

Shri G. S. Institute of Technology and Science, Indore
Department of Electronics and Telecommunication Engineering

06th July 2023

Minutes of the Board of Studies

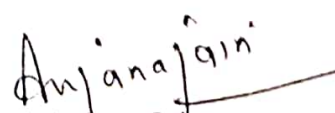
The Board of Studies Meeting of Electronics and Telecommunication Engineering was held in hybrid (online/offline) mode on 06th July 2023, at 4:00 PM. Following members attended the meeting:


1.	Prof. (Mrs.) Anjana Jain	Chairman & Head of the Dept.
2.	Prof. S P Mahajan, COE, Pune	External Expert
3.	Prof. Vimal Bhatia, IIT Indore	External Expert
4.	Prof. (Mrs.) Sonali Chouhan, IIT Guhawati	External Expert
5.	Prof. (Mrs.) Jyoti Singhai, MANIT Bhopal	External Expert
6.	Prof. Aditya Trivedi, IITM Gwalior	External Expert
7.	Prof. Shekhar Sharma	Member
8.	Prof. S. K. Jain	Member
9.	Prof. L. D. Malviya	Member
10.	Prof. (Mrs.) Anjulata Yadav	Member
11.	Prof. (Mrs.) Preeti Trivedi	Member
12.	Mr. Manish Panchal	Member
13.	Mr. Amit Naik	Member
14.	Mrs. Rekha Jain	Member
15.	Dr. (Mrs.) Jaya Dipti Lal	Member
16.	Mr. Ashwin Shrivastava	Member
17.	Mr. Ajay Parmar	Member

The following member could not attend the meeting:
Mr. Saumitra Kale CISCO SYSTEM Bangalore

The following points are discussed and resolved in the meeting:

1. DPAQIC minutes are discussed and approved by BoS committee.
2. As per the suggestions of Department of Telecommunication, Government of India following items are approved.
 - a. A new subject "Advanced mobile communication" is to be introduced for the students promoted in IV year in 2023-24, as an elective (PEC-5) in 8th semester. The syllabus of this subject is approved and attached with modified scheme herewith.
 - b. Following lines are added in the syllabus of elective subject EC45301- Internet of Things in the respective units:
 - i. Unit 1--"Power constraints for IoT implementation"
 - ii. Unit 2--"Fog Eco systems for IoT"


Prof. Anjana Jain
Head
Electronics and Telecom.



Shri. G.S. Institute of Technology & Science, Indore
Department of Electronics & Telecommunication Engineering
List of Experts & Faculty members who have attended BOS Meeting held on 6/7/2023

Sr. No	Name	Designation	Signature
1.	Prof. S.P. Mahajan,	CoEP, Pune	← Attended online →
2.	Prof. Vimal Bhatia	IIT Indore	← Attended online →
3.	Prof. (Mrs.) Sonali Chouhan	IIT Guwahati	← Attended online →
4.	Prof. Aditya Trivedi	IIIT Gwalior	← Attended online →
5.	Prof. Jyoti Singhai	MANIT Bhopal	← Attended online →
6.	Mr. Saumitra Kale	CISCO System	← Absent →
7.	Dr. (Mrs.) Anjana Jain	Professor	Anjana Jain
8.	Dr. Shekhar Sharma	Professor	Shekhar
9.	Dr. Anjulata Yadav	Professor	Anjulata
10.	Dr. S. K. Jain	Professor	S.K. Jain
11.	Dr. L.D. Malviya	Professor	L.D. Malviya 06/07/2023
12.	Dr. (Mrs.) Preeti Trivedi	Professor	Preeti
13.	Mr. Manish Panchal	Associate Professor	Manish Panchal 6/7/2023
14.	Mr. Amit Naik	Associate Professor	Amit Naik 6/7/2023
15.	Mrs. Rekha Jain	Associate Professor	Rekha Jain 6/7/2023
16.	Dr. (Mrs.) Jayadipti Lal	Associate Professor	Jayadipti Lal 6/7/2023
17.	Mr. Ashwin Shrivastava	Assistant Professor	Ashwin Shrivastava 06/7/23
18.	Mr. Ajay Parmar	Assistant Professor	Ajay Parmar
19.	Dr. Vaishali Naik	Assistant Professor	Vaishali Naik
20.	Mr. Shubham Shrivastava	Assistant Professor	Shubham Shrivastava
21.	Ms. Deepali Kothari	Assistant Professor	Deepali Kothari 6/7/23
22.	Mrs. Ritika Nair	Assistant Professor	Ritika Nair 6/7/2023
23.	Mr. Mohit Khamele	Assistant Professor	Mohit Khamele
24.	Mr. Neeraj Malviya	Assistant Professor	Neeraj Malviya
25.	Ms. Shruchi Jain	Assistant Professor	Shruchi Jain 6/7/23
26.	Mr. Sunil Chouhan	Assistant Professor	Sunil Chouhan
26.	Mrs. Neeta Sharma	Assistant Professor	Neeta Sharma

