



Department of Electronics and Communication Engineering
B.Tech. Electronics and Communication Engineering with IoT and AI
(Full Time)

Curriculum – 2018 Regulation

I SEMESTER							
S.NO.	SUBJECT CODE	SUBJECT NAME	Ty/ Lb/ ET L	L	T/ SLr	P/ R	C
1	BEN18001	Technical English –I	Ty	1	0/0	2/0	2
2	BMA18001	Mathematics – I	Ty	3	1/0	0/0	4
3	BPH18001	Engineering Physics –I	Ty	2	0/1	0/0	3
4	BCH18001	Engineering Chemistry –I	Ty	2	0/1	0/0	3
5	BES18001	Basic Electrical & Electronics Engineering	Ty	2	0/1	0/0	3
6	BES18002	Basic Mechanical & Civil Engineering	Ty	2	0/1	0/0	3
PRACTICALS*							
1	BES18L01	Basic Engineering Workshop	Lb	0	0/0	2/0	1
2	BES18ET1	Orientation to Entrepreneurship & Project Lab	ETL	0	0/0	2/0	1
3	BES19I01	Digital Skills(Python Programming)	ETL	1	0/0	1/0	1

Credits Sub Total: 21

II SEMESTER							
S.NO.	SUBJECT CODE	SUBJECT NAME	Ty/ Lb/ ETL	L	T/ SL r	P/R	C
1	BMA18003	Mathematics – II	Ty	3	1/0	0/0	4
2	BPH18002	Engineering Physics –II	Ty	2	0/1	0/0	3
3	BCH18002	Engineering Chemistry – II	Ty	2	0/1	0/0	3
4	BES18003	Environmental Science*	Ty	NON CREDIT COURSE			
PRACTICALS*							
1	BEN18ET1	Communication Lab	ETL	1	0/0	2/0	1
2	BES18ET2	Basic Engineering Graphics	ETL	1	0/0	2/0	2
3	BES18L02	Integrated Physical Science Lab	Lb	0	0/0	2/0	1
4	BES18ET3	C Programming and Lab	ETL	1	0/0	2/0	2
5	BES19I02	Java programming	ETL	1	0/0	2/0	2

Credits Sub Total: 18

TOTAL CREDITS: 39

C: Credits L: Lecture T: Tutorial S.Lr: Supervised Learning P: Problem / Practical R: Research Ty/Lb/ETL: Theory /Lab/Embedded Theory and Lab * Internal Evaluation



Department of Electronics and Communication Engineering

III SEMESTER							
S.NO.	SUBJECT CODE	SUBJECT NAME	Ty/ Lb/ ETL	L	T/ SLr	P/R	C
1	BEC18001	Signals and Systems	Ty	3	1/0	0/0	4
2	BEC18003	Digital Electronics	Ty	3	1/0	0/0	4
3	BEC18004	Solid State Devices	Ty	3	0/0	0/0	3
4	BCS18I01	C Programming with Linux (Inter Disciplinary Theory -I)	Ty	3	0/0	0/0	3
PRACTICALS*							
1	BEC18L01	Circuits And Devices Lab	Lb	0	0/0	3/0	1
2	BEC18L02	Digital System Design Lab	Lb	0	0/0	3/0	1
3	BCS18IL1	C Programming with Linux Lab	Lb	0	0/0	3/0	1
4	BCS19I03	Cloud Applications	ETL	2	0/1	3/0	4

Credits Sub Total: 21

IV SEMESTER							
S.NO.	SUBJECT CODE	SUBJECT NAME	Ty/ Lb/ ETL	L	T/ SLr	P/R	C
1	BMA18007	Probability and Random Process	Ty	3	1/0	0/0	4
2	BEC18005	Control Systems for Electronics	Ty	3	1/0	0/0	4
3	BEC18006	Electronic Circuits	Ty	3	0/0	0/0	3
4	BEC18007	Communication Theory	Ty	3	0/0	0/0	3
5	BHS18NC1/ BHS18NC2	The Indian Constitution* / The Indian Traditional Knowledge*	Ty	2	0/0	0/0	NC
PRACTICALS*							
1	BCS19I05	Big Data Engineering	ETL	1	0/1	3/0	3
2	BEC18L03	Electronic Circuits Lab	Lb	0	0/0	3/0	1
3	BEC18L04	Digital Simulation Lab	Lb	0	0/0	3/0	1
4	BEC18L05	Circuit Simulation Using P- Spice	Lb	0	0/0	3/0	1
5	BEC18TS1	Technical Skill -I	Lb	0	0/0	3/0	1
6	BEN18SK1	Soft Skill I (Career & Confidence Building)	ETL	0	0/0	3/0	1

Credits Sub Total: 22

C: Credits L: Lecture T: Tutorial S.Lr: Supervised Learning P: Problem / Practical R: Research Ty/Lb/ETL: Theory /Lab/Embedded Theory and Lab * Internal Evaluation



Department of Electronics and Communication Engineering

V SEMESTER							
S.NO.	SUBJECT CODE	SUBJECT NAME	Ty/ Lb/ ETL	L	T/ SL r	P/R	C
1	BEC18008	Digital Signal Processing	Ty	3	1/0	0/0	4
2	BCS18I02	Computer Communication	Ty	3	0/0	0/0	3
3	BEC18EXX	Elective- I	Ty	3	0/0	0/0	3
4	BXX18OEX	Open Elective- I	Ty	3	0/0	0/0	3
PRACTICALS*							
1	BCS19I07	Artificial Intelligence	ETL	1	0/1	3/0	3
2	BEC18L06	Communication Lab- I	Lb	0	0/0	3/0	1
3	BEC18LXX	Lab Based on Elective	Lb	0	0/0	3/0	1
4	BCS18IL2	Computer Networks Lab	Lb	0	0/0	3/0	1
5	BEC18TS2	Technical Skill -II	Lb	0	0/0	3/0	1

Credits Sub Total: 20

VI SEMESTER							
S.NO.	SUBJECT CODE	SUBJECT NAME	Ty/ Lb/ ETL	L	T/ SLr	P/ R	C
1	BEC18009	Digital Communication	Ty	3	1/0	0/0	4
2	BEC18010	Introduction to VLSI and Embedded System Design	Ty	3	0/0	0/0	3
3	BEC18EXX	Elective- II	Ty	3	0/0	0/0	3
4	BXX18OEX	Open Elective- II	Ty	3	0/0	0/0	3
PRACTICALS*							
1	BEC19I01	IoT and its Applications	ETL	1	0/1	3/0	3
2	BEC18L07	Communication Lab -II	Lb	0	0/0	3/0	1
3	BEC18L08	VLSI and Embedded System Design Lab	Lb	0	0/0	3/0	1
4	BEN18SK2	Soft Skill II (Qualitative and Quantitative Skills)	ETL	0	0/0	3/0	1
5	BEC18L09	Mini Project/In plant Training/Industrial training	Lb	0	0	3/0	1
6	BEC18TS3	Technical Skill -III	Lb	0	0/0	3/0	1

Credits Sub Total: 21

C: Credits L: Lecture T: Tutorial S.Lr: Supervised Learning P: Problem / Practical R: Research Ty/Lb/ETL: Theory /Lab/Embedded Theory and Lab * Internal Evaluation



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VII SEMESTER							
S.NO.	SUBJECT CODE	SUBJECT NAME	Ty/ Lb/ ETL	L	T/ SL r	P/ R	C
1	BEC18011	Digital Image Processing and its Applications	Ty	3	1/0	0/0	4
2	BEC18EXX	Elective -III	Ty	3	0/0	0/0	3
3	BEC18EXX	Elective -IV	Ty	3	0/0	0/0	3
4	BMG18003	Principles of Management	Ty	3	0/0	0/0	3
PRACTICALS*							
1	BEC19I02	Block Chain Technology	ETL	1	0/1	3/0	3
2	BEC18L10	Microwave and Optical Communication Lab	Lb	0	0/0	3/0	1
3	BEC18L11	Open CV - Python for Digital Image Processing Lab	Lb	0	0/0	3/0	1
4	BEC18L12	Project Phase – I	Lb	0	0/0	3/3	2
5	BFL18001	Foreign Language	Lb	0	0/0	3/0	1
6	BXX18OLX	Open Lab	Lb	0	0/0	3/0	1

Credits Sub Total: 22

VIII SEMESTER							
S.NO.	SUBJECT CODE	SUBJECT NAME	Ty/ Lb/ ETL	L	T/ SLr	P/R	C
1	BEC18012	Wireless Networks	Ty	3	1/0	0/0	4
2	BEC18013	Cognitive Radio	Ty	3	0/0	0/0	3
PRACTICALS*							
1	BEC18L13	Project (Phase – II)	Lb	0	0/0	12/12	8

Credits Sub Total: 15

Credit Summary

Semester: 1 : 21
 Semester: 2 : 18
 Semester: 3 : 21
 Semester: 4 : 22
 Semester: 5 : 20
 Semester: 6 : 21
 Semester: 7 : 22
 Semester: 8 : 15
Total Credits : 160



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ELECTIVE I – Electronics Stream							
S.NO.	SUBJECT CODE	SUBJECT NAME	Ty/ Lb/ ETL	L	T/ SLr	P/R	C
1	BEC18E01	Microprocessor and Microcontroller	Ty	3	0/0	0/0	3
2	BEC18E02	Semiconductor devices and its Applications	Ty	3	0/0	0/0	3
3	BEC18E03	Basics of Robotics	Ty	3	0/0	0/0	3
4	BEC18E04	C++ and Data structures	Ty	3	0/0	0/0	3

ELECTIVE I – Communication Stream							
S.NO.	SUBJECT CODE	SUBJECT NAME	Ty/ Lb/ ETL	L	T/ SLr	P/R	C
1	BEC18E05	Antenna and Wave Propagation	Ty	3	0/0	0/0	3
2	BEC18E06	Telecommunication Switching System	Ty	3	0/0	0/0	3
3	BEC18E07	Real Time Operating Systems	Ty	3	0/0	0/0	3
4	BEC18E08	Audio Signal Processing	Ty	3	0/0	0/0	3

ELECTIVE II – Electronics Stream							
S.NO.	SUBJECT CODE	SUBJECT NAME	Ty/ Lb/ ETL	L	T/ SLr	P/R	C
1	BEC18E09	Intelligent Instrumentation	Ty	3	0/0	0/0	3
2	BEC18E10	Advanced Microprocessors	Ty	3	0/0	0/0	3
3	BEC18E11	Nano Electronics	Ty	3	0/0	0/0	3
4	BEC18E12	Computer Architecture	Ty	3	0/0	0/0	3

ELECTIVE II – Communication Stream							
S.NO.	SUBJECT CODE	SUBJECT NAME	Ty/ Lb/ ETL	L	T/ SLr	P/R	C
1	BEC18E13	Next Generation IP Networks	Ty	3	0/0	0/0	3
2	BEC18E14	Neural Networks and its Applications	Ty	3	0/0	0/0	3
3	BEC18E15	Optical Communication	Ty	3	0/0	0/0	3
4	BEC18E16	Radar and Navigational Aids	Ty	3	0/0	0/0	3



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ELECTIVE III – Electronics Stream							
S.NO.	SUBJECT CODE	SUBJECT NAME	Ty/ Lb/ ETL	L	T/ SLr	P/R	C
1	BEC18E17	Advanced Digital System	Ty	3	0/0	0/0	3
2	BEC18E18	Embedded System	Ty	3	0/0	0/0	3
3	BEC18E19	Quantum Computing	Ty	3	0/0	0/0	3
4	BEC18E20	Power Electronics	Ty	3	0/0	0/0	3
ELECTIVE III – Communication Stream							
S.NO.	SUBJECT CODE	SUBJECT NAME	Ty/ Lb/ ETL	L	T/ SLr	P/R	C
1	BEC18E21	High Speed Switching Architecture	Ty	3	0/0	0/0	3
2	BEC18E22	Information Coding Techniques	Ty	3	0/0	0/0	3
3	BEC18E23	Microwave Engineering	Ty	3	0/0	0/0	3
4	BEC18E24	Optical Network and Switching Techniques	Ty	3	0/0	0/0	3
ELECTIVE IV – Electronics Stream							
S.NO.	SUBJECT CODE	SUBJECT NAME	Ty/ Lb/ ETL	L	T/ SLr	P/R	C
1	BEC18E25	Device Modeling	Ty	3	0/0	0/0	3
2	BEC18E26	VLSI Technology	Ty	3	0/0	0/0	3
3	BEC18E27	Bio Medical Instrumentation	Ty	3	0/0	0/0	3
4	BEC18E28	Embedded Software Design	Ty	3	0/0	0/0	3
ELECTIVE IV – Communication Stream							
S.NO.	SUBJECT CODE	SUBJECT NAME	Ty/ Lb/ ETL	L	T/ SLr	P/R	C
1	BEC18E29	Spread Spectrum Communication	Ty	3	0/0	0/0	3
2	BEC18E30	Network Management	Ty	3	0/0	0/0	3
3	BEC18E31	Satellite Communication	Ty	3	0/0	0/0	3
4	BEC18E32	Operating Mobile Communication	Ty	3	0/0	0/0	3



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Common Elective For Both Streams

S.NO.	SUBJECT CODE	SUBJECT NAME	Ty/ Lb/ ETL	L	T/ SLr	P/R	C
1	BEC18CE1	Sensors and its Applications	Ty	3	0/0	0/0	3
2	BEC18CE2	Cryptography and Network Security	Ty	3	0/0	0/0	3
3	BEC18CE3	Advanced Microcontroller	Ty	3	0/0	0/0	3
4	BEC18CE4	Electromagnetic Field Theory	Ty	3	0/0	0/0	3
5	BEC18CE5	Transmission Lines & Wave Guides	Ty	3	0/0	0/0	3

Lab Based on Elective

S.NO.	SUBJECT CODE	SUBJECT NAME	Ty/ Lb/ ETL	L	T/ SLr	P/R	C
1	BEC18L14	Microprocessor and Microcontroller Lab	Lb	0	0/0	3/0	1
2	BEC18L15	Basics of Robotics Lab	Lb	0	0/0	3/0	1
3	BEC18L16	C++ and Data Structures Lab	Lb	0	0/0	3/0	1
4	BEC18L17	Antenna and Wave Propagation Lab	Lb	0	0/0	3/0	1
5	BEC18L18	Telecommunication Switching Systems Lab	Lb	0	0/0	3/0	1
6	BEC18L19	Audio Signal Processing Lab	Lb	0	0/0	3/0	1

OPEN ELECTIVES

S.NO.	SUBJECT CODE	SUBJECT NAME	Ty/ Lb/ ETL	L	T/ SLr	P/R	C
1	BEC18OE1	Internet of things and its applications	Ty	3	0/0	0/0	3
2	BEC18OE2	Cellular mobile communication	Ty	3	0/0	0/0	3
3	BEC18OE3	Satellite and its applications	Ty	3	0/0	0/0	3
4	BEC18OE4	Fundamentals of sensors	Ty	3	0/0	0/0	3
5	BEC18OE5	Basics of microprocessors and microcontrollers	Ty	3	0/0	0/0	3
6	BEC18OE6	Industry 4.0 concepts	Ty	3	0/0	0/0	3

OPEN LAB

S.NO.	SUBJECT CODE	SUBJECT NAME	Ty/ Lb/ ETL	L	T/ SLr	P/R	C
1	BEC18OL1	Sensors and IoT Lab	Lb	0	0/0	3/0	1
2	BEC18OL2	Robotics Control Lab	Lb	0	0/0	3/0	1
3	BEC18OL3	Basics of MATLAB	Lb	0	0/0	3/0	1



Department of Electronics and Communication Engineering
DEPARTMENT OF ENGLISH

Subject Code :BEN18001	Subject Name : TECHNICAL ENGLISH – I	L	T/SLr	P/R	C							
	Prerequisite : None	1	0/0	2/0	2							
L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab												
OBJECTIVES :												
<ul style="list-style-type: none"> Strengthen their vocabulary in both technical and business situations Get practice in functional grammar Learn the effective way of corresponding with officials Learn to give instructions, suggestions, and recommendations and comprehend and infer the information from the given passages. Train learners in organized academic and professional writing 												
COURSE OUTCOMES (Cos) : (3 – 5)												
Students completing the course would be able to												
CO1	Recall basic grammar, spelling and phonetics concept											
CO2	Discuss ideas and concepts in groups											
CO3	Interpret charts, diagrams, reports and advertisements.											
CO4	Analyze and evaluate scientific and technical concepts for organized oral and written presentation											
CO5	Apprise, argue and support using critical judgements on any given topic											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	1	3	1	1	1	1	3	1	3
CO2	3	3	3	3	1	3	3	1	3	3	1	3
CO3	3	2	1	3	3	2	2	1	2	3	1	3
CO4	3	3	3	3	1	2	1	3	2	3	1	3
CO5	1	2	2	3	3	2	2	1	3	3	2	3
COs/PSOs		PSO1			PSO2			PSO3			PSO4	
CO1		3			1			1			1	
CO2		3			1			1			1	
CO3		3			1			1			1	
CO4		3			1			1			1	
CO5		3			1			1			1	
3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low												
Category	Basic Sciences	Engg Sciences	Humanities & Social Sciences	Program	Program Electives	Open Electives	Practical / Project	Internship / Technical	Soft Skills			
			✓									



Department of Electronics and Communication Engineering

BEN18001	TECHNICAL ENGLISH - I	1	0/0	2/0	2
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UNIT I VOCABULARY BUILDING

6 HRS

The concept of Word Formation-Root words and affixes from foreign languages and their use in English to form derivatives.-Homophones- Words often confused-Verbal analogy

UNIT II BASIC WRITING SKILLS

6 HRS

Using Idioms and phrases in sentences-Sentence structures: statements, interrogative and imperative-Use of Conditional/'if' clauses in sentences-Importance of proper punctuation-Creating coherence with sentence markers-Organizing coherent paragraphs in essays

UNIT III IDENTIFYING COMMON ERRORS IN WRITING

6 HRS

Subject-verb agreement-Noun-pronoun agreement- Misplaced modifiers-Articles-Prepositions- Redundancies and Clichés

UNIT IV WRITING PRACTICE- NATURE AND STYLE OF TECHNICAL WRITING

6 HRS

Describing Gadgets- Defining Concepts-Classifying data-Comprehension-Essay Writing- Informal and Formal Letter Writing:

UNIT V ORAL COMMUNICATION AND INTERACTIVE LEARNING

6 HRS

(This unit involves interactive practice sessions in Language Lab)

Activities to develop knowledge in Word formation, Vocabulary and analytical thinking-Instructions and – Recommendations-Formal and Informal Registers in Speech-Listening and taking notes

Total no. of Hours: 30

TEXT BOOKS:

1. Quest: A Textbook of Communication Skills, Vijay Nicole, 2017.
2. Pushkala, R, Padmasani Kannan S, Anuradha V, Chandrasena M Rajeswaran

SUGGESTED READINGS:

- (i) *Practical English Usage*. Michael Swan. OUP. 1995.
- (ii) *Remedial English Grammar*. F.T. Wood. Macmillan.2007
- (iii) *On Writing Well*.William Zinsser. Harper Resource Book. 2001
- (iv) *Study Writing*. Liz Hamp-Lyons and Ben Heasley.Cambridge University Press. 2006.
- (v) *Communication Skills*. Sanjay Kumar and Pushp Lata.Oxford University Press. 2011.
- (vi) *Exercises in Spoken English*. Parts.I-III. CIEFL, Hyderabad. Oxford University Press
- (vi) Pronunciation in Use ,Mark Hancock. Cambridge University Press. 2012



Department of Electronics and Communication Engineering

DEPARTMENT OF MATHEMATICS

Subject Code :BMA18001	Subject Name : MATHEMATICS – I	L	T/SLr	P/R	C
	Prerequisite : None	3	1/0	0/0	4

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES :

- Apply the Basic concepts in Algebra
- Use the Basic concepts in Matrices
- Identify and solve problems in Trigonometry
- Understand the Basic concepts in Differentiation
- Apply the Basic concepts in Functions of Several variables

COURSE OUTCOMES (Cos) : (3 – 5)

Students completing the course were able to

CO1	Demonstrate knowledge of basic concepts of Mathematics science & Engineering mathematics
CO2	Calculate the required parameters using basic mathematical theorem, laws and formulae
CO3	Apply mathematical techniques to solve problems
CO4	Examine the relevant methods, tools and techniques to provide solutions
CO5	Combine scientific & math principles, apply to real time problems for accurate results

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	1	2	2	1	1	3	3	1	3
CO2	3	3	1	2	3	1	1	1	1	1	1	3
CO3	3	3	2	2	3	2	1	1	2	3	1	2
CO4	3	3	2	2	1	2	1	1	2	3	1	2
CO5	3	3	2	2	2	2	1	1	2	2	1	1

COs/PSOs	PSO1	PSO2	PSO3	PSO4
CO1	3	1	1	1
CO2	3	1	1	1
CO3	3	1	1	1
CO4	3	1	1	1
CO5	3	1	1	1

H/M/L indicates strength of correlation H – High, M – Medium, L – Low

Category	Basic Sciences	Engg Sciences	Humanities & Social Sciences	Program core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skills	Soft Skills
	√								



Department of Electronics and Communication Engineering

BMA18001	MATHEMATICS – I	3 1/0 0/0 4
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UNIT I ALGEBRA

12 HRS

Binomial, Exponential, Logarithmic Series (without proof of theorems) – Problems on Summation, Approximation and Coefficients.

UNIT II MATRICES

12 HRS

Characteristic equation – Eigen values and Eigen vectors of a real matrix – Properties of Eigen values – Cayley - Hamilton theorem (without proof) – Orthogonal reduction of a symmetric matrix to Diagonal form.

UNIT III TRIGONOMETRY

12 HRS

Expansions of $\sin n\theta$, $\cos n\theta$ in powers of $\sin\theta$ and $\cos\theta$ – Expansion of $\tan n\theta$ – Expansions of $\sin^n\theta$ and $\cos^n\theta$ in terms of Sines and Cosines of multiples of θ – Hyperbolic functions – Separation into real and imaginary parts.

UNIT IV DIFFERENTIATION

12 HRS Basic

concepts of Differentiation – Elementary differentiation methods – Parametric functions – Implicit function – Leibnitz theorem (without proof) – Maxima and Minima – Points of inflection.

UNIT V FUNCTIONS OF SEVERAL VARIABLES

12 HRS

Partial derivatives – Total differential – Differentiation of implicit functions – Taylor's expansion – Maxima and Minima by Lagrange's Method of undetermined multipliers – Jacobians.

Total no. of Hours: 60

TEXT BOOKS:

1. Kreyszig E., *Advanced Engineering Mathematics (10th ed.)*, John Wiley & Sons, (2011).
2. Veerarajan T., *Engineering Mathematics (for first year)*, Tata McGraw Hill Publishing Co., (2008).

REFERENCES:

1. Grewal B.S., *Higher Engineering Mathematics, Khanna Publishers, (2012)*.
2. John Bird, *Basic Engineering Mathematics (5th ed.)*, Elsevier Ltd, (2010).
3. P.Kandasamy, K.Thilagavathy and K. Gunavathy, *Engineering Mathematics Vol. I (4th Revised ed.)*, S.Chand & Co., Publishers, New Delhi (2000).
4. John Bird, *Higher Engineering Mathematics (5th ed.)*, Elsevier Ltd, (2006).



Department of Electronics and Communication Engineering

DEPARTMENT OF PHYSICS

Subject Code :BPH18001	Subject Name : ENGINEERING PHYSICS - I	L	T/SLr	P/R	C
	Prerequisite : None	2	0/1	0/0	3

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES :

- Outline the relation between Science, Engineering & Technology.
- Demonstrate competency in understanding basic concepts.
- Apply fundamental laws of Physics in Engineering & Technology.
- To identify & solve problems using physics concepts.
- Produce and present activities associated with the course through effective technical communication

COURSE OUTCOMES (Cos) : (3 – 5)

Students completing this course were able to

CO1	Demonstrate competency in understanding basic concepts.
CO2	Utilize scientific methods for formal investigations & demonstrate competency with experimental methods and verify the concept to content knowledge.
CO3	Identify and provide solutions for engineering problems.
CO4	Relate the technical concepts to day to day life and to practical situations.
CO5	Think analytically to interpret concepts.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	2	2	2	1	1	1	2	1	1
CO2	3	3	2	2	2	2	1	1	2	2	1	1
CO3	3	3	3	2	2	2	1	1	1	2	1	2
CO4	3	3	2	2	1	2	2	1	2	2	1	2
CO5	3	3	2	1	1	2	1	2	1	2	1	1
COs/POs	PSO1			PSO2			PSO3			PSO4		
CO1	3			1			1			1		
CO2	3			1			1			1		
CO3	3			1			1			1		
CO4	3			1			1			1		
CO5	3			1			1			1		

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engg Sciences	Humanities & Social Sciences	Program core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skills	Soft Skills
	√								



Department of Electronics and Communication Engineering

BPH18001

ENGINEERING PHYSICS - I

2 0/1 0/0 3

UNIT I MECHANICS & PROPERTIES OF MATTER

9 HRS

Mechanics : Introduction- scalar and vector quantities - rigid body - moment of inertia - forces in nature - Newton's laws of motion - derivation of Newton's second law of motion - motion of rocket – dynamical concepts - kinematics - conservation of energy and momentum - conservative and non-conservative forces - mechanics of continuous media - friction and its applications.

Properties of Matter: Elasticity - stress, strain and Hook's law - Poisson's ratio - three moduli of elasticity - twisting couple on a wire - viscosity - flow of liquid through a narrow tube: Poiseuille's law - Ostwald's viscometer - flow of blood in human body.

UNIT II SHM AND ACOUSTICS

9 HRS

SHM: Simple harmonic motion - differential equation of SHM - graphical representation of SHM - average kinetic energy of vibration - total energy of vibration - free and forced vibrations - damped and undamped vibrations - resonance - transverse wave on a string - law of transverse vibration of string - verification of the laws of transverse vibration of string - standing waves.

Acoustics : Fundamentals of acoustics - reverberation- reverberation time - factors affectinacoustics

Ultrasonics -Production of ultrasonic waves - detection of ultrasonic waves - acoustic grating - application of ultrasonic waves.

UNIT III WAVE OPTICS

9 HRS

Huygen`s principle - interference of light - wavefront splitting and amplitude - airwedge - Newton`s rings - Michelson interferometer and its applications - Fraunhofer diffraction from a single slit - Rayleigh criterion for limit of resolution - diffraction grating and resolving power of a telescope.

UNIT IV ELECTRO MAGNETIC THEORY

9 HRS

Electric field - coulomb`s law - alternating emf - rms and average value of an alternating current & voltage - resistors, capacitors and inductor - energy stored in a capacitor - LCR circuit & resonance – magnetism-definition - types - Biot Savart law - energy stored in a magnetic field - Domain theory - electromagnetic induction - self and mutual inductance - Faraday`s law of electromagnetic induction -Lenz law.

UNIT V LASER

9HRS

Laser principle and characteristics - amplification of light by population inversion - properties of laser beams: mono-chromaticity, coherence, directionality and brightness - different types of lasers - Ruby laser-Nd-YAG laser-He-Ne laser-CO₂ laser - semiconductor laser - applications of lasers in science, engineering and medicine.

