SRI KRISHNA COLLEGE OF ENGINEERING AND TECHNOLOGY
An Autonomous Institution | Approved by AICTE | Affiliated to Anna University | Accredited by NAAC with A++ Grade
Kuniamuthur, Coimbatore – 641008
Phone : (0422)-2678001 (7 Lines) | Email : info@skcet.ac.in | Website : www.skcet.ac.in

Curriculum & Syllabi

Regulation 2022

2022-2026 Batch

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

(Batch 2022-2026)

VISION OF THE INSTITUTION

- To Produce Globally Competitive Engineers with High Ethical Values and Social Responsibilities.

MISSION OF THE INSTITUTION

- To impart the highest quality state-of-the-art technical education by providing impetus to innovation, research, and development and empowering students with entrepreneurship skills.
- To instill ethical values, imbibe a sense of social responsibility, and strive for societal well-being.
- To identify the needs of society and offer sustainable solutions through outreach programs.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

VISION OF THE DEPARTMENT

- To equip future engineers with high academic knowledge, ethical values, leadership skills and a passion to contribute to the society.

MISSION OF THE DEPARTMENT

- To provide quality and contemporary education in Electronics and Communication Engineering through continuous upgradation of Curriculum and laboratory facilities, industrial collaboration and effective teaching learning process.
- To facilitate research activities and entrepreneurship skills to cope up with the changes in industrial demand and meet the global and societal needs.
- To inculcate professional attitude and ethical values.

I.	PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)
PEO 1	Exhibit technical competence in Electronics and Communication Engineering by providing innovative engineering solutions and excel in professional career.
PEO 2	Indulge in problem identification, analysis and formulation to provide technically superior, economically feasible, environmentally compatible and socially acceptable design solutions.
PEO 3	Contribute towards entrepreneurship and research, and exercise leadership through effective communication, teamwork and knowledge upgradation through lifelong learning.

II.	PROGRAMME OUTCOMES (POs)
PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to

	comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

III.PROGRAMME SPECIFIC OUTCOMES (PSOs)	
The Graduates of B.E – ELECTRONICS AND COMMUNICATION ENGINEERING programme will be able to:	
PSO 1	Potential to analyse, design, synthesize and provide technical solutions in the field of VLSI, Embedded Systems and Communication Networks.
PSO 2	Emerge as ethical leaders, excel in research, engage in lifelong learning, pursue entrepreneurship and contribute towards the field of Electronics and Communication Engineering.

IV. MAPPING OF PEOs WITH POs

PEO	**POs**											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
1	**3**	**3**	**3**	**3**	**2**	**2**	**1**	**1**	**1**	**1**	**2**	**2**
2	**3**	**3**	**3**	**3**	**3**	**3**	**1**	**1**	**1**	**1**	**2**	**2**
3	**1**	**1**	**1**	**1**	**1**	**2**	**3**	**3**	**3**	**3**	**1**	**1**
	1- low, 2 - medium, 3 - high, '-' - no correlation											

V. MAPPING OF PEOs WITH PSOs

	PSO 1	**PSO 2**
PEO 1	3	2
PEO 2	2	2
PEO 3	2	3

AUTONOMOUS CURRICULUM AND SYLLABI

Regulations 2022

SEMESTER I						
SL. No.	**Course Code**	**Course**	**L/T/P**	**Contact Hrs/Wk**	**Credits**	**Cat.**
Theory (Internal 40 Marks & External 60 Marks)						
1	22MA104	Calculus and Transforms I	3/1/0	4	4	BSC
2	22EC101	Circuit Theory	3/0/0	3	3	ESC
3	22SB101	Engineering Biology	2/0/0	2	2	BSC
Theory with Practical (Internal 50 Marks & External 50 Marks)						
4	22CS101	Problem Solving using C++	3/0/2	5	4	ESC
5	22EN101	Technical Communication Skills	2/0/2	4	3	HSMC
6	22PH101	Physics for Electronics	3/0/2	5	4	BSC
Mandatory Course (Internal 100 Marks)						
7	22MC101	Mandatory Course I (Induction Programme)	3 weeks		0	MC
			TOTAL	**23**	**20**	

SEMESTER II						
SL. No.	**Course Code**	**Course**	**L/T/P**	**Contact Hrs/Wk**	**Credits**	**Cat.**
Theory (Internal 40 Marks & External 60 Marks)						
1	22MA304	Calculus and Transforms II	3/1/0	4	4	BSC
2	22GE201	Universal Human Values	3/0/0	3	3	HSMC
3	22EC201	Electron Devices	3/0/0	3	3	ESC
Theory with Practical (Internal 50 Marks & External 50 Marks)						
4	22IT201	Database Management Systems	3/0/2	5	4	ESC
5	22AD201	Java Programming	3/0/2	5	4	ESC

6	22CH101	Engineering Chemistry	3/0/2	5	4	BSC
Practical (Internal 60 Marks & External 40 Marks)						
7	22EC202	Circuits and Devices Laboratory	0/0/3	3	1.5	ESC
Indian Knowledge System - Blended Learning (Internal 100 Marks)						
8	22TA101	Heritage of Tamils	1/0/0	1	1	HSMC
Mandatory Course (Internal 100 Marks)						
9	22MC102	Mandatory Course II (Environmental Sciences)	1/0/0	1	0	MC
			TOTAL	**30**	**24.5**	

SEMESTER III						
SL. No.	**Course Code**	**Course**	**L/T/P**	**Contact Hrs/Wk**	**Credits**	**Cat.**
Theory (Internal 40 Marks & External 60 Marks)						
1	22EC301	Electronic Circuits	3/0/0	3	3	PCC
2	22EC302	Digital Electronics	3/0/0	3	3	PCC
3	22EC303	Electromagnetics	3/0/0	3	3	PCC
4	22MA307	Probability and Random Processes	3/1/0	4	4	BSC
Theory with Practical (Internal 50 Marks & External 50 Marks)						
5	22CS201	Data Structures and Algorithms	1/0/4	5	3	ESC
6	22CS301	Advanced Java Programming	1/0/4	5	3	ESC
Practical (Internal 60 Marks & External 40 Marks)						
7	22EC304	Digital Electronics Laboratory	0/0/2	2	1	PCC
Indian Knowledge System - Blended Learning (Internal 100 Marks)						
8	22TA201	Tamils and Technology	1/0/0	1	1	HSMC
Mandatory Course (Internal 100 Marks)						
9	22MCXXX	Mandatory Course III	1/0/0	1	0	MC
			TOTAL	**27**	**21**	

SEMESTER IV						
SL. No.	**Course Code**	**Course**	**L/T/P**	**Contact Hrs/Wk**	**Credits**	**Cat.**
Theory (Internal 40 Marks & External 60 Marks)						
1	22EC401	Signals and Systems	3/0/0	3	3	PCC
2	22EC402	Analog and Digital Communication	3/0/0	3	3	PCC
3	22EC403	Analog Integrated Circuits	3/0/0	3	3	PCC
4	22MG701	Principles of Management	3/0/0	3	3	HSMC
5	22XXXX	Open Elective-I	1/0/4 Or 3/0/0	5 or 3	3	OEC
Theory with Practical (Internal 50 Marks & External 50 Marks)						
6	22IT101	Application Development Practices	1/0/4	5	3	ESC
Practical (Internal 60 Marks & External 40 Marks)						
7	22EC404	Circuits Laboratory	0/0/3	3	1.5	PCC
8	22EC405	Analog and Digital Communication Laboratory	0/0/2	2	1	PCC
Mini Project (Internal 100 Marks)						
9	22EC406	Mini Project	0/0/4	4	2	PROJ
Mandatory Course (Internal 100 Marks)						
10	22MCXXX	Mandatory Course IV	1/0/0	1	0	MC
TOTAL				**32 or 30**	**22.5**	

SEMESTER V						
SL. No.	**Course Code**	**Course**	**L/T/P**	**Contact Hrs/Wk**	**Credits**	**Cat.**
Theory (Internal 40 Marks & External 60 Marks)						
1	22EC501	Microcontrollers and Interfacing	3/0/0	3	3	PCC
2	22EC502	Data and Wireless Networks	3/0/0	3	3	PCC
3	22EC503	Digital Signal Processing	4/0/0	4	4	PCC
4	22EE511	Control Engineering	4/0/0	4	4	PCC

5	22EC9XX	Professional Elective-I	3/0/0	3	3	PEC
6	22XXXX	Open Elective-II	0/0/6 or 3/0/0	6 Or 3	3	OEC
Practical (Internal 60 Marks & External 40 Marks)						
7	22EC504	Digital Signal Processing Laboratory	0/0/2	2	1	PCC
8	22EC505	Microcontrollers Laboratory	0/0/2	2	1	
TOTAL				**27 or 24**	**22**	