EC45 -----: Advanced Mobile Communications

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. Understand the currently used cellular technology 3G/4G
2. Evaluate the use of advanced techniques in cellular communications.
3. Perform computations and solve numerical problems while using different transmission technologies.
4. Assess how softwarization of network functions helps in scalability and ease of operations.
5. Learn basics of 6G technology and spectrum related issues.

Hours/Week			Maximum Marks				Total Marks	Credits		
L	T	P	Theory		Practical			Th	Pr	Total
			End sem	CW	SW	End Sem				
3	-	-	70	30	-	-	100	3	-	3

Course Contents:

Unit 1: Mobile Communications Overview: Reviews of 3G Technology, 3G services and data rates, 4G Technology, LTE, LTE Advanced Pro (3GPP Release 13+), VoLTE, OFDM, MIMO, IMT standards- IMT-2000, IMT-2020 and IMT Advanced.

Unit 2: Introduction to 5G Communication: Overview of Massive MIMO and beam forming, millimeter Wave communication, 5G potential and applications, enhanced mobile broadband (eMBB), ultra reliable low latency communications (URLLC), massive machine type communications (MMTC), D2D and V2X communications.

Unit 3: Spectrum and connectivity issues: 5G-spectrum access/sharing, channels and signals/waveforms in 5G, carrier aggregation, small cells, large cells, low mobility large cells (LMLC), dual connectivity. Connectivity in rural areas (BharatNet, TVWS, Long-range WiFi, FSO); non-terrestrial fronthaul / backhaul solutions: LEOs, HAP/UAV.

Unit 4: 5G Network: New Radio (NR) and its Standalone and non-standalone mode, NOMA, PHY API Specification, restful API, flexible frame structure, Service Data Adaptation Protocol (SDAP), centralized RAN, open RAN, multi-access edge computing (MEC), SDN, NFV, Network slicing.

Unit 5: Current state and Challenges: 5G penetration in developed countries; deployment challenges in low-middle income countries, stronger backhaul requirements, dynamic spectrum access and usage of unlicensed spectrum, contrasting radio resource requirements, Introduction to 6G technology.

Text and References Books:

1. Mobile communication design Fundamentals by William Lee, Pub: Wiley India Pvt. Ltd.
2. 5G NR: The Next Generation Wireless Access Technology Mobile Communications Design, Erik Dahlman, Stefan Parkvall, Johan Skold 1st Edition,, 2018
3. Wireless Communications: Principles and Practice by Theodore S. Rappaport, Pub: Pearson

Reference Books –

1. Mobile Communications by Jochen Schiller Pub: Financial Times / Imprint of Pearson.
2. Mobile Cellular Telecommunications: Analog and Digital Systems by William Lee, Pub: McGrawHill Education

EC 45301: INTERNET OF THINGS (IoT)**OLD****COURSE OUTCOMES:****At the end of this course students will demonstrate the ability to:**

1. Understand IoT architecture and IoT decision framework.
2. Configure Raspberry Pi, understand sensors, actuators & get started with Python on Raspberry Pi.
3. Understand various IoT networking protocols used to develop communication solutions.
4. Able to design architecture for an end-to-end solution and perform data analytics.
5. Understand IoT challenges, business solutions, research scope and current development.

Hours / Week			Maximum Marks				Total Marks	Credits		
			Theory		Practical			Th	Pr	Total
L	T	P	End Sem	CW	SW	End Sem				
3	-	-	70	30	-	-	100	3	-	3

UNIT 1:

Introduction: Definition, Characteristics of IoT, IoT Conceptual framework, IoT Architectural view, Physical design of IoT, Logical design of IoT, Application of IoT.

UNIT 2:

Machine-to-machine (M2M), SDN (software defined networking) and NFV (network function virtualization) for IoT, data storage in IoT, IoT Cloud Based Services.

UNIT 3:

Design Principles for Web Connectivity: Web Communication Protocols for connected devices, Message Communication Protocols for connected devices, SOAP, REST, HTTP Restful and Web Sockets. Internet Connectivity Principles: Internet Connectivity, Internet based communication, IP addressing in IoT, Media Access control.

UNIT 4:

Sensor Technology, Participatory Sensing, Industrial IoT and Automotive IoT, Actuator, Sensor data Communication Protocols, Radio Frequency Identification Technology, Wireless Sensor Network Technology.

UNIT 5:

IoT Design methodology: Specification -Requirement, process, model, service, functional & Operational view. IoT Privacy and security solutions, Raspberry Pi & arduino devices. IoT Case studies: smart city streetlights control & monitoring.

ASSESSMENT: Mid-term test, Assignment, Tutorial, Quiz and End semester exam.

TEXT BOOKS RECOMMENDED:

1. V. Madiseti and A. Bahga, "Internet of things (A-Hand-on-Approach)", Universal Press.
2. Rajkamal, "Internet of Things", Tata McGraw Hill publication.
3. A. Pajankar and A. Kakkar, "Raspberry Pi by Example", Packet Publishing Ltd, Birmingham, UK.

REFERENCE BOOKS RECOMMENDED:

1. F. Dacosta "Rethinking the Internet of things: A Scalable Approach to Connecting Everything", Apress publications.
2. D. Norris, "The Internet of Things: Do-It-Yourself Projects with Arduino, Raspberry Pi, and BeagleBone Black", McGraw-Hill Education, New Delhi.
3. P. Raj and A.C. Raman, "The Internet of Things", CRC Press (T&F Group), New York

EC 45301: INTERNET OF THINGS (IoT)**NEW****COURSE OUTCOMES:****At the end of this course students will demonstrate the ability to:**

1. Understand IoT architecture and IoT decision framework.
2. Configure Raspberry Pi, understand sensors, actuators & get started with Python on Raspberry Pi.
3. Understand various IoT networking protocols used to develop communication solutions.
4. Able to design architecture for an end-to-end solution and perform data analytics.
5. Understand IoT challenges, business solutions, research scope and current development.

Hours / Week			Maximum Marks				Total Marks	Credits		
			Theory		Practical			Th	Pr	Total
L	T	P	End Sem	CW	SW	End Sem				
3	-	-	70	30	-	-	100	3	-	3

UNIT 1:

Introduction: Definition, Characteristics of IoT, IoT Conceptual framework, IoT Architectural view, Physical design of IoT, Logical design of IoT, Application of IoT.

(Power constraints for IOT implementation.)

UNIT 2:

Machine-to-machine (M2M), SDN (software defined networking) and NFV (network function virtualization) for IoT, data storage in IoT, IoT Cloud Based Services.

(Fog ecosystem for IOT)

UNIT 3:

Design Principles for Web Connectivity: Web Communication Protocols for connected devices, Message Communication Protocols for connected devices, SOAP, REST, HTTP Restful and Web Sockets. Internet Connectivity Principles: Internet Connectivity, Internet based communication, IP addressing in IoT, Media Access control.

UNIT 4:

Sensor Technology, Participatory Sensing, Industrial IoT and Automotive IoT, Actuator, Sensor data Communication Protocols, Radio Frequency Identification Technology, Wireless Sensor Network Technology.

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3. P. Raj and A.C. Raman, "The Internet of Things", CRC Press (T&F Group), New York

Scheme of Examination

Bachelor of Technology in Electronics and Telecommunication Engineering

Semester: I															
S. No.	Subject Code	Category	Subject Name	Hours /Week			Maximum Marks allotted				Total Marks		Credits		Total Credits
				L	T	P	Theory		Practical				T	P	
							Th.	CW	SW	Pr.					
1	MA 10001	BSC	Mathematics - I	3	1	–	70	30	0	0	100	4	–	4	
2	PH 10016	BSC	Physics	2	1	–	70	30	0	0	100	3	–	3	
3	EE 10015	ESC	Fundamentals of Electrical Engineering	2	1	–	70	30	0	0	100	3	–	3	
4	CE 10013	ESC	Fundamentals of Civil Engineering & Applied Mechanics	2	1	–	70	30	0	0	100	3	–	3	
5	ME 10049	ESC	Engineering Graphics	2	–	–	70	30	0	0	100	2	–	2	
6	PH 10151	BSC(LC)	Applied Physics Lab	–	–	2	0	0	20	30	50	–	1	1	
7	EE 10152	ESC(LC)	Electrical Engineering Lab	–	–	2	0	0	20	30	50	–	1	1	
8	ME 10153	ESC(LC)	Engineering Drawing/ Auto CAD Lab	–	–	4	0	0	40	60	100	–	2	2	
9	HU10191	HSMC	Extra/Cocurricular Activity	–	–	2	0	0	50	0	50	–	1	1	
10		MC	Induction Program & Universal Human Values	2-3 Weeks in the beginning of I Year & 1 Hour per Week during Semester											
Total				11	4	10	350	150	130	120	750	15	5	20	
Semester: II															
S. No.	Subject Code	Category	Subject Name	Hours /Week			Maximum Marks allotted				Total Marks		Credits		Total Credits
				L	T	P	Theory		Practical				T	P	
							Th.	CW	SW	Pr.					
1	MA 10501	BSC	Mathematics - II	3	1	–	70	30	0	0	100	4	–	4	
2	CH 10516	BSC	Chemistry	3	–	–	70	30	0	0	100	3	–	3	
3	HU 10551	HSMC	Technical English	2	–	–	70	30	0	0	100	2	–	2	
4	CO 10507	ESC	Programming for Problem Solving	2	1	–	70	30	0	0	100	3	–	3	
5	EC 10508	ESC	Basic electronics Engineering	2	–	–	70	30	0	0	100	2	–	2	
6	CH 10652	BSC(LC)	Chemistry Lab	–	–	2	0	0	20	30	50	–	1	1	
7	HU 10653	HSMC(LC)	Language Lab	–	–	2	0	0	20	30	50	–	1	1	
8	CO 10654	ESC(LC)	Computer Programming Lab	–	–	2	0	0	20	30	50	–	1	1	
9	IP 10655	ESC(LC)	Manufacturing Practices	–	–	4	0	0	40	60	100	–	2	2	
10	HU 10691	HSMC	Extra/Cocurricular Activity	–	–	2	0	0	50	0	50	–	1	1	
11		MC	Induction Program & Universal Human Values	2-3 Weeks in the beginning of I Year & 1 Hour per Week during Semester											
TOTAL				12	2	12	350	150	150	150	800		14	6	20

Engineering Certificate shall be awarded after acquiring additional 10 credits out of which 6 credits as 2 Months industrial training within 5 years.

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Scheme of Examination
Bachelor of Technology in Electronics and Telecommunication Engineering

Semester: III

S. No.	Subject Code	Category	Subject Name	Hours /Week			Maximum Marks allotted				Total Marks	Credits		Total Credits
				L	T	P	Theory		Practical			T	P	
							Th.	CW	SW	Pr.				
1	MA25014	BSC	Mathematics-III	3	1	-	70	30	0	0	100	4	-	4
2	EC25016	PCC	Electronics Devices	3	-	2	70	30	40	60	200	3	1	4
3	EC25017	PCC	Signals and Systems	3	-	-	70	30	0	0	100	3	-	3
4	EE 25004	PCC	Network Theory & Analysis	3	-	2	70	30	40	60	200	3	1	4
5	EC25018	PCC	Digital System Design	3	-	2	70	30	40	60	200	3	1	4
6	HU25005	HSMC	Economics for Engineers	3	-	-	70	30	0	0	100	3	-	3
7	CHM 2002	MC	Environmental Science	2	-	-	0	50	0	0	50	-	-	-
Total				20	1	6	420	230	120	180	950	19	3	22

Semester: IV

S. No.	Subject Code	Category	Subject Name	Hours /Week			Maximum Marks allotted				Total Marks	Credits		Total Credits
				L	T	P	Theory		Practical			T	P	
							Th.	CW	SW	Pr.				
1	MA25563	BSC	Mathematics-IV	3	1	-	70	30	0	0	100	4	-	4
2	EC25564	PCC	Electromagnetic Waves	3	-	-	70	30	0	0	100	3	-	3
3	EC25565	PCC	Analog Circuits	3	-	2	70	30	40	60	200	3	1	4
4	EC25566	BSC	Probability Theory and Stochastic	3	-	-	70	30	0	0	100	3	-	3
5	EC25567	PCC	Analog and Digital Communication	3	-	2	70	30	40	60	200	3	1	4
6	EC25568	ESC	Electronics Workshop	-	-	4	0	0	40	60	100	-	2	2
7	HU25881	HSMC	Values, Humanities and professional	-	2	-	0	100	0	0	100	2	-	2
8	HU25--	MC	Constitution of India	2	-	-	0	50	0	0	50	-	-	-
Total				17	3	8	350	300	120	180	950	18	4	22

Internship 1	2-4 Weeks
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Scheme of Examination

Bachelor of Technology in Electronics and Telecommunication Engineering

Semester: V

S. No.	Subject Code	Category	Subject Name	Hours /Week			Maximum Marks allotted				Total Marks	Credits		Total Credits
				L	T	P	Theory		Practical			T	P	
							Th.	CW	SW	Pr.				
1	EC35008	PCC	Microprocessors and Microcontrollers	3	-	2	70	30	40	60	200	3	1	4
2	EC35009	PCC	Antenna and Wave Propagation	3	-	2	70	30	40	60	200	3	1	4
3	EC35010	PCC	VLSI Design	3	-	2	70	30	40	60	200	3	1	4
4	EC35011	PCC	Data communication	3	-	-	70	30	0	0	100	3	-	3
5	EC/CO-----	PEC-1	Program Elective (PEC-1)	3	-	2	70	30	40	60	200	3	1	4
6	EC35481		Evaluation of Internship-1	-	-	-	0	0	100	0	100	-	2	2
7	HU35	MC	Essence of Indian Knowledge Tradition	2	-	-	0	50	0	0	50	-	-	-
			Total	17	0	8	350	200	260	240	1050	15	6	21

Semester:VI

S. No.	Subject Code	Category	Subject Name	Hours /Week			Maximum Marks allotted				Total Marks	Credits		Total Credits
				L	T	P	Theory		Practical			T	P	
							Th.	CW	SW	Pr.				
1	EE35510	PCC	Control Systems	3	-	-	70	30	0	0	100	3	-	3
2	EC35511	PCC	Mobile Communication	3	-	-	70	30	0	0	100	3	-	3
3	EC35513	PCC	Computer Networks	3	-	2	70	30	40	60	200	3	1	4
4	EC35514	PCC	Applied Digital Signal Processing	3	-	2	70	30	40	60	200	3	1	4
5		PEC-2	Program Elective (PEC-2)	3	-	2	70	30	40	60	200	3	1	4
6	EC35881	ESC	Electronics design & Simulation Workshop	-	-	2	0	0	40	60	100	-	1	1
			Total	15	0	8	350	150	160	240	900	15	4	19

Internship 2

2-4 Weeks

S. No.	Subject Code	PEC 1
1	CO35251	Data Structure & Operating system
2	EC35252	Electronics Measurement

S. No.	Subject Code	PEC 2
1	EC35661	Embedded Systems
2	IT35662	Intelligent systems

PEC --> Can be replaced by Moocs/Swayam Course in consultation with Mentor/Faculty Advisor

Shri G.S. Institute of Technology & Science
Scheme of Examination
Bachelor of Engineering in Electronics and Telecommunication Engineering

Semester-VII																	
S. No.	Subject Code	Category	Subject Name	Hours /Week			Maximum Marks allotted				Total Marks	Credits		Total Credits			
				L	T	P	Theory		Practical			T	P				
							Th.	CW	SW	Pr.							
1	EC45009	PCC	Wireless and Mobile Networks	3	-	-	70	30	0	0	100	3	-	3			
2		PEC-3	Program Elective (PEC-3)	3	-	2	70	30	40	60	200	3	1	4			
3		PEC-4	Program Elective (PEC-4)	3	-	-	70	30	0	0	100	3	-	3			
4		OEC-1	Open Elective (OEC-1)	3	-	-	70	30	0	0	100	3	-	3			
5	IP45010	HSMC	Industrial Engineering and Management	3	-	-	70	30	0	0	100	3	-	3			
6	EC45481		Evaluation of Internship-2	-	-	4	0	0	100	0	100	-	2	2			
7	EC45498		Major Project Phase - I (AB group)	-	-	8	0	0	40	60	100	-	4	4			
8	EC45998		Major Project Phase -II (BA group)	-	-	8	0	0	40	60	100	-	4	4			
Total				For AB Group			15	0	14	350	150	140	60	700	15	7	22
				For BA Group			15	0	14	350	150	140	60	700	15	7	22

Internship 3	4-8 Weeks
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Semester- VIII																	
S. No.	Subject Code	Category	Subject Name	Hours /Week			Maximum Marks allotted				Total Marks	Credits		Total Credits			
				L	T	P	Theory		Practical			T	P				
							Th.	CW	SW	Pr.							
1		PEC-5	Program Elective (PEC-5)	3	-	-	70	30	0	0	100	3	-	3			
2		OEC-2	Open Elective (OEC-2)	3	-	-	70	30	0	0	100	3	-	3			
3	EC45882		Evaluation of Internship-3	-	2	4	0	0	100	0	100	-	4	4			
4	EC45998	PROJ	Major Project Stage II (AB GROUP)	-	-	8	0	0	40	60	100	-	4	4			
5	EC45498	PROJ	Major Project Stage I (BA GROUP)	-	-	8	0	0	40	60	100	-	4	4			
Total				For AB Group			6	0	12	140	60	140	60	400	6	8	14
				For BA Group			6	0	12	140	60	140	60	400	6	8	14

*OEC/PEC --> Can be replaced by Moocs/Swamyam Course in consultation with mentor

S. No.	Subject Code	PEC 3	S. No.	Subject Code	PEC 4
1	EC45207	Microwave Device and Circuits	1	CO45251	Data Science
2	EC45-----	Advance Antenna Design	2	EI45252	VLSI Technology
3	EC45208	Optical Communication	3		Moocs/ Swayam Online Courses
S. No.	Subject Code	PEC 5			
1	EE45-----	Industrial and Power Electronics			
2	EC45-----	Information theory and coding			
3	EC45602	Optical Networks			
4	EC45-----	Advanced Mobile Communication			
5		Mooc/ Swayam Online Courses			

***OEC/PEC --> Can be replaced by Moocs/Swayam Course in consultation with mentor**

S. No.	Subject Code	OEC 1
1	EC45301	Internet of Things
2	EC45302	Adavanced Digital Signal Processing
3	BM45---	Digital Image Processing
4		Moocs/ Swayam Online Courses
S. No.	Subject Code	OEC 2
1	EC45759	Satellite and Radar Communication
2	EC45-----	Game Theory in Wireless Communication
3	EC45-----	Introduction to Cryptography
4		Moocs/ Swayam Online Courses