Total No of Hours: 45

TEXT BOOKS:

1. Brijlal, M. N. Avadhanulu & N. Subrahmanyam, Text Book of Optics, S. Chand Publications, 25th edition, 2012
2. R. Murugesan, Electricity and Magnetism, S.Chand Publications, 10th edition, 2017
3. R. Murugesan & Kiruthiga Sivaprasath, Modern Physics, S.Chand Publications, 2016

REFERENCES:

1. Dr. Senthil Kumar Engineering Physics I VRB Publishers, 2016
2. N Subrahmanyam & Brijlal, Waves and Oscillations, Vikas Publications, New Delhi, 1988
3. N Subrahmanyam & Brijlal, Properties of Matter, S. Chand Co., New Delhi, 1982
4. N Subrahmanyam & Brijlal, Text book of Optics, S. Chand Co., New Delhi, 1989
5. R. Murugesan, Electricity and Magnetism, S. Chand & Co., New Delhi, 1995
6. Thygarajan K & Ajay Ghatak, Laser Theory and Applications, Macmillan, New Delhi, 1981



Department of Electronics and Communication Engineering
DEPARTMENT OF CHEMISTRY

Subject Code :BCH18001	Subject Name : ENGINEERING CHEMISTRY – I	L	T/SLr	P/R	C
	Prerequisite : None	2	0/1	0/0	3

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES :

- Providing an insight into basic concepts of chemical thermodynamics.
- To create awareness about the water quality parameters, water analysis and softening of water from industrial perspective.
- Imparting fundamentals of emf, storage and fuel cells.
- Creating awareness about corrosion and its control methods.
- Introducing modern materials such as composites along with basic concepts of polymer chemistry and plastics.

COURSE OUTCOMES (Cos) : (1– 5)

Students completing this course were able to

CO1	Gain a clear understanding of the basic science as applied to engineering problems
CO2	Describe the ideas applied to demonstrate the competence through effective communication
CO3	Recall the information and analyze the health, ethical and engineering problems
CO4	Identify the environmental and societal issues and design solutions
CO5	Apply appropriate techniques by recognizing the need.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	1	1	1	1	1	1	1	1	3
CO2	3	3	2	3	1	1	1	1	1	3	1	2
CO3	3	2	2	1	2	3	1	3	1	1	1	3
CO4	3	1	1	3	3	3	3	1	1	1	1	3
CO5	3	1	1	3	3	1	1	1	1	1	1	3
COs/POs	PSO1			PSO2			PSO3			PSO4		
CO1	3			3			3			3		
CO2	3			3			3			1		
CO3	3			2			2			3		
CO4	3			1			2			2		
CO5	3			3			2			1		

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engg Sciences	Humanities & Social Sciences	Program core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skills	Soft Skills
	√								



Department of Electronics and Communication Engineering

BCH18001

ENGINEERING CHEMISTRY – I

2 0/1 0/0 3

UNIT I CHEMICAL THERMODYNAMICS

8 HRS

Introduction, Terminology in thermodynamics –System, Surrounding, State and Path functions, Extensive and intensive properties.Laws of thermodynamics – I and II laws-Need for the II law.Enthalpy, Entropy, Gibbs free energy, Helmholtz free energy - Spontaneity and its criteria.Maxwell relations, Gibbs -Helmholtz equation (relating E & A) and (relating H & G), Van't Hoff equations.

UNIT II TECHNOLOGY OF WATER

9 HRS

Water quality parameters – Definition and expression.Analysis of water – alkalinity, hardness and its determination (EDTA method only).Boiler feed water and Boiler troubles-Scales and sludges, Caustic embrittlement, Priming and Foaming and Boiler corrosion. Water softening processes – Internal and external conditioning – Lime soda, Zeolite, Demineralisation methods.Desalination processes-RO and Electrodialysis .Domestic water treatment.

UNIT III ELECTROCHEMISTRY AND ENERGY STORAGE DEVICES

10 HRS

Conductance – Types of conductance and its Measurement. Electrochemical cells – Electrodes and electrode potential, Nernst equation – EMF measurement and its applications. Types of electrodes- Reference electrodes- Standard hydrogen electrode- Saturated calomel electrode-Quinhydrone electrode – Determination of p^H using these electrodes. Reversible and irreversible cells– Fuel cells- H_2-O_2 fuel cell, Batteries-Lead storage battery,Nickel– Cadmium and Lithium-Battery.

UNIT IV CORROSION AND PROTECTIVE COATING

9 HRS

Introduction–Causes of Corrosion–Consequences- Factors affecting corrosion. Theories of corrosion-Chemical corrosion and Electrochemical corrosion. Methods of corrosion control – corrosion inhibitors, Sacrificial anode and Impressed current cathodic protection. Protective coatings- Metallic coatings- Chemical conversion coatings-paints-Constituents and functions.

UNIT V POLYMERS AND COMPOSITES

9 HRS

Monomers – Functionality – Degree of polymerization-Tacticity.Polymers – Classification, Conducting Polymers,Biodegradable polymers- Properties and applications.Plastics – Thermoplastics and thermosetting plastics,Compounding of plastics – Compression moulding, injection moulding and extrusion processes. Polymer composites-introduction-Types of composites-particle reinforced-fiber reinforced-structural composites-examples. Matrix materials, reinforcement materials-Kevlar, Polyamides, fiber glass, carbon fibers, ceramics and metals .

Total no. of Hours: 45

TEXTBOOKS:

- 1.S.Nanjundan&C.SreekuttanUnnithan, “Applied Chemistry”, Sreelakshmi Publications, (2007)
2. Dr.R.Sivakumar and Dr.N.Sivakumar” Engineering Chemistry” Tata McGraw Hill Publishing Company Ltd, Reprint 2013.

REFERENCES:

1. P.C. Jain & Monika Jain, “Engineering Chemistry”, Dhanpat Rai publishing Co., (Ltd.) (2013).
2. J. C. Kuriacose& J. Rajaram, “Chemistry in Engineering & Technology”, Tata Mc Graw Hill (1996).
3. B.R.Puri, L.R.Sharma&M.S.Pathania, “Principles of Physical Chemistry”, Vishal publishing co., (2013).



Department of Electronics and Communication Engineering
DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Subject Code : BES18001	Subject Name : BASIC ELECTRICAL & ELECTRONICS ENGINEERING	L	T/SLr	P/R	C
	Prerequisite : None	2	0/1	0/0	3

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES :

- Understand the concepts of circuit elements, circuit laws and coupled circuits.
- Acquire knowledge on conventional & non-conventional energy production.
- Gain information on measurement of electrical parameters.
- Identify basic theoretical principles behind the working of modern electronic gadgets.
- Demonstrate digital electronic circuits and assemble simple devices.

COURSE OUTCOMES (Cos) : (3 – 5)

Students completing the course were able to

CO1	Interpret fundamental principles, laws and their practical applications.
CO2	Verify the concept of electric & magnetic circuits and interpret results
CO3	Analyze various sources of power & energy, generation methods & conservation
CO4	Identify & Apply schematic symbols and understand the working principles of electronic devices & instruments
CO5	Design analog & digital circuits using basic concept to solve problems

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	3	2	3	1	1	1	3	2	1
CO2	3	3	3	3	3	3	3	1	1	2	2	1
CO3	3	3	3	2	3	3	2	1	2	2	3	1
CO4	3	3	3	2	3	2	2	1	3	3	2	1
CO5	3	3	3	2	3	3	2	2	2	2	2	1
COs/POs	PSO1			PSO2			PSO3			PSO4		
CO1	3			1			1			1		
CO2	3			1			1			1		
CO3	3			1			1			1		
CO4	3			1			1			1		
CO5	3			1			1			1		

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engg Sciences	Humanities & Socials	Program Core	Program Elect	Open Electives	Practical/Proj	Internships/Tech	Soft Skills
		√							



Department of Electronics and Communication Engineering

BES18001	BASIC ELECTRICAL & ELECTRONICS ENGINEERING	2	0/1	0/0	3
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UNIT I ELECTRIC CIRCUITS

9 HRS

Electrical Quantities – Ohms Law – Kirchoff's Law – Series and Parallel Connections – Current Division and Voltage Division Rule - Source Transformation – Wye (Y) – Delta (Δ) , Delta (Δ) – Wye (Y) Transformation – Rectangular to Polar and Polar to Rectangular.

UNIT II MACHINES & MEASURING INSTRUMENTS

9HRS

Construction & Principle of Operation of DC motor & DC Generator – EMF equation of Generator – Torque Equation of Motor – Construction & Principle of operation of a Transformer – PMMC – Moving Iron types of meter – Single Phase Induction Type Energy Meter.

UNIT III BASICS OF POWER SYSTEM

9HRS

Generation of Electric Power (Thermal, Hydro, Wind and Solar) – Transmission & Distribution of Electric Power – Types of Transmission & Distribution Schemes – Representation of Substation.

UNIT IV ELECTRON DEVICES

9HRS

Passive Circuit Components-Classification of Semiconductor-PN Junction Diode-Zener diode- Construction and Working Principle –Applications--BJT-Types of configuration-JFET.

UNIT V DIGITAL SYSTEM

9HRS

Number System – Binary, Decimal, Octal, Hexadecimal – Binary Addition Subtraction, Multiplication & Division– Boolean Algebra – Reduction of Boolean Expressions – Logic Gates - De-Morgan's Theorem, Adder – Subtractor.

Total no of Hours: 45

TEXT BOOKS:

1. D P Kothari, I J Nagrath, Basic Electrical Engineering, Second Edition, , Tata McGraw-Hill Publisher
2. A Course In Electrical And Electronic Measurements And Instrumentation,A.K. Sawhney, publisher DHANPAT RAI&CO
3. Text Book of Electrical Technology: Volume 3: Transmission, Distribution and Utilization,B.L.Theraja, A.K.Theraja, publisher S.CHAND
4. Morris Mano, M. (2002) Digital Logic and Computer Design. Prentice Hall of India
5. Millman and Halkias1991, Electronic Devices and Circuits , Tata McGraw Hill,

REFERENCE:

1. R.Muthusubramanian, S.Salivahanan, K A Muraleedharan, Basic Electrical, Electronics And Computer Engineering, Second Edition, ,Tata McGraw-Hill publisher.



Department of Electronics and Communication Engineering
DEPARTMENT OF MECHANICAL ENGINEERING

Subject Code: BES18002	Subject Name: BASIC MECHANICAL & CIVIL ENGINEERING	L	T/SLr	P/R	C
	Prerequisite: None	2	0/1	0/0	3

L: Lecture T: Tutorial SLr: Supervised Learning P : Project R : Research C: Credits
T/L/ETL: Theory / Lab / Embedded Theory and Lab

OBJECTIVES:

- To understand the fundamentals and applications of IC Engines, power plants, manufacturing processes and mechanics.
- To expose the students to the various construction materials and their applications.

COURSE OUTCOMES (Cos): (3 – 5)

Students completing the course were able to

CO1	Understand the construction and working principles of steam generators, IC engines and power plants.
CO2	Apply the knowledge of various concepts of Manufacturing processes.
CO3	Solve simple problems on Engineering mechanics
CO4	Identify the appropriate materials and their properties, used for construction purpose
CO5	Apply the knowledge of construction for various structural applications.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	1	1	2	2	3	3	3	1	3
CO2	3	2	1	1	1	2	2	2	2	2	1	2
CO3	3	3	2	1	1	1	2	2	2	2	1	2
CO4	3	2	2	1	1	1	3	1	2	2	1	2
CO5	3	2	2	1	1	1	3	2	2	2	1	2

COs/POs	PSO1	PSO2	PSO3	PSO4
CO1	3	1	1	1
CO2	3	1	1	1
CO3	3	1	1	1
CO4	3	1	1	1
CO5	3	1	1	1

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engg Sciences	Humanities & Social Sciences	Program core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skills	Soft Skills
		√							



Department of Electronics and Communication Engineering

BES18002	BASIC MECHANICAL & CIVIL ENGINEERING	2 0/1 0/0 3
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UNIT I THERMAL ENGINEERING

9 HRS

Classification of internal combustion engine – two stroke, four stroke petrol and diesel engines. Classification of Boilers – Cochran boiler – Locomotive boilers – Power plant classification – Working of Thermal and Nuclear power plant.

UNIT II MANUFACTURING PROCESS

13HRS

Metal

forming processes – Rolling, forging, drawing, extrusion and sheet metal operations- fundamentals only. Metal Joining processes – Welding - arc and gas welding, Soldering and Brazing. Casting process – Patterns -Moulding tools - Types of moulding - Preparation of green sand mould -Operation of Cupola furnace. Basics of metal cutting operations – Working of lathe- parts-Operations performed. Drilling machine – Classification – Radial drilling machine - Twist drill nomenclature.

UNIT III MECHANICS

9 HRS

Stresses and Strains – Definition – Relationship – Elastic modulus – Centre of gravity – Moment of Inertia – Problems. (Simple Problems Only).

UNIT IV BUILDING MATERIALS AND CONSTRUCTION

7 HRS

Materials: Brick - Types of Bricks - Test on bricks - Cement – Types, Properties and uses of cement – Steel - Properties and its uses – Ply wood and Plastics.

Construction: Mortar – Ingredients – Uses – Plastering - Types of mortar - Preparation – Uses – Concrete – Types – Grades – Uses – Curing – Introduction to Building Components (foundation to roof) – Masonry – Types of masonry (Bricks & Stones)

UNIT V ROADS, RAILWAYS, BRIDGES & DAMS

7 HRS

Roads – Classification of roads – Components in roads – Railways -Components of permanent way and their function – Bridges – Components of bridges – Dams – Purpose of dams – Types of dams.

Total No.of Hours: 45

TEXT BOOKS:

1. S. Bhaskar, S. Sellappan, H.N.Sreekanth,, (2002), “*Basic Engineering*” –Hi-Tech Publications
2. K. Venugopal, V. Prabhu Raja, (2013-14), “*Basic Mechanical Engineering*”, Anuradha Publications.
3. K.V. Natarajan (2000), *Basic Civil Engineering*, Dhanalakshmi Publishers
4. S.C. Sharma(2002), *Basic Civil Engineering*, Dhanpat Raj Publications

REFERENCES:

1. *PR.SL. Somasundaram, (2002), “Basic Mechanical Engineering” –, Vikas Publications.*
2. *S.C. Rangawala (2002), Building Material and Construction, S. Chand Publisher*



Department of Electronics and Communication Engineering

Subject Code :BES18L01	Subject Name : BASIC ENGINEERING WORKSHOP	L	T/SLr	P/R	C
	Prerequisite : None	0	0/0	2/0	1

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES :

- Familiarize the plumbing tools, fittings, carpentry tools, etc.
- Identify basic electrical wiring and measurement of electrical quantities.
- Identify Electronic components ,logic gates and soldering process
- Display simple fabrication techniques
- Execute a project independently and make a working model

COURSE OUTCOMES (Cos) : (3 – 5)

Students completing the course were able to

CO1	Demonstrate fitting tools and carpentry tools, & Perform the process of Filing, Chipping, and Cutting.
CO2	Perform the process of fabrication of tray, cones and funnels, Tee Halving Cross, Lap Joint Martise& Joints
CO3	Demonstrate various types of wirings and other equipments.
CO4	Measure fundamental parameters using the electronic instruments

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	1	1	2	1	3	3	3	1	3
CO2	3	2	1	1	1	2	1	2	2	2	1	2
CO3	3	3	1	1	1	1	1	2	2	2	1	2
CO4	3	2	1	1	1	1	1	1	2	2	1	2
CO5	1	1	1	1	1	1	1	1	1	1	1	1
COs/POs	PSO1			PSO2			PSO3			PSO4		
CO1	3			3			2			3		
CO2	3			3			1			2		
CO3	3			3			2			1		
CO4	3			3			1			2		

3/2/1 indicates strength of correlation 3 – High, 2– Medium, 1 – Low

Category	Basic Sciences	Engg Sciences	Humanities & Social Sciences	Program core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skills	Soft Skills
							√		



Department of Electronics and Communication Engineering
DEPARTMENT OF ENGINEERING SCIENCES

BES18L01	BASIC ENGINEERING WORKSHOP	0 0/0 2/0 1
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MEP PRACTICE

1. FITTING :

Study of fitting tools and Equipments – Practicing, filing, chipping and cutting – making V-joints, half round joint, square cutting and dovetail joints.

2. CARPENTRY:

Introduction – Types of wood – Tools – Carpentry processes – Joints – Planning practice – Tee Halving Joint – Cross Lap Joint – Maritse and Tenon Joint – Dovetail Joint

3. SHEET METAL:

Study of tools and equipments – Fabrication of tray, cones and funnels.

CIVIL ENGINEERING PRACTICE

1. Study of Surveying and its equipments
2. Preparation of plumbing line sketches for water supply and sewage lines
3. Basic pipe connection using valves, laps, couplings, unions, reduces and elbows in house hold fittings

ELECTRICAL ENGINEERING PRACTICE

1. Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.
2. Measurement of energy using single phase energy meter.
3. Measurement of resistance to earth of electrical equipment.
4. Residential house wiring using switches, fuse, indicator, lamp and energy meter.
5. Fluorescent lamp wiring.
6. Stair case wiring

ELECTRONIC ENGINEERING PRACTICE

1. Study of Electronic components and equipments – Resistor, colour coding measurement of AC signal parameter (peak- peak, rms period, frequency) using CRO
2. Soldering practice – Components Devices and Circuits – Using general purpose P



Department of Electronics and Communication Engineering
Abdul Kalam CoE for Innovation & Entrepreneurship

Subject Code : BES18ET1	Subject Name : ORIENTATION TO ENTREPRENEURSHIP & PROJECT LAB	L	T/SLr	P/R	C
	Prerequisite : None	0	0/0	2/0	1

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES :

- Understand how entrepreneurship Education transforms individuals into successful leaders.
- Identify individual potential & S have career dreams
- Understand difference between ideas & opportunities
- Identify components & create action plan.
- Use brainstorming in a group to generate ideas.

COURSE OUTCOMES (Cos) : (3 – 5)

Students completing the course were able to

CO1	Develop a Business plan & improve ability to recognize business opportunity
CO2	Do a self analysis to build a entrepreneurial career.
CO3	Articulate an effective elevator pitch.
CO4	Analyze the local market environment & demonstrate the ability to find an attractive market
CO5	Identify the required skills for entrepreneurship & develop

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	2	2	2	3	2	2	2	1
CO2	3	2	2	3	2	3	2	3	3	3	2	2
CO3	3	2	2	2	2	3	2	3	3	3	2	2
CO4	3	3	2	2	2	2	2	3	2	2	3	1
CO5	3	2	2	3	2	2	3	3	2	2	3	1

COs/POs	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3
CO2	3	2	3	2
CO3	3	1	3	1
CO4	3	1	3	1
CO5	3	2	3	1

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engg Sciences	Humanities & Social Sciences	Program core	Program Electives	Open Electives	Practical / Project	Internships / Technical	Soft Skills
							√		



Department of Electronics and Communication Engineering

BES18ET1

ENTREPRENEURSHIP & PROJECT LAB

0 0/0 2/0 1 (ETL)

UNIT I CHARACTERISTICS OF A SUCCESSFUL ENTREPRENEUR 3 HRS

Introduction to entrepreneurship education – Myths about entrepreneurship – How has entrepreneurship changed the country – Dream it. Do it - Idea planes - Some success stories – Global Legends – Identify your own heroes –

UNIT II ENTREPRENEURIAL STYLE 3 HRS

Entrepreneurial styles – Introduction, concept & Different types - Barrier to Communication – Body language speaks louder than words

UNIT III DESIGN THINKING 3 HRS

Introduction to Design thinking – Myth busters – Design thinking Process - Customer profiling – Wowing your customer – Personal selling – concept & process – show & tell concept – Introduction to the concept of Elevator Pitch

UNIT IV RISK MANAGEMENT 3 HRS

Introduction to risk taking & Resilience – Managing risks (Learning from failures, Myth Buster) – Understanding risks through risk takers – Why do I do? – what do I do ?

UNIT V PROJECT 3 HRS

How to choose a topic – basic skill sets necessary to take up a project – creating a prototype – Pitch your project – Project presentation.

Total No. of Hours: 15



Department of Electronics and Communication Engineering

Subject Code : BES19I01	Subject Name : DIGITAL SKLILLS (PYTHON PROGRAMMING)	P/R	L	T/SLr	C
	Prerequisite : <ul style="list-style-type: none"> • Computer Science fundamentals • Basic knowledge of applied math, algorithms, and data modelling • Basic knowledge of statistics 	1/0	1	0/0	1

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES :

- To make the students accustomed to Python language
- Aid the students in understanding the basics of the python language, Python libraries and the use of python for the analytics

COURSE OUTCOMES (Cos) : (3 – 5)

Students completing the course were able to

CO1	Run python scripts, how to use variables, string operator and functions
CO2	Encounter different types of errors while running a python program
CO3	Deal with miscellaneous things in python
CO4	Demonstrate regression analysis with the help of a use case and different types of data analytics
CO5	Explain advance techniques in data analytics

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	1	1	3	2	3	3	3	3
CO2	3	3	3	3	1	1	3	2	3	3	3	3
CO3	3	3	3	3	3	3	3	2	3	3	1	3
CO4	3	3	3	3	1	1	3	2	3	3	3	3
CO5	3	3	3	3	1	1	3	2	3	3	3	3
COs/POs	PSO1	PSO2	PSO3	PSO4								
CO1	3	3	3	3								
CO2	3	2	1	2								
CO3	3	3	2	1								
CO4	3	2	3	1								
CO5	3	2	1	3								

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engg Sciences	Humanities & Social Sciences	Program core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skills	Soft Skills
							√		



Department of Electronics and Communication Engineering

BES19I01	DIGITAL SKILLS (PYTHON PROGRAMMING)	1	1/0	0/1	1
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UNIT I INTRODUCTION TO PYTHON 3 HRS

Introduction to PYTHON: what is Python install and get start with python, basic variables and strings in python, Mathematical operators in python. Deep dive into PYTHON: input data in Python, Boolean with python, If and else if statement in python, while loop in python, Work with lists, Forstatement.

UNIT II PYTHON LIBRARIES 3 HRS

Python Libraries: Install Pandas, series and data frames, grouping, aggregating and applying different functions on data, Merge and Join the data

UNIT III ERROR HANDLING 3 HRS

Error Handling: Syntax errors, exceptions Things in Python: regular expression, Pattern matching, Parse data

UNIT IV REGRESSION 3 HRS

Regression: regression analysis, Work with regression analysis, exploratory analysis, correlation matrix, Perform visualization using matplotlib lib, Implement linear regression

UNIT V ADVANCED DATA ANALYTICS 3 HRS

Data Analytics: advanced Machine learning algorithms, Support vector machines, Random forest

Total No. Of Hours: 15

TEXT BOOK/ Materials:

- 1. E-content byIBM.**



Department of Electronics and Communication Engineering
DEPARTMENT OF MATHEMATICS

Subject Code : BMA18003	Subject Name : MATHEMATICS – II	L	T/SLr	P/R	C
	Prerequisite : None	3	1/0	0/0	4

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES :

- Understand the Basic concepts in Integration
- Identify the Basic concepts in Multiple integrals
- Use the Basic concepts in Ordinary Differential equations
- Apply the Basic concepts of Analytical Geometry
- Analyze the Basic concepts of Vector Calculus

COURSE OUTCOMES (Cos) : (3 – 5)

Students completing the course were able to

CO1	Demonstrate knowledge of Basic concepts of Mathematics science & Engineering mathematics
CO2	Calculate the required parameters using basic mathematical theorems, laws and formulae
CO3	Analyze the problem, find solution & interpret the data
CO4	Examine the relevant methods, tools and techniques to provide solutions
CO5	Combine scientific & math principles, apply to real time problems for accurate results

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	1	2	2	1	1	2	2	1	3
CO2	3	3	2	1	2	3	1	1	3	3	1	2
CO3	3	3	2	2	2	3	1	1	3	3	1	2
CO4	3	3	2	1	1	2		1	2	3	1	2
CO5	3	3	2	2	2	2	1	1	2	3	1	2
COs/POs	PSO1			PSO2			PSO3			PSO4		
CO1	3			1			1			1		
CO2	3			1			1			1		
CO3	3			1			1			1		
CO4	3			1			1			1		
CO5	3			1			1			1		

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – low

Category	Basic Sciences	Engg Sciences	Humanities &	Program core	Program Electives	Open Electives	Practical / Project	Internships / Technical	Soft Skills
	√								



Department of Electronics and Communication Engineering

BMA18003

MATHEMATICS – II

3 1/0 0/0 4

UNIT I INTEGRATION

12 HRS

Basic concepts of Integration – Methods of Integration– Integration by substitution – Integration by parts – Definite integrals– Properties of definite integrals – Problems on finding Area and Volume using single integrals (simple problems).

UNIT II MULTIPLE INTEGRALS

12 HRS

Double integral in Cartesian and Polar Co-ordinates – Change of order of integration – Triple integral in Cartesian Co-ordinates – Spherical Polar Co-ordinates – Change of variables (simple problems).

UNIT III ORDINARY DIFFERENTIAL EQUATIONS

12 HRS

First order differential equations – Second and higher order linear differential equations with constant coefficients and with RHS of the form: e^{ax} , x^n , $\sin ax$, $\cos ax$, $e^{ax}f(x)$, $x f(x)$ where $f(x)$ is $\sin bx$ or $\cos bx$ – Differential equations with variable coefficients (Euler's form) (simple problems).

UNIT IV THREE DIMENSIONAL ANALYTICAL GEOMETRY

12 HRS

Direction Cosines and Ratios – Equation of a straight line – Angle between two lines – Equation of a plane – Coplanar lines – Shortest distance between skew lines – Sphere – Tangent plane.

UNIT V VECTOR CALCULUS

12 HRS

Scalar and Vector functions – Differentiation – Gradient, Divergence and Curl – Directional derivatives – Irrotational and Solenoidal fields– Line, Surface and Volume integrals – Green's, Stoke's and Gauss divergence theorems (statement only) – Verification.

Total no. of Hours: 60

TEXTBOOKS:

1. Kreyszig E., *Advanced Engineering Mathematics (10th ed.)*, John Wiley & Sons, (2011).
2. Veerarajan T., *Engineering Mathematics (for first year)*, Tata McGraw Hill Publishing Co., (2008).

REFERENCES:

1. Grewal B.S., *Higher Engineering Mathematics*, Khanna Publishers, (2012).
2. John Bird, *Basic Engineering Mathematics (5th ed.)*, Elsevier Ltd, (2010).
- P.Kandasamy, K.Thilagavathy and K. Gunavathy, *Engineering Mathematics Vol. I (4th Revised ed.)*, S.Chand & Co., Publishers, New Delhi (2000).
3. John Bird, *Higher Engineering Mathematics (5th ed.)*, Elsevier Ltd, (2006).



Department of Electronics and Communication Engineering
DEPARTMENT OF PHYSICS

Subject Code : BPH18002	Subject Name : ENGINEERING PHYSICS – II	L	T/SLr	P/R	C
	Prerequisite : None	2	0/1	0/0	3

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES :

- Design, conduct experiment and analyze data.
- Develop a Scientific attitude at micro and nano scale of materials
- Understand the concepts of Modern Physics
- Apply the science of materials to Engineering & Technology

COURSE OUTCOMES (Cos) : (3 – 5)

Students completing the course were able to

CO1	Demonstrate skills necessary for conducting research related to content knowledge and laboratory skills.
CO2	Apply knowledge and concepts in advanced materials and devices.
CO3	Acquired Analytical, Mathematical skills for solving engineering problems.
CO4	Ability to design and conduct experiments as well as function in a multi-disciplinary team.
CO5	Generate analytical thought to interpret results & place them within a broader context

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	2	1	1	1	1	2	1	1
CO2	3	3	1	2	2	1	1	1	1	2	1	1
CO3	3	3	3	3	2	2	2	1	1	2	1	1
CO4	3	3	3	3	2	2	1	1	3	2	1	1
CO5	3	2	2	2	2	1	1	1	2	2	1	1
COs/POs	PSO1			PSO2			PSO3			PSO4		
CO1	3			1			1			1		
CO2	3			1			1			1		
CO3	3			1			1			1		
CO4	3			1			1			1		
CO5	3			1			1			1		

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engg Sciences	Humanities & Social Sciences	Program core	Program Electives	Open Electives	Practical / Project	Internships / Technical	Soft Skills
	√								



Department of Electronics and Communication Engineering

BPH18002	ENGINEERING PHYSICS - II	2	0/1	0/0	3
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UNIT I QUANTUM PHYSICS

9 HRS

Quantum free electron theory - deBroglie waves - derivation of deBroglie waves - Davisson and Germer experiment - uncertainty principle - electron microscope - scanning electron microscope - physical significance of wave function - Schrodinger wave equation and its applications - Fermi energy- effective mass - phonons - Fermi function-density of states - origin of bandgap in solids - 1D scattering of electrons in periodic potential.

UNIT II SEMICONDUCTORS

9 HRS

Introduction - properties of semiconductors - classification of semiconductor - effect of temperature in semiconductor - hole current - carrier concentration in intrinsic semiconductor (electron and hole density) - variation of Fermi energy level and carrier concentration with temperature in an intrinsic semiconductor - carrier transport - diffusion - drift - mobility - Hall effect - determination of Hall coefficient and its applications - diodes.

UNIT III LIGHT SEMICONDUCTOR INTERACTION

9 HRS

Types of electronic materials: metals, semiconductors and insulators - qualitative analysis of extrinsic semiconductor & its applications - optical transition in bulk semiconductors: absorption, spontaneous and stimulated emission - exciton and its types - traps and its types - colour centers and its types and importance - luminescence - classifications of luminescence based on excitation - optical loss and gain - Photovoltaic effect - Photovoltaic potential - spectral response - solar energy converters - solar cells.

UNIT IV OPTO ELECTRONIC DEVICES

9 HRS

Photodetectors - photoconductors - photodiodes principle, construction, working and characteristics - Phototransistors - Laser diodes - LED theory, construction and working - seven segment display, advantages of LED - LCD theory, construction and working.

UNIT V ENGINEERED MATERIALS

9 HRS

Classification of engineered materials - nano phase materials - its synthesis and properties - shape memory alloys and its applications - biomaterials - non linear materials - metallic glasses - metamaterials - homo and hetero junction semiconductors - semiconducting materials for optoelectronic devices - quantum wells, wires and dots.

Total no. of Hours: 45

TEXT BOOKS:

- (1) P.K. Palanisamy, Semiconductor Physics and Optoelectronics, Scitech Publications, 2010
- (2) Jyoti Prasad Bandyopadhyay, Semiconductor Devices, S. Chand Publications, 2014
- (3) Charles Kittel, Introduction to Solid State Physics, Wiley Publications, 2012

REFERENCs:

- (1) S. Shubhashree, S. Bharathi Devi & S. ChellammalMadhusudanan, Engineering Physics, Sree Lakshmi Publications, 2004
- (2) G. Senthil Kumar, N. Iyandurai, & G. Vijayakumar, Material Science, VRB Publishers, 2017
- (3) R.Murugesan&Kiruthigasivaprakash, Modern Physics, 14th edition, S. Chand & Co, 2008
- (4) Pallab Bhattacharya, Semiconductor optoelectronic devices, second edition, Pearson Education, 2003
- (5) V Rajendran & A. Marikani, Materials Science, Tata McGraw- Hill, New Delhi, 2004



Department of Electronics and Communication Engineering
DEPARTMENT OF CHEMISTRY

Subject Code : BCH18002	Subject Name : ENGINEERING CHEMISTRY – II	L	T/SLr	P/R	C
	Prerequisite : None	2	0/1	0/0	3

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES :

- Imparting the basic concepts of phase rule and apply the same to one and two component systems.
- Introducing the chemistry of engineering materials such as cement, lubricants, abrasives, refractories, alloys and nano materials.
- To impart a sound knowledge on the principles of chemistry involving different application oriented topics
- Introducing salient features of fuels and combustion.
- To give an overview on modern analytical techniques

COURSE OUTCOMES (Cos) : (1 – 5)

Students completing the course were able to

CO1	Recall, predict the consequences and apply appropriate techniques.
CO2	Categorize the engineering materials and analytical tools through appropriate communication
CO3	Analyze the environmental dimension and identify ethical principles to design solution.
CO4	Recognize the essential information for continuing professional development
CO5	Apply relevant instrumentation techniques through basic science to solve complex problems.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	3	3	1	1	1	1	1	1	1	3
CO2	3	3	1	3	3	1	3	1	1	3	1	3
CO3	3	3	3	1	1	3	1	3	1	1	1	3
CO4	3	1	1	1	1	1	3	1	1	3	1	3
CO5	3	1	3	1	3	1	1	1	1	1	1	3
COs/POs	PSO1			PSO2			PSO3			PSO4		
CO1	3			3			3			3		
CO2	3			3			3			3		
CO3	3			3			3			3		
CO4	3			3			3			3		
CO5	3			3			3			3		

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engg Sciences	Humanities & Social Sciences	Program core	Program Electives	Open Electives	Practical / Project	Internships / Technical	Soft Skills
	√								



Department of Electronics and Communication Engineering

BCH18002

ENGINEERING CHEMISTRY – II

2 0/1 0/0 3

UNIT I PHASE EQUILIBRIA

8 HRS

Introduction – Definition of terms involved in phase rule. Derivation of Gibbs phase rule – Applications to one component system – water system. Binary system – Eutectic system – Pb – Ag system, Bi – Cd system. Thermal analysis – Cooling curves.

UNIT II MATERIAL CHEMISTRY

10 HRS

Cement – Manufacture, Chemistry of setting and hardening. Lubricants – Requirements of good lubricants, Mechanism, Properties of lubricants, Classification – Examples. Abrasives – Classification – Moh's scale – Hard and soft abrasives, Preparation of artificial abrasives (silicon carbide, boron carbide), Applications of abrasives. Refractories – Classification, Properties – Refractoriness, RUL, Porosity, Thermal spalling Alloys Classification of alloys – Purpose of making alloys - Ferrous and non-Ferrous alloys - Heat treatment Nano materials – properties, carbon nano tubes – properties, fabrication – carbon arc method, laser vapourization method.

UNIT III APPLIED CHEMISTRY

9 HRS

Soaps and detergents: Soaps – Saponification of oils and fats, manufacture of soaps, classification of soap – soft soap, medicated soap, herbal soap, shaving soap and creams.

Detergents – Anionic detergents – manufacture and applications, Comparison of soaps and detergents.

Rocket propellants and explosives: Rocket propellants – characteristics, solid and liquid propellants – examples. Explosives- Introduction, characteristics, classification, Oxygen balance, preparation, properties and uses of detonators, low explosives and high explosives, Dynamites, Gun cotton, Cordite.

Food adulterants- Common adulterants in different foods – milk and milk products, vegetable oils, and fats, spices and condiments, cereals, pulses, sweetening agents and beverages, Contamination with toxic chemicals – pesticides and insecticides.

UNIT IV FUELS & COMBUSTION

9 HRS

Introduction to Fuels – classification – Calorific value – GCV, LCV. Solid Fuels – Coal – Proximate Analysis, Metallurgical Coke – Manufacture of Metallurgical Coke – Liquid Fuel – Refining of Petrol, Synthetic Petrol – Manufacturing Process – Hydrogenation of Coal, Polymerization, Cracking – Knocking – Octane Number – Leaded Petrol (or) Anti-knocking – Cetane Number – Ignition Lag – Gaseous fuels – CNG – LPG – Water Gas, Producer gas – Biogas – Combustion – Flue Gas analysis – Orsat's method.

UNIT V ANALYTICAL AND CHARACTERIZATION TECHNIQUES

9 HRS

Electron microscopes: Scanning electron microscope & Transmission electron microscope, instrumentation and applications Absorption and Emission Spectrum - Beer - Lambert's law. Visible and UV Spectroscopy – instrumentation – Block diagram - working. IR Spectroscopy – instrumentation - Block diagram – molecular vibrations – stretching and bending – H₂O, CO₂. – Characterization of some important organic functional groups. Chromatographic techniques – column, thin layer and paper.

Total no. of Hours: 45

TEXTBOOKS:

1. C. S. Unnithan, T. Jayachandran & P. Udhayakala, "Industrial Chemistry", Sreelakshmi Publications (2009).
2. Dr. R. Sivakumar and Dr. N. Sivakumar "Engineering Chemistry" Tata McGraw Hill Publishing Company Ltd, Reprint 2013.

REFERENCES:

1. P. C. Jain & Monika Jain, "Engineering Chemistry", Dhanpat Rai publishing Co., (Ltd.) (2013).
2. B. R. Puri, L. R. Sharma & M. S. Pathania, "Principles of Physical Chemistry", Vishal publishing co., (2013).

B. Tech - ECE with Specialization in IoT and AI - in collaboration with IBM-Regulation 2018



Department of Electronics and Communication Engineering
DEPARTMENT OF ENGINEERING SCIENCES

Subject Code : BES18003	Subject Name : ENVIRONMENTAL SCIENCE		L	T/SLr	P/R	C						
	(Non- Credited)											
	Prerequisite : None		-	-	-	-						
L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab												
OBJECTIVES :												
<ul style="list-style-type: none"> • To acquire knowledge of the Environment and Ecosystem & Biodiversity • To acquire knowledge of the different types of Environmental pollution • To know more about Natural Resources • To gain understanding of social issues and the Environment • To attain familiarity of human population and Environment 												
COURSE OUTCOMES (Cos) : (3 – 5)												
Students completing the course were able to												
CO1	To know about Environment and Ecosystem & Biodiversity											
CO2	To clearly comprehend air, water, Soil, Marine, Noise, Thermal and Nuclear Pollutions and Solid Waste management and identify the importance of natural resources like forest, water, and food resources											
CO3	To discover water conservation and watershed management											
CO4	To identify its problems and concerns climate change, global warming, acid rain, ozone layer depletion etc.,											
CO5	To explain family welfare programmes and role of information technology in human health and environment											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	1	1	3	3	2	1	1	1	2
CO2	1	1	1	1	1	2	3	1	1	2	1	2
CO3	1	1	1	1	1	2	3	2	1	1	1	2
CO4	1	1	1	1	1	2	3	2	1	2	1	2
CO5	1	1	1	1	1	2	3	1	1	2	1	2
3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low												
Category	Basic Sciences	Engg Sciences	Humanities & Social Sciences	Program core	Program Electives	Open Electives	Practical / Project	Internships / Technical	Soft Skills			
			√									



Department of Electronics and Communication Engineering

BES18003

ENVIRONMENTAL SCIENCE

UNIT I ENVIRONMENT AND ECOSYSTEM

Definition, Scope and Importance of environment – need for public awareness – concept, structure and function of an ecosystem - producers, consumers and decomposers – energy flow in the ecosystem. Biodiversity at national and local levels – India

UNIT II ENVIRONMENT POLLUTION

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Nuclear hazards (g) E-Wastes and causes, effects and control measures

UNIT III NATURAL RESOURCES

Forest resources: Use and over-exploitation, deforestation. Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns climate change, global warming, acid rain, ozone layer depletion, nuclear accidents, central and state pollution control boards- Public awareness.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT

Population growth, variation among nations – population explosion, environment and human health – human rights – value education – HIV/AIDS – women and child welfare – role of information technology in environment and human health

TEXT BOOKS:

1. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education (2004).
2. Benny Joseph, 'Environmental Science and Engineering', Tata McGrawHill, New Delhi, (2006).

REFERENCES:

1. Vairamani, S. and Dr. K. Sankaran. Elements of Environmental and Health Science. Karaikudi: KPSV Publications, 5th Edition, July, 2013.
2. Ifthikarudeen, Etal, Environmental Studies, Sooraj Publications, 2005.
3. R.Murugesan, Environmental Studies, Millennium Publishers and Distributors, 2nd Edition, July, 2009.



Department of Electronics and Communication Engineering

SubjectCode: BEN18ET1	Subject Name : COMMUNICATION LAB	L	T/SLr	P/R	C
	Prerequisite : None	1	0/0	2/0	1

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES :

The students should be able to

- Use appropriate vocabulary and structure for effective interpersonal and academic communication
- Interpret charts, diagrams, advertisements, etc.
- Participate in group discussions and present projects effectively
- Present project and ideas effectively
- Attend Interviews

COURSE OUTCOMES (Cos) : (3 – 5)

Students completing the course were able to

CO1	Use appropriate vocabulary and structure for effective interpersonal and academic communication
CO2	Interpret charts, diagrams, advertisements, etc.
CO3	Participate in group discussions and present projects effectively
CO4	Present project and ideas effectively
CO5	Attend Interviews

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	1	3	1	1	1	1	3	3	3
CO2	3	2	1	3	3	1	3	1	1	3	2	3
CO3	3	3	3	3	1	3	3	1	3	3	3	3
CO4	2	3	3	3	1	3	3	3	3	3	1	3
CO5	2	2	2	2	1	2	3	3	3	3	3	3

COs/POs	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2	1
CO2	3	1	1	1
CO3	3	1	1	1
CO4	3	1	1	1
CO5	3	2	1	2

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engg Sciences	Humanities & Social Sciences	Program core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skills	Soft Skills
							√		



Department of Electronics and Communication Engineering

BEN18ET1	COMMUNICATION LAB	1 0 /0 2/0 1
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UNIT I

LISTENING AND SPEAKING - INFORMAL AND FORMAL CONTEXTS

UNIT II

INTERPRETATION OF CHARTS / DIAGRAMS - GROUP DISCUSSION

UNIT III

COMPEERING - ANCHORING - WELCOME SPEECH - VOTE OF THANKS

UNIT IV

FORMAL PRESENTATION - POWER POINT PRESENTATION - POSTER PRESENTATION

UNIT V

INTERVIEW

SUGGESTED READINGS:

1. *Practical English Usage. Michael Swan. OUP. 1995*
2. *Remedial English Grammar. F.T. Wood. Macmillan. 2007*
3. *Study writing. Liz Hamp-Lyons and Ben Heasley. Cambridge University Press. 2006.*
4. *Communication skills. Sanjay Kumar and Pushp Lata. Oxford University Press. 2011.*
5. *Exercises in spoken English. Parts. I - III. CIEFL, Hyderabad. Oxford University Press*
6. *Pronunciation in use, Mark Hancock. Cambridge University Press. 2012*



Department of Electronics and Communication Engineering
DEPARTMENT OF MECHANICAL ENGINEERING

SubjectCode: BES18ET2	Subject Name : BASIC ENGINEERING GRAPHICS	L	T/SLr	P/R	C
	Prerequisite : None	1	0/0	2/0	2

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES:

- To acquire knowledge in geometrical drawing
- To expose the students in computer aided drafting

COURSE OUTCOMES (Cos) : (3 – 5)

Students completing the course were able to

CO1	Gain knowledge on Drawing standards and angle of projection
CO2	Draw projections of planes, solid, on planes of projection
CO3	Apply the knowledge of development to find lateral surface area of solids.
CO4	Visualize and draw Isometric and orthographic projections
CO5	Apply the knowledge of projection in Building drawing
CO6	Learn and draw simple components using CAD software

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	2	2	1	1	3	3	1	3
CO2	3	3	3	3	2	2	1	1	3	3	1	3
CO3	3	3	3	1	2	2	1	1	2	2	1	2
CO4	3	3	2	2	2	3	1	2	3	3	1	3
CO5	3	3	3	2	3	1	2	2	3	3	1	3
CO6	3	3	3	1	3	1	2	1	2	2	1	3
COs/POs	PSO1	PSO2	PSO3	PSO4								
CO1	3	1	1	1								
CO2	3	1	1	1								
CO3	3	1	1	1								
CO4	3	1	1	1								
CO5	3	1	1	1								

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engg Sciences	Humanities & Social Sciences	Program core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skills	Soft Skills
						3	√		



Department of Electronics and Communication Engineering

BES18ET2

BASIC ENGINEERING GRAPHICS

1 0/0 2/0 2

CONCEPTS AND CONVENTIONS (Not for examination)

3 HRS

Introduction to drawing, importance and areas of applications – BIS standards – IS: 10711 – 2001 : Technical products Documentation – Size and layout of drawing sheets – IS 9606 – 2001: Technical products Documentation – Lettering – IS 10714 & SP 46 – 2003: Dimensioning of Technical Drawings – IS : 15021 – 2001 : Technical drawings – Projections Methods – drawing Instruments, Lettering Practice – Line types and dimensioning – Border lines, lines title blocks Construction of polygons – conic sections – Ellipse, Parabola, Hyperbola and cycloids.

UNIT I PROJECTION OF POINTS, LINES AND PLANE SURFACES

6 HRS

Projection of points and straight lines located in the first quadrant – Determination of true lengths and true inclinations – projection of polygonal surface and circular lamina in simple position only.

UNIT II PROJECTION OF SOLIDS

6 HRS

Projection of simple solids like prism, pyramid, cylinder and cone in simple position
Sectioning of above solids in simple vertical position by cutting plane inclined to one reference plane and perpendicular to the other.

UNIT III DEVELOPMENT OF SURFACES AND ISOMETRIC PROJECTION

6 HRS

Development of lateral surfaces of simple and truncated solids – prisms, pyramids, cylinders, and cones.
Principles of isometric projection – isometric scale – isometric projections of simple solids, like prisms pyramids, cylinders and cones.

UNIT IV ORTHOGRAPHICS PROJECTIONS

6 HRS

Orthographic projection of simple machine parts – missing views

BUILDING DRAWING

Building components – front, Top and sectional view of a security shed.

UNIT V COMPUTER AIDED DRAFTING

3 HRS

Introduction to CAD – Advantages of CAD – Practice of basic commands – Creation of simple components drawing using CAD software.

Total No. of Hours: 30

Note: First angle projection to be followed.

TEXT BOOKS:

1. Bhatt, N.D. and Panchal, V.M. (2014) Engineering Drawing Charotar Publishing House
2. Gopalakrishnan, K.R. (2014) Engineering Drawing (Vol.I& II Combined) Subhas Stores, Bangalore.



Department of Electronics and Communication Engineering

Subject Code :BES18L02	Subject Name : INTEGRATED PHYSICAL SCIENCE LAB	L	T/SLr	P/R	C
	Prerequisite : None	0	0/0	2/0	1

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES :

- Demonstrate the ability to make physical measurements & understand the limits of precision in measurements.
- Display the ability to measure properties of variety of electrical, mechanical, optical systems.
- To help learners measure conductivity and EMF using electrical equipment.
- To understand the analytical skills through chromatography & viscometry
- To familiarize the concepts of cheminformatics

COURSE OUTCOMES (Cos) : (3 – 5)

Students completing the course were able to

CO1	Recognize the correctness and precision in the results of measurements.
CO2	Construct and compare the properties of variety of mechanical, optical, electrical and electronic systems.
CO3	Familiarizing the titration methods using conductometry & potentiometry
CO4	Developing the Research spirit through the knowledge of Cheminformatics & Analytical skills.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	3	3	1	1	1	1	2	1	1
CO2	3	3	2	3	3	2	1	1	1	2	1	1
CO3	3	3	2	3	3	1	1	1	3	1	1	1
CO4	3	3	3	3	3	1	2	2	3	1	3	2

COs/POs	PSO1			PSO2			PSO3			PSO4		
CO1	3			1			1			1		
CO2	3			1			1			1		
CO3	3			1			1			1		
CO4	3			1			1			1		

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engg Sciences	Humanities & Social Sciences	Program core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skills	Soft Skills
							√		



Department of Electronics and Communication Engineering

BES18L02	INTEGRATED PHYSICAL SCIENCE LAB	0	0/0	2/0	1
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LIST OF EXPERIMENTS

1. DETERMINATION OF COEFFICIENT OF VISCOSITY OF A GIVEN LIQUID BY POISEUILLE`S METHOD.
2. PARTICLE SIZE DETERMINATION USING LASER SOURCE.
3. DETERMINATION OF NUMERICAL APERTURE OF AN OPTICAL FIBER.
4. SPECTROMETER- REFRACTIVE INDEX/DISPERSIVE POWER/I-D CURVE.
5. POTENTIOMETER - RESISTANCE OF A WIRE.
6. TRANSISTOR CHARACTERISTICS - INPUT RESISTANCE, OUTPUT RESISTANCE AND GAIN.
7. STUDIES ON ACID-BASE CONDUCTOMETRIC TITRATION.
8. DETERMINATION OF REDOX POTENTIALS USING POTENTIO METRY.
9. DETERMINATION OF R_F VALUES OF VARIOUS COMPONENTS USING THIN LAYER CHROMATOGRAPHY.
10. VISCOSITY STUDIES USING DIGITAL CAPILLARY VISCOMETER.
11. COMPUTE THE STRUCTURES OF THE GIVEN POLYMERS, DRUGS, BIOMOLECULES USINGCHEM DRAW.
12. STUDIES ON POTENTIAL ENERGY SURFACE OF THE GIVEN MOLECULES.
13. ESTIMATE NMR SPECTRA FROM A CHEM DRAW STRUCTURE.



Department of Electronics and Communication Engineering

DEPARTMENT OF COMPUTER SCIENCE

Subject Code : BES18ET3	Subject Name : C PROGRAMMING AND LAB	L	T/SLr	P/R	C
	Prerequisite : None	1	0/0	2/0	2

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES :

- Outline the basics of C Language.
- Apply fundamentals in C programming.
- Produce and present activities associated with the course.

COURSE OUTCOMES (Cos) : (3 – 5)

Students completing the course were able to

CO1	Understand the concepts of C programming
CO2	Develop C Programs using basic programming constructs
CO3	Create Programs with arrays, structures, functions, pointers and file handling
CO4	Write diversified solutions for applications using C language

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	2	2	1	1	3	3	1	3
CO2	3	3	3	2	2	2	1	1	3	3	1	3
CO3	3	3	3	1	1	2	1	1	2	2	1	2
CO4	3	3	2	1	1	3	1	2	3	3	1	3
COs/POs	PSO1			PSO2			PSO3			PSO4		
CO1	3			1			1			1		
CO2	3			1			1			1		
CO3	3			1			1			1		
CO4	3			2			1			1		

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engg Sciences	Humanities & Social Sciences	Program core	Program Electives	Open Electives	Practical/ Project	Internships / Technical Skills	Soft Skills
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Department of Electronics and Communication Engineering

BES18ET3	C PROGRAMMING AND LAB	1 0/0 2/0 2
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UNIT I INTRODUCTION 6 HRS
Fundamentals, C Character set, Identifiers and Keywords, Data Types, Variables and Constants, Structure of a C Program, Executing a C Program.

UNIT II EXPRESSION AND STATEMENT 6 HRS
Operators, Types-Complex and Imaginary, Looping Statement-For, While, Do, Break, continue, Decision Statement-If, If else, Nested if, Switching Statement, Conditional Operator.

UNIT III ARRAYS AND FUNCTIONS 6 HRS
Defining an Array, Using Array elements as counters, Generate Fibonacci number, Generate Prime Numbers, Initializing Arrays, Multidimensional Arrays, Defining a Function, Function call -types of Function calls -Function pass by value -Function pass by reference, Write a Program in Recursive Function.

UNIT IV STRUCTURES AND POINTERS 6 HRS
Working with Structures -Introduction -Syntax of structures -Declaration and initialization -Declaration of structure variable -Accessing structure variables, Understanding Pointers -Introduction -Syntax of Pointer.

UNIT V STRINGS AND FILE HANDLING 6 HRS
Strings -Syntax for declaring a string -Syntax for initializing a string -To read a string from keyboard, Files in C -File handling functions -Opening a File closing a file --example: fopen, fclose -Reading data from a File- Problem solving in C

Total No of Hours: 30

1. www.spoken-tutorials.org
2. <http://www.learn-c.org/>

REFERENCES:

1. Stephen G. Kochen“Programming in C- A complete introduction to the C Programming Language. Third Edition, Sams Publishing -2004
2. Ajay Mital, “ Programming in C: A Practical Approach”, Pearson Publication-2010

LIST OF PROGRAMS

1. Write a program to check 'a' is greater than 'b' or less than 'b' Hint: use if statement.
2. Write another program to check which value is greater 'a', 'b' or 'c'. Hint: use else-if statement. (Take values of a, b, c as user inputs)
3. Write a Program to find the sum of the series: $x + X^3/3! + X^5/5! + \dots + X^n/n!$
4. Write a C Program to solve a Quadratic Equation by taking input from Keyboard
5. Write a C Program to arrange 20 numbers in ascending and descending Order. Input the Numbers from Keyboard
6. Write a C Program to Multiply a 3 x 3 Matrix with input of members from Keyboard
7. Write a program that takes marks of three students as input. Compare the marks to see which student has scored the highest. Check also if two or more students have scored equal marks.
8. Write a program to display records of an employee. Like name, address, designation, salary.
9. Write a C program; declare a variable and a pointer. Store the address of the variable in the pointer. Print the value of the pointer.
10. Write a C program to concatenate String 'best' and String 'bus'. Hint: strcat(char str1, char str2);
11. Explore the other functions in string library.
12. Write a program to create a file TEST. Write your name and address in the file TEST. Then display it on the console using C program.



Department of Electronics and Communication Engineering

Subject Code: BES19I02	Subject Name : JAVA PROGRAMMING	Ty / Lb/ ETL	L	T/ S.Lr	P/ R	C
	Prerequisite: BCS18002	ETL	1	0/0	2/0	2

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C:Credits
Ty/Lb/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE : To teach the basic concepts and techniques which form the object oriented Programming paradigm.

COURSE OUTCOMES (COs) : (3- 5)

CO1	To design, create, build, and debug Java applications.
CO2	To write Java programs using object-oriented programming techniques including classes, Objects, methods, instance variables, composition, inheritance, and polymorphism.
CO3	To write programs using graphical user interface (GUI) components and Java's Event Handling Model.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	1	1	3	2	3	3	3	3
CO2	3	3	3	3	1	1	3	2	3	3	3	3
CO3	3	3	3	3	3	3	3	2	3	3	1	3
COs / POs	PSO1		PSO2		PSO3		PSO4					
CO1	3		3		1		3					
CO2	3		3		1		3					
CO3	3		3		1		3					

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					✓							



Department of Electronics and Communication Engineering

Subject Code: BEC18001	Subject Name: SIGNALS AND SYSTEMS	T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Engineering Mathematics	Ty	3	1/0	0/0	4

L : Lecture T: Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory andLab

OBJECTIVES :

- To study the representation of discrete and continuous signals and systems.
- To study the analysis of continuous time systems using Laplace and Fourier transforms.
- To study the analysis of discrete time systems using DFT and Z transforms.

COURSE OUTCOMES (COs) : (3- 5)

The student will be able to

CO1	Classify continuous and discrete time signals and systems.
CO2	Analyze continuous signals and its spectrum with transforms.
CO3	Determine the response of continuous time systems with transforms and state variable approach.
CO4	Analyze discrete signals and its spectrum with transforms.
CO5	Determine the response of discrete time systems with transforms and state variable approach.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	1	2	1	1	2	2	2
CO2	3	3	3	3	3	1	2	1	1	2	2	2
CO3	3	3	3	3	3	1	2	1	1	2	2	2
CO4	3	3	3	3	3	1	2	1	1	2	2	2
CO5	3	3	3	3	3	1	2	1	1	2	2	2
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		3		3		2					
CO2	3		3		3		2					
CO3	3		3		3		2					
CO4	3		3		3		2					
CO5	3		3		3		2					

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					✓							



Department of Electronics and Communication Engineering

BEC18001	SIGNALS AND SYSTEMS	3	1/0	0/0	4
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UNIT I CLASSIFICATION OF SIGNALS AND SYSTEMS 10 HRS

Continuous Time Signals (CT signals), Discrete Time Signals (DT Signals) – Step, Ramp, Pulse, Impulse, Exponential, Classification of CT and DT signals – Periodic and aperiodic, Random Signals, CT Systems and DT Systems, Classification of Systems – Linear Time Invariant Systems(LTI).

UNIT II ANALYSIS OF C.T.SIGNALS 12 HRS

Fourier series Analysis, Spectrum of C.T. Signals, Fourier Transform and Laplace Transform – Properties of Fourier Transform - Applications in Signal Analysis.

UNIT III LTI –CT SYSTEMS 12 HRS

Differential Equation, Block Diagram Representation, Impulse Response, Step Response, Convolution Integral, Frequency Response, Fourier and Laplace Transforms in Signal Analysis, State Equations and Matrix.

UNIT IV ANALYSIS OF D.T.SIGNALS 13 HRS

Spectrum of D.T. Signals, Discrete Time Fourier Transform (DTFT), Discrete Fourier Transform (DFT), Properties of DFT, Properties of Z – Transform in Signal Analysis, Inverse Z-Transform.

UNIT V LTI – DT SYSTEMS 13 HRS

Difference Equations, Block Diagram Representation, Impulse Response, Convolution, Frequency Response, Z – Transform Analysis, Realization of Digital Filters – Direct Form-I, Direct Form-II, Transposed, Parallel, Cascade Structure, State Variable Equation and Matrix.

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No. of Hours: 60

TEXTBOOKS:

1. Alan V Oppenheim, "Signals and Systems", Prentice Hall of India Pvt. Ltd, 2nd Edition, 1997.
2. Roger E. Zeimer et al, "Signals and Systems": Continuous and Discrete, McMillan, 2nd Edition, 1990
3. Hwei P. Hsu, Schaum's Outline Series, "Signals and Systems", Mc Graw Hill Companies, 2nd Edition.

REFERENCES:

1. Douglas K Lindner, "Signals and Systems", McGraw Hill International, 1999.
2. Simon Haykin and Barry Van Veen, " Signals and Systems", John Wiley and Sons, Inc., 1999.
3. Robert A. Gabel and Richard A. Roberts, "Signals and Linear Systems", John Wiley, 3rd Edition, 1987.



Department of Electronics and Communication Engineering

Subject Code: BEC18003	Subject Name : DIGITAL ELECTRONICS	T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Basic electronics and computer concepts	Ty	3	1/0	0/0	4

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory andLab

OBJECTIVES :

- To give a conceptual understanding about Boolean algebra, demorgans theorem, simplification of Boolean expression, Karnaugh map and Quine Mcklusky methodology.
- To Design and implement logic gates, combinational logic circuits, PAL, PLA and FPGA.
- To Design and implement sequential logic circuits like Flip flops, counters and shift registers.
- To analyzer state diagram, state tables and its reduction and design and implement synchronous and asynchronous sequential circuits.
- To study different logic families and classify different types of memories.

COURSE OUTCOMES (COs) : (3- 5)

The Student will be able to

CO1	Apply Karnaugh map and Quine McCluskey methodology to simplify Boolean expressions.
CO2	Design and implement combinational logic circuits.
CO3	Explain the basic building blocks of sequential circuits and its applications.
CO4	Demonstrate the ability to design and implement synchronous and asynchronous sequential circuits
CO5	Compare the digital logic families and Classify different types of semiconductor memories.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	3	3	2	2	3	1	3	2
CO2	3	3	3	2	3	3	2	2	3	1	3	2
CO3	3	3	3	2	3	3	2	2	3	2	3	2
CO4	3	3	3	2	3	3	2	2	3	2	3	2
CO5	3	2	3	2	2	3	2	2	2	1	3	2

COs / PSOs	PSO1	PSO2	PSO3	PSO4				
CO1	3	3	2	2				
CO2	3	3	2	2				
CO3	3	3	2	2				
CO4	3	3	2	2				
CO5	2	2	2	2				

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				✓								



Department of Electronics and Communication Engineering

Subject Code: BEC18004	Subject Name : SOLID STATE DEVICES	T / L/ ETL	L	T / S.Lr	P/ R	C						
	Prerequisite: Basics of Electrical and Electronics.	Ty	3	0/0	0/0	3						
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory andLab												
OBJECTIVES :												
<ul style="list-style-type: none"> • To learn the theory of semiconductor devices such as diodes and zener diode • To study the working and biasing of bipolar junction transistors both PNP and NPN. • To understand the construction and operation of FET and MOSFET and their biasing. • To study behavior of power electronic devices like SCR, UJT, etc and photo devices. • To study the small signal model and analysis of transistors and FET 												
COURSE OUTCOMES (COs) : (3- 5)												
The students will be able to												
CO1	Learn semiconductor devices like diodes and zener diode											
CO2	Know working and biasing of bipolar junction transistors.											
CO3	Understand the construction and operation of FET and MOSFET											
CO4	Study the behavior of power electronic and photo electronic devices.											
CO5	Analyze transistors and FET using small signal model											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	2	1	2	2	1	3	3	2	2	2
CO2	3	1	1	2	1	3	2	2	2	2	1	1
CO3	3	3	1	1	1	2	2	3	2	1	3	2
CO4	3	2	1	1	1	3	3	3	2	2	2	1
CO5	3	3	2	2	2	2	1	1	2	2	2	2
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		2		1		1					
CO2	3		2		2		2					
CO3	3		2		1		3					
CO4	3		2		2		3					
C05	3		3		2		3					
H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				✓								



Department of Electronics and Communication Engineering

BEC18004	SOLID STATE DEVICES	3	0/0	0/0	3
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UNIT I SEMI CONDUCTOR DIODES

9 HRS

Theory of PN Junction Diode – VI characteristics – Static and Dynamic Resistance – Effect of Temperature on Diodes – Space Charge and Diffusion Capacitance - Zener Diode – Avalanche and Zener Break Down Mechanisms – Zener Diode as a Voltage Regulator.

UNIT II BJT & BIASING

9 HRS

Principles of Transistor Action – Current Components – Cut Off, Active & Saturation Region – I/P & O/P characteristics CE, CB and CC. Small Signal Large Signal ‘ β ’, Break Down & Switching Characteristics – Transistor Biasing – Bias Stabilization – Bias Compensation – Thermal Runaway – Design with Heat Sink.

UNIT III FET & MOSFET

9 HRS

Construction Feature & Working Principles of JFET, MOSFET Depletion and Enhancement Mode, Biasing of FET, and MOSFETS, Transmission Gate using CMOS.

UNIT IV POWER DEVICES

9 HRS

Charge Transfer Device, UJT, SCR, Diac, Triac, GTO, MCT and Introduction to Gallium Arsenide Devices, FinFET, LDR, Photo Voltaic cell, Varactor diode.

UNIT V SMALL SIGNAL MODEL

9 HRS

Small Signal Model of Transistor- Analysis of Amplifiers using Small Signal Model. Common Emitter, Common Base, Common Collector, Common Source, Common Drain, Common Gate, Multistage Amplifiers.

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No.of Hours: 45

Textbooks:

1. Nandita Das Gupta, Amitava Das Gupta, “*Semiconductor Devices*”, Prentice Hall of India, 2005
2. Sedra and Smith, “*Microelectronic Circuits*”, Oxford University Press, 2004
3. Mohammed Gausi and Spencer, “*Introduction to Electronics Circuit Design*”, Pearson Education, 2004

References:

1. Boylestad, Robert. L and Nashelsky Louis, “*Electronic Devices and Circuit theory*”, Prentice Hall of India, 6th Edition, 2001
2. William & Harris, “*Electronic Devices and Circuits*”, Tata McGraw Hill International Editions, 2000
3. Millman Halkias, “*Electron Devices*”, Tata McGraw Hill, 2000.
4. Donald Neamam, “*Microelectronics*”, Tata McGraw Hill, 2007.
5. Sedra Smith, “*Micro Electronic Circuits*” Fifth edition, 2013.



Department of Electronics and Communication Engineering

Subject Code: BCS18I01	Subject Name : C PROGRAMMING WITH LINUX	T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Programming and Multimedia lab	Ty	3	0/0	0/0	3

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C:Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVES :

- To understand and develop well-structured programs using C language
- Problem solving through computer programming
- Familiarity of programming environment in Linux operating system
- Comfortably use basic UNIX/Linux commands from the commandline.
- Be knowledgeable enough about basic UNIX/Linux shell scripting to be able to successfully read and write bash shell script.

COURSE OUTCOMES (COs) : (3- 5)

The Students will be able to

CO1	Analyze the structure of C program, declaration of variables and usage of iterative and conditional statements.
CO2	Write C programs using arrays, strings and structures.
CO3	Apply Pointers to access arrays and Functions to process files.
CO4	Interpret basic hardware components and installation of Linux operating system
CO5	Design and implement basic Linux commands and Shell Programming

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	2	2	2	1	2	2	2	3
CO2	3	2	3	3	2	2	3	2	3	3	3	3
CO3	3	3	2	3	2	2	3	2	3	2	3	3
CO4	3	2	2	2	1	1	2	1	3	2	3	3
CO5	3	2	2	3	3	2	2	1	3	2	3	3
COs / PSOs	PSO1	PSO2	PSO3	PSO4								
CO1	1	2	3	3								
CO2	1	2	3	3								
CO3	2	3	3	3								
CO4	2	3	3	2								
CO5	2	2	3	3								

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
			✓									



Department of Electronics and Communication Engineering

BCS18I01	C PROGRAMMING WITH LINUX	3	0/0	0/0	3
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UNIT I BASICS OF C PROGRAMMING 9 Hrs

Introduction to programming paradigms – Structure of C program – C programming: Data Types – Storage classes – Constants – Enumeration Constants – Keywords – Operators: Precedence and Associativity – Expressions – Input/Output statements, Assignment statements – Decision making statements – Switch statement – Looping statements – Pre-processor directives – Compilation process

UNIT II ARRAYS, STRINGS AND STRUCTURES 9 Hrs

Introduction to Arrays: Declaration, Initialization – One dimensional array – Two dimensional arrays – String operations: length, compare, concatenate, copy – Selection sort, linear and binary search - Structure – Nested structures – Pointer and Structures – Array of structures.

UNIT III FUNCTIONS AND POINTERS 9 Hrs

Introduction to functions: Function prototype, function definition, function call, Built-in functions– Recursion – Pointers – Pointer operators – Array of pointers - Files – Types of file processing: Sequential access, Random access - Command line arguments

UNIT IV INTRODUCTION TO LINUX 9 Hrs

Introduction: Comparison of various operating systems, Advantages of Linux, Flavors of Linux, Installation notes, Linux Loader - file system concept, Concepts of devices, various kinds of hardware: Hard disk, floppy disk drivers, CD – ROM drives, Mouse, Memory devices, Printer devices.

UNIT V LINUX COMMANDS AND SHELL PROGRAMMING 9 Hrs

Linux commands and Utilities - Backup and Restore: Back up Strategies and Operations, Restoring files Introduction to Shell Programming: Basics, Control Statements, shell variables, filters, Interrupt, parsing options, file generation

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No. of Hours: 45

Textbooks:

1. Balaguruswamy, E (1990) Programming in C (3rd ed.), Tata McGraw-Hill Publishing Company Limited.
2. Reema Thareja, “programming in C”, Oxford university press, second edition, 2016.
3. Bill Ball & David Pitts RedHat “Linux7 Unleashed”, Tech media SAMSPublication.

References:

1. Kernighan, B.W and Ritchie, D.M, “The C programming language”, second edition, Pearson Education, 2006.
2. Byron Gottfried & Jitender Chhabra (2010), Programming with C (Schaum's Outlines Series), McGraw Hill Education.
3. K N King (2008), C Programming (2nd ed.), W. Norton & Company.
4. Evi Nemeth, Garth Snyder, Scott Seebass, Trent R. Hein UNIX System Administration Handbook (3rd. Ed), Person Education Asia (LPE).
5. Mark G. Sobell (2013), Practical Guide to Linux Commands Editor, Pearson.
6. Goodlife (2006), Running Linux (5th ed.), Om Books Publisher



Department of Electronics and Communication Engineering

Subject Code: BCS19I03	SubjectName: CLOUD APPLICATIONS	Ty / Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: HTML and Java Programming	ETL	2	0/1	3/0	4

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory andLab

OBJECTIVE :

- To learn Cloud computing infrastructure and services, to acquire knowledge about cloud Storage. To understand cloud computing security and to test web application in cloud platform.

COURSE OUTCOMES (COs) : (3- 5)

CO1	Understand the application of cloud computing
CO2	Recognize the importance cloud security.
CO3	Design the efficient flexible cloud applications

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	3	2	2	2	3	2	3	3
CO2	3	2	3	2	3	2	2	3	2	3	2	2
CO3	3	3	2	2	3	2	2	2	3	2	3	2
COs / PSOs	PSO1	PSO2	PSO3	PSO4								
CO1	3	3	2	3								
CO2	3	2	3	2								
CO3	3	2	3	2								

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				✓								



Department of Electronics and Communication Engineering

BCS19I03

CLOUD APPLICATIONS

2 0/1 3/0 4

UNIT I CLOUD APPLICATION FOUNDATIONS

12 Hrs

Introduction to HTML5 and JavaScript Programming: HTML5 overview: HTML, HTML5, types that are supported in HTML5, DOM, HTML4 vs HTML5, API properties and methods, scripting is enabled in browsers, HTML5 features- JavaScript programming for web applications: JavaScript primitives and objects, declared and used in JavaScript, JavaScript control structures, functions in JavaScript, (DOM) hierarchy, window and document objects, JavaScript applications working with HTML documents.

UNIT II HTML 5 FEATURES

12 Hrs

HTML5: elements in HTML5, HTML5 structural elements: section, article, header, footer, figure, figcaption, HTML5 input element: tel, email, datetime, number, range, color. Introduction to cloud computing and IBM Cloud: cloud computing, factors adoption of cloud computing, creating cloud applications, infrastructure as a service, platform as a service, and software as a service, IBM Cloud, Cloud Foundry works with IBM Cloud, services that IBM Cloud offers.

UNIT III DEVELOPING IBM CLOUD APPLICATIONS ON A LOCAL WORK STATION

12 Hrs

IBM Cloud account with the Cloud Foundry CLI and IBM Cloud CLI- Node.js application, Node.js for server-side scripting, IBM Cloud plug-in for Eclipse. Adopt a DevOps approach by using IBM Cloud Continuous Delivery: DevOps, IBM Cloud Continuous Delivery, Web IDE features in IBM Cloud Continuous Delivery, Git Repos and Issue tracking, pipeline build and deploy process. REST architecture and Watson APIs: characteristics of REST APIs, advantages of the JSON data format, REST APIs using IBM Watson. Introduction to data services in IBM Cloud: data services in IBM Cloud, IBM Cloudant, and REST APIs to interact with Cloudant database

UNIT IV IBM CLOUD MOBILE BACKEND AS A SERVICE

12 Hrs

Mobile Backend as a Service (MBaaS)- MBaaS architecture- Push Notifications service- App ID service- Kinetise service- Developing Cloud Applications with SDK for Node.js: Node.js JavaScript framework, web server with Node.js, Node.js modules. . Asynchronous I/O with callback programming: concept of anonymous callback functions, concept of asynchronous callback functions, callback function.

UNIT V EXPRESS WEB APPLICATION FRAME WORK

12 Hrs

Package dependency, Express server object, inbound HTTP method calls for a server resource, callback function to intercept HTTP method calls, JSON data from an HTTP message. Building a rich UI application by using AngularJS with Node.js: Clone an IBM Cloud application, Fetch API to interact with back-end web services. Classes, Arrow functions, Promises.

Total No. of Hours: 60

TEXT BOOK/ Materials:

1. E-content by IBM.



Department of Electronics and Communication Engineering

Subject Code: BEC18L01	Subject Name : CIRCUITS AND DEVICES LAB	T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Circuit theory , Solid State Devices	Lb	0	0/0	3/0	1

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory andLab

OBJECTIVES :

- To apply the different networks theorems of circuit theory
- To understand the working principle of semiconductor devices and its operations.
- To illustrate the characteristics of power electronic devices, like SCR and UJT.
- To analyze the characteristics of MOSFET's and resonant circuits.
- To implement a miniproject based on above concepts

COURSE OUTCOMES (COs) : (3- 5)

The Students will be able to

CO1	Recognize the practical implementation of network theorems.
CO2	Illustrate and examine the characteristics of Diodes and Transistors.
CO3	Analyze the behavior of various Amplifiers and SCR circuits.
CO4	Design and implement a mini project based on the concepts of circuits and devices.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	2	3	2	2	2	2	2
CO2	3	3	3	3	3	2	3	2	2	2	1	2
CO3	3	3	3	3	3	2	3	2	2	2	2	2
CO4	3	3	3	3	3	2	2	2	2	2	1	2
COs / PSO	PSO1	PSO2	PSO3	PSO4								
CO1	3	3	3	2								
CO2	3	3	3	2								
CO3	3	3	2	2								
CO4	3	3	2	2								

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
								✓				



Department of Electronics and Communication Engineering

BEC18L01	CIRCUITS & DEVICES LAB	0	0/0	3/0	1
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LIST OF EXPERIMENTS

1. VERIFICATION OF SUPERPOSITION THEOREM, MPT, THEVENIN, NORTON
2. VERIFICATION OF NODAL & MESH ANALYSIS
3. CHARACTERISTICS OF P-N JUNCTION & ZENER DIODE
4. I/P & O/P CHARACTERISTICS OF BJT
5. CHARACTERISTICS OF JFET; FINDING β OF THE TRANSISTOR AND FIXED BIASING
6. BIASING OF TRANSISTOR IN CE MODE; BJT AMPLIFIER DESIGN CE MODE
7. BJT AMPLIFIER CB MODE AND CC MODE; JFET C.S. AMPLIFIER
8. UJT CHARACTERISTICS; SCR CHARACTERISTICS
9. MOSFET CHARACTERISTICS; STUDY OF RESONANT CIRCUITS
10. MINIPROJECT

Reference:

1. *Lab manual, Department of ECE, DR.MGR UNIVERSITY.*



Department of Electronics and Communication Engineering

Subject Code: BEC18L02	Subject Name : DIGITAL SYSTEM DESIGN LAB	T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Digital Electronics	Lb	0	0/0	3/0	1

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory andLab

OBJECTIVES :

- To implement of various laws of Boolean algebra in SOP and POSforms.
- To implement various combinational logic and sequential logiccircuits.
- To implement standard IC's in implementing digitalcircuits.

COURSE OUTCOMES (COs) : (3- 5)

The Students will be able to

CO1	Practically implement of various laws of Boolean algebra in SOP and POS forms.
CO2	Implement various combinational logic circuits and code converters.
CO3	Design and implement different types of multiplexer and demultiplexers.
CO4	Design and implement various sequential circuits like flip-flops, counters and registers.
CO5	Use the standard IC's in implementing combinational and sequential logic circuits.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	2	2	2	2	2	1	2
CO2	3	3	3	3	3	2	2	2	2	1	2	2
CO3	3	3	3	3	3	2	2	2	2	2	1	2
CO4	3	3	3	3	3	2	2	2	2	1	2	2
CO5	3	3	3	3	3	2	2	2	2	2	1	2
COs / PSOs	PSO1	PSO2	PSO3	PSO4								
CO1	3	2	2	2								
CO2	3	3	3	3								
CO3	3	3	3	3								
CO4	2	2	3	3								
CO5	2	2	2	2								

3/2/1 indicates strength of correlation 3 – High, 2 – Medium,1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
							✓					



Department of Electronics and Communication Engineering

BEC18L02	DIGITAL SYSTEM DESIGN LAB	0	0/0	3/0	1
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LIST OF EXPERIMENTS:

1. IMPLEMENTATION OF BOOLEAN FUNCTIONS USING LOGIC GATES –POS &SOPFORM.
2. IMPLEMENTATION OF MULTIBIT ADDERS & SUBTRACTORS (2 & 3BITS).
3. DESIGN AND IMPLEMENTATION OF CODE CONVERTERS USING LOGICGATES
 - i) BCD TO EXCESS-3 CODE AND VICEVERSA
 - ii) BINARY TO GRAY ANDVICE-VERSA
4. DESIGN AND IMPLEMENTATION OF MAGNITUDE COMPARATOR (2-BIT).
5. MULTIPLEXER & DE MULTIPLEXER LOGIC CIRCUITDESIGN
6. DESIGN AND IMPLEMENTATION OF FLIP FLOPS
7. IMPLEMENTATION OF STUDY OF REGISTERS
8. CONSTRUCTION AND VERIFICATION OFCOUNTERS.
9. IMPLEMENTATION OF COMBINATIONAL LOGIC FUNCTIONS USING STANDARD ICS
10. IMPLEMENTATION OF SEQUENTIAL LOGIC FUNCTIONS USING STANDARD ICS

Reference:

1. *Lab manual, Department of ECE, DR.MGR UNIVERSITY.*



Department of Electronics and Communication Engineering

Subject Code: BCS18IL1	Subject Name : C PROGRAMMING WITH LINUX LAB	T / L / ETL	L	T / S.Lr	P / R	C						
	Prerequisite: Programming lab	Lb	0	0/0	3/0	1						
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory andLab												
OBJECTIVES :												
<ul style="list-style-type: none"> • To make student learn a programming language. • To learn problem solving techniques. • To learn basic understanding of LINUX commands & file systems to familiarize students with LINUX environment. • To make student learn fundamentals of shell scripting and shell programming. 												
COURSE OUTCOMES (COs) : (3- 5)												
The Students will be able to												
CO1	Develop conditional and iterative statements to execute basic c program.											
CO2	Formulate C program that uses pointers to access arrays and structure											
CO3	Construct C programs using built-in and user defined functions to solve problems.											
CO4	Evaluate basic shell scripts on Linux operating system											
CO5	Design generic application menu and handle Linux system calls.											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	2	2	2	3	2	3	3
CO2	3	3	3	3	3	2	2	2	3	2	3	3
CO3	3	3	3	3	3	2	2	2	3	2	2	2
CO4	2	2	3	3	3	2	3	2	3	1	2	3
CO5	2	2	3	3	2	3	2	2	3	1	2	3
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	2		3		3		3					
CO2	3		3		3		2					
CO3	2		3		3		3					
CO4	2		2		3		2					
CO5	2		3		3		2					
3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
							✓					



Department of Electronics and Communication Engineering

BCS18IL1	C PROGRAMMING WITH LINUX LAB	0	0/0	3/0	1
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LIST OF EXPERIMENTS

1. PRIME TEST.
2. PALINDROMETEST.
3. FIBONACCI SERIESGENERATION.
4. ARMSTRONG NOTEST.
5. SOLVING QUADRATICEQUATION.
6. USAGE OF CASE STRUCTURES.
7. MATRIXMULTIPLICATION.
8. RECURSIONPROGRAM
9. SIMPLE SHELL PROGRAMMING.
10. MENU DRIVEN SHELL SCRIPT - SORT WITH VARIOUSOPTIONS.

Reference:

1. *Lab manual, Department of ECE, DR.MGR UNIVERSITY.*



Department of Electronics and Communication Engineering

Subject Code: BMA18007	Subject Name: PROBABILITY AND RANDOM PROCESS Prerequisite: Mathematics – I, Mathematics - II	T / L / ETL Ty	L 3	T / S.Lr 1/0	P / R 0/0	C 4
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L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory andLab

OBJECTIVE :

- To understand the basic concepts in probability and random process and its application in signal processing.

COURSE OUTCOMES (Cos) : (3- 5)

The student will be able to

CO1	Understand the Basic concepts in Probability
CO2	Understand the Basic concepts in Distribution
CO3	Understand the Basic concepts in Random process
CO4	Understand the Basic concepts in Correlation
CO5	Understand the Basic concepts in Spectral Density

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	3	1	1	1	1	1	1	1	2
CO2	3	3	2	3	1	1	1	1	1	1	1	2
CO3	3	3	2	3	1	1	1	1	1	1	1	2
CO4	3	3	2	3	1	1	1	1	1	1	1	2
CO5	3	3	2	3	1	1	1	1	1	1	1	2
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	2		3		2		1					
CO2	2		3		2		1					
CO3	2		3		2		1					
CO4	2		3		2		1					
CO5	2		3		2		1					

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
	✓											



Department of Electronics and Communication Engineering

BMA18007	PROBABILITY AND RANDOM PROCESS	3	1/0	0/0	4
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UNIT I RANDOM VARIABLES

12 HRS

Baye's Theorem – Applications - Random Variables – Distribution functions – Moments – Moment Generating functions –Chebychev's Inequality (statement and application only) – Function of Random Variables.

UNIT II STANDARD DISTRIBUTIONS

12 HRS

Marginal and Conditional Distributions – Applications of Discrete Distributions: Binomial – Poisson – Geometric – Applications of Continuous distributions: Uniform – Exponential– Normal distributions – Central Limit theorem (statement applications only).

UNIT III RANDOM PROCESS

12 HRS

Stationary Process – Ergodic Process – Poisson Process –Applications: Birth and Death Process – Markov Process – Markov Chains.

UNIT IV CORRELATION

12 HRS

Auto Correlation – Auto Covariance – Cross Correlation – Cross Covariance.

UNIT V LINEAR SYSTEMS-APPLICATIONS

12 HRS

Spectral Density – Cross Spectral Density – Applications to Linear Systems with Random Inputs and Outputs.

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No. of Hours: 60

Text Books:

- 1) Veerarajan T., “Probability, Statistics and, Random Processes”, Tata McGraw Hill Publishing Co., (2008).
- 2) Gupta S.C., Kapoor V.K., “Fundamentals of Mathematical Statistics”, S.Chand & Co., (2007).

References :

1. Singaravelu, “Probability and Random Processes”, Meenakshi Agency, (2017).
2. Richard Johnson A., “Miller & Freund's Probability and statistics for Engineers” (9thEd), Prentice Hall of India, (2016).



Department of Electronics and Communication Engineering

Subject Code: BEC18005	Subject Name : CONTROL SYSTEMS FOR ELECTRONICS	T / L / ETL	L	T / S.Lr	P / R	C						
	Prerequisite: Network System	Ty	3	1/0	0/0	4						
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory andLab												
OBJECTIVES :												
<ul style="list-style-type: none"> • To learn the basic elements of control system with mathematical model. • To understand the time response of first and second order system feedback. • To learn the frequency response of systems using bode plot and polar plot. • To check the stability of Control system using various techniques. • To study different compensators and advance control system concepts using state variables. 												
COURSE OUTCOMES (COs) : (3- 5)												
The student will be able to												
CO1	Model physical systems using block diagram and signal graph.											
CO2	Analyze the system in time for standard input functions											
CO3	Perform analysis on margin for stability of the control systems											
CO4	Explain the nature of stability for the given system using Characteristics equations.											
CO5	Design compensators to obtain the required dynamic response of the system and understand the state variable analysis of systems											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	1	2	1	2	2	2	1
CO2	3	3	3	3	3	1	2	1	2	2	2	2
CO3	3	3	3	3	3	2	2	3	2	2	2	3
CO4	3	3	3	3	3	3	3	1	2	2	2	3
CO5	3	3	3	3	3	1	3	3	3	2	2	3
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		3		2		2					
CO2	3		3		2		2					
CO3	3		3		2		2					
CO4	3		3		2		2					
CO5	3		3		2		2					
3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				✓								



Department of Electronics and Communication Engineering

Subject Code: BEC18006	Subject Name: ELECTRONIC CIRCUITS	T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Solid State Devices	Ty	3	0/0	0/0	3

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory andLab

OBJECTIVES :

- On completion of this course the student will understand
- The construction and operation of rectifiers
- Design of amplifier circuits
- Working of oscillators
- Construction of multivibrators
- Design of power amplifiers

COURSE OUTCOMES (COs) : (3- 5)

The Students will be able to

CO1	Discuss various types of rectifiers.
CO2	Design different amplifiers with required gain independently
CO3	Construct the feedback amplifiers and oscillators for desired frequency.
CO4	Calculate the delay and design multivibrator circuits
CO5	Design and construct power amplifiers for different applications.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	2	2	1	2	3	2	3	3
CO2	3	3	3	3	3	2	2	3	2	2	3	3
CO3	3	3	3	3	3	1	1	2	3	3	3	2
CO4	3	3	3	3	3	1	1	1	3	3	2	2
CO5	3	3	2	3	3	1	2	1	3	2	1	3
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		3		2		3					
CO2	3		2		3		3					
CO3	3		2		3		2					
CO4	3		3		2		1					
CO5	3		3		3		3					

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					✓							



Department of Electronics and Communication Engineering

BEC18006	ELECTRONIC CIRCUITS	3	0/0	0/0	3
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UNIT I RECTIFIER & POWER SUPPLY 9 HRS

Half & Full Wave Rectifiers – Filters – Shunt, Inductor, LC Section & Ripple Factor, π filters, Calculation for C, L and LC Filters – Voltage Regulators – Zener – Series Voltage Regulator – Shunt Voltage Regulator – SMPS- IC Voltage Regulators.

UNIT II AMPLIFIERS 9 HRS

Amplifiers – Frequency Response of RC Coupled Amplifiers – Frequency Response of Emitter follower, Gain Band Width Product – FET - Amplifier at Low and High Frequency Cascaded Amplifiers

UNIT III FEED BACK AMPLIFIER & OSCILLATORS 9 HRS

Four Basic Type of Feedback – Effect of Feedback on Amplifier Performance-Examples of Different types of Feedback Amplifiers-Voltage Series & Shunt Feedback, Current Series & Shunt Feedback – Condition for Oscillation Barkhausen Criteria – LC Oscillators – Hartley & Colpitts – RC Oscillators – Wein Bridge, RC Phase Shift, Crystal Oscillator.

UNIT IV MULTI VIBRATORS 9 HRS

Collector Coupled & Emitter Coupled Astable Multivibrator, – Mono Stable, Bistable Multivibrator – Triggering Methods – Storage Delay and Calculation of Switching Time - Schmitt Trigger Circuits, Speed up Capacitor in Switching – UJT based Relaxation Oscillator.

UNIT V POWER AMPLIFIER 9 HRS

Classification – Class A, B, C & AB, Class B-push pull – Class B Complementary Symmetry, Class S, and Power sections Classifications, Efficiency, Distortion in Amplifiers-Tuned Amplifiers.

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No. of Hours: 45

Textbooks:

1. Mohammed. H. Rashid, "*Micro Electronic Circuits, Analysis and Design*", Thomson Learning
2. David. A. Bell, "*Solid state Pulse Circuits*", Prentice Hall India, 4th Edition, 2000.
3. Angsuman sarkar, "*Solid State Microelectroni and Optoelectronic Devices*", University press, 2012.

References:

1. *Millman Taub, "H Pulse Digital & Switching waveform "*, Tata McGraw Hill International, 2001
2. *Jacob Millman, Cristas C. Halkias, " Integrated Electronics", Tata McGraw Hill., Edition 1991.*



Department of Electronics and Communication Engineering

Subject Code: BEC18007	Subject Name : COMMUNICATION THEORY	T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Probability and Random Process	Ty	3	0/0	0/0	3

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory andLab

OBJECTIVES :

- To study various Amplitude modulation and demodulationsystems.
- To provide some depth analysis in noise performance of variousreceiver.
- To study some basic information theory with some channel codingtheorem.

COURSE OUTCOMES (COs) : (3- 5)

The Students will be able to

CO1	Identify the types of Noise and express the need for modulation.
CO2	Illustrate the concepts of amplitude modulation and its transmission technique.
CO3	Articulate the generation & demodulation of FM systems.
CO4	Analyze the analog to digital conversion methods.
CO5	Implement the coding techniques and calculate the channel capacity.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	1	3	2	3	1	2	3	1	2
CO2	3	3	3	3	3	2	2	2	2	2	3	3
CO3	3	3	3	3	3	2	2	1	2	2	3	3
CO4	3	3	3	3	3	1	2	1	2	2	3	3
CO5	3	3	3	3	3	1	2	3	1	2	2	3
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		2		2		3					
CO2	3		3		3		3					
CO3	3		3		3		3					
CO4	3		2		2		3					
CO5	3		2		3		2					

3/2/1 indicates strength of correlation 3 – High, 2 – Medium,1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					✓							



Department of Electronics and Communication Engineering

BEC18007	COMMUNICATION THEORY	3 0/0 0/0 3
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UNIT I INTRODUCTION TO COMMUNICATION SYSTEMS AND NOISE 9 HRS

Basic Communication Systems – Need for Modulation in Communication Systems - Noise - Sources of Noise – Types of Noise - External Noise – Thermal Agitation – Shot Noise – Noise Figure – Signal to Noise Ratio – Equivalent Noise Resistance, Amplitude Modulation and demodulation- Frequency Spectrum – power relations in Amplitude Modulation.

UNIT II CONTINUOUS MODULATION SYSTEMS 9 HRS

Balanced Modulator, DSB – SC, SSB and VSB – Modulation and Demodulation - AM Transmitter, Receiver- Types, AM receivers.

UNIT III ANGLE MODULATION 9 HRS

Frequency modulation – Mathematical representation of FM – Frequency Spectrum – Phase Modulation – Noise triangle – Pre-emphasis, de- emphasis- Comparison of Wide band and Narrow band FM, AFC - Stereophonic FM multiplex system – Generation of FM - FM receivers - Communication receivers.

UNIT IV ANALOG TO DIGITAL CONVERSION 9 HRS

Sampling Theorem - PAM - Quantization of signal - Quantization Error – PWM, PPM – Introduction to digital modulation systems – ASK, FSK, PSK – Transmitter and receiver.

UNIT V INFORMATION THEORY AND CODING 9 HRS

Introduction –Information - Entropy - Information rate, Classification of codes, Kraft McMillan Inequality–Source codingtheorem - Shannon, Fano coding - Huffman coding, Joint and Conditional entropies– Channel capacity -Shannon limit - BSC -Discrete memory less channels – Mutual information.

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No. of Hours: 45

Textbooks:

1. Roy Blake, "*Electronic Communication Systems*", Thomson Learning 2nd Edition, 2002.
2. George Kennedy: "*Electronic Communication Systems*", Tata McGraw Hill publications, 1992.
3. R Bose, "*Information theory, Coding and Cryptography*", TMH2007.

References:

1. K.C.Raveendranath, "Communication system modeling and simulation using matlab & Simulink" universities press, 2011.
2. Taub& Schilling, "Principles of Communication", Tata McGraw Hill, 1986.
3. Simon Haykins, "Principles of Communications", Prentice Hall of India. 2001.



Department of Electronics and Communication Engineering

Subject Code: BHS18NC1	Subject Name : THE INDIAN CONSTITUTION	T / L/ ETL	L	T / S.Lr	P/ R	C						
	Prerequisite: NIL	Ty	2	0	0	0						
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory andLab												
OBJECTIVES :												
<ul style="list-style-type: none"> To provide an overview of the history of the making of IndianConstitution To understand the preamble and the basic structures of theConstitution. To Know the fundamental rights, duties and the directive principles of statepolicy To understand the functionality of the legislature , the executive and thejudiciary 												
COURSE OUTCOMES (COs) : (3- 5)												
The Students will be able to												
CO1	To provide an overview of the history of the making of Indian Constitution											
CO2	To understand the preamble and the basic structures of the Constitution											
CO3	To Know the fundamental rights, duties and the directive principles of state policy											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO 3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	1	1	3	1	1	1	1	1	1
CO2	1	1	1	1	1	3	1	1	1	1	1	1
CO3	1	1	1	1	1	3	1	1	2	1	1	1
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	1		1		2		1					
CO2	1		1		2		1					
CO3	1		1		2		1					
3/2/1 indicates strength of correlation 3 – High, 2 – Medium,1 – Low												
Category	Basic Sciences	Engg Sciences	Humanities & Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
			✓									



Department of Electronics and Communication Engineering

BHS18NC1	THE INDIAN CONSTITUTION	2	0	0	0
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UNIT1

3 HRS

The History of the Making of Indian Constitution, Preamble and the Basic Structures

UNIT2

3 HRS

Fundamental Rights and Duties, Directive Principles of State Policy

UNIT3

3 HRS

Legislature, Executive and Judiciary

UNIT4

3 HRS

Emergency Powers

UNIT5

3 HRS

Special Provisions for Jammu and Kashmir, Nagaland and Other Regions, Amendments

Total No. of Hours: 15

TEXT BOOK:

1. D D Basu, Introduction to the Constitution of India, 20th Edn, LexisnexisButterworths, 2012.

REFERENCES:

1. Rajeev Bhargava (ed), Ethics and Politics of the Indian Constitution, Oxford University Press, New Delhi, 2008.
2. Granville Austin, the Indian Constitution: Cornerstone of a Nation, Oxford University Press, Oxford, 1966.
3. Zoya Hassan, E. Sridharan and R. Sudarshan (Eds), India's Living Constitution: Ideas, Practices, Controversies, Permanent Black, New Delhi, 2002.
4. Subhash C. Kashyap, Our Constitution, National Book Trust, New Delhi, 2011



Department of Electronics and Communication Engineering

Subject Code: BHS18NC2	Subject Name: THE INDIAN TRADITIONAL KNOWLEDGE	T / L / ET L	L	T / S.L r	P / R	C						
	Prerequisite: NIL	Ty	2	0	0	0						
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory andLab												
OBJECTIVES :												
<ul style="list-style-type: none"> To understand the Pre- colonial and Colonial Period, Indian Traditional Knowledge System To understand the Traditional Medicine, Traditional Production and Construction Technology To Know the History of Physics and Chemistry, Traditional Art and Architecture and Vastu Shashtra, Astronomy and Astrology To understand the Origin of Mathematics, Aviation Technology in Ancient India, Crafts and Trade in Ancient India 												
COURSE OUTCOMES (COs) : (3- 5)												
The Students will be able to												
CO1	To understand the Pre- colonial and Colonial Period, Indian Traditional Knowledge System											
CO2	To understand the Traditional Medicine, Traditional Production and Construction Technology											
CO3	To understand the Origin of Mathematics, Aviation Technology in Ancient India, Crafts and Trade in Ancient India											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	3	3	1	1	2	1	1	1	2	1	1
CO2	1	3	3	1	1	2	1	1	1	2	1	1
CO3	1	3	3	1	1	2	1	1	1	2	1	1
COs	PSO1		PSO2		PSO3		PSO4					
CO1	1		1		2		1					
CO2	1		1		2		1					
CO3	1		1		2		1					
3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low												
Category	Basic	Engg	Humanities &	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technic	Soft Skills			
			✓									



Department of Electronics and Communication Engineering

BHS18NC2	THE INDIAN TRADITIONAL KNOWLEDGE	2	0	0	0
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UNIT I

3 HRS

Historical Background: TKS during the Pre- colonial and Colonial Period, Indian Traditional Knowledge System

UNIT II

3 HRS

Traditional Medicine, Traditional Production and Construction Technology

UNIT III

3 HRS

History of Physics and Chemistry, Traditional Art and Architecture and Vastu Shashtra, Astronomy and Astrology

UNIT IV

3 HRS

Mathematics, Aviation Technology in Ancient India, Crafts and Trade in Ancient India Origin of

UNIT V

3 HRS

TKS and the Contemporary World, TKS and the Indian Union, TKS and IT Revolution.

Total No.of Hours: 15

TEXT BOOKS:

1. Amit Jha (2009) , Traditional knowledge system in India, 1st Edition, Delhi University (North Campus)
2. Dr.A.K.Ghosh (2011), Traditional Knowledge of Household Products.



Department of Electronics and Communication Engineering

Subject Code: BCS19I05	Subject Name : BIG DATA ENGINEERING	Ty / Lb / ETL	L	T / S.Lr	P/ R	C
	Prerequisite: None	ETL	1	0/1	3/0	3

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
Ty/Lb/ETL : Theory/Lab/Embedded Theory andLab

OBJECTIVES : The objective of the course is to

- Provide an overview of the methodologies and approaches to bigdata
- Gain insight into the challenges and limitations of big data andclusters.
- Applying various data tools.

COURSE OUTCOMES (COs) : (3- 5)

CO1	Understand the difference between Data and big data.
CO2	Understand the different steps followed in Data mining and pre-processing techniques using tools
CO3	Able to apply Association Rule mining and Clustering approaches
CO4	Familiarize with multi-dimensional data cubes and related analysis

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	1	1	2	2	1	1	1	3	1
CO2	3	3	2	3	3	2	2	2	2	2	3	1
CO3	3	3	3	3	3	2	2	1	2	2	3	1
CO4	3	3	3	3	3	2	2	2	3	3	3	3
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		3		1		1					
CO2	3		3		1		3					
CO3	3		3		1		3					
CO4	3		3		2		2					

3/2/1 indicates strength of correlation 3 – High, 2 – Medium,1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				✓								



Department of Electronics and Communication Engineering

BCS19I05	BIG DATA ENGINEERING	1 0/1 3/0 3
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UNIT I BIG DATA OVERVIEW 9 HRS

Introduction to Big Data: Big Data, major challenges of data, real life examples of Big Data, types of Big Data, Big Data use cases-Prerequisites— Introduction to the Big Data Ecosystem:.Introduction to Hortonworks Data Platform (HDP)- . Apache Ambari

UNIT II HADOOP and HDFS 9 HRS

Big data strategy in terms of parallel reading of large data files and internode network speed in a cluster-Hadoop Distributed File System (HDFS)- NameNode and DataNodes in an Hadoop cluster-MapReduce and YARN: MapReduce model v1, limitations of Hadoop 1 and MapReduce 1, Java code required to handle the Mapper class, YARN model , Compare Hadoop 2/YARN with Hadoop

UNIT III APACHE SPARK 9 HRS

purpose of Apache Spark in the Hadoop ecosystem-architecture and components of the Spark unified stack-a Resilient Distributed Dataset (RDD)- Launch and use Spark's Scala and Python shells-Storing and querying data-data file formats, including flat/text files, CSV, XML, JSON, and YAML-r types of NoSQL datastores, R and Python

UNIT IV ZOOKEEPER, SLIDER, AND KNOX 9 HRS

Challenges posed by distributed applications, role of ZooKeeper within the Apache Hadoop infrastructure and the realm of Big Data management, generic use cases and some real-world scenarios for ZooKeeper, ZooKeeper CLI to interact with ZooKeeper services, peripheral security services to an Hadoop cluster. Loading data with Sqoop: scenarios that are applicable to Hadoop, how to load data from common sources such as a data warehouse, relational database, web server, or database logs, Brief introduction to what Flume is and how it works

UNIT V SECURITY AND GOVERNANCE 9 HRS

r data governance and the role of data security in this governance-e history of security with Hadoop-function of the Hortonworks DataPlane Service (DPS)- Stream Computing: – Introduction to Data Science-Data Science and Data Science Notebooks-Data Science with Open Source Tools— Big SQL- Creating Big SQL schemas and tables-File formats and querying Big SQL tables-Managing the Big SQL Server-Configuring Big SQL security-Data federation with Big SQL-. Introduction to IBM Watson Studio-Analyzing data with Watson Studio

Total No. of Hours: 45

TEXT BOOK/ Materials:

- 1. E-content by IBM.**



Department of Electronics and Communication Engineering

Subject Code: BEC18L03	Subject Name : ELECTRONIC CIRCUITS LAB	T / L/ ETL	L	T / S.Lr	P/ R	C						
	Prerequisite: Electronic Circuits	Lb	0	0/0	3/0	1						
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory andLab												
OBJECTIVES :												
<ul style="list-style-type: none"> • To be able to design, implement different types of rectifiercircuits. • To be able to design different types of voltage regulators. • To be able to design different amplifiers and oscillatorycircuits. • To be able to design power amplifier and study itscharacteristics. • To be able to design tuned amplifier and analyze itsbehavior. 												
COURSE OUTCOMES (COs) : (3- 5)												
The Students will be able to												
CO1	Recall the knowledge on different types of rectifier and examine the effect of filter characteristics.											
CO2	Analyze the characteristics of voltage regulators and feedback amplifier circuits.											
CO3	Demonstrate the characteristics of Wave form Generators.											
CO4	Experiment Amplifiers and evaluate its characteristics.											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	2	2	2	2	3	2	2
CO2	3	3	3	3	3	2	2	2	2	3	1	2
CO3	3	3	3	3	3	2	2	2	2	2	2	1
CO4	3	3	3	3	3	2	2	2	2	2	1	2
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		3		3		2					
CO2	3		3		3		2					
CO3	3		3		2		2					
CO4	3		3		2		2					
3/2/1 indicates strength of correlation 3 – High, 2 – Medium,1 – Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
							✓					



Department of Electronics and Communication Engineering

BEC18L03	ELECTRONIC CIRCUITS LAB	0	0/0	3/0	1
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LIST OF EXPERIMENTS

1. RECTIFIERS – HALF WAVE, FULL WAVE WITHOUT FILTER
2. FWR WITH SHUNT, L AND PI FILTERS
3. VOLTAGE REGULATOR-SERIES & SHUNT
4. RC COUPLED AMPLIFIER (WITH FEEDBACK)
5. FEEDBACK CIRCUITS (VOLTAGE SERIES FEEDBACK; VOLTAGE SHUNT FEEDBACK)
6. SCHMITT TRIGGER
7. MULTI VIBRATORS, MONOSTABLE, ASTABLE, BISTABLE
8. LC OSCILLATORS
 - a) HARTLEY OSCILLATOR
 - b) COLPITTS OSCILLATOR
9. AUDIO OSCILLATORS
 - a) WEIN BRIDGE OSCILLATOR
 - b) RC PHASE SHIFT OSCILLATOR
10. CLASS A – POWER AMPLIFIER
11. CLASS B – POWER AMPLIFIER
12. TUNED AMPLIFIER

Reference:

1. *Lab manual, Department of ECE, DR.MGR UNIVERSITY.*



Department of Electronics and Communication Engineering

Subject Code: BEC18L04	Subject Name : DIGITAL SIMULATION LAB						T / L/ ETL	L	T / S.Lr	P/ R	C	
	Prerequisite: Signals and Systems, Control System						Lb	0	0/0	3/0	1	
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory andLab												
OBJECTIVES :												
<ul style="list-style-type: none"> • Programmatically generate different types of signals usingMATLAB. • Perform sampling and generate waveforms. • Generate time series perform convolution check stability perform DFT and IDFT computation usingMATLAB. • Program and analyze behavior of different types of systems usingMATLAB. 												
COURSE OUTCOMES (COs) : (3- 5)												
The Students will be able to												
CO1	Generate different types of signals.											
CO2	Perform sampling and generate waveforms.											
CO3	Generate times series, perform convolution and check stability perform DFT and IDFT computation.											
CO4	Program and analyze behavior of different types of systems using MATLAB.											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	3	3	2	2	1	1	1	1	1
CO2	3	2	1	3	3	2	2	1	1	1	1	1
CO3	3	2	2	3	3	2	2	3	2	2	2	2
CO4	3	3	2	3	3	2	2	3	2	2	3	2
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	2		2		1		1					
CO2	2		2		1		1					
CO3	3		3		2		2					
CO4	3		3		3		3					
3/2/1 indicates strength of correlation 3 – High, 2 – Medium,1 – Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
							✓					



Department of Electronics and Communication Engineering

BEC18L04	DIGITAL SIMULATION LAB	0	0/0	3/0	1
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LIST OF EXPERIMENTS

SIGNALS AND SYSTEMS

1. GENERATION OF SIGNAL SEQUENCE
2. SAMPLING & WAVEFORM GENERATION
3. REPRESENTATION OF TIME-SERIES; COMPUTATION OF CONVOLUTION
4. STABILITY OF LTI SYSTEM.
5. DFT & IDFT COMPUTATION

CONTROL SYSTEM

6. IMPULSE RESPONSE OF FIRST AND SECOND ORDER SYSTEMS
7. TIME DOMAIN SPECIFICATIONS FOR CLOSED LOOP TRANSFER FUNCTION.
8. BODE PLOT AND POLAR PLOT FOR OPEN LOOP SYSTEM
9. STABILITY CHECK USING ROUTH-HURWITZ CRITERION BODE PLOT AND ROOT LOCUS.
10. DETERMINATION OF CONTROLABILITY, OBSERVABILITY AND TRANSFER FUNCTION FROM STATE MODEL

Reference:

1. *Lab manual, Department of ECE, DR.MGR UNIVERSITY.*



Department of Electronics and Communication Engineering

Subject Code: BEC18L05	Subject Name : CIRCUIT SIMULATION USING P-SPICE	T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Circuit theory and electronic devices and circuits	Lb	0	0/0	3/0	1

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory andLab

OBJECTIVE :

- To implement the various electrical and electronics circuits usingPSPICE.

COURSE OUTCOMES (COs) : (3- 5)

The Students will be able to

- | | |
|------------|--|
| CO1 | Apply PSPICE for designing amplifiers |
| CO2 | Demonstrate their skills in designing multivibrator circuit. |
| CO3 | Apply their skills for the design of filters. |

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	2	2	1	2	3	1	2
CO2	3	3	3	3	3	2	2	2	2	2	3	2
CO3	3	3	3	3	3	2	2	1	1	2	1	2
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		3		2		3					
CO2	3		3		2		2					
CO3	3		3		2		2					

3/2/1 indicates strength of correlation 3 – High, 2 – Medium,1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
							↙					



Department of Electronics and Communication Engineering

BEC18L05

CIRCUIT SIMULATION USING P-SPICE

0 0/0 3 /0 1

LIST OF EXPERIMENTS

1. CHARACTERISTICS OF BJT.
2. VERIFICATION OF SUPERPOSITION AND MPT THEOREMS.
3. FREQUENCY ANALYSIS OF RC COUPLED AMPLIFIER
4. FREQUENCY ANALYSIS OF JFET AMPLIFIER
5. MONOSTABLE MULTIVIBRATOR CIRCUITS.
6. ASTABLE MULTIVIBRATOR CIRCUITS
7. SUMMER, SUBTRACTOR.
8. DIFFERENTIATOR, INTEGRATOR.
9. LPF, HPF FILTERS
10. BPF, BRF FILTERS.

Reference:

1. *Lab manual, Department of ECE, DR.MGR UNIVERSITY.*



Department of Electronics and Communication Engineering

Subject Code: BEC18TS1	SubjectName: TECHNICAL SKILL- I	T / L/ ETL	L	T / S.Lr	P/ R	C						
	Prerequisite: None	Lb	0	0	3	1						
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C:Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab												
OBJECTIVE: The objective is to develop the technical skill of the students.												
COURSE OUTCOMES (COs) : (3- 5)												
CO1	Develop the technical skills required in the field of study											
CO2	Bridge the gap between the skill requirements of the employer or industry and the Competency of the students.											
CO3	Enhance the employability of the students.											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	3	3	3	3	2	2	3	2	3	2
CO2	3	3	2	3	3	3	2	2	3	3	3	3
CO3	3	3	3	3	3	3	2	2	3	3	3	3
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		3		3		2					
CO2	3		2		3		3					
CO3	2		3		2		3					
3/2/1 indicates strength of correlation 3 – High, 2 – Medium,1 – Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
								✓				



Department of Electronics and Communication Engineering

Subject Code: BSK18ET1	Subject Name : SOFT SKILL – I CAREER & CONFIDENCE BUILDING	T / L / ETL	L	T / S.Lr	P / R	C
	Prerequisite: None	ETL	0	0	3/0	1

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory andLab

OBJECTIVES :

- To create awareness in students, various top companies helping them improve their skillset matrix, leading to develop a positive frame of mind.
- To help students be aware of various techniques of candidate recruitment and help them prepare CV's and resume.
- To help student how to face various types of interview, preparing for HR, technical interviews.
- To help students improve their verbal reading, narration and presentation skills by performs various mock sessions.

COURSE OUTCOMES (COs) : (3- 5)

The Students will be able to

CO1	Gain the knowledge of various top companies leading to improvement in skills amongst them.
CO2	Developing various candidate recruitment techniques like group discussion, interviews and be able to prepare CV's and resumes.
CO3	Prepare for different types of interviews and be prepared for HR and technical interviews.
CO4	Improve their verbal, written and other skills by performing mock sessions.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	1	1	2	2	2	3	3	2	2	3
CO2	2	1	2	1	1	2	2	3	3	2	2	3
CO3	1	3	1	3	1	2	2	3	3	2	2	3
CO4	3	1	1	1	1	2	2	3	3	2	2	3
COs / PSOs	PSO1	PSO2	PSO3	PSO4								
CO1	2	2	3	1								
CO2	3	3	3	2								
CO3	2	3	3	2								
CO4	3	2	3	2								

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
									✓			



Department of Electronics and Communication Engineering

BSK18ET1	SOFT SKILL – I CAREER & CONFIDENCE BUILDING	0	0	3/0	1
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UNIT I

6 HRS

Creation of awareness of top companies / improving skill set matrix / Development of positive frame of mind / Creation of self-awareness.

UNIT II

6 HRS

Group discussions / Do's and don'ts – handling group discussions / what evaluators look for interpersonal relationships / Preparation of Curriculum Vitae / Resume.

UNIT III

6 HRS

Interview – awareness of facing questions – Do's and don'ts of personal interview / group interview, enabling students to prepare for different procedures such as HR interviews and Technical Interviews / self-introductions.

UNIT IV

6 HRS

Verbal aptitude, Reading comprehension / narration / presentation / Mock Interviews.

UNIT V

6 HRS

Practical session on Group Discussion and written tests on vocabulary and reading comprehension

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No. of Hours: 30



Department of Electronics and Communication Engineering

Subject Code: BEC18008	Subject Name : DIGITAL SIGNAL PROCESSING	T / L/ ETL	L	T / S.Lr	P/ R	C						
	Prerequisite: Signals System	Ty	3	1/0	0/0	4						
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C:Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab												
OBJECTIVES :												
<ul style="list-style-type: none"> To learn the concepts of Fourier transform and it's Applications. To understand the design techniques of digital IIR filters To learn the concepts and design techniques of digital FIR filters. To understand the concepts and applications of Multi – rate sampling. To introduce the architecture of Digital Signal Processors. 												
COURSE OUTCOMES (COs) : (3- 5)												
The students will be able to												
CO1	Illustrate Fourier transform concepts.											
CO2	Interpret the knowledge of designing IIR filters.											
CO3	Learn to design FIR filters.											
CO4	Evaluate Multi rate samplings techniques for system design.											
CO5	Describe the modules in the architecture of digital signal processor.											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	2	1	1	1	1	2	2
CO2	3	3	3	3	3	2	2	1	2	2	1	2
CO3	3	3	3	3	3	2	1	1	1	1	2	1
CO4	3	3	3	3	3	1	2	1	2	1	2	2
CO5	3	3	3	2	2	2	1	1	2	2	2	2
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		3		2		3					
CO2	3		3		2		2					
CO3	3		3		1		3					
CO4	3		3		1		2					
CO5	2		2		3		1					
3/2/1 indicates strength of correlation 3 – High, 2 – Medium,1 – Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				✓								



Department of Electronics and Communication Engineering

BEC18008	DIGITAL SIGNAL PROCESSING	3	1/0	0/0	4
UNIT I	DFT AND FFT	12 HRS			
Discrete Fourier Transform (DFT) - Properties-Convolution of Sequences - Linear Convolution - Circular Convolution - Introduction to Radix-2 FFT- Properties - DIT (FFT)-DIF (FFT) - Algorithms of Radix-2FFT-Computing Inverse DFT by doing a direct DFT.					
UNIT II	DESIGN OF IIR FILTER	12 HRS			
IIR Filters- Properties of IIR Filters -Analog Low pass Filter Design - Butterworth Filter - Chebyshev Filter - Design of IIR Filters from Analog filters - Approximation of Derivatives – Impulse Invariance - Bilinear Transformation – The Matched z- Transformation - Frequency Transformation.					
UNIT III	DESIGN OF FIRFILTER	12 HRS			
FIR Filters - Characteristics of FIR Filters with Linear Phase-Properties of FIR Filters-Design of FIR Filters using Windows-Fourier Series Method-Frequency sampling Method – Limit cycle oscillations-Zero- Input Limit cycle oscillations- Overflow Limit cycle oscillations- Signal Scaling.					
UNIT IV	MULTIRATE SIGNAL PROCESSING	12 HRS			
Multirate Signal Processing- Interpolation - Decimation - Single and Multistage Realization - Filter Bank Implementation - Applications-Sub Band Coding.					
UNIT V	OVERVIEW OF DIGITAL SIGNAL PROCESSOR	12 HRS			
Overview of Digital Signal Processors – Application of Digital Signal Processor – Memory Architecture of DSP Processor – Von Neumann Architecture – Harvard Architecture - Architecture of TMS32C5X Processor – Addressing modes – Pipelining .					

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No.of Hours: 60

Textbooks:

1. John. G. Proakis and Dimitris C.Manolakis, “*Digital Signal Processing Principles, Algorithms and Applications*”, Pearson Education, Third edition2006.
2. Sanjit k.Mitra "*Digital signal processing*", A Computer Based Approach, Tata McGraw Hill, NewDelhi, 2001.
3. A.V.Oppenheim, R.W. Schafer and J.R. Buck, “*Discrete – Time Signal Processing*”, 8th Indian reprint, Pearson2004.

References:

1. Ashok Ambardar, "*Analog and Digital Signal Processing*", 2nd Edition, Thomson Learning2000.
2. Ashok Ambardar, "*Analog and Digital Signal Processing A Modern Introduction*", 1st edition Thomson Learning 2006
3. Johnny R.Johnson, "*Introduction to Digital Signal Processing*", Minth printing, September2001.
4. M.D.Srinath, P.K.Rajasekaran, R.Vishwanathan "*Introduction to Statistical Signal ProcessingWith Application*", Prentice-Hall of India Pvt.Ltd. NewDelhi, 1999.
5. B.Venkataramani, M.Bhaskar, “*Digital Signal Processors, Architecture, Programming and Application*”, Tata McGraw Hill, New Delhi, 2003.



Department of Electronics and Communication Engineering

Subject Code: BCS18I02	Subject Name : COMPUTER COMMUNICATION						T / L/ ETL	L	T / S.Lr	P/ R	C	
	Prerequisite: CommunicationSystem						Ty	3	0/0	0/0	3	
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory andLab												
OBJECTIVES :												
<ul style="list-style-type: none"> • To understand different storage media and OSIlayers • To introduce the features of different I/O peripheral devices andprotocols. • To introduce the students the functions and standards ofLAN. • To introduce IEEE standard employed in computernetworking. • To make students to get familiarized with different protocols and networkcomponents. 												
COURSE OUTCOMES (COs) : (3- 5)												
The Students will able to												
CO1	Describe the basic concepts of data communication and OSI layers.											
CO2	Analyze data link control protocol.											
CO3	Explain different standards and protocols used in LAN											
CO4	Express the duties of network support layer and WAN protocols											
CO5	Define the functions of upper OSI layer											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	1	1	1	1	3	3	2	1	2
CO2	3	3	1	1	2	1	1	1	1	1	2	1
CO3	2	2	2	1	3	2	2	2	1	1	1	3
CO4	3	1	2	2	2	2	2	2	2	1	1	3
CO5	3	2	1	2	1	3	2	1	2	2	2	2
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		3		1		3					
CO2	3		2		3		1					
CO3	1		3		2		2					
CO4	1		1		1		1					
CO5	2		2		3		1					
3/2/1 indicates strength of correlation 3 – High, 2 – Medium,1 – Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills	Inter disciplinary		
										↙		



Department of Electronics and Communication Engineering

BCS18I02	COMPUTER COMMUNICATION	3	0/0	0/0	3
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UNIT I DATA COMMUNICATION 9 HRS

Introduction, Basic concepts, OSI Reference Model, Transmission of Digital Data –Electrical Interface, Modems-Transmission rate-modem standards-Guided Media-Twisted –pair Cable-Coaxial cable-Performance- Error Detection and Correction (CRC) - Time and Frequency domains Signals

UNIT II DATA LINK CONTROL AND PROTOCOLS 9 HRS

Flow Control and Error Control, Stop And Wait - Sliding Windows- Automatic Repeat (ARQ), Asynchronous Protocols - X Modem, Y Modem, Synchronous Protocols – Character Oriented and Bit Oriented Protocols (HDLC).

UNIT III LOCAL AREA NETWORKS 9 HRS

IEEE 802 Standards, LLC, MAC Layer Protocols –CSMA/CD Ethernet, Token Bus, Token Ring, FDDI, Distributed Queue Dual Bus, Switched Multimegabit Data Service

UNIT IV WIDE AREA NETWORKS 9 HRS

Switching, Duties of the Transport Layer, ATM Protocol –Architecture Header Structure, Function of AAL Layer, Internetworking Devices, Repeater, Bridge, Routers and Gateways, Routing Algorithms- Link State and Distance Vector routing.

UNIT V UPPER OSI LAYERS 9 HRS

Session Layer - Presentation Layer –Translation, Brief Introduction to Encryption / Decryption, Authentication -Data Compression, Application Layer Protocols, MHS, File Transfer , Virtual Terminal, Common Management Information Protocol.

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No. of Hours: 45

Textbooks:

1. Behrouz A. Forouzan, “Data Communication and Networking”, Tata McGraw Hill, 5th Edition, 2013.
2. William A, Shay, "Understanding Data Communications and Networks", Thomson Learning, 3rd Edition 2003.
3. Gallo, "Computer Communications and Networking Technologies", Thomson Learning, 1st edition 2001.

References:

1. William Stallings, “Data and Computer Communication”, Prentice Hall of India, Fifth Edition 1997.
2. Andrew S. Tanenbaum, “Computer Networks”, prentice hall of India, Third Edition 1996.
3. Fred Hallsall, “Data Communication Computer Networks and Open System”, Addison – Wesley, 1992



Department of Electronics and Communication Engineering

Subject Code: BCS19I07	Subject Name : ARTIFICIAL INTELLIGENCE	Ty / Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: NIL	ETL	1	0/1	3/0	3

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C:Credits
Ty/Lb/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVES :

- The students will be able to solve problems using AI techniques.
- To develop new games using AI techniques.
- To guide the process of deducing information in a computational manner.

COURSE OUTCOMES (COs) : (3- 5)

CO1	Understand different types of AI agents
CO2	Know various AI search algorithms (uninformed, informed, heuristic, constraint satisfaction, genetic algorithms)
CO3	Understand the fundamentals of knowledge representation (logic-based, frame-based, semantic nets), inference and theorem proving
CO4	Demonstrate working knowledge of reasoning in the presence of incomplete and/or uncertain information
CO5	Ability to apply knowledge representation, reasoning, and machine learning techniques to real-world problems

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	2	3	2	2	3	3	3	3
CO2	3	3	3	3	2	3	2	2	3	3	3	3
CO3	3	3	3	3	1	3	2	2	3	2	3	3
CO4	3	3	3	3	2	3	2	2	3	3	3	3
CO5	3	3	3	3	2	3	2	2	3	2	3	3
COs/PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		3		2		2					
CO2	3		3		3		3					
CO3	3		3		3		3					
CO4	3		3		2		3					
CO5	3		2		3		3					

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					✓							



Department of Electronics and Communication Engineering

BCS19I07	ARTIFICIAL INTELLIGENCE	1 0/1 3/0 3
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UNIT I ARTIFICIAL INTELLIGENCE OVER VIEW 9 HRS

Introduction to Artificial Intelligence - Machine Learning - Natural Language Processing - Computer vision - Cognitive Computing.

UNIT II ARTIFICIAL INTELLIGENCE FOUNDATIONS 9 HRS

Introduction to IBM Watson - Evolution from DeepQA to Watson services on IBM Cloud - Build with Watson –

UNIT III ARTIFICIAL INTELLIGENCE ANALYST 9 HRS

Introduction to Natural Language Processing - Pipeline and concepts - NLP and IBM Watson

UNIT IV CHATBOTS 9 HRS

Introduction to Chatbots - Chatbot fundamentals - IBM Watson conversation service

UNIT V COMPUTERVISION 9 HRS

Introduction to Computer Vision - Computer Vision fundamentals - IBM Watson Visual Recognition service

Total No. of Hours: 45

TEXT BOOK:

- 1. E-content from IBM.**



Department of Electronics and Communication Engineering

Subject Code: BEC18L06	Subject Name : COMMUNICATION LAB - I	T / L/ ETL	L	T / S.Lr	P/ R	C						
	Prerequisite: Basic Concepts of Communication	Lb	0	0/0	3/0	1						
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory andLab												
OBJECTIVES :												
<ul style="list-style-type: none"> • To design and implement FIR & IIR filters, Multi rate signal processing, adaptive filters and fast Fourier transform using DSP processors. • To measure signal parameters in time domain and frequency domain. • To perform modulation and demodulation of various signals. 												
COURSE OUTCOMES (COs) : (3- 5)												
The Students will be able to												
CO1	Implement various kinds of digital filter perform Multi rate signal processing and perform Fast Fourier Transform using DSP processors.											
CO2	Measure various signal parameters in time domain and frequency domain.											
CO3	Perform modulation and demodulation of various signals.											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	2	2	2	2	2	2	2
CO2	3	3	3	3	3	2	2	2	2	2	2	2
CO3	3	3	3	3	3	2	2	2	2	2	2	2
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		3		3		2					
CO2	3		3		3		2					
CO3	3		3		3		2					
3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
							✓					



Department of Electronics and Communication Engineering

BEC18L06	COMMUNICATION LAB - I	0	0/0	3/0	1
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LIST OF EXPERIMENTS

DSP PROCESSOR IMPLEMENTATION

1. FIR & IIR FILTERSIMPLEMENTATION
2. MULTIRATE SIGNALPROCESSING
3. ADAPTIVEFILTER
4. FAST FOURIERTRANSFORMS

MEASUREMENT ON SIGNAL PARAMETERS IN TIME DOMAIN & FREQUENCY DOMAIN

5. DETERMINATION OF THE PHASE DIFFERENCE BETWEEN TWO SIGNALS (DERIVED FROM THE SAME SOURCE (SAY 1 KHZ SQUARE WAVE SIGNAL) USING TWO DIFFERENT PATHS, ONE OF WHICH CONTAINS A DELAY UNIT) USING CRO AND A PHASE DETECTORCIRCUIT.
6. DETERMINATION OF THE FREQUENCY OF UNKNOWN SIGNALS: USING CRO AND LISSAJOUSPATTERNS.

ANALOG COMMUNICATION LAB

7. DESIGN AND TESTING OF AMPLITUDE MODULATION ANDDEMODULATION.
8. DESIGN AND TESTING OF FREQUENCY MODULATION ANDDEMODULATION.
9. DESIGN AND TESTING OF PRE-EMPHASIS.
10. DESIGN AND TESTING OF NARROW FREQUENCYMODULATION.

Reference:

1. *Lab manual, Department of ECE, DR.MGR UNIVERSITY.*



Department of Electronics and Communication Engineering

Subject Code: BCS18IL2	Subject Name : COMPUTER NETWORKS LAB	T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: C++ and Data structures lab	Lb	0	0/0	3/0	1

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
 T/L/ETL : Theory/Lab/Embedded Theory andLab

OBJECTIVES :

- The students will be able to implement the different protocols
- The students will be able to implement and compare the various routing algorithms
- The students will be able to independently use the NS2 simulator tool.

COURSE OUTCOMES (COs) : (3- 5)

The Students will be able to

CO1	Establish and observe the characteristics of point to point network with n nodes.
CO2	Transmit messages between different network nodes.
CO3	Encrypt and decrypt the message transmitted through a network.
CO4	Implement and compare various routing algorithms.
CO5	Use the simulation tools like NS2, OPNET etc.,

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	3	3	3	3	3	3	3	2
CO2	3	3	3	2	3	3	3	2	3	3	2	2
CO3	3	3	3	3	3	2	2	1	3	3	2	3
CO4	3	3	3	3	3	1	2	1	3	3	2	3
CO5	3	3	3	3	3	3	1	3	2	2	3	3
COs / PSOs	PSO1	PSO2	PSO3	PSO4								
CO1	3	3	3	2								
CO2	3	2	3	3								
CO3	3	3	3	3								
CO4	2	3	2	2								
CO5	2	3	2	3								

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
							✓					



Department of Electronics and Communication Engineering

BCS18IL2	COMPUTER NETWORKS LAB	0	0/0	3/0	1
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LIST OF EXPERIMENTS

Using NS2/OPNET

1. SIMULATE THREE NODES POINT-TO-POINT NETWORKS WITH A DUPLEX LINK BETWEEN THEM. SET THE QUEUE SIZE AND VARY THE BANDWIDTH AND FIND THE NUMBER OF PACKETS DROPPED.
2. APPLY TCP AGENT BETWEEN N0 TO N3 AND UDP N1 TO N3. APPLY RELEVANT APPLICATIONS OVER TCP AND UDP AGENTS CHANGING THE PARAMETERS AND DETERMINE THE NUMBER OF PACKETS SENT BY TCP/UDP.
3. SIMULATE THE DIFFERENT TYPE OF INTERNET TRAFFIC SUCH AS FTP AND TELNET OVER A NETWORK AND ANALYZE THE THROUGHPUT.
4. SIMULATE A TRANSMISSION OF PING MESSAGE OVER A NETWORK TOPOLOGY CONSISTING OF 6 NODES AND FIND THE NUMBER OF PACKETS DROPPED DUE TO CONGESTION.
5. SIMULATE AN ETHERNET LAN USING N NODES CHANGE ERROR RATE AND DATA RATE AND COMPARE THE THROUGHPUT.
6. SIMULATE AN ETHERNET LAN USING N NODES AND SET MULTIPLE TRAFFIC NODES AND DETERMINE THE COLLISION ACROSS DIFFERENT NODES.
7. SIMULATE AN ETHERNET LAN USING N NODES AND SET MULTIPLE TRAFFIC NODES AND PLOT CONGESTION WINDOW FOR DIFFERENT SOURCE/DESTINATION

USING C/C++

8. WRITE A PROGRAM FOR ERROR DETECTING CODE USING CRC-CCITT(16BIT)
9. WRITE A PROGRAM FOR DISTANCE VECTOR ALGORITHM TO FIND SUITABLE PATH FOR TRANSMISSION
10. WRITE A PROGRAM FOR SIMPLE RSA ALGORITHM TO ENCRYPT AND DECRYPT THE DATA
11. WRITE A PROGRAM FOR HAMMING CODE GENERATION FOR ERROR DETECTION/CORRECTION

Reference:

1. Lab manual, Department of ECE, DR.MGR UNIVERSITY.

B. Tech - ECE with Specialization in IoT and AI - in collaboration with IBM-Regulation 2018



Department of Electronics and Communication Engineering

Subject Code: BEC18TS2	SubjectName: TECHNICAL SKILL-II	T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: None	Lb	0	0	3/0	1

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C:Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE: The objective is to develop the technical skill of the students.

COURSE OUTCOMES (COs) : (3- 5)

CO1	Recognize various technological aspects related to Electronics and Communication
CO2	Observe design methodology of analog and digital circuits
CO3	Prepare to face the real time challenges with reasonable solutions

Mapping of Course Outcomes with Program Outcomes (POs)

COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	3	2	2	3	2	3	2
CO2	3	3	2	3	3	3	2	2	3	3	3	3
CO3	3	3	3	3	3	3	2	2	3	3	3	3
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		3		3		2					
CO2	3		2		3		3					
CO3	2		3		2		3					

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
								✓				



Department of Electronics and Communication Engineering

Subject Code: BEC18009	Subject Name : DIGITAL COMMUNICATION						T / L/ ETL	L	T / S.Lr	P/ R	C	
	Prerequisite: Communication System, Probability and Random Process, Mathematics-I						Ty	3	1/0	0/0	4	
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C:Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab												
OBJECTIVES :												
<ul style="list-style-type: none"> To study detection, estimation and discuss the process of sampling, quantization and coding that are fundamental to the digital transmission of analogsignals. To understand the concepts of different digital modulation techniques and their applications in our day to daylife To learn error control coding which encompasses techniques for the encoding and decoding of digital data streams for their reliable transmission over noisychannels. 												
COURSE OUTCOMES (COs) : (3- 5)												
The students will be able to												
CO1	Interpret the sampling process in real-time systems and reconstruct the signal with the estimation of noise											
CO2	Design a system without distortion and interference											
CO3	Hone their inferences to develop various modulation technologies for the state of the art communication.											
CO4	Demonstrate their skills in generating a unique code for detecting the error in digital communication											
CO5	Apply their understanding to improve the digital communication efficiency in a multipath environment.											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	2	3	1	1	1	2	2	1
CO2	3	3	3	3	2	3	1	1	1	2	2	1
CO3	3	2	2	3	3	3	2	3	2	2	3	3
CO4	3	3	3	3	3	2	2	3	1	2	1	3
CO5	3	2	1	2	2	2	3	1	3	2	3	3
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		3		1		1					
CO2	3		1		1		2					
CO3	3		3		1		2					
CO4	3		3		1		1					
CO5	3		3		1		2					
3/2/1 indicates strength of correlation 3 – High, 2 – Medium,1 – Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				✓								



Department of Electronics and Communication Engineering

BEC18009	DIGITAL COMMUNICATION	3	1/0	0/0	4
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UNIT I DETECTION, ESTIMATION AND SAMPLING PROCESS 12 HRS
 Model of Digital Communication System, Gram Schmidt Orthogonalization Procedure, Matched Filters, Correlation Receivers, Error Probability, Maximum Likelihood Estimation, Linear Prediction and Prediction Filters, Sampling Theorem, Quadrature Sampling of Band-Pass Signals, Reconstruction of a message from its samples

UNIT II WAVEFORM CODING TECHNIQUES AND BASE BAND SHAPING 12 HRS
 PCM and TDMA Principles, Channel Noise and Error Probability, Quantization Noise and SNR, Differential Pulse Code Modulation and Delta Modulation, Speech Coding at Low Bit Rates, Power Spectra of PAM Signals, Inter Symbol Interference, Nyquist Criterion for distortionless baseband transmission, Correlative Coding and Precoding, Eye Patterns and Equalization Techniques.

UNIT III DIGITAL MODULATION TECHNIQUES 12 HRS
 Coherent Binary Modulation Techniques, Coherent Quadrature Modulation Techniques, NonCoherent Binary Modulation Techniques, Power Spectra, Bandwidth Efficiency, Bit versus Symbol Error Probabilities

UNIT IV ERROR CONTROL CODING 12 HRS
 Need for Coding, Types of Codes, Linear Block Codes, Cyclic Codes, Convolution Codes, Maximum Likelihood Decoding of convolutional Codes, Distance Properties and Sequential Decoding of convolutional Codes, Trellis coding, Viterbi coding.

UNIT V SPREAD SPECTRUM SYSTEMS 12 HRS
 Generation of Pseudo Noise Sequences, Correlation Properties, Direct Sequence Spread Spectrum Systems, Frequency Hop System, Signal Space Dimension and Processing Gain , Probability of Error, Antijam and Multipath Performance.

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No. of Hours: 60

Textbooks:

1. Simon Haykin, "Digital communications", John Wiley & Sons, 1988.
2. John. G. Proakis, "Digital Communication", McGraw Hill Inc., Third Edition, Malaysia, 1995.
3. B.P. Lathi, "Modern Digital and Analog Communication System", Oxford publications, Third edition.

References:

1. Roy Blake, "Electronic Communication systems", Thomson learning, 2nd edition, 2002.
2. M.K. Simen, "Digital Communication Techniques Signal Design & Detection", Prentice Hall of India, 1999.
3. Bernard Sklar, "Digital Communication: Fundamentals and Applications", Prentice Hall, 2011 Edition.
4. Upamanyu Madhow, "Fundamentals of Digital Communication", Cambridge University Press, 2008
5. Robert G. Gallager, "Principles of Digital Communication", Cambridge University Press, 2008.



Department of Electronics and Communication Engineering

Subject Code: BEC18010	Subject Name : INTRODUCTION TO VLSI AND EMBEDDED SYSTEM DESIGN	T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Digital Electronics and Data Structures	Ty	3	0/0	0/0	3

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory andLab

OBJECTIVES :

- To learn the basics of MOSTransistors.
- To study the design of combinational logic circuit usingCMOS.
- To learn CMOS sequential logic circuitsdesign.
- To learn the concepts of modeling a digital system usingHDL.
- To study the basics of PICmicrocontroller.

COURSE OUTCOMES (COs) : (3- 5)

The students will be able to

CO1	Gain sound knowledge in the basics CMOS Circuits.
CO2	Analysis and design of different combinational circuits.
CO3	Identify the techniques involved in the analysis and synthesis of sequential circuits.
CO4	Expertise in digital system design using VHDL & Verilog.
CO5	Understand the basics of 16F877 PIC Microcontroller.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2	1	1	1	1	1	1	1	1
CO2	3	3	3	3	1	1	1	1	1	1	1	1
CO3	3	3	3	3	1	1	1	1	1	1	1	1
CO4	3	2	3	2	1	1	1	1	1	1	1	1
CO5	3		3	2	1	1	1	1	1	1	1	1
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		3		2		1					
CO2	3		3		2		2					
CO3	3		3		2		2					
CO4	3		3		2		2					
CO5	3		3		1		1					

3/2/1 indicates strength of correlation 3 – High, 2 – Medium,1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				✓								



Department of Electronics and Communication Engineering

BEC18010	INTRODUCTION TO VLSI AND EMBEDDED SYSTEM DESIGN	3	0/0	0/0	3
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UNIT I MOS TRANSISTOR THEORY

9 Hrs

Introduction – NMOS and PMOS transistor, Threshold voltage, Body effect, MOS device – Basic DC equations, Second order effects, MOS models, Small signal AC characteristics, Complementary CMOS Inverter, Power dissipation and scaling of MOS transistors.

UNIT II DESIGNING COMBINATIONAL LOGIC CIRCUITS

9 Hrs

Static CMOS design – Complementary CMOS, Propagation Delay and Power Consumption in static CMOS, Pseudo NMOS Logic, Pass Transistor Logic, Transmission gates, Dynamic CMOS Design – Basic principle, Speed and Power dissipation of Dynamic logic, Signal integrity issues in dynamic design, CMOS Domino logic, np CMOS logic.

UNIT III DESIGNING SEQUENTIAL LOGIC CIRCUITS

9 Hrs

Introduction – Timing metrics for sequential circuits, Classification of memory elements, Static latches and registers – The bi-stability principle, Multiplexer based latch, Master slave edge triggered register, Static SR flip flop, Dynamic latches and registers – Dynamic transmission gate edge triggered registers, clocked CMOS register.

UNIT IV VHDL & VERILOG PROGRAMMING

9 Hrs

VHDL background – VHDL requirement, Elements of VHDL, operators, Basic concepts in VHDL, Structural modeling, Behavioral modeling and Dataflow modeling in VHDL and Simple programs, Verilog HDL – Basic concepts – Gate Level modeling, Dataflow modeling and Behavioral modeling – Simple programs.

UNIT V PIC MICROCONTROLLER

9 Hrs

Introduction - PIC16F877 Micro controller overview, Special Function Registers, I/O Ports, Timers, Oscillators, Capture/ Compare and PWM module, Serial communication module, Analog module and Instruction set.

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No. of Hours: 45

Textbooks:

1. Neil H.E. Weste, Kamran Eshraghian, “*Principles of CMOS VLSI Design – A system perspective*”, second edition, AddisonWesley, 1997.
2. Jan M.Rabaey, Ananth Chandrakasan, Borivoje Nikolic, “*Digital Integrated Circuits: A Design perspective*”, second edition, Prentice Hall of India, 2003.
3. Zainalabedin Navabi, “*VHDL – Analysis and modeling of Digital Systems*”, Second edition, Mcgraw – Hill International Editions, 1998.

References:

1. A. Pucknell, Kamran Eshraghian, “*Basic VLSI Design*”, Third Edition, Prentice Hall of India, 2007.
2. R.Jacob Baker, Harry W.Li, David E. Boyce, “*CMOS circuit design, Layout and Simulation*”, Prentice Hall of India, 2005.
3. J.Baskar, “*A VHDL Primer*”, Third edition, Pearson Education, 2004.
4. Samir Palnitkar, “*Verilog HDL, A Guide to Digital Design and Synthesis*”, second edition, Pearson Education, 2003.
5. Pic-microcontroller.com / free- ebook-pic-microcontrollers.



Department of Electronics and Communication Engineering

Subject Code: BEC19I01	Subject Name : IoT AND ITS APPLICATIONS	T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Computer Science fundamentals, Exposure to the IBM Skills Academy Portal learning environment	ETL	1	0/1	3/0	3

L : Lecture T: Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
 T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- The IoT Cloud Developer career path prepares students to apply IoT and cloud computing concepts to build solutions based on devices connected to a cloud-based IoT platform. The concepts are then applied to practical use cases by using IBM Watson IoT Platform, Watson AI services, and tools on IBM Cloud.

COURSE OUTCOMES (COs) : (3- 5)

The Students will be able to

CO1	To work on the basics of IoT
CO2	To develop on IoT Cloud developer
CO3	To build on different IoT application
CO4	To understand the concept of IoT network protocols
CO5	To work on different IoT solutions

Mapping of Course Outcomes with Program Outcomes (POs)

COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	3	2	1	2	2	3	1	2
CO2	2	3	3	3	3	2	1	1	1	1	1	2
CO3	2	3	3	3	2	2	1	1	2	2	1	3
CO4	2	3	3	3	3	1	1	2	1	2	1	3
CO5	2	3	3	3	3	2	1	1	1	2	1	1
COs/ PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3	3	3	1	3							
CO2	3	2	1	3								
CO3	3	3	1	3								
CO4	3	2	1	3								
CO5	2	3	1	3								

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				✓								



Department of Electronics and Communication Engineering

BEC19I01	IoT AND ITS APPLICATIONS	1 0/1 3/0 3
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UNIT I INTRODUCTION TO IoT 9 HRS

Basics of Internet of Things (IoT) - Node-RED - Build a web page - create a REST API in Node-RED - Translate text - analyze tone - add audio - send tweets - Node-RED application - Node-RED Messenger Listener - Node-RED Messenger Writer - Face book Messenger Credentials - video captioning application- Basics to Bots – IoT applications.

UNIT II IoT CLOUD DEVELOPER 9 HRS

Introduction to IBM Watson IoT platform - IoT reference architecture - characteristics of Watson IoT platform - four quadrants of Watson IoT platform - communication protocols used - key capabilities of IBM cloud - services available - databases available.

UNIT III IOT APPLICATION 9 HRS

IoT sensors - connect an IoT device to Watson IoT Platform - IBM Cloud users and resources - IBM Cloud Lite account - IoT related services - Deploy the IoT application - features of Watson IoT platform - Manage applications on Watson IoT platform - advanced features of Watson IoT platform - application to monitor room temperature and humidity - visualize the data sent in real time using dashboard.

UNIT IV IBM WATSON IOT PLATFORM NETWORK PROTOCOLS 9 HRS

Concept of flow-based programming - Node-RED workspace and components - Node-RED palette manager - IoT application functions using Node-RED – twilio – HTTP protocol - Request/Response model– MQTT protocol - concept of publish/subscribe model - Node-RED application.

UNIT V IoT SOLUTIONS 9 HRS

IoT solutions with REST APIs - characteristics of REST APIs - characteristics of JSON data format - Watson AI services - Integrating IoT applications with IBM Watson Visual Recognition - Watson Studio project - Visual Recognition built-in model to classify images - analytics services on IBM Cloud - features of IBM Analytics Engine - Geospatial Analytics - IBM Cloud Object Storage - capabilities of IBM Cloud SQL Query - Monitoring parking utilization with IBM Cloudant Geospatial - use Node-RED to build a car simulator - use raw data and analyze in real time to fulfill a business case - to configure Cloudant to do geospatial analytics.

Total No. of Hours: 45

TEXT BOOK/ Materials:

- 1. E-content by IBM.**



Department of Electronics and Communication Engineering

Subject Code: BEC18L07	Subject Name : COMMUNICATION LAB II	T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Digital Communication, Communication Systems	Lb	0	0/0	3/0	1

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory andLab

OBJECTIVES :

- To learn the concepts of analog pulse modulation techniques.
- To study the working of digital modulation system.
- To study the different types of information coding.

COURSE OUTCOMES (COs) : (3- 5)

The Students will be able to

- | | |
|------------|--|
| CO1 | Apply various digital modulation techniques for the state of art of communication. |
| CO2 | Generate error correcting codes for transmitting signals. |
| CO3 | Interpret the sampling process and reconstruct the signal |

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	3	3	3	2	3	3	2	3
CO2	3	3	3	2	3	3	3	2	3	2	2	3
CO3	3	3	3	2	2	3	3	1	3	2	2	3
COs / PSOs	PSO1	PSO2	PSO3	PSO4								
CO1	3	3	3	3								
CO2	3	3	3	3								
CO3	3	3	3	3								

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
							✓					



Department of Electronics and Communication Engineering

BEC18L07	COMMUNICATION LAB II	0	0/0	3/0	1
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LIST OF EXPERIMENTS

1. DESIGN AND TESTING OF PULSE AMPLITUDE MODULATION & DEMODULATION.
2. DESIGN AND TESTING OF PULSE WIDTH MODULATION & DEMODULATION.
3. DESIGN AND TESTING OF PULSE POSITION MODULATION & DEMODULATION.
4. DESIGN AND TESTING OF ASK, FSK AND PSK
5. STUDY OF LINE CODING AND DECODING TECHNIQUES
6. STUDY OF SAMPLING
7. STUDY OF PULSE CODE MODULATION
8. DESIGN & TESTING OF EYE PATTERN
9. BLOCK/HAMMING CODES.
10. PN SEQUENCE GENERATOR.
11. DELTA MODULATION AND TIME DIVISION MULTIPLEXING

Reference:

1. *Lab manual, Department of ECE, DR.MGR UNIVERSITY.*



Department of Electronics and Communication Engineering

Subject Code: BEC18L08	Subject Name : VLSI AND EMBEDDED SYSTEM DESIGN LAB	T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Introduction of VLSI & embedded system design	Lb	0	0/0	3/0	1

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory andLab

OBJECTIVES :

- To design and simulate combinational logic circuits usingXilinx.
- To design and simulate sequential logiccircuits.
- To interface ADC, DAC, DC motor, stepper motor with PICmicrocontroller.

COURSE OUTCOMES (COs) : (3- 5)

The Students will be able to

CO1	Design & implement combinational circuits like adder, multiplexer, de multiplexer etc.,
CO2	Construct sequential circuits like FFs, counters, shift registers.
CO3	Investigate I/O devices, ADC, DAC, motors with microcontroller.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	3	2	2	2	2	3	2	2
CO2	3	2	3	3	3	1	1	2	2	2	3	2
CO3	3	3	3	3	3	2	3	3	2	3	3	3
COs / PSO	PSO1	PSO2	PSO3	PSO4								
CO1	3	3	2	2								
CO2	3	2	3	1								
CO3	3	2	3	2								

3/2/1 indicates strength of correlation 3 – High, 2 – Medium,1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
								✓				



Department of Electronics and Communication Engineering

BEC18L08	VLSI AND EMBEDDED SYSTEM DESIGN LAB	0 0/0 3/0 1
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LIST OF EXPERIMENTS

SIMULATION OF DIGITAL CIRCUITS USING XILINX

1. DESIGN AND TESTING OF ADDER AND SUBTRACTOR
2. DESIGN AND TESTING OF MULTIPLEXER, DEMULTIPLEXER, ENCODER, DECODER.
3. DESIGN AND TESTING OF MAGNITUDE COMPARATOR WITH 4/8BITS.
4. DESIGN AND TESTING OF JK, D, T AND SR FLIP FLOPS, ANDREGISTERS
5. DESIGN AND TESTING OF SYNCHRONOUS & ASYNCHRONOUSCOUNTERS.
6. DESIGN AND TESTING OF SHIFT REGISTERS (RIGHT /LEFT).

INTERFACING WITH PIC MICROCONTROLLER

7. ADC INTERFACE WITH LM35.
8. STEPPER MOTOR INTERFACE
9. TRAFFIC LIGHT CONTROLLER INTERFACE
10. DC MOTOR INTERFACE
11. LCD DISPLAY INTERFACE.
12. LED INTERFACE

Reference:

1. *Lab manual, Department of ECE, DR.MGR UNIVERSITY.*



Department of Electronics and Communication Engineering

Subject Code: BSK18ET2	Subject Name : SOFT SKILLS – II	T / L/ ETL	L	T / S.Lr	P/ R	C
	QUANTITATIVE APTITUDE					
	Prerequisite: Soft Skills - I	ETL	0	0	3/0	1

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C:Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE: The main objective is to strengthen the logical and arithmetic reasoning skills of the students.

COURSE OUTCOMES (COs) : (3- 5)

CO1	Recognize and apply arithmetic knowledge in a variety of contexts.
CO2	Ability to identify and critically evaluate philosophical arguments and defend them from criticism.
CO3	Define data and interpret information from graphs.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	3	1	1	3	2	3	3
CO2	2	2	2	3	1	3	1	3	3	3	3	1
CO3	3	3	3	3	3	3	2	2	3	3	3	3
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	2		2		3		3					
CO2	3		2		2		3					
CO3	1		2		1		1					

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
										✓		



Department of Electronics and Communication Engineering

BSK18ET2	SOFT SKILLS – II QUANTITATIVE APTITUDE	1 0 3/0 1
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UNIT 1 Logical Reasoning I

Logical statements – arguments – assumptions – courses of action.

UNIT 2 Logical Reasoning II

Logical conclusions – deriving conclusions from passages – theme detection.

UNIT 3 Arithmetical Reasoning I

Number system – h.c.f & l.c.m – problem on ages – percentage – profit & loss – ratio & proportion– partnership.

UNIT 4 Arithmetical Reasoning II

Time & work – time & distance – clocks – permutations & combinations – heights & distances – odd man out and series.

UNIT 5 Data Interpretation

Tabulation – bar graphs – pie graphs – line graphs.

References:

1. R.S.Agarwal, A modern approach to Logical Reasoning, S.Chand & Co., (2017).
2. R.S.Agarwal, A modern approach to Verbal and Non verbal Reasoning, S.Chand & Co., (2017).
3. R.S.Agarwal, Quantitative Aptitude for Competitive Examinations, S.Chand & Co., (2017).
4. A.K.Gupta, Logical and Analytical Reasoning, Ramesh Publishing House, (2014).
5. B.S.Sijwali, Indu sijwali, A new approach to Reasoning (Verbal and Non verbal), Arihant Publishers, (2014).



Department of Electronics and Communication Engineering

Subject Code: BEC18L09	SubjectName: INPLANT TRAINING	T / L/ ETL	L	T / S.Lr	P/ R	C						
	Prerequisite: None	Lb	0	0	3/0	1						
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C:Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab												
OBJECTIVE : The main objective of the Inplant training is to provide a short-term work experience in an Industry/ Company/ Organization												
COURSE OUTCOMES (COs) : (3- 5)												
CO1	To get an insight of an industry / organization/company pertaining to the domain of study.											
CO2	To acquire skills and knowledge for a smooth transition into the career.											
CO3	To gain field experience and get linked with the professional network.											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	1	1	1	3	3	3	3	3	3	3
CO2	3	2	3	3	2	3	3	3	3	3	3	2
CO3	3	3	3	3	2	3	3	3	3	3	3	2
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	2		3		2		3					
CO2	2		3		2		3					
CO3	3		3		3		2					
3/2/1 indicates strength of correlation 3 – High, 2 – Medium,1 – Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
								✓				



Department of Electronics and Communication Engineering

Subject Code: BEC18TS3	SubjectName: TECHNICAL SKILL - III	T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: None	L	0	0	3/0	1

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C:Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE: The objective is to develop the technical skill of the students.

COURSE OUTCOMES (COs) : (3- 5)

CO1	Generalize the technical needs by categorizing the societal needs
CO2	Apply the technical skills to solve complex problems
CO3	Enhance the operational excellence to sustain in corporate world.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	3	3	3	3	2	2	3	2	3	2
CO2	3	3	2	3	3	3	2	2	3	3	3	3
CO3	3	3	3	3	3	3	2	2	3	3	3	3
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		3		3		2					
CO2	3		2		3		3					
CO3	2		3		2		3					

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
								✓				



Department of Electronics and Communication Engineering

Subject Code: BEC18011	Subject Name : DIGITAL IMAGE PROCESSING AND ITS APPLICATIONS	T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Digital Signal Processing	Ty	3	1/0	0/0	4

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory andLab

OBJECTIVES :

- To provide introduction to students the fundamentals of Digital Image Processing system and its breadth and depth of thefield.
- To enable the students acquaint with principles of image acquisition system and imaging technologies are used in various fields.
- To provide in depth knowledge to students on various unitary form of Image transforms techniques and its practicalrealization.
- To analyze the spatial and frequency domain enhancement techniques and students to apply appropriate algorithms to perform image enhancement, image restoration, image segmentation and imagecompression.
- To Design a typical digital image processing for specific application like Machine vision, Vision based sensing and control for automobiles, remote sensing, and medical image diagnosticsetc.

COURSE OUTCOMES (COs) :

The students will be able to

CO1	Listing the elements of visual perception and recognizing image sensing and acquisition.
CO2	Identify the various image transforms and their inverse operations
CO3	Discuss the image enhancement techniques, defining different kinds of filtering.
CO4	Recognizing the various image degradation models and categorizing image restoration methods.
CO5	Articulate various image compression techniques and interpret the fundamental Python syntax and semantics.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	3	1	3	2	3	2	3	3
CO2	3	3	2	2	3	3	2	2	3	2	3	1
CO3	3	2	3	2	2	3	2	2	2	3	3	3
CO4	2	3	3	3	3	2	2	1	2	1	2	3
CO5	1	2	3	3	3	2	2	1	2	2	3	3
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		3		2		3					
CO2	2		3		1		3					
CO3	2		3		3		3					
CO4	2		3		3		2					
CO5	3		2		3		2					

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engineering	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships /	Soft Skills			
					✓							



Department of Electronics and Communication Engineering

BEC18011	DIGITAL IMAGE PROCESSING AND ITS APPLICATIONS	3	1/0	0/0	4
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UNIT I DIGITAL IMAGE FUNDAMENTALS 12 HRS

Need for DIP- Fundamental steps in DIP – Elements of visual perception -Image sensing and Acquisition – Image Sampling and Quantization – Imaging geometry, discrete image mathematical characterization.

UNIT II IMAGE TRANSFORMS 12 HRS

Two dimensional Fourier Transform- Properties – Fast Fourier Transform – Inverse FFT Discrete cosine transform and KL transform.-Discrete Short time Fourier Transform Wavelet Transform- Discrete wavelet Transform- and its application in Compression

UNIT III IMAGE ENHANCEMENT 12 HRS

Spatial Domain: Basic relationship between pixels- Basic Gray level Transformations – Histogram Processing – Smoothing spatial filters- Sharpening spatial filters. Frequency Domain: Smoothing frequency domain filters- sharpening frequency domain filters- Homomorphic filtering

UNIT IV IMAGE RESTORATION & SEGMENTATION 12 HRS

Overview of Degradation models –Unconstrained and constrained restorations-Inverse Filtering- Wiener Filter - Feature Extraction Detection of discontinuities – Edge linking and Boundary detection- Thresholding- -Edge based segmentation-Region based Segmentation-- Use of motion in segmentation.

UNIT V APPLICATIONS 12 HRS

Pattern, Signature, Character Recognition- Texture and Shape Analysis- Biometric and Biomedical Image Processing-Remote Sensing Applications.

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No. of Hours: 60

Text books:

1. Rafael C.Gonzalez & Richard E.Woods – Digital Image Processing – Pearson Education- 3/e – Reprint 2014.
2. Anil.K.Jain – Fundamentals of Digital Image Processing- Pearson Education, 9th Reprint, 2002.

References:

1. B.Chanda & D.Dutta Majumder – Digital Image Processing and Analysis – Prentice Hall of India –2006.
2. William K. Pratt – Digital Image Processing – John Wiley & Sons, 4/e,2007
3. Tinku Acharya, Ajoy K. Ray - Image Processing: Principles and Applications-JohnWiley & Sons, 2005.



Department of Electronics and Communication Engineering

Subject Code: BMG18003	SubjectName : PRINCIPLES OF MANAGEMENT	T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: None	Ty	3	0/0	0/0	3

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory andLab

OBJECTIVES :

- To enable the students to study the evolution of Management and types of business organization organizational culture and environment and trends and issues inmanagement.
- To enable the students understand the nature of planning and its processes and decisionmaking steps andprocess.
- To enable the students understand the nature and purpose of organizing types of organization authority and its types and Human Resource Management and itsconcepts.
- To understand the foundation of individual and group behavior and various motivational theories, techniques, job satisfaction concepts and communicationtheories.
- To understand the concept of controlling its system andprocesses.

COURSE OUTCOMES (COs) : (3- 5)

The Students will able to

CO1	To know the evolution of management, types of business organization, Organizational culture and environment and trends and issues in management.
CO2	Illustrate the planning and processes associates with tools and decision making steps.
CO3	Examine the concept of organizing, HR and its concepts.
CO4	Analyze individual, group behavior and related concepts.
CO5	Evaluate system and process of controlling techniques.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	2	2	2	3	3	3	3	3	3	3
CO2	2	3	2	3	1	3	3	3	3	3	3	3
CO3	2	2	2	3	2	3	3	2	3	2	2	3
CO4	1	2	2	3	1	2	2	2	3	3	3	3
CO5	2	2	2	3	2	2	2	2	3	3	3	2
COs / PSO s	PSO1		PSO2		PSO3		PSO4					
CO1	2		3		3		3					
CO2	2		3		2		2					
CO3	2		3		3		1					
CO4	2		3		3		2					
CO5	3		3		2		1					

3/2/1 indicates strength of correlation 3 – High, 2 – Medium,1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
			✓									



Department of Electronics and Communication Engineering

BMG18003	PRINCIPLES OF MANAGEMENT	3	0/0	0/0	3
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UNIT-I INTRODUCTION TO MANAGEMENT

9HRS

Management: Importance – Definition – Nature and Scope of Management Process – Role and Functions of a Manager – Levels of Management – Development of Scientific Management and other Schools of thought and approaches.

UNIT-II PLANNING AND DECISION MAKING

9HRS

Planning: Nature – Importance – Forms – Types – Steps in Planning – Objectives – Policies – Procedures and Methods – Natures and Types of Policies – Decision –making – Process of Decision – making – Types of Decision.

UNIT-III ORGANISATION

9HRS

Organisation: Types of Organisations – Organisation Structure – Span of Control and Committees – Departmentalisation – Informal Organisation.

UNIT-IV DECENTRALISATION

9HRS

Authority – Delegation – Decentralisation – Difference between Authority and Power – Responsibility – Recruitment – Sources, Selection, Training – Direction – Nature and Purpose.

UNIT-V CONTROLLING

9HRS

Co-ordination – Need, Type and Techniques and requisites for excellent Co-ordination – Controlling – Meaning and Importance – Control Process.

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No. of Hours: 45

Textbooks:

1. C.B.Gupta, Management Theory & Practice -Sultan Chand & Sons - New Delhi.
2. L.M.Prasad, Principles & Practice of Management - Sultan Chand & Sons - New Delhi.
3. P.C. Tripathi &P.N Reddy, Principles of Managements - Tata Mc.Graw Hill - New Delhi.

References:

1. Weihrich and Koontz, Management – A Global Perspective.
2. N.Premavathy, Principles of Management - Sri Vishnu Publication - Chennai.
3. J.Jayasankar, Business Management - Margham Publication - Chennai.



Department of Electronics and Communication Engineering

Subject Code: BEC19I02	Subject Name : BLOCK CHAIN TECHNOLOGY	T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: JavaScript, Node.js, and Docker, IBM Skills Academy Cloud hands-on labs platform	ETL	1	0/1	3/0	3

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
 T/L/ETL : Theory/Lab/Embedded Theory andLab

OBJECTIVES :

- To learn about Blockchain, its key principles, and how it is applied across various industries
- To apply blockchain concepts to the business use case by identifying basic components, requirements, and capabilities in the example business network

COURSE OUTCOMES (COs) : (3- 5)

The students will be able to

CO1	Understand and apply the concepts in Blockchain technology
CO2	Build an application using Hyperledger Composer
CO3	Apply the deep dive concepts to set up a business
CO4	Develop a Client Application for Hyperledger Fabric
CO5	To integrate Blockchain with other systems for a secured application

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	2	2	1	1	3	2	2	2	3
CO2	2	3	3	3	2	1	2	2	2	3	2	3
CO3	3	3	3	3	2	2	2	1	1	1	3	3
CO4	2	3	3	2	3	1	2	2	2	2	1	3
CO5	3	3	3	3	3	3	2	2	2	2	2	3
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	2		3		1		1					
CO2	2		3		1		1					
CO3	3		2		1		1					
CO4	2		2		1		1					
CO5	3		3		1		1					

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					✓							



Department of Electronics and Communication Engineering

BEC19I02	BLOCK CHAIN TECHNOLOGY	1	0/1	3/0	3
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UNIT I BASIC BLOCK CHAIN CONCEPTS 9 HRS

Introduction – Overview of Blockchain Technology – Applying blockchain concepts to the vehicle manufacture lifecycle use case - Introducing Hyperledger Composer.

UNIT II HYPERLEDGER COMPOSER 9 HRS

Building the Vehicle Manufacture sample application with Hyperledger Composer - Understanding Blockchain Solution Architecture – Exploring the Vehicle Manufacture sample application

UNIT III BLOCK CHAIN DEEPPDIVE 9 HRS

Elements of a business network - Role of channels – Maintenance of the world state - Develop a blockchain user application with Hyperledger Composer SDK - Setting up a blockchain business network with Hyperledger Fabric

UNIT IV HYPER LEDGER FABRIC APPLICATION DEVELOPMENT 9 HRS

Hyperledger Fabric Application Development - Develop a blockchain user application with Hyperledger Composer SDK – Understanding Blockchain Deployment - Develop a client application for Hyperledger Fabric.

UNIT V BLOCK CHAIN SECURITY 9 HRS

Raspberry Pi – Linux on Raspberry Pi -Raspberry Pi Interfaces – Programming Raspberry Pi with Python – Arduino boards – Other IoT devices – Data analytics for IoT –Intel Galileo Arduino board Specification (with simple programs).

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No. of Hours: 45

TEXT BOOK/ Materials:

- 1. E-content byIBM.**



Department of Electronics and Communication Engineering

Subject Code: BEC18L10	Subject Name : MICROWAVE AND OPTICAL COMMUNICATION LAB	T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Microwave Engineering, Optical Communication	Ty	0	0/0	3/0	1

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory andLab

OBJECTIVES :

- To have a detailed practical study of microwave equipments
- To study the optical devices and to use in the appropriate application.
- To learn the fiber optical receivers and connectors.

COURSE OUTCOMES (COs) : (3- 5)

The Students will be able to

CO1	Demonstrate the ability to design and conduct experiments, analyze and interpret data.
CO2	Demonstrate the skills to use modern engineering tools, software and equipments to analyze problems.
CO3	Design a system and to learn about measurement of fiber parameters.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	3	3	3	2	2	3	3	3
CO2	3	2	3	3	3	3	3	2	2	2	3	3
CO3	3	2	3	2	3	3	3	3	2	2	3	3
COs / PSOs	PSO1	PSO2	PSO3	PSO4								
CO1	3	3	3	2								
CO2	3	3	3	2								
CO3	3	2	2	2								

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills				
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Department of Electronics and Communication Engineering

BEC18L10	MICROWAVE AND OPTICAL COMMUNICATION LAB	0	0/0	3/0	1
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LIST OF EXPERIMENTS

1. REFLEX KLYSTRON MODE CHARACTERISTICS.
2. MEASUREMENT OF GUIDE WAVELENGTH
3. MEASUREMENT OF VSWR AND IMPEDANCE OF UNKNOWN LOADS, INCLUDING MEASUREMENT OF HIGH VSWR.
4. MEASUREMENT OF THE COUPLING AND THE DIRECTIVITY OF WAVEGUIDE DIRECTIONAL COUPLERS.
5. MEASUREMENT OF INSERTION LOSS AND ISOLATION OF NON – RECIPROCAL FERRITE DEVICES.
6. STUDY OF TEE JUNCTION (E-PLANE, H-PLANE AND E-H PLANETEEES.)
7. MEASUREMENT OF THE GAIN AND RADIATION PATTERN OF A WAVEGUIDE HORN ANTENNA
8. STUDY OF GUNN OSCILLATOR CHARACTERISTICS.
9. STUDY OF A FIBER-OPTIC COMMUNICATION LINK.
10. CHARACTERISTICS OF LED AND PIN DIODE
11. CHARACTERISTICS OF LASER DIODE
12. CHARACTERISTICS OF AVALANCHE PHOTODIODE
13. MEASUREMENTS OF FIBER PARAMETERS : NUMERICAL APERTURE, ATTENUATION

Reference:

1. Lab manual, Department of ECE, DR.MGR UNIVERSITY.



Department of Electronics and Communication Engineering

Subject Code: BEC18L11	Subject Name : OPEN CV-PYTHON FOR DIGITAL IMAGE PROCESSING LAB	T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Digital Image Processing	Lb	0	0/0	3/0	1

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory andLab

OBJECTIVES :

- The fundamentals of digital imageprocessing
- Image transform used in digital imageprocessing
- Image enhancement techniques used in digital imageprocessing

COURSE OUTCOMES (COs) : (3- 5)

The Students will be able to

CO1	Describe different modalities and current techniques in image acquisition
CO2	Use the mathematical principles of digital image enhancement (contrast, gradients, noise)
CO3	Describe and apply the concepts of feature detection and contour finding algorithms.
CO4	Apply the knowledge primarily obtained by studying examples and cases in the field of biomedical imaging to other engineering disciplines
CO5	Independently work in OpenCV software using python programming

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	2	2	2	3	3	2	2
CO2	3	3	3	3	3	2	2	2	3	3	2	2
CO3	3	3	3	3	3	2	2	2	3	3	2	2
COs / PSOs	PSO1	PSO2	PSO3	PSO4								
CO1	3	3	2	2								
CO2	3	3	2	2								
CO3	3	3	2	2								

3/2/1 indicates strength of correlation 3 – High, 2 – Medium,1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
								✓				



Department of Electronics and Communication Engineering

BEC18L11	Open CV-PYTHON FOR DIGITAL IMAGE PROCESSING LAB	0 0/0 3/0 1
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LIST OF EXPERIMENTS

1. IMAGE PROCESSING IN OPEN CV
2. CHANGINGCOLOR-SPACE
3. IMAGETHRESHOLDING
4. GEOMETRIC TRANSFORMATIONS OFIMAGES
5. SMOOTHING IMAGES
6. MORPHOLOGICALTRANSFORMATIONS
7. IMAGEGRADIENTS
8. CANNY EDGEDETECTION
9. IMAGEPYRAMIDS
10. CONTOURS INOPENCV
11. HISTOGRAMS INOPENCV
12. IMAGE TRANSFORMS IN OPENCV
13. FEATURE DETECTION ANDDESCRIPTION
14. CAMERA CALIBRATION AND 3DRECONSTRUCTION

Reference:

1. Lab manual, Department of ECE, DR.MGR UNIVERSITY.



Department of Electronics and Communication Engineering

Subject Code:	SubjectName: PROJECT PHASE -I	T / L/ ETL	L	T / S.Lr	P/ R	C
BEC18L12	Prerequisite: NIL	Lb	0	0	3/3	2

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C:Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE: The objective of the Project is to culminate the academic study and provide an opportunity to explore a problem or issue, address through focused and applied research under the direction of a faculty mentor. The project demonstrates the student's ability to synthesize and apply the knowledge and skills acquired to real-world issues and problems. This project affirms the students to think critically and creatively, find an optimal solution, make ethical decisions and to present effectively.

COURSE OUTCOMES (COs) : (3- 5)

CO1	Apply the knowledge and skills acquired in the course of study addressing a specific problem or issue.
CO2	To encourage students to think critically and creatively about societal issues and develop user friendly and reachable solutions
CO3	To refine research skills and demonstrate their proficiency in communication skills.
CO4	To take on the challenges of teamwork, prepare a presentation and demonstrate the innate talents.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	2	3	3	1	2	2	3	3
CO2	3	3	3	3	3	3	3	2	2	2	3	3
CO3	3	3	3	3	3	3	3	2	2	3	3	2
CO4	3	2	3	3	3	3	2	3	3	3	3	3
COs / PSOs	PSO1	PSO2	PSO3	PSO4								
CO1	3	3	3	3								
CO2	3	3	3	3								
CO3	3	2	3	3								
CO4	3	2	2	2								

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
							✓					



Department of Electronics and Communication Engineering

Subject Code: BFL18001	Subject Name: FOREIGN LANGUAGE	T / L / ETL	L	T / S.Lr	P / R	C
	Prerequisite: NIL	Ty	0	0	3/0	1

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C:Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE: To recognize the cultural values, practices, and heritage of the foreign country, communicate effectively in a foreign language and interact in a culturally appropriate manner with native speakers of that language.

COURSE OUTCOMES (COs) : (3- 5)

CO1	Achieve functional proficiency in listening, speaking, reading, and writing.
CO2	Develop an insight into the nature of language itself, the process of language and culture acquisition.
CO3	Decode, analyze, and interpret authentic texts of different genres.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	1	1	3	1	3	2	3	3	1
CO2	2	1	1	1	1	3	1	3	3	3	3	1
CO3	1	1	2	2	1	3	2	3	2	3	3	1
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	1		1		1		1					
CO2	1		1		1		1					
CO3	1		1		1		1					

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
			✓									



Department of Electronics and Communication Engineering

Subject Code: BEC18012	Subject Name : WIRELESS NETWORKS						T / L / ETL	L	T / S.Lr	P / R	C	
	Prerequisite: Computer Networks						Ty	3	1/0	0/0	4	
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory andLab												
OBJECTIVES :												
<ul style="list-style-type: none"> To give a deep insight for the wireless network architectures, protocols, and applications. To study about Adhoc wireless networks and its MAC & Routing protocols. To understand the wireless sensor networks and its MAC & Routing protocols. 												
COURSE OUTCOMES (COs) : (3- 5)												
The Students will be able to												
CO1	Understand the concepts of WLAN and PAN											
CO2	Analyze the issues in Adhoc wireless networks											
CO3	Operate MAC protocols											
CO4	Differentiate and experiment network routing protocols											
CO5	Describe the facts of wireless sensor networks											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	1	1	1	1	1	2	1	3
CO2	3	3	3	3	3	3	2	1	3	1	3	3
CO3	3	3	3	3	3	3	2	2	3	2	1	3
CO4	3	3	3	3	3	2	2	1	3	3	3	3
CO5	3	3	2	2	1	1	1	1	1	2	1	3
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	2		1		2		3					
CO2	3		3		2		3					
CO3	3		3		3		2					
CO4	3		3		3		2					
CO5	2		1		1		3					
3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				✓								



Department of Electronics and Communication Engineering

Subject Code: BEC18013	Subject Name : COGNITIVE RADIO	T / L / ETL	L	T / S.Lr	P / R	C						
	Prerequisite: Communication Theory	Ty	3	0/0	0/0	3						
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory andLab												
OBJECTIVES :												
<ul style="list-style-type: none"> • To enable the student to understand the evolving paradigm of cognitive radio communication and the enabling technologies for its implementation. • To enable the student to understand the essential functionalities and requirements in designing software defined radios and their usage for cognitive communication. • To expose the student to the evolving next generation wireless networks and their associated challenges 												
COURSE OUTCOMES (COs) : (3- 5)												
The Students will be able to												
CO1	Describe the basics of the software defined radios.											
CO2	To learn the hardware and software architecture of software defined radio											
CO3	Design the wireless networks based on the cognitive radios											
CO4	Gives an understanding of cognitive radio architecture											
CO5	Explain the concepts behind the wireless networks and next generation networks											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	1	3	1	3	1	1	1	1	3
CO2	3	1	1	3	1	3	1	3	1	1	1	1
CO3	1	1	3	1	1	1	1	1	1	1	1	1
CO4	1	3	1	3	1	3	3	1	1	3	1	1
CO5	3	1	1	1	3	3		1	1	1	1	3
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		2		1		3					
CO2	3		3		2		3					
CO3	3		3		1		3					
CO4	3		1		3		3					
CO5	3		2		1		3					
3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	✓ Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			



Department of Electronics and Communication Engineering

BEC18013	COGNITIVE RADIO	3 0/0 0/0 3
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UNIT I INTRODUCTION TO SDR 9 HRS

Definitions and potential benefits, software radio architecture evolution – foundations, technology tradeoffs and architecture implications, Antenna for Cognitive Radio.

UNIT II SDR ARCHITECTURE 9 HRS

Essential functions of the software radio, architecture goals, quantifying degrees of Programmability, top level component topology, Computational properties of functional components, interface topologies among plug and play modules, architecture partitions.

UNIT III INTRODUCTION TO COGNITIVE RADIO 9 HRS

Making radio self-aware, the cognition cycle, organization of cognition tasks, structuring knowledge for cognition tasks, Enabling location and environment awareness in cognitive radios – concepts, architecture, design considerations.

UNIT IV COGNITIVE RADIO ARCHITECTURE 9 HRS

Primary Cognitive Radio functions, Behaviors, Components, A–Priori Knowledge taxonomy, observe – phase data structures, Radio procedure knowledge encapsulation, components of orient, plan, decide, act phases; knowledge representation, design rules.

UNIT V NEXT GENERATION WIRELESS NETWORKS 9 HRS

The XG Network architecture, spectrum sensing, spectrum management, spectrum mobility, spectrum sharing, upper layer issues, cross – layer design.

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No. of Hours: 45

TEXT BOOKS:

1. Alexander M. Wyglinski, Maziar Nekovee, and Y. Thomas Hou, “CognitiveRadio Communications and Networks - Principles And Practice”, Elsevier Inc., 2010.
2. E. Biglieri, A.J. Goldsmith., L.J. Greenstein, N.B. Mandayam, H.V. Poor, “Principles of Cognitive Radio”, Cambridge University Press, 2013.
3. Kwang-Cheng Chen and Ramjee Prasad, “Cognitive Radio Networks”, John Wiley & Sons Ltd., 2009.

REFERENCES:

1. Khattab, Ahmed, Perkins, Dmitri, Bayoumi, Magdy, “Cognitive Radio Networks - From Theory to Practice”, Springer Series: Analog Circuits and Signal Processing, 2009.
2. J. Mitola, “Cognitive Radio: An Integrated Agent Architecture for software defined radio”, Doctor of Technology thesis, Royal Inst. Technology, Sweden2000.
3. Simon Haykin, “Cognitive Radio: Brain –empowered wireless communications”, IEEE Journal on selected areas in communications, Feb2005.
4. Ian F. Akyildiz, Won – Yeol Lee, Mehmet C. Vuran, Shantidev Mohanty, “NeXtgeneration /dynamic spectrum access / cognitive radio wireless networks: A Survey” Elsevier Computer Networks, May 2006.
5. Joseph Mitola, “Software Radio Architecture: A Mathematical Perspective” IEEE Journal on Selected Areas in Communication, Vol. 17, No. 4, April1999.
6. Hasari Celebi, Huseyin Arslan, “Enabling location and environment awareness in cognitive radios”, Elsevier Computer Communications, January2008.



Department of Electronics and Communication Engineering

Subject Code: BEC18L13	SubjectName: Project Phase - II Prerequisite: NIL	T / L/ ETL Lb	L 0	T / S.Lr 0	P/ R 12/12	C 8						
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C:Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab												
OBJECTIVE: The objective of the Main Project is to culminate the academic study and provide an opportunity to explore a problem or issue, address through focused and applied research under the direction of a faculty mentor. The project demonstrates the student's ability to synthesize and apply the knowledge and skills acquired to real-world issues and problems. This project affirms the students to think critically and creatively, find an optimal solution, make ethical decisions and to present effectively.												
COURSE OUTCOMES (COs) : (3- 5)												
CO1	Apply the knowledge and skills acquired in the course of study addressing a specific problem or issue.											
CO2	To encourage students to think critically and creatively about societal issues and develop user friendly and reachable solutions											
CO3	To refine research skills and demonstrate their proficiency in communication skills.											
CO4	To take on the challenges of teamwork, prepare a presentation and demonstrate the innate talents.											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	2	2	3	3	3
CO4	3	3	3	3	3	3	3	2	2	3	3	3
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		3		3		3					
CO2	3		3		3		3					
CO3	3		3		3		3					
CO4	3		3		3		3					
3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
							✓					



Department of Electronics and Communication Engineering

Subject Code: BEC18E01	Subject Name : MICROPROCESSOR AND MICROCONTROLLER	T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Digital Electronics	Ty	3	0/0	0/0	3

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory andLab

OBJECTIVES :

- To study the architecture, addressing modes, and assembly language program of 80386 microprocessor.
- To understand the concepts of different peripherals and their applications
- To learn the functions of 8051 microcontroller and ARM processor and their applications.

COURSE OUTCOMES (COs) :

The students will be able to

CO1	Write assembly language program in 8085 and 8086 and understand the design of advanced processors.
CO2	Show their ability to interface peripherals with microprocessors
CO3	Done their inferences to develop a hardware using 8051 microcontroller
CO4	Demonstrate their skills in writing an ALP in 8051 to do real time applications
CO5	Apply their understanding to do a project to develop an application using ARM processor.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	2	3	1	1	2	2	2	1
CO2	3	3	3	3	3	3	1	2	2	3	2	2
CO3	2	2	2	1	3	3	2	3	3	3	3	2
CO4	3	3	2	3	3	2	2	3	2	2	1	3
CO5	3	2	3	2	3	3	3	3	3	2	3	3
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		3		3		2					
CO2	2		2		3		2					
CO3	3		3		3		3					
CO4	3		2		3		3					
CO5	3		2		2		3					

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					✓							



Department of Electronics and Communication Engineering

BEC18E01	MICROPROCESSOR AND MICROCONTROLLER	3	0/0	0/0	3
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UNIT I INTEL 8 BIT, 16 BIT & 32 BIT MICROPROCESSORS 9 HRS

Introduction to 8085 & 8086 microprocessors – Instruction sets – Advanced 80386 Architecture, Addressing modes – Data types of 80386 – Real address mode of 80386 – Segmentation, paging, Salient features of PENTUM.

UNIT II PERIPHERALS INTERFACING 9 HRS

Interfacing serial I/O (8251)-Parallel I/O (8255) –Keyboard and display controller (8279)-ADC/DAC Interfacing-Timer (8253). Programmable Interrupt Controller (8259), DMA controller, Applications of 8085

UNIT III 8051 MICROCONTROLLER 9 HRS

8051 Microcontroller hardware I/O pins, Ports and circuits-External memory –Counters and Timers-Serial Data I/O –Interrupts.

UNIT IV 8051 PROGRAMMING AND APPLICATIONS 9 HRS

8051 Instruction set –Addressing Modes –Assembly Language Programming -8051 interfacing LCD, ADC, Sensors, Stepper motors, Motors, Keyboard and DAC

UNIT V INTRODUCTION TO ARM PROCESSOR 9 HRS

ARM Architecture –ARM programmer’s model- ARM development tools-memory hierarchy-ARM assembly language programming-Simple Examples-Architectural support for operating system- ARM instruction Set-Embedded ARM Applications

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No.of Hours: 45

Text books:

1. Krishna Kant, “*Microprocessors and Microcontrollers, Architecture, programming and system design using 8085, 8086, 8051 and 8096*”, PHI, 2007.
2. Douglas V Hall, “*Microprocessor and Interfacing, Programming and hardware*”, TMH, 2006.
3. R.S. Gaonkar, “*Microprocessor Architecture Programming and Application, with 8085*”, Wiley Eastern Ltd., New Delhi, 2013.

References:

1. Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D.MCKinlay “The 8051Microcontrollerand Embedded Systems”, Second Edition, Pearson Education2008.
2. Kenneth J. Ayala, “The 8086 Microprocessor: Programming & Interfacing the PC”, Delmar Publishers, 2007.
3. A K Ray, K M Bhurchandi, Advanced Microprocessors and Peripherals, TMH, 2007.
4. Steve furber “ARM Systems on chip Architecture”, Second Edition Addison Wesley trade computer publication, 2000.
5. John .B.Peatman“Design with PIC Microcontrollers”, Pearson Education, 3rd Edition, 2004.



Department of Electronics and Communication Engineering

Subject Code: BEC18E02	Subject Name : Semiconductor devices and its applications	T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Solid state devices	Ty	3	0/0	0/0	3

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C:Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVES :

- To learn the functions of special diodes and their applications.
- To acquire the knowledge about operation of power diodes and utilize them for various applications with a regulated power supply

COURSE OUTCOMES (COs) : (3- 5)

The Students will be able to

CO1	Understand the working of different types of diodes
CO2	Design circuits using diodes
CO3	Develop an inverter circuit using thyristors
CO4	Design different types of converters using thyristors
CO5	Develop a protection circuit for over voltage, over current and gate isolation

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	2	2	2	1	1	1	1	2	1	1
CO2	2	1	2	3	2	1	1	1	1	2	1	1
CO3	2	1	1	2	2	2	2	1	2	2	2	2
CO4	2	1	1	2	2	2	2	1	2	2	2	2
CO5	2	2	3	3	2	1	2	3	3	2	3	2
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	2		3		2		1					
CO2	2		3		2		1					
CO3	1		1		3		2					
CO4	1		1		3		2					
CO5	1		1		2		2					

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					✓							



Department of Electronics and Communication Engineering

BEC18E02	SEMICONDUCTOR DEVICES AND ITS APPLICATIONS	3	0/0	0/0	3
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UNIT I SPECIAL DIODES 9 HRS

Breakdown Diodes-Avalanche Multiplication, Zener breakdown and its characteristics, Tunnel Diodes – Principle and Characteristics, Photodiode and its characteristics, Photo Voltaic Effect, and Light Emitting Diodes, Four Layer diode and its characteristics

UNIT II APPLICATIONS OF DIODES 9 HRS

Diode as clipper, clamper, comparator, sampling gate, voltage multipliers and peak detectors - Regulated Power Supply

UNIT III INVERTERS 9 HRS

Single Phase and three phase inverters-Voltage source inverters-current source inverters-Multilevel inverters-Resonant inverters

UNIT IV CONVERTERS 9 HRS

Single phase and three phase converters –Buck-Boost Converters-Dc to Dc converters-Ac to Ac Converters- Resonant Converters-Cycloconverters

UNIT V FIRING AND PROTECTING CIRCUITS 9 HRS

Necessity of isolation, pulse transformer, optocoupler – Gate drives circuit: SCR, MOSFET, IGBTs and base driving for power BJT - Over voltage, over current and gate protections

Total No. of Hours: 45

Text Books:

1. Jacob Milman, Christos Halkias and Chetan D.Parikh, ‘Integrated Electronics, Analog and Digital Circuits and Systems’
2. Rashid M.H., " Power Electronics Circuits, Devices and Applications ", Prentice Hall India, Third Edition, New Delhi, 2004
3. B.W Williams ‘Power Electronics Circuit Devices and Applications’.

References:

1. P.S.Bimbra, ‘Power Electronics’ , Khanna Publishers,Eleventh Edition2003
2. Ned Mohan,T.MUndeland and W.P Robbin, “Power Electronics: converters, Application and design” John Wiley and sons.Wiley India edition,2006
3. P.C. Sen, “Modern Power Electronics”, Wheeler Publishing Co, First Edition, New Delhi,1998



Department of Electronics and Communication Engineering

Subject Code: BEC18E03	Subject Name : BASICS OF ROBOTICS	T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Microprocessor and Microcontroller	Ty	3	0/0	0/0	3

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
 T/L/ETL : Theory/Lab/Embedded Theory andLab

OBJECTIVES :

- To introduce the basic concepts, parts of robots and types of robots.
- To make the student familiar with the various drive systems for robot.
- To develop a deep knowledge sensors and their applications in robot.
- To discuss about the various end effectors and manipulators.
- To develop a path planning and programming of robots.

COURSE OUTCOMES (COs) : (3- 5)

The students will be able to

CO1	Understand the importance of robotics in today and future goods production.
CO2	Have knowledge on robot configuration and subsystems.
CO3	Understand the principles of robot programming.
CO4	Handle with typical robot.
CO5	Implement specialized software and working of mobile robot.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	2	3	3	3	3
CO3	3	3	3	3	3	3	2	2	3	3	3	3
CO4	3	3	3	3	3	2	3	3	3	2	3	3
CO5	2	2	2	3	3	2	3	3	3	2	3	3
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		3		3		3					
CO2	3		3		3		2					
CO3	3		3		3		3					
CO4	3		3		3		3					
CO5	3		3		3		3					

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					✓							



Department of Electronics and Communication Engineering

BEC18E03	BASICS OF ROBOTICS	3	0/0	0/0	3
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UNIT I INTRODUCTION

9 HRS

Specifications of Robots- Classifications of robots – Work envelope - Flexible automation versus Robotic technology – Applications of Robots- robot kinematics and dynamics -Positions, Orientations and frames, Mappings: Changing descriptions from frame to frame, Operators: Translations, Rotations and Transformations - Transformation Arithmetic - D-H Representation - Forward and inverse Kinematics of Six Degree of Freedom Robot Arm – Robot Arm dynamics

UNIT II ROBOT DRIVES AND POWER TRANSMISSION SYSTEMS

9 HRS

Robot drive mechanisms, hydraulic – electric – servomotor- stepper motor - pneumatic drives, Mechanical transmission method - Gear transmission, Belt drives, cables, Roller chains, Link - Rod systems - Rotary-to-Rotary motion conversion, Rotary-to-Linear motion conversion, Rack and Pinion drives, Lead screws, Ball Bearingscrews.

UNIT III MANIPULATORS

9 HRS

Construction of Manipulators, Manipulator Dynamic and Force Control, Electronic and Pneumatic manipulators.

UNIT IV ROBOTEND EFFECTORS

9 HRS

Classification of End effectors – Tools as end effectors. Drive system for grippers-Mechanical adhesive-vacuum, magnetic-grippers. Hooks & Scoops. Gripper force analysis and gripper design. Active and passive grippers.

UNIT V PATH PLANNING & PROGRAMMING

9 HRS

Trajectory planning and avoidance of obstacles, path planning, skew motion, joint integrated motion – straight line motion-Robot languages -.computer control and Robot software.

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No. of Hours: 45

Text books:

1. Deb S. R. and Deb S., “Robotics Technology and Flexible Automation”, Tata McGraw Hill Education Pvt. Ltd, 2010.
2. John J. Craig, “Introduction to Robotics”, Pearson, 2009.
3. Mikell P. Groover et. al., "Industrial Robots - Technology, Programming and Applications", McGraw Hill, New York, 2008.

References:

1. Richard D Klafter, Thomas A Chmielewski, Michael Negin, "Robotics Engineering – An Integrated Approach", Eastern Economy Edition, Prentice Hall of India Pvt. Ltd., 2006.
2. Fu K S, Gonzalez R C, Lee C.S.G, "Robotics : Control, Sensing, Vision and Intelligence", McGraw Hill, 1987



Department of Electronics and Communication Engineering

Subject Code: BEC18E04	Subject Name : C++ AND DATA STRUCTURES	T / L / ETL	L	T / S.Lr	P / R	C						
	Prerequisite: Programming and Multimedia lab	Ty	3	0/0	0/0	3						
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C:Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab												
OBJECTIVES : <ul style="list-style-type: none"> To learn different object oriented programming concepts To understand the different methods of organizing large amounts of data To efficiently implement the different data structures To learn the systematic way of solving problems To efficiently implement solutions for specific problems Get to know about the trending programming technologies. 												
COURSE OUTCOMES (COs) : (3- 5) The Students will be able to												
CO1	Describe the use of control statements operators and developments of functions using C++											
CO2	Analyze the concepts of constructors, destructors to create and destroy objects and focus on the types of inheritance and templates											
CO3	Illustrate the operations of stacks, queue and use of linked list to implement insertion and deletion.											
CO4	Identify different tree algorithms to represent nodes connected by edges											
CO5	Apply searching and sorting design mechanism in data structures to solve problems											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	2	2	1	2	2	2	3	3
CO2	3	3	3	3	3	2	2	1	3	2	3	3
CO3	3	3	3	3	3	2	2	1	3	3	3	3
CO4	3	3	3	3	3	2	2	1	2	3	3	3
CO5	3	3	3	3	3	2	2	1	3	2	3	3
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		3		3		3					
CO2	3		3		3		3					
CO3	3		3		3		3					
CO4	3		3		3		3					
CO5	3		3		3		3					
3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					✓							



Department of Electronics and Communication Engineering

BEC18E04	C++ AND DATA STRUCTURES	3 0/0 0/0 3
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UNIT I INTRODUCTION TO OOPS 9 HRS

Object Oriented Concepts – Basics of C++ Environment. Definition – Data Members – Function Members – Control Statements-Overloading Operators – Functions – Friends – Class derivation – Virtual Functions – Abstract BaseClasses.

UNIT II CLASSES, INHERITANCE&TEMPLATES 10 HRS

Constructor – Default constructors – Copy Constructors – Destructors – Static members –Constant Members – Free Store Operators- Multiple Inheritances- Exception Handling – Streams - Class Templates – Function Templates

UNIT III LINEAR DATA STRUCTURES 9 HRS

Stacks, Queues & Lists Implementation and Application Singly linked list – Doubly linked lists

UNIT IV NON LINEAR DATA STRUCTURES 9 HRS

Trees – Binary Trees – Binary Search Tree – Tree Traversals – AVL Trees

UNIT V SEARCHING AND SORTING 8 HRS

Searching – Linear search-Binary Search. Sorting- Insertion sort, Bucket sort, Heap sort, Merge sort, Quick sort.

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No. of Hours: 45

Textbooks:

1. Balagurusamy.E, “*Object oriented programming with C++*”, Tata McGraw-Hill publishing company limited, AddisonWesley
2. E.Horowitz, S.Sahani & S.Rajasekharan, “*Fundamentals of data structure in C++*”, Computer sciencepress.
3. Stanley B.Lippman, “*The C++ Primer*”, Addison Wesley Publishers, 4th Edition, 2005.

References:

1. Weiss Mark Allen. “Data Structures and Algorithms Analysis in C”, Pearson Education, 2/e,1997
2. E.Horowitz, S.Sahani & S.Rajasekharan, “Computer Algorithms”, Galgotia1999.
3. Gary J. Bronson, “Object Oriented Program Development using C++”, Thomson learning, 4th Edition 2005.
4. Brett D. McLaughlin,Gary Pollice, David West Head “First Object-Oriented Analysis & Design”, O’Reilly Media, 2007.
5. Gilberg & Forugan, "Data Structures: A Pseudo Code Approach using C++ ", Thomson Learning 1st Edition, 2002.
6. Gary J. Bronson, “Object oriented program development using Java”, Thomson Learning, 2nd Revised Edition, 2005.



Department of Electronics and Communication Engineering
ELECTIVES LIST 1- COMMUNICATION STREAM

Subject Code: BEC18E05	Subject Name : Antenna and Wave Propagation	T / L/ ETL	L	T / S.Lr	P/ R	C						
	Prerequisite: EMF, TLWG	Ty	3	0/0	0/0	3						
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory andLab												
OBJECTIVES :												
<ul style="list-style-type: none"> • To study AntennaParameters. • To study Radiation Resistance, Antenna EfficiencyMeasurement. • To study Antenna Arrays. • To study different typesAntennas • To study Radio wavepropagation. 												
COURSE OUTCOMES (COs) : (3- 5)												
The students will be able to												
CO1	Understand the knowledge about antenna basics.											
CO2	Write about the radiation from a current element.											
CO3	Analyze the antenna arrays.											
CO4	Explain various types of antenna.											
CO5	Explain the various types of radio wave propagation.											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	3	2	2	2	1	2	2
CO2	3	3	3	3	3	3	2	2	2	2	2	2
CO3	3	3	3	3	3	2	2	2	2	1	2	2
CO4	3	3	3	3	3	2	2	2	2	1	2	2
CO5	3	3	3	3	3	2	2	3	2	1	2	2
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		3		2		2					
CO2	3		3		2		2					
CO3	3		3		2		2					
CO4	3		3		2		2					
CO5	3		3		2		2					
3/2/1 indicates strength of correlation 3 – High, 2 – Medium,1 – Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					✓							



Department of Electronics and Communication Engineering

BEC18E05	ANTENNA AND WAVE PROPAGATION	3	0/0	0/0	3
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UNIT I ANTENNA BASICS 9 HRS

Antenna Parameters – Gain, Directivity, Effective Aperture Polarization, Beam width, Balun, Ground System, Top loading, monopole and Half wave dipole antenna, Short linear antenna, Beam solid angle, Antenna Temperature.

UNIT II RADIATION PRINCIPLE AND ANTENNA TERMINOLOGIES 9 HRS

Principle of Radiation, pattern, Antenna Terminologies – Reciprocity Theorem, Friss Formula, Slot Antennas, SWR(Standing Wave Radiators)

UNIT III ANTENNA ARRAYS 9 HRS

Arrays – Two Element Arrays – Uniform Linear Array – Broadside Array – End fire array – Principle of Pattern Multiplication – Binomial Arrays.

UNIT IV SPECIAL ANTENNA 9 HRS

Dish Antenna – Helical Antenna, Biconical Antenna, Microstrip Patch Antenna, Turnstile Antenna, Yagi – uda antenna, Loop Antenna, Antenna Low and Medium Frequencies.

UNIT V WAVE PROPAGATION 9 HRS

Wave Propagation - Surface Wave Propagation , Structure of the Ionosphere, Space Wave Propagation- Determination of Critical Frequencies - Maximum Usable Frequency - Effect of Earth's Magnetic Field - Fading - Super Refraction - Scatter Propagation.

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No. of Hours: 45

Textbooks:

1. Constantine A.Balanis, “Antenna theory analysis and design” JohnWiley, 2nd Edition, 2007.
2. G.S.V. Raju, “Antenna wave propagation”, Pearson education, 2004.
3. R.E. Collins, “Antenna and Radio wavepropagation”.

References:

1. John D. Kraus, Ronald J Marhefