarma	2	1	0	0					23	74.19%							
45	Abhradeep Das	2	1	1	1					31	100.00%							
46	Abhishek Aich	2	0	1	1					24	77.42%							
47	Prabir Paul	2	0	1	1					23	74.19%							
48	Debolina Chatterjee	2	1	1	1					24	77.42%							
49	Chirayata Sarkar	2	1	0	0					23	74.19%							

50	Ayush Chakraborty	2	1	1	1					24	77.42%							

Records of Quiz

Subject with code: Embedded System**(EC 704B)** Semester: **7TH sem, 2022**

Discipline:ELECTRONICS & COMMUNICATION ENGINEERING

Sl.	Roll No.	Name	CO1	CO2	CO3	Total (10)
1	11900317004	Vivekkumar Thakur	**3**	2	3	8
2	11900317005	Vishal Choudhury	2	3	3	8
3	11900317006	TanmoyBhowmick	3	3	3	9
4	11900317007	Tamajit Das	3	3	3	9
5	11900317008	Supratim Nag	3	2	4	9
6	11900317011	SoumodeepSaha	3	3	2	8
7	11900317012	SoumodiptaBasuMazumder	2	3	4	9
8	11900317013	Sohini Sarkar	2	3	4	9
9	11900317014	Sneha Chakraborty	1	1	2	4
10	11900317015	Shraddha Das	3	3	2	8
11	11900317016	Shalini Das	3	2	2	7
12	11900317017	SamitDebnath	1	2	3	6
13	11900317019	Rahul Biswas	1	3	3	7
14	11900317020	Preety Prasad	2	3	3	8
15	11900317021	Pratik Goutam	1	3	3	7
16	11900317022	PranabSingha	2	3	3	8
17	11900317023	ParnaMajumdar	1	2	3	6
18	11900317024	Nitish Kumar Sah	3	1	3	7
19	11900317025	Nitin Raj	3	1	1	5
20	11900317026	NibeditaBanik	1	3	2	6
21	11900317027	Lohit Sarkar	2	3	3	8
22	11900317028	KomalKantiGanguly	3	1	3	7
23	11900317029	Joy Sarkar	2	2	3	7
24	11900317030	JipsyIndra	1	3	4	8
25	11900317031	Indrabati Chowdhury	2	2	3	7
26	11900317032	HaimantikaMitra	3	3	3	9
27	11900317033	GourabDewan	3	2	3	8

28	11900317034	GargiKarmakar	3	3	3	9
29	11900317035	Eshita Roy	3	3	4	10
30	11900317036	Dilip Kumar Sah	3	2	4	9
31	11900317037	Dikhsha Deb	3	3	4	10
32	11900317038	DibyasreePramanik	1	3	2	6
33	11900317039	Debojit Ghosh	2	3	2	7
34	11900317040	DebanjonaBhattacharjya	3	3	4	10
35	11900317041	BudhadityaDey	2	2	4	8
36	11900317042	BrintikMajumder	1	2	2	5
37	11900317043	Bidyut Kumar Barman	2	2	4	8
38	11900317044	AvishekhSutradhar	2	3	3	8
39	11900317045	Ashu Prasad Shah	3	3	3	9
40	11900317046	Arpan Banerjee	3	1	4	8
41	11900317047	Arijit Ghosh	2	2	2	6
42	11900317048	Aniketchhetri	1	2	2	5
43	11900317049	Amrita Ghosh	2	2	4	8
44	11900317050	AkshetaSarma	1	2	2	5
45	11900317051	Abhradeep Das	2	2	4	8
46	11900317052	Abhishek Aich	2	3	3	8
47	11900317053	Prabir Paul	3	3	3	9
48	11900318001	Debolina Chatterjee	3	1	4	8
49	11900318002	Chirayata Sarkar	2	2	2	6
50	11900318003	Ayush Chakraborty	1	2	2	5

NAME WITH ROLL NO.s OF STUDENT WHOSE ACADEMIC PERFOMANCE IS NOT SATISFACTORY			
Sl.	**Roll No.**	**Name of Student**	**Remedial measures taken by teacher**
1	11900317042	BrintikMajumder	• Additional doubt clearing sessions were taken after schedule lectures. • Providing extra Viva-Voce to students with poor attendance. • Guiding them through previous question year papers. • Highlighting important and frequently asked questions in the class. • Study materials were provided.
2	11900317050	AkshetaSarma	
3	11900317025	Nitin Raj	
4	11900317014	Sneha Chakraborty	
5	11900317025	Nitin Raj	

CERTIFICATE

I, the undersigned, have completed the course allotted to me as shown below

Sl. No.	Semester	Subject with Code	Total Units/ Chapters	Remarks
1.	7th	Embedded System, EC-704B	6	

Date :	**Signature of Faculty**

Submitted to HOD

Certificate by HOD

I, the undersigned, certify that……..has completed the course work allotted to him/ her satisfactorily/ notsatisfactorily.

Date :	**Signature of HOD**

Submitted to Principal/Director

Date :	**Signature of Principal/Director**