SEMESTER VI						
SL. No.	**Course Code**	**Course**	**L/T/P**	**Contact Hrs/Wk**	**Credits**	**Cat.**
Theory (Internal 40 Marks & External 60 Marks)						
1	22EC601	Embedded Systems and its Applications	3/0/0	3	3	PCC
2	22EC602	Antenna and Wave Propagation	4/0/0	4	4	PCC
3	22EC603	VLSI Design	4/0/0	4	4	PCC
4	22EC9XX	Professional Elective-II	3/0/0	3	3	PEC
5	22XXXX	Emerging Elective-I	3/0/0	3	3	EEC/ OEC
6	22XXXX	Open Elective-III	0/0/6 or 3/0/0	6 or 3	3	OEC
Practical (Internal 60 Marks & External 40 Marks)						
7	22EC604	Embedded Systems Laboratory	0/0/2	2	1	PCC
8	22EC605	VLSI Design Laboratory	0/0/2	2	1	PCC
TOTAL				28 or 25	**22**	

SEMESTER VII						
SL. No.	**Course Code**	**Course**	**L/T/P**	**Contact Hrs/Wk**	**Credits**	**Cat.**
Theory (Internal 40 Marks & External 60 Marks)						
1	22EC701	Microwave and Optical Communication	3/0/0	3	3	PCC
2	22EC702	Fundamentals of Network Security	3/0/0	3	3	PCC
3	22EC9XX	Professional Elective-III	3/0/0	3	3	PEC
4	22EC9XX	Professional Elective-IV	3/0/0	3	3	PEC
5	22EC9XX	Professional Elective-V	3/0/0	3	3	PEC
6	22EC9XX	Professional Elective-VI	3/0/0	3	3	PEC
Practical (Internal 60 Marks & External 40 Marks)						
7	22EC703	Microwave and Optical Communication Laboratory	0/0/2	2	1	PCC
Internship (Internal 100 Marks)						
8	22EES01	Employability Enhancement Skills (Internship)	28 days		2	EES
Project (Internal 60 Marks & External 40 Marks)						
9	22EC704	Project - I	0/0/6	6	3	PROJ
TOTAL				**20**	**24**	

SEMESTER VIII						
SL. No.	**Course Code**	**Course**	**L/T/P**	**Contact Hrs/Wk**	**Credits**	**Cat.**
Project (Internal 60 Marks & External 40 Marks)						
1	22EC801	Project - II	0/0/24	24	12	PROJ
			TOTAL	**24**	**12**	

SCHEME OF CREDIT DISTRIBUTION – SUMMARY											
Sl. No.	Stream	Credits/Semester								Credits	%
		I	II	III	IV	V	VI	VII	VIII		
1	Humanities and Social Sciences Including Management (HSMC)	3	4	1	3					11	6.54
2	Basic Science Courses (BSC)	10	8	4						22	13.1
3	Engineering Science Courses (ESC)	7	12.5	6	3	4				32.5	19.35
4	Professional Core Courses (PCC)			10	11.5	12	13	7		53.5	31.85
5	Professional Elective Courses (PEC)					3	3	12		18	10.71
6	Open Elective Course (OEC) /Emerging Elective Course (EEC)				3	3	6			12	7.14
7	Project work				2			3	12	17	10.12
8	Employability Enhancement Skills (EES)							2		2	1.19
9	Mandatory Courses (MC)	-	-	-	-	-	-	-	-	Non-Credit	-
Total		20	24.5	21	22.5	22	22	24	12	168	100

STRUCTURE FOR UNDERGRADUATE ENGINEERING PROGRAM			
S. No.	**Course Work - Subject Area**	**AICTE Suggested Credits**	**SKCET Credits (165)**
1.	Humanities and Social Sciences (HS), including Management;	15*	**11**
2.	Basic Sciences (BS) including Mathematics, Physics, Chemistry, Biology;	23*	**22**
3.	Engineering Sciences (ES), including Materials, Workshop, Drawing, Basics of Electrical/Electronics/Mechanical/Computer Engineering, Instrumentation;	17*	**32.5**
4.	Professional Subjects-Core (PC), relevant to the chosen specialization/branch; (May be split into Hard (no choice) and Soft (with choice), if required	61*	**53.5**
5.	Professional Subjects – Electives (PE), relevant to the chosen specialization/ branch;	12*	**18**
6.	Open Subjects- Electives (OE), from other technical and/or emerging subject areas;	12*	**12**
7.	Project Work, Seminar and/or Internship in Industry or elsewhere.	20*	**17**
8.	Mandatory Courses (MC)	Non-credit	Non-credit
Total		**160**	**168**
**Minor Variations is allowed as per need of the respective disciplines*			

HUMANITIES & SOCIAL SCIENCES INCLUDING MANAGEMENT (11 Credits)						
SL. No.	**Course Code**	**Course Title**	**L/T/P**	**Contact hrs./Wk.**	**C**	**Cat.**
1.	22EN101	Technical Communication Skills	2/0/2	4	3	HSMC
2.	22GE201	Universal Human Values	3/0/0	3	3	HSMC
3	22TA101	Heritage of Tamils	1/0/0	1	1	HSMC
4	22TA201	amils and Technology	1/0/0	1	1	HSMC
5	22MG701	rinciples of Management	3/0/0	3	3	HSMC

BASIC SCIENCE COURSES (22 Credits)						
SL. No.	Course Code	Course Title	L/T/P	Contact hrs./Wk.	C	Cat.
1	22SB101	Engineering Biology	2/0/0	2	2	BSC
2	22MA104	Calculus and Transforms I	3/1/0	4	4	BSC
3	22PH101	Physics for Electronics	3/0/2	5	4	BSC
4	22CH101	Engineering Chemistry	3/0/2	5	4	BSC
5	22MA304	Calculus and Transforms II	3/1/0	4	4	BSC
6	22MA307	Probability and Random Processes	3/1/0	4	4	BSC

ENGINEERING SCIENCE COURSES (32.5 Credits)						
SL. No.	Course Code	Course Title	L/T/P	Contact hrs./Wk.	C	Cat.
1.	22EC101	Circuit Theory	3/0/0	3	3	ESC
2.	22CS101	Problem Solving using C++	3/0/2	5	4	ESC
3.	22EC201	Electron Devices	3/0/0	3	3	ESC
4.	22AD201	Java Programming	3/0/2	5	4	ESC
5.	22IT201	Database Management Systems	3/0/2	5	4	ESC
6.	22EC202	Circuits and Devices Laboratory	0/0/2	2	1.5	ESC
7.	22CS201	Data Structures and Algorithms	3/0/2	5	4	ESC
8.	22CS302	Advanced Java Programming	1/0/4	5	3	ESC
10.	22IT101	Application Development Practices	1/0/4	5	3	ESC
11	22EE511	Control Engineering	4/0/0	4	4	ESC

PROFESSIONAL CORE COURSES (53.5 Credits)						
SL. No.	Course Code	Course Title	L/T/P	Contact hrs./Wk.	C	Cat.
1.	22EC301	Electronic Circuits	3/0/0	3	3	PCC
2.	22EC302	Digital Electronics	3/0/0	3	3	PCC
3.	22EC303	Electromagnetics	3/0/0	3	3	PCC
4	22EC304	Digital Electronics Laboratory	0/0/2	2	1	PCC
5.	22EC401	Signals and Systems	3/0/0	3	3	PCC
6.	22EC402	Analog and Digital Communication	3/0/0	3	3	PCC
7	22EC403	Analog Integrated Circuits	3/0/0	3	3	PCC
8.	22EC404	Circuits Laboratory	0/0/3	3	1.5	PCC
9.	22EC405	Analog and Digital Communication Laboratory	0/0/2	2	1	PCC
10.	22EC501	Microcontrollers and Interfacing	3/0/0	3	3	PCC
11.	22EC502	Data and Wireless Networks	3/0/0	3	3	PCC
12.	22EC503	Digital Signal Processing	4/0/0	4	4	PCC
13.	22EC504	Digital Signal Processing Laboratory	0/0/2	2	1	PCC
14	22EC505	Microcontrollers Laboratory	0/0/2	2	1	PCC
15	22EC601	Embedded Systems and its Applications	3/0/0	3	3	PCC
16	22EC602	Antenna and Wave Propagation	4/0/0	4	4	PCC
17	22EC603	VLSI Design	4/0/0	4	4	PCC
18	22EC604	Embedded Systems Laboratory	0/0/2	2	1	PCC

19	22EC605	VLSI Design Laboratory	0/0/2	2	1	PCC
20	22EC701	Microwave and Optical Communication	3/0/0	3	3	PCC
21	22EC702	Fundamentals of Network Security	3/0/0	3	3	PCC
22	22EC703	Microwave and Optical Communication Laboratory	0/0/2	2	1	PCC

PROFESSIONAL ELECTIVE COURSES (18 Credits)						
SL. No.	**Course Code**	**Course Title**	**L/T/P**	**Contact hrs./Wk.**	**C**	**Cat.**
Elective Stream I: Embedded Systems						
1	22EC901	Embedded Processors	3/0/0	3	3	PEC
2	22EC902	ARM Processor Architecture and Programming	3/0/0	3	3	PEC
3	22EC903	Real Time Operating Systems	3/0/0	3	3	PEC
4	22EC904	Embedded Product Design	3/0/0	3	3	PEC
5	22EC905	Embedded Systems for Edge computing	3/0/0	3	3	PEC
6	22EC906	Microcontroller Based System Design	3/0/0	3	3	PEC
7	22EC937	Internet of Things and its Applications	3/0/0	3	3	PEC
Elective Stream II: VLSI						
1	22EC907	ASIC Design	3/0/0	3	3	PEC
2	22EC908	System on Chip Design	3/0/0	3	3	PEC
3	22EC909	Electronic Design Automation Tools	3/0/0	3	3	PEC
4	22EC910	Low Power VLSI Design	3/0/0	3	3	PEC
5	22EC911	VLSI for Image and Video Processing	3/0/0	3	3	PEC
6	22EC912	VLSI Testing	3/0/0	3	3	PEC
Elective Stream III – Networks, Image and Video Processing						
1	22EC913	Wireless Sensor Networks	3/0/0	3	3	PEC
2	22EC914	High Speed Networks	3/0/0	3	3	PEC
3	22EC915	Neural Networks and Deep Learning	3/0/0	3	3	PEC
4	22EC916	Digital Image and Video Processing	3/0/0	3	3	PEC
5	22EC917	Pattern Recognition Techniques	3/0/0	3	3	PEC
6	22EC918	Information Security	3/0/0	3	3	PEC
Elective Stream IV – Next Generation Communication Systems						
1	22EC919	Advanced Wireless Technologies	3/0/0	3	3	PEC
2	22EC920	Satellite Communication and GPS	3/0/0	3	3	PEC
3	22EC921	Smart Antennas	3/0/0	3	3	PEC
4	22EC922	Cognitive Radio Networks	3/0/0	3	3	PEC
5	22EC923	Advanced wireless networks for 5G	3/0/0	3	3	PEC
6	22EC924	Signal Integrity in high speed design	3/0/0	3	3	PEC
Elective Stream V – Microelectronics, IC Design and Photonics						

1	22EC925	SOI device modelling and simulation	3/0/0	3	3	PEC
2	22EC926	Architectural Design of Digital Integrated Circuits	3/0/0	3	3	PEC
3	22EC927	IC Design and Technology	3/0/0	3	3	PEC
4	22EC928	Power Semiconductor Devices and Technology	3/0/0	3	3	PEC
5	22EC929	Photonic integrated circuits	3/0/0	3	3	PEC
6	22EC930	Biophotonics and optical sensors	3/0/0	3	3	PEC
Elective Stream VI – Smart Sensor Technologies and Biomedical Engineering						
1	22EC931	Flexible and Wearable Sensors	3/0/0	3	3	PEC
2	22EC932	Sensor Technology	3/0/0	3	3	PEC
3	22EC933	Medical Robotics	3/0/0	3	3	PEC
4	22EC934	Sensors for Industrial Applications	3/0/0	3	3	PEC
5	22EC935	Biomaterials and its Applications	3/0/0	3	3	PEC
6	22EC936	Ergonomics	3/0/0	3	3	PEC

OPEN/ EMERGING/ INDUSTRY (12 Credits)						
SL. No.	**Course Code**	**Course Title**	**L/T/P**	**Contact hrs./Wk.**	**C**	**Cat.**
1.	22EC001	Principles of Cyber Physical Systems	3/0/0	3	3	OEC
2.	22EC002	Introduction to Raspberry Pi and Arduino	3/0/0	3	3	OEC
3.	22EC003	IT Workshop SCILAB/MATLAB	3/0/0	3	3	OEC
4.	22EC004	Brain Computer Interface and its Applications	3/0/0	3	3	OEC
5.	22EC005	Wireless wearable Sensors	3/0/0	3	3	OEC
6.	22EC006	Organizational Behavior	3/0/0	3	3	OEC
1.	22EC007	Robotics	3/0/0	3	3	EEC
2.	22EC008	Augmented and Virtual Reality	3/0/0	3	3	EEC
3.	22EC009	Computer Vision	3/0/0	3	3	EEC
4.	22EC010	Bio – inspired Human Machine Interface	3/0/0	3	3	EEC

PROJECT WORK (17 Credits)						
SL. No.	**Course Code**	**Course Title**	**L/T/P**	**Contact hrs./Wk.**	**C**	**Cat.**
1.	22EC406	Mini Project	0/0/4	4	2	PROJ
2.	22EC704	Project - I	0/0/6	6	3	PROJ
3.	22EC801	Project - II	0 / 0 / 24	24	12	PROJ

INTERN (2 Credits)						
S.No	**Course Code**	**Name of the Course**	**L/T/P**	**Contact Hrs/Wk**	**C**	**Ext/Int**
1.	22EES01	Employment Enhancement Skills (Internship)	3 weeks		2	40/60

MANDATORY COURSES (0 Credits)						
S.No	**Course Code**	**Course Title**	**L/T/P**	**Contact Hrs/Wk**	**C**	**Ext/Int**
1.	22MC101	Induction Programme	3 weeks		0	0/100
2.	22MC102	Environmental Sciences	1/0/0	1	0	0/100
3.	22MC103	Soft Skills	1/0/0	1	0	0/100
4.	22MC104	Management Organizational Behaviour	1/0/0	1	0	0/100
5.	22MC105	General Aptitude	1/0/0	1	0	0/100
6.	22MC106	Life Skills and Ethics	1/0/0	1	0	0/100
7.	22MC107	Stress Management	1/0/0	1	0	0/100
8.	22MC108	Constitution of India	1/0/0	1	0	0/100
9.	22MC109	Essence of Indian Traditional Knowledge	1/0/0	1	0	0/100

PROFESSIONAL ELECTIVE COURSES: VERTICALS					
Vertical I	**Vertical II**	**Vertical III**	**Vertical IV**	**Vertical V**	**Vertical VI**
Embedded Processors	ASIC Design	Wireless Sensor Networks	Advanced Wireless Technologies	SOI device modelling and simulation	Flexible and Wearable Sensors
ARM Processor Architecture and Programming	System on Chip Design	High Speed Networks	Satellite Communication and GPS	Architectural Design of Digital Integrated Circuits	Sensor Technology
Real Time Operating Systems	Electronic Design Automation Tools	Neural Networks and Deep Learning	Smart Antennas	IC Design and Technology	Medical Robotics
Embedded Product Design	Low Power VLSI Design	Digital Image and Video Processing	Cognitive Radio Networks	Power Semiconductor Devices and Technology	Sensors for Industrial Applications
Embedded Systems for Edge computing	VLSI for Image and Video Processing	Pattern Recognition Techniques	Advanced wireless networks for 5G	Photonic integrated circuits	Biomaterials and its Applications
Microcontroller Based System Design	VLSI Testing	Information Security	Signal Integrity in high speed design	Biophotonics and optical sensors	Ergonomics

VALUE ADDED COURSES (Based on student's interest)			
S.No	**Course Code**	**Course Title**	**Credits**
1.	22VA401	Antenna Design using ANSYS HFSS Tool Flow	1
2.	22VA402	Mastering in MATLAB - Math and Optimization	1
3.	22VA403	The Agriculture Industry in Industry 4.0	1
4.	22VA404	Connecting Technologies With Real World	1
5.	22VA405	Arduino Programming model	1
6.	22VA406	PCB Design for Electronic Circuits	1
7.	22VA407	Energy Harvesting and Security Issues in Cognitive Networks	1
8.	22VA161	Soft Skills for Corporate Workplace	

L: Lecture **T:** Tutorial **P:** Practical **C:** Credit **O:** Outside Class hours **Cat.:** Category

HSMC : Humanities and Social Sciences including Management
BSC : Basic Science Courses
ESC : Engineering Science Courses
PCC : Professional Core Courses
PEC : Professional Elective Courses
OEC : Open and Emerging Elective Courses
PROJ : Project Work
EES : Employability Enhancement Skills
MC : Mandatory Course

Definition of Credit:

L – Lecture	1 Hr. Lecture (L) per week	1 credit
T – Tutorial	1 Hr. Tutorial (T) per week	1 credit
P - Practical/Practice (Project and Industry based Courses)	1 Hr. Practical (P) per week	0.5 credit

SEMESTER – VII

22EC701	MICROWAVE AND OPTICAL COMMUNICATION	3/0/0/3

Nature of Course : G (Theory & Analytical)

Course Objectives:

1	To study the basics of Microwave network and characterization
2	To enable the students to examine the principles of microwave passive components
3	To enable the students to determine the principles and operations of Microwave semiconductor devices.
4	To enable the students to describe the fundamentals of optical fiber communication.
5	To enable the students to apply the characteristics of optical transmitters and receivers

Course Outcomes:
Upon completion of the course, students shall have ability to

C701.1	Understand the concepts of microwave network characterization	[U]
C701.2	Examine the principles of microwave passive components	[AP]
C701.3	Explain the operation of semiconductor devices	[AP]
C701.4	Describe the significance of optical fibers and their operational modes	[U]
C701.5	Apply optical transmitter and receiver in modern fiber optic systems	[AP]

Course Contents:

Network Characterization and Passive Components **15**

Microwave Frequency band and RF Spectrum -S parameter representation of N ports- Losses in terms of S parameters- Properties of S parameters. Directional Coupler- Microwave Hybrid Circuits-Circulator and Isolator- branch line coupler (equal & unequal), Rat Race Coupler (180^{o} hybrid coupler), Noise figure computations, Dynamic range - Millimetre Wave Techniques**.**

Tubes and Semiconductor Devices **15**

Two cavity klystron - Reflex Klystron- Travelling Wave Tube Gunn Diode, Avalanche Breakdown diodes (TRAPATT, IMPATT, BARITT)- Manley – Rowe Power Relations - Wilkinson power divider. Microwave Resonators: Series and Parallel Resonant Circuits, Microwave Radar (MR)-Applications of MR.

Optical Transmitters and Receivers **15**

Optical Fibers: Optical Fiber Modes and Configuration, Fiber Loss, Dispersions. Power coupling: splices, connectors, coupler, Light Emitting diode and Laser diodes Operational principles of WDM-Passive optical coupler-2x2 Fiber coupler. PIN and APD, Erbium Doped Fiber Amplifier.

Total Periods **45**

Text Books:

1	Annapurna Das and Sisir K Das, Microwave Engineering, Third Edition, Tata McGraw Hill, Inc., 2017.
2	D.M. Pozar, Microwave Engineering,4th Edition, John Wiley & sons, Inc., 2013.
3	Gerd Keiser, Optical Fiber Communications, 5th Ed, McGraw-Hill, 2017.

Reference Books:

1	Samuel Y Liao, Microwave Devices & Circuits, Third Edition, Pearson Education, 2011.
2	Robert E. Collin, Foundations for Microwave Engineering, Second Edition, Wiley

	IEEE Press,2007.
3	S. Kumar and M. J. Deen, Fiber Optic Communications, John Wiley & sons,2014.
Web References:	
1	https://radfiz.org.ua/.../Collin.%20Foundations%20for%20Microwave%20Engineering.p
2	https://www.slac.stanford.edu/slac/sass/talks/opticalfiber.pdf
3	https://www.utdallas.edu/~torlak/courses/ee4367/lectures/FIBEROPTICS.pdf
4	https://www.cse.wustl.edu/~jain/tutorials/ftp/t_3opt.pdf
Online Resources:	
1	https://onlinecourses.nptel.ac.in/noc20_ee91/preview
2	https://onlinecourses.nptel.ac.in/noc21_ee42/preview
3	https://nptel.ac.in/courses/108101112/
4	https://nptel.ac.in/courses/117101054/

22EC702	FUNDAMENTALS OF NETWORK SECURITY	3/0/0/3
Nature of Course	: F (Theory)	
Course Objectives:		
1	Understand the fundamentals of network security, including security services, threats and attack models.	
2	To understand various algorithms for network security to protect against the threats in the networks.	
3	Learn the cryptographic techniques, cryptographic functions and message authentication codes	
4	Explore security threats, vulnerabilities, and mitigation strategies in wireless network security and end point security.	
5	Study open-source security modules for cloud and IoT environments and their practical applications.	
Course Outcomes: **Upon completion of the course, students shall have ability to**		
C702.1	Understand the challenges of network security, OSI security architecture and classical encryption techniques.	[U]
C702.2	Analyze the Symmetric and Asymmetric cryptographic algorithms in network security	[AN]
C702.3	Examine the applications of Cryptographic functions and Message Authentication Codes	[AP]
C702.4	Understand the mobile device security, firewalls and intrusion detection systems to protect against security threats.	[U]
C702.5	Understand open-source security module and their role in enhancing cloud and IoT security	[U]

Course Contents:

Network Security Concepts and Encryption Techniques **15**

Introduction, Security objectives, Challenges of information security, OSI security architecture, Security attacks: passive attacks- active attacks, security services, security mechanisms. Cryptography, network security, Classical encryption techniques - substitution techniques and transposition techniques, Data encryption standard (DES) – The Strength of DES.

Public Key Encryption and Hash Functions **15**

Advanced Encryption Standard- AES structure- AES Key Expansion, Public key Cryptography: The RSA algorithm- Diffie-Hellman key exchange algorithm, Cryptographic Hash Functions- Applications of Hash Functions - Two simple Hash functions - Secure hash algorithm (SHA), Message Authentication Codes- Requirements – MACs based on Hash Functions: HMAC.

Network Security Applications **15**

Wireless Network security: Wireless Security-Mobile Device Security, **Network Endpoint Security:** Firewalls- Intrusion detection systems, **Cloud security:** Cloud Security as service- A open-source Cloud security Module, **IoT Security**: Security concepts and objectives-Tamper resistance and detection- gateway security, IoT security environment.

Total Periods	**45**

Text Books:

1	William Stallings, "Cryptography and Network Security: Principles and Practice", 8th Edition, Pearson, 2023.

2	Sabyasachi Pramanik et al., "Cyber Security and Network Security", Wiley-Scrivener, 2022.
3	Sarhan M. Musa, "Network Security and Cryptography", Mercury Learning, 2024.

Reference Books:	
1	Charlie Kaufman et al., "Network Security: Private Communication in a Public World", 3rd Edition, Pearson, 2016.
2	Bruce Schneier, "Applied Cryptography", 20th Anniversary Edition, Wiley, 2015.
3	Niels Ferguson et al., "Cryptography Engineering", Wiley, 2018.

Web References:	
1	https://www.tutorialspoint.com/network_security/index.htm
2	https://www.sans.org/network-security/
3	https://www.coursera.org/learn/network-security
4	https://www.cybrary.it/course/network-security-fundamentals/
Online Resources:	
1	https://www.edx.org/course/network-security
2	https://nptel.ac.in/courses/106105184
3	https://www.coursera.org/specializations/cybersecurity
4	https://www.udemy.com/course/network-security-for-beginners/

22EC703	MICROWAVE AND OPTICAL COMMUNICATION LABORATORY	0/0/2/1

Nature of Course: M (Practical application)

Course Objectives:

1. To learn the performance of Microwave active and passive components
2. To study the performance of semiconductor devices
3. To study the performance of different types of antennas
4. To gain the knowledge in the characteristics of optical fiber.
5. To learn the performance of Microwave waveguide tees using EM simulation software

Course Outcomes

C703.1	Analyze the performance of semiconductor devices	[AN]
C703.2	Analyze the performance of microwave components.	[AN]
C703.3	Analyze the various performance parameters of antenna.	[AN]
C703.4	Analyze the optical fiber losses and parameters.	[AN]
C703.5	Simulate the performance of Microwave waveguide tees using EM software	[AN]

Course Content:

S.No	List of Experiments	CO Mapping	BT
1	Analyze the Mode characteristics of Reflex Klystron	C703.1	[AN]
2	Compute the V-I Characteristics of Gunn Diode.	C703.1	[AN]
3	Analyze the performance of Isolator and Circulator	C703.2	[AN]
4	Compute the directivity, coupling coefficient, S-parameter of directional coupler using Microwave components	C703.2	[AN]
5	Analyze the Radiation pattern characteristics using Horn antenna.	C703.3	[AN]
6	Compute the bending and attenuation losses in optical fiber.	C703.4	[AN]
7	Compute the numerical aperture for optical fiber	C703.4	[AN]
8	Analyze the performance parameters of micro strip patch antenna using EM simulation software.	C703.5	[AN]
9.	Analyze the performance of Microwave E-Plane & H-Plane tees using EM simulation software.	C703.5	[AN]
10.	Analyze the performance of Microwave Magic tee using EM simulation software..	C703.5	[AN]

Total Hours	**30**

Text Books:

1. Annapurna Das and Sisir K Das, Microwave Engineering, Third Edition, Tata McGraw Hill, Inc., 2017.
2. D.M. Pozar, Microwave Engineering,4th Edition, John Wiley & sons, Inc., 2013.
3. Gerd Keiser, Optical Fiber Communications, 5th Ed, McGraw-Hill, 2017.

Reference Books:

1. Samuel Y Liao, Microwave Devices & Circuits, Third Edition, Pearson Education, 2011.
2. Robert E. Collin, Foundations for Microwave Engineering, Second Edition, Wiley IEEE Press,2007.
3. S. Kumar and M. J. Deen, Fiber Optic Communications, John Wiley & sons,2014.

Web References:

1. https://eem-iitd.vlabs.ac.in/experiments.html
2. https://oc-iitr.vlabs.ac.in/List%20of%20experiments.html
3. http://ece.cet.ac.in/optical-communication-lab/

22EC914	HIGH SPEED NETWORKS	3/0/0/3
Nature of Course	(C) Theory	

Course Objectives:

1	To understand the concepts of ATM and frame relay
2	To understand the congestion and traffic management strategies
3	To learn the concepts behind TCP and ATM congestion control
4	To provide an in depth knowledge of Integrated and Differentiated Services
5	To understand the protocols for QoS support

Course Outcomes:
Upon completion of the course, students shall have ability to

C914.1	Illustrate the concepts behind ATM and Frame relay networks	[U]
C914.2	Understand the concepts of high speed LAN and Ethernet	[U]
C914.3	Analyze the concepts and congestions associated with TCP and ATM	[AN]
C914.4	Understand the various traffic management strategies of ABR and GFR	[U]
C914.5	Categorize queuing disciplines of Integrated and Differentiated Services	[AN]
C914.6	Explore the various protocols for improvement of QoS support	[U]

Course Contents:

HIGH SPEED NETWORKS AND TRAFFIC MANAGEMENT: **15**

Introduction -Frame Relay Networks – Asynchronous transfer mode – ATM Protocol Architecture, ATM logical Connection - ATM Cell – ATM Service Categories – AAL. High Speed LAN, Gigabit Ethernet, TRAFFIC MANAGEMENT: Congestion - Effects of Congestion – Congestion Control in Data Networks and Internets- Traffic Management.

TCP AND ATM CONGESTION CONTROL: **15**

TCP Flow control – TCP Congestion Control – Retransmission – Timer Management – KARN's Algorithm – Window management – Performance of TCP over ATM - TCP over 3G/4G wireless networks – TCP/IP performance over Optical Networks - Traffic and Congestion control in ATM – Requirements – Traffic Management Frame work, Traffic Control – ABR traffic Management – ABR rate control. RM cell formats – ABR capacity allocation - GFR traffic management.

SERVICE ARCHITECTURE AND PROTOCOLS FOR QOS SUPPORT: **15**

Integrated Services Architecture – Approach, Components, Services - Queuing Discipline – FQ – PS – BRFQ – GPS – WFQ – Random Early Detection – Differentiated Services. Protocols For QOS Support:RSVP – Goals & Characteristics, Data Flow, RSVP operations – Protocol Mechanisms – Multiprotocol Label Switching, Subnet Bandwidth Management – Operations, Label Stacking – Protocol details – RTP – Protocol Architecture – Data Transfer Protocol – RTCP.

Total Periods:	**45**

Text Books:

1	William Stallings, "High Speed Networks and Internet", Second Edition, Pearson Education, reprinted edition, 2018.

2	Jean Walrand, Pravin Varaiya, “High Performance Communication Networks”, Reprinted Second Edition, Jean Harcourt Asia Pvt. Ltd., 2009.
Reference Books:	
1	Ivan Pepelnjak, Jim Guichard, Jeff Apcar, “MPLS and VPN architectures”, Second Edition, Cisco Press, 2005.
2	Abhijit S. Pandya, Ercan Sea, “ATM Technology for Broad Band Telecommunication Networks”, First Edition, CRC Press, 2007.
3	Thomas Pötsch “Future Mobile Transport Protocols Adaptive congestion control for unpredictable cellular networks”, First Edition, Springer, 2016.
4	Tere Parnell “Building High speed Networks”, First Edition, Osborne/McGraw-Hill, reprinted edition, 2009.
Web References:	
1	http://www.informit.com/articles/article.aspx?p=101655&seqNum=4
2	https://fenix.tecnico.ulisboa.pt/downloadFile/3779571512047/Generic%20Framing%20Procedure.pdf
3	http://www.nptel.ac.in/courses/117101050/3
4	https://www.coursera.org/courses?query=computer%20network
Online References:	
1	https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-263j-data-communication-networks-fall-2002/
2	https://www.techopedia.com/definition/24244/high-speed-downlink-packet-access-hsdpa
3	http://www.cs.ust.hk/~hamdi/Class/CSIT560-S13/lecture_notes.htm

22EC916	DIGITAL IMAGE AND VIDEO PROCESSING	3/ 0 / 0/ 3
Nature of Course	C (Theory Concept)	

Course Objectives:

1	To provide knowledge about the mathematical transforms in image processing
2	To give a view on human visual perception
3	To learn various techniques to improve the visual appeal of the image
4	To analyse the noise removal technique from the degraded images
5	To implement various coding techniques for image and video analysis

Course Outcomes:
Upon completion of the course, students shall have ability to

C916.1	Understand the basic definition of an image and human visual system	[U]
C916.2	Apply the concepts of image formation, sampling, quantization and the human visual system to investigate specific image processing techniques	[AP]
C916.3	Analyze the various image intensity transformations and spatial filtering for the purpose of image enhancement	[AN]
C916.4	Analyze the image segmentation techniques and implement various image compression models,	[AN]
C916.5	Apply the principles of color video processing and various Estimation techniques.	[AP]
C916.6	Apply video processing techniques to real-world applications	[AP]

Course Contents:

Fundamentals of Image processing and image transform **15**

Basic steps in Digital Image processing, Image sampling and quantization, Basic relationship between pixels, color images- RGB, HSI and other models. Image Transforms: 2 –D Discrete Fourier Transform, Discrete Cosine Transform (DCT), Discrete Wavelet transforms.

Image Processing Techniques **15**

Image Enhancement-Spatial Domain methods: Histogram Processing, Basics of Spatial Filtering, Smoothing Spatial filters, Sharpening Spatial filters, Frequency Domain methods: Basics of filtering in frequency domain, image smoothing, image sharpening, Homomorphic filtering. Image Segmentation - Segmentation concepts, point, line and Edge detection, Thresholding, region-based segmentation. Image Compression models: Lossy and Lossless, Huffmann coding, Arithmetic coding, LZW coding, run length coding, Bit Plane coding, transform coding, predictive coding, JPEG-2000, MPEG standards

Video Processing and Applications **15**

Basic concepts and Terminology-Monochrome Analog video, Color in Video, Analog video standards, Digital video basics, Analog to digital conversion, Color representation and chroma sub sampling, sampling of video signals, filtering operations, 2-D Motion Estimation: Optical flow, general methodologies, pixel-based motion estimation, Block matching algorithm, Mesh based motion Estimation, global Motion Estimation, Region based motion estimation, multi resolution motion estimation , Applications of motion estimation in Surveillance systems and autonomous vehicles

Total Periods:45

Text Books:	
1	Rafael C. González ,Richard E Woods, “Digital image processing” Pearson Education,Third Edition, 2014
2	John W. Wood, Multidimensional Signal, Image, and Video Processing and Coding, Second Edition, Academic Press, 2011
3	Yao Wang, Jorn Ostermann, Ya-Qin Zhang, “Video Processing and Communications”,Prentice Hall, First Edition, 2001
Reference Books:	
1	A. Murat Tekalp, “Digital Video Processing”, Prentice Hall, Second Edition, 2015.
2	W. K. Pratt, ``Digital Image Processing,'' John Wiley and Sons, Second Edition, 2008
3	Alan C. Bovik, “The Essential Guide to Video Processing”, Elsevier Science, Second Edition, 2009
Web References:	
1	http://web.stanford.edu/class/ee368/handouts.html
2	http://www.ee.columbia.edu/~sfchang/course/dip/
3	http://diwakar-marur.blogspot.com/search/label/Digital%20Television
Online Resources:	
1	nptel.ac.in/downloads/117104020/
2	https://www.coursera.org/learn/digital
3	https://www.edx.org/course/computer-vision-image-analysis-1

22EC918	INFORMATION SECURITY	3/0/0/3
Nature of Course	C (Theory Concept)	

Course Objectives:

1	To learn the layers of Networking devices and different types of network layer attacks
2	To learn about firewalls and intrusion detection and prevention systems.
3	To study the concepts of virtual private networks and WAN topologies.
4	To study the concepts of main security threats and techniques involved.

Course Outcomes:
Upon completion of the course, students shall have ability to

C918.1	Recall the different network layers and various attacks possible on networking devices.	[R]
C918.2	Understand the concept of a firewall and its types and understand the intrusion detection and prevention of the system.	[U]
C918.3	Identify the concepts of virtual private networks and their types	[U]
C918.4	Understand the various methods, protocols, and WAN topologies.	[U]
C918.5	Interpret various threats and authentication models.	[AP]
C918.6	Analyze the Security and privacy in Wireless Mobile Systems with security policies and standards	[AN]

Course Contents:

Introduction To Network Security: **15**

Networking Devices (Layer1, 2, 3) - Different types of network layer attacks–Firewall (ACL, Packet Filtering, DMZ, Alerts and Audit Trials) – IDS, IPS and its types (Signature based, Anomaly based, Policy based, Honey pot based).

Virtual Private Networks and MPLS: **15**

VPN and its types –Tunneling Protocols – Tunnel and Transport Mode –Authentication Header-Encapsulation Security Payload (ESP) - IPSEC Protocol Suite – IKE PHASE 1, II – Generic Routing Encapsulation (GRE) - WAN Topologies - Standard IP based Switching – CEF based multi-layer switching - MPLS Characteristics - Frame Mode MPLS Operation – MPLS VPN.

Threats and Authentication Models: **15**

Threats, Vulnerabilities- Attack vectors and their counter measures-Identity Management – Identification, Authorization and Access Controls –Categories-Models, Challenges, Principles, Techniques and Practices, Concept of trust and trustworthiness. Authentication Methods, Passwords, Biometrics, Challenge Response based authentication, Two-Factor Authentication-Single Sign-On and Web Cookies. Wi-Fi Security (WEP, WPA, WPA-Enterprise), Information security management – Monitor systems and apply controls - security assessment using automated tools – Backups of security devices – security polices and standards.

Total Periods:	**45**

Text Books:

1	Charlie Kaufman, Radia Perlman, Mike Speciner, “Network Security: Private communication in a public world”, Prentice Hall, Second edition, 2011.
2	Charles Pfleeger, Shari Lawrence Pfleeger ,“Security in computing”, Prentice Hall, 5th Edition, 2015.

3	William Stallings, “Cryptography and Network Security”, Pearson Education, 6th Edition, 2013.
4	Jyrki T J Penttinen, “Wireless Communication Security: Solutions for the Internet of Things”, Wiley Publication, 1st Edition, 2016.
Reference Books:	
1	Christopher Dawson,”Internet security you can afford: using Untangle as your internet gateway”, Cengage Learning, 1st Edition,2015.
2	William Stallings and Lawrie Brown, “Computer Security Principles and Practice”, Published by Pearson Education, 5th edition, 2024.
3	Chimay J Anumba, Xiangyu Wang”Mobile and pervasive computing in construction”, Wiley-Blackwell, 1st Edition,2012.
Online Resources:	
1	https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-857-network-and-computer-security-spring-2014/
2	http://www.nptelvideos.in/2012/11/cryptography-and-network-security.html
3	http://freevideolectures.com/Course/3027/Cryptography-and-Network-Security
Web References:	
1	https://ahsanghazi.files.wordpress.com/2017/03/263973122-security-in-computing-5-e-charles-p-pfleeger-pdf1.pdf
2	http://www.ccs.neu.edu/home/noubir/Courses/CS7780/F14/slides/crypto-use-misuse.pdf
3	https://securityintelligence.com/media/podcast-cybersecurity-challenges-facing-telecommunications-and-media-entertainment/

22EC919	ADVANCED WIRELESS TECHNOLOGIES	3/0/0/0
Nature of Course	C(Theory Concept)	
Course Objectives:		
1	To learn about 4G technologies and LTE-A in mobile cellular network	
2	To study the emerging techniques in 5G network	
3	To understand the evolving paradigm of cooperative communication	
4	To understand the different power saving strategies and energy efficient signal, system and network design	
5	To study the design principles in cooperative communications, cognitive systems and relay channels	
Course Outcomes: **Upon completion of the course, students shall have ability to**		
C919.1	Analyze the difference of LTE-A network design from 4G standard	[AN]
C919.2	Explore the network architecture of the current 5G standard	[U]
C919.3	Appreciate the necessity and the design aspects of cooperative communication in OFDM and MIMO cellular relay networks	[U]
C919.4	Understand the different power saving strategies and energy efficient signal, system and network design	[U]
C919.5	Learn and impart new techniques in cognitive systems and relay channels	[U]
C919.6	Impart the design principles in cooperative communications and its transmission schemes	[AN]

Course Contents:

EVOLUTION OF 4G AND 5G CELLULAR NETWORKS **15**

Introduction to LTE-A – Requirements and Challenges, network architectures – EPC, E- UTRAN architecture - mobility management, resource management, services, channel - logical and transport channel mapping, 4G Protocol, WiMax IEEE 802.16d/e – WiMax Internetworking with 3GPP - 5G Roadmap - Pillars of 5G - 5G Architecture, The 5G internet - IoT and context awareness - Networking reconfiguration and virtualization support - Mobility QoS control - emerging approach for resource over provisioning.

COOPERATIVE COMMUNICATIONS AND TECHNIQUES **15**

Network architectures and research issues in cooperative cellular wireless networks; Cooperative communications in OFDM and MIMO cellular relay networks: issues and approaches, Cooperative techniques for energy efficiency, Cooperative base station techniques for cellular wireless networks; Turbo base stations, Cooperative communications in 3GPP LTE-Advanced, Partial information relaying and Coordinated multi-point transmission in LTE-Advanced.

USER COOPERATIVE COMMUNICATIONS **15**

User Cooperation and Cognitive Systems, Relay Channels: General Three-Node Relay Channel, Wireless Relay Channel - User Cooperation in Wireless Networks: Two user cooperative transmission schemes - Decode and forward - Amplify and forward Coded cooperation - Compress and forward relaying schemes, Cooperative Wireless Network, Multihop Relay Channel.

Total periods:	**45**

Text Books:

1	Sassan Ahmadi, “LTE-Advanced – A practical systems approach to understanding the3GPP LTE Releases 10 and 11 radio access technologies”, Elsevier, 2014.
2	Jonathan Rodriguez, "Fundamentals of 5G Mobile networks", John Wiley, 2015.
3	Y.-W. Peter Hong, Wan-Jen Huang, C.-C. Jay Kuo, Cooperative Communications and Networking: Technologies and System Design, Springer.
Reference Books:	
1	Ekram Hossain, Dong In Kim, Vijay K. Bhargava, “Cooperative Cellular Wireless Networks”, Cambridge University Press, 2011.
2	Murat Oysal, Cooperative Communications for Improved Wireless Network for virtualantenna array signals by, information science reference. Transmission: framework.
3	Savo G, Glisic, “Advanced Wireless Communications and Internet: Future Evolving Technologies”, Wiley, 2011.
Web References:	
1	https://nptel.ac.in/courses/117104099
2	https://www.coursera.org/lecture/computer-networking/introduction-to-wireless-networking-technologies-RgXEN
3	https://www.udemy.com/course/wireless-technologies-for-iot
Online Resources:	
1	https://www.slideshare.net/ShashikantAthawale/advanced-wireless-technologies
2	https://www.slideserve.com/jeroen/wireless-technology-powerpoint-ppt-presentation
3	https://1000projects.org/4g-wireless-technologies-ppt-slides.html
4	http://homes.ieu.edu.tr/hozcan/CE360/Lect1-Wireless-Introduction.pdf
4	http://homes.ieu.edu.tr/hozcan/CE360/Lect1-Wireless-Introduction.pdf

22EC921	SMART ANTENNAS	3/0/0/3
Nature of Course	G (Theory Analytical)	
Course Objectives:		
1	To gain knowledge in smart antenna radiation properties.	
2	To analyze various narrow band signal processing.	
3	To analyze various algorithms in estimating solution converges to optimal solution.	
4	To acquire knowledge in broad band signal processing in time domain and frequency domain	
5	To enable students to understand and analyze direction of arrival estimation	
Course Outcomes: **Upon completion of the course, students shall have ability to**		
C921.1	Recall the basic components of antenna and smart antennas	[R]
C921.2	Analysis and optimization of various Narrowband Signal processing in the absence of errors	[AN]
C921.3	Analysis of various algorithms to show how estimated solution converges to optimal solution	[AN]
C921.4	Apply Broadband Signal processing in time domain and frequency domain and realize broadband signal processing	[AP]
C921.5	Analyze performance of smart antenna using various direction of arrival estimation methods	[AN]
C921.6	Understand Conventional DOA Estimation Methods	[AN]

Course Contents:

INTRODUCTION: **15**

Antenna gain, wavelength, Directivity, beamwidth, phased array antenna, power pattern, beam steering, degree of freedom, optimal antenna, adaptive antennas, smart antenna – key benefits of smart antenna technology, wide band smart antennas, Digital radio receiver techniques and software radio for smart antennas, Narrow Band Processing**:** Signal model conventional beamformer, null steering beamformer, optimal beam former. Flexible /wearable antennas, Reconfigurable antennas/ Reconfigurable Intelligent surfaces(6G applications), Massive MIMO 5G Antennas

ADAPTIVE PROCESSING AND BROADBAND PROCESSING: **15**

Sample matrix inversion algorithm, unconstrained LMS algorithm, Gradient Estimate, Recursive Least Mean Square (RLS) Algorithm, normalized LMS algorithm, Constrained LMS algorithm, Neural network Approach. Tapped delay line structure, Digital beam forming, Broad band processing using DFT method.

.

DIRECTION OF ARRIVAL ESTIMATION METHODS: **15**

Spectral estimation methods, linear prediction method, Maximum entropy method, Maximum likelihood method, Eigen structure methods, Conventional DOA Estimation Methods, Conventional Beam forming Method, Capon's Minimum Variance Method, MUSIC Algorithm, ESPRIT Algorithm, Uniqueness of DOA Estimates

Total Periods:	**45**

Text Books:

1	Lal Chand Godara, "Smart Antennas" CRC press, 1st edition,2004.

2	Balanis, “Antenna Theory”, John Wiley and Sons, 4th edition, 2016.
3	R. S. Elliot, “Antenna Theory and Design”, Wiley-IEEE Press, revised edition,2003
4	Constantine A. Balanis & Panayiotis I. Ioannides, “Introduction to Smart Antennas”, Morgan & Claypool Publishers’ series-2007
Reference Books:	
1	T.S Rappaport, “Smart Antennas Adaptive Arrays Algorithms and Wireless Position Location”, IEEE press 1998, PTR – PH publishers 1999.
2	Robert A.Monzingo, R.L.Haupt, T.W. Miller, “Introduction to Adaptive Arrays”,Yesdee Publishing Pvt.Ltd.,Reprint, 2012
3	Frank B.Gross,”Smart Antennas for wireless Communications”,Mcgraw Hill, 1st edition,2005
Web References:	
1	http://nptel.ac.in/courses/117107035/
2	https://elearning.nxp.com/enrol/index.php?id=213
3	https://ocw.mit.edu/resources/res-ll-002-adaptive-antennas-and-phased-arrays-spring-2010/
Online Resources:	
1	*downloads.hindawi.com/books/9789775945099.pdf*
2	https://www.electronics-tutorials.com/basics/antenna-basics.htm
3	http://www.comlab.hut.fi/opetus/333/2004_2005_slides/Adaptive_antennas_text.pdf
4	http://www.wtec.org/loyola/wireless/chapter06.pdf

22EC929	PHOTONIC INTEGRATED CIRCUITS	3/0/0/3

Nature of Course : C (Theory Concept)

Course Objectives:

1	Understand the development of optical communication systems and explain the key benefits of integrated optics in modern photonic circuits.
2	Identify and analyze guided modes (TE/TM) in various planar waveguide structures
3	Explain the structure and operation of passive and active photonic devices
4	Describe the working principles of advanced integrated photonic components
5	List and compare different material platforms used in PIC fabrication
6	Explain and apply characterization techniques for integrated photonic devices

Course Outcomes:
Upon completion of the course, students shall have ability to

C929.1	Summarize the fundamental concept of optical waveguides.	[U]
C929.2	Understand the different types of optical waveguides.	[U]
C929.3	Analyze the couplers, modulators and devices for communication applications.	[AN]
C929.4	Understand the working of nano photonic devices.	[U]
C929.5	Interpret the fabrication technologies for design of optical waveguides	[U]
C929.6	Apply the various nonlinear effects in integrated optical waveguides.	[AP]

Course Contents:

FUNDAMENTALS OF OPTICAL WAVEGUIDES **15**

Brief history of optical communication, Advantages of integrated optics configuration, Guided TE and TM Modes of Symmetric and anti-symmetric planar waveguides: Step-index and graded index waveguides. Strip and channel waveguides, Beam propagation method.

OPTICAL AND NANO DEVICES **15**

Directional couplers, Applications as power splitters, Y-junction, optical switch; modulators, filters, A/D converters, Mode splitters, Mach-Zehnder interferometer-based devices. Acousto- optic waveguide devices. Arrayed waveguide devices, Nano-photonic-devices: Metal/dielectric plasmonic waveguides, Surface Plasmon modes, applications in waveguide polarizers.

OPTICAL FABRICATION PROCESS AND NON- LINEAR EFFECTS **15**

Materials- Glass, lithium niobate, silicon, compound semiconductors. Fabrication of integrated optical waveguides and devices. Lithography, deposition. Waveguide characterisation, prism coupling, grating and tapered couplers, Nonlinear effects in integrated optical waveguides, Types and Applications- case study on applications of non linear effects .

Total Periods: 45

Text Books:

1	H Nishihara, M Haruna and T Suhara, Optical Integrated Circuits; McGraw-Hill Book Company, New York, 1989.
2	C. R. Pollock and M Lipson, Integrated photonics,Kluwer Pub, 2003.

3	José Capmany and Daniel Pérez, Photonic Integrated Circuits, Oxford Univversity Press, 2020
Reference Books:	
1	A Ghatak and K Thyagarajan, Optical Electronics, Cambridge University Press, 1989.
2	T. Tamir, Guided wave opto-electronics, Springer Verilag, 1990.
3	K. Okamota, Fundamentals of Optical waveguides, Academic Press, 2006.
Web References:	
1	https://www.photonics.com/
2	https://opg.optica.org/
3	Recent journals and conference proceedings.
4	https://innovationspace.ansys.com/courses/courses/introduction-to-waveguide-design/lessons/photonic-integrated-circuits-and-the-role-of-waveguide-lesson-1/
Online Resources:	
1	https://archive.nptel.ac.in/courses/108/108/108108174/

22EC932	SENSOR TECHNOLOGY	3/0/0/3
Nature of Course	:C (Theory Concept)	

Course Objectives:

1	Introduce various developments in sensor technology.
2	Familiarize with the basics of optimal system layout, partitioning and device scaling.
3	Know various thick film and thin film techniques used for sensor development.
4	Study the various sensor technologies and robot guidance for the measurement of Force, Pressure, acceleration, vibration, and Torque.

Course Outcomes:
Upon completion of the course, students shall have ability to

C932.1	Study the basics of sensor technology and the various sensors and to understand the basics of optimal system layout, partitioning, and device scaling.	[U]
C932.2	Acquaint with various thick and thin film techniques used in sensor development.	[U]
C932.3	To acquire knowledge on microelectromechanical system sensors that is integrated with electronics on a common silicon substrate through microfabrication technology.	[AP]
C932.4	Identify the sensor for acceleration, vibration and shock measurement and Familiarize with the fabrication techniques for packaging of sensors.	[U]
C932.5	Apply an integrated knowledge on the sensors, work with and interpret the data obtained from various sensor and Radar applications.	[AN]

Course Contents:

DEVELOPMENTS, DESIGN AND PACKAGING OF SENSOR IN SENSOR TECHNOLOGY **15**

Semiconductor sensors, smart sensors, micro sensors, fiber optic sensors, chemical sensors, biosensors, TEDs - Partitioning, Layout, technology constraints, scaling, compatibility study.

THICK AND THIN FILM TECHNOLOGY **15**

Thick-film processing-screen printing, Lasering of substrates, curing, low temperature co-fired ceramic processing, wire bonding. Micro machining, IOC (Integrated Optical circuit) fabrication process - thin film formation and characterization- sol-gel method, chemical vapour deposition, physical vapour deposition, sputtering, plasma/Ion beam deposition, structural and physical properties, Applications- Thin films for microelectronics, MEMS, optical coatings, photodetectors, smart sensors.

SENSOR TECHNOLOGIES FOR VARIOUS APPLICATIONS **15**

Introduction – Sensors in Manufacturing – Temperature Sensors in Process Control – Pressure Sensors – Fibre Optic Pressure Sensors – Displacement Sensors for robotic Applications – Process Control Sensors for measuring and monitoring Liquid Flow – Role of Sensors in flexible manufacturing systems – Robot Control through vision sensors – Robot guidance with vision systems – End effector camera sensor for Edge detection, extraction and detecting partially visible objects – Ultrasonic End effectors – Vision recognition sensors – Multisensor – Controlled robot

Assembly –Introduction to RADAR - Applications of RADAR sensors - imaging radar - Airborne radar.	
Total Periods:	**45**
Text Books:	
1	Jon S Wilson, Sensor Technology Handbook, 2022, Elsevier Inc., USA.
2	Sabrie Soloman, Sensors Handbook, Tata Mcgraw Hill, 2022.
3	Ashwini Pendurkar, Vaishali C. Shelar , “Sensor Technology”, ISBN : 978-93-91496-51-7, 2023.
Reference Books:	
1	B C Nakra& K K Choudhry, Instrumentation Measurement and Analysis, 2023, 3rd ed.,Tata McGrawHill, India.
2	Jacob Fraden, Hand Book of Modern Sensors: Physics, Designs and Applications, 2021, 3rded., Springer, USA.
3	John G Webster, Measurement, Instrumentation and sensor Handbook, 2023, CRC Press, USA.
4	A Stephen, The Science and Engineering of Microelectronic Fabrication, 2001, Second Edition,, Oxford University Press, 198, Madison Avenue, New York.
5	Meril I Skolink,“Introduction to Radar Systems”, Tata–McGraw Hill (Third Edition), 2019
6	Jerzy M Kawecki, “Radar Essentials”, IEEE Press 2000.
Web References:	
1	https://r2r.tech/blog/web-guiding-fundamentals-sensors
2	https://www.electrochem.org/world-of-sensors/
Online Resources:	
1	https://onlinecourses.nptel.ac.in/noc23_ee95/preview
2	https://iisc.talentsprint.com/sensor-technologies-certification-course/mobile/?utm_source=g_search&utm_medium=paid_google&utm_campaign=iisc-st-g_search-performance-lower_funnel&utm_content=iisc-st-g_search-performance-lower_funnel-audience&utm_term=course%20on%20sensors&placement=&matchtype=b&device=c&network=g&gad_source=1&gclid=Cj0KCQjwkdO0BhDxARIsANkNcrclYiG8CUlde6hTu32pPHKl38AdGLZzfou13iRyg6ffDr_b3ygJTOQaArzrEALw_wcB
3	https://www.coursera.org/learn/sensors-circuit-interface

22EC934	SENSORS FOR INDUSTRIAL APPLICATIONS	3/0/0/3

Nature of Course	: C (Theory Concept)

Course Objectives:

1	To study the sensor characteristics and the fundamental principles of Sensing
2	To understand the sensor interface electronics
3	To analyse motion-related sensors
4	To study smart sensors for IoT
5	To study light and radiation detectors

Course Outcomes:

Upon completion of the course, students shall have ability to

C934.1	Understand the characteristics of sensors used to measure various parameters.	[U]
C934.2	Understand the function of various sensor interface circuits	[U]
C934.3	Analyze the interface electronics and the sensors related to motion	[AN]
C934.4	Integrate various sensors into the development of flexible manufacturing systems	[AP]
C934.5	Apply the principles of light detectors to a range of practical applications	[AP]
C934.6	Apply knowledge of smart sensors for IoT applications and radiation detectors for industrial measurement systems	[AP]

Course Contents:

PRINCIPLES OFSENSING: **15**

Data Acquisition – sensor characteristics and types– pyroelectric Sensors – Integrated Hall Sensors - thermoelectric effects – dynamic models of sensors. Optical components and interface electronics :radiometry – Photometry – fibre optic sensors – concentrators – Interface circuits - Visible light color sensors - light-to-voltage – Capacitance-to-voltage – noise in sensors and circuits – calibration – low power sensors -Hysteresis, Torque , Torsion.

MOTION RELATEDSENSORS: **15**

Occupancy and motion detectors: ultrasonic – microwave – capacitive detectors – triboelectric – Optoelectronic motion sensors – optical presence sensor – Pressure Gradient sensors Velocity and acceleration sensors: Accelerometer characteristics – capacitativeaccelerometers – Piezoelectric accelerometers – piezoresistive accelerometers – thermal accelerometers – Gyroscopes – piezoelectric cables – gravitational sensors-gesture sensor-PIR sensor.

SMART SENSORS FOR IoT -LIGHT AND RADIATION DETECTORS: **15**

Smart Transducers: Smart Sensors, Components of Smart Sensors, General Architecture of Smart Sensors, Evolution of Smart Sensors, Advantages, Application area of Smart Sensors - Sensor-Cloud; Fog Computing, Smart Cities and Smart Homes, Connected Vehicles, Smart Grid, Industrial IoT -Light Detectors: Photo diodes – photo transistor - optical design –gas flame detectors Radiation Detectors: scintillating detectors – ionization detectors. **Case Study**:Agriculture, Healthcare, Activity Monitoring

Total Periods: 45

Text Books:	
1	Jacob Fraden, “Handbook of Modern Sensors: Physics, Designs, and Applications”, Fourth Edition, Springer, 2010.
2	Pethuru Raj and Anupama C. Raman, "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", CRC Press, 2017.
3	Nihtianov, Stoyan, and Antonio Luque, eds. Smart sensors and MEMS: Intelligent sensing devices and microsystems for industrial applications. Woodhead Publishing, 2018.
Reference Books:	
1	Dan Mihai Stefanescu,”Handbook of Force Transducers”, Springer science and Business Media, 2011.
2	John Vetelino, Aravind Reghu, “Introduction to Sensors”, CRC Press 2010.
3	E.A. Doebelin, “Measurement Systems – Applications and Design", Tata Mc Graw Hill, New York, 2012.
Web References:	
1	http://courses.csail.mit.edu/6.141/spring2011/pub/lectures
2	http://web.eecs.umich.edu/~jfr/embeddedctrls/files
Online Resources:	
1	http://nptel.ac.in/courses/112103174/3
2	https://nptel.ac.in/courses/112103174/pdf/mod2.pdf
3	https://nptel.ac.in/courses/117103125/

22EC935	BIOMATERIALS AND ITS APPLICATIONS	3/0/0/3
Nature of Course	:C (Theory Concept)	

Course Objectives:

1	To study the characteristics of Biomaterials and its reaction in the host
2	To understand Biomaterials degradation mechanism
3	To understand different metals and ceramics used as biomaterials
4	To study the different polymeric materials and their clinical application and role in drug delivery
5	To understand the concept of Biomedical application of polymers outside the body

Course Outcomes:
Upon completion of the course, students shall have ability to

C935.1	Understand the properties of biomaterials and biomaterial- tissue reaction.	[U]
C935.2	Understand the Biomaterials degradation mechanism	[U]
C935.3	Apply the metals and ceramic materials used for medical applications	[AP]
C935.4	Compare the different polymeric materials, applications in biomedical field and its function in drug delivery	[U]
C935.5	Analyse the concept of Biodegradable polymers for medicinal application	[AN]

Course Contents:

INTRODUCTION TO BIO-MATERIALS **15**

Definition and classification of bio-materials, Characterization of biomaterials: mechanical properties, surface properties, viscoelasticity. Host reactions to biomaterials: Inflammation, Wound Healing and Foreign Body Response, Failure mechanisms: corrosion, fracture, degradation of Implanted materials in the biological environment.

METALLIC AND CERAMIC MATERIALS **15**

Metallic implants: Stainless steels, co-based alloys, Ti-based alloys, shape memory alloy, applications. Ceramic implant: bioinert, biodegradable or bio resorbable, bioactive ceramics, applications.

POLYMERIC IMPLANT MATERIALS **15**

Polymerization, Polyethylene, Clinical study of synthetic polymers, Blood compatible polymers, Bioactive polymers, Hydrogels; Drug incorporation polymer gels, Biomedical application of polymers outside the body and temporary in vivo applications. Case Study: Biodegradable polymers for medicinal application

Total Periods: 45

Text Books:

1	Sujata V. Bhatt, “Biomaterials”, Narosa Publishing House, Second edition, 2022
2	BD Ratner, AS Hoffmann, FJ Schoen, JE Lemmons, “An Introduction to Materials in Medicine” Academic Press, Third Edition, 2019
3	Vasif Hasirci , Nesrin Hasirci, “Fundamentals of Biomaterials”, Springer, 2024

Reference Books:

1	Park J.B, R.S Lakes “Biomaterials an Introduction”, Springer, Third edition, 2017.
2	Joseph D Bronzino, “Biomedical engineering Fundamentals”, CRC press, Third Edition, 2014
3	Subhash C Anand, J F Kennedy, M.Miraftab, S.Rajendran, “Medical Textiles and Biomaterials for Healthcare”, 2016.
Web References:	
1	https://iopscience.iop.org/article/10.1088/1757-899X/1116/1/012178/pdf
2	https://www.intechopen.com/online-first/89304
Online Resources:	
1	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8513057/
2	https://nptel.ac.in/courses/102106057
3	https://www.coursera.org/learn/materials-oral-health

22EC704	PROJECT - I	0/0/6/3
Nature of Course	PROJ	
Course Objectives:		
1	To demonstrate the interpersonal skills and technical abilities.	
2	To apply suitable tools and techniques to solve the practical problems.	
3	To develop a working model	
Course Outcomes: **Upon completion of the course, students shall have ability to**		
C702.1	Design and develop a working model.	[C]
C702.2	Develop technical skill, presentation skill and interpersonal behavior.	[AP]
C702.3	Demonstrate interdisciplinary skill, ethical values and team work.	[AP]
C702.4	Examine market trends in terms of economics and finance.	[AP]

Course Guidelines:

Introduction: Identifying an Innovation Challenge, Needs Finding, Observation Techniques, Techniques for Organizing Data. **Ideate:** Rules of Brainstorming, Brainstorm Facilitation. **Prototype:** Role of DT in your work, Prototyping Techniques, Testing Prototypes. **Experiments:** Introduction to Experimental Design, Types of Experiments, Business model canvass. Introduction and need for intellectual property rights.

1. Each student is expected to do a project and form a team of 3 members.
2. Every team shall have a guide who is the member of the faculty of the institution. Identification of faculty guide has to be completed within a week from the day of beginning of sixth semester.
3. The student has to identify and fabricate his/her idea into the project-working model by conducting literature survey and finalize it.
4. A project report to this effect has to be submitted by the team. Also, the complete design project report has to be submitted by team.
5. Three mid semester reviews and one end semester review of the progress of the project work have to be conducted by a team of faculty (minimum 3 and a maximum of 5) along with their faculty guide as a member of the faculty team.
6. During the end semester exam, one internal examiner and one external examiner, appointed by the COE will examine the Project - I done by the students.

Summative assessment based on Continuous Examination

Activity	Month	Continuous Assessment [100 marks]
Project Evaluation	August	30
Project Evaluation	September	30
Project Evaluation + Presenting in International Conference/Journal	October	40

SEMESTER – VIII

22EC801	PROJECT - II	0/0/24/12
Nature of Course	PROJ	
Course Objectives:		
1	To demonstrate the interpersonal skills and technical abilities.	
2	To apply suitable tools and techniques to solve the practical problems.	
3	To develop a working model	
Course Outcomes: **Upon completion of the course, students shall have ability to**		
C801.1	Design and develop a working model.	[C]
C801.2	Develop technical skill, presentation skill and interpersonal behavior.	[AP]
C801.3	Demonstrate interdisciplinary skill, ethical values and team work.	[AP]
C801.4	Examine market trends in terms of economics and finance.	[AP]

Course Guidelines:

Introduction: Identifying an Innovation Challenge, Needs Finding, Observation Techniques, Techniques for Organizing Data. **Ideate:** Rules of Brainstorming, Brainstorm Facilitation. **Prototype:** Role of DT in your work, Prototyping Techniques, Testing Prototypes. **Experiments:** Introduction to Experimental Design, Types of Experiments, Business model canvass. Introduction and need for intellectual property rights.

1. Each student is expected to do a project and form a team of 3 members.
2. Every team shall have a guide who is the member of the faculty of the institution, identified earlier for project - I
3. The student has to identify and fabricate his/her idea into the project-working model by conducting literature survey and finalize it.
4. A project report (of the Project - II) to this effect has to be submitted by the team. Also, the complete design project report has to be submitted by team.
5. Three mid semester reviews and one end semester review of the progress of the project work have to be conducted by a team of faculty (minimum 3 and a maximum of 5) along with their faculty guide as a member of the faculty team.
6. During the end semester exam, one internal examiner and one external examiner, appointed by the COE will examine the Project - II done by the students.

Summative assessment based on Continuous Examination

Activity	Month	Continuous Assessment [100 marks]
Project Evaluation	January	30
Project Evaluation	February	30
Project Evaluation + Presenting in International Conference/Journal	March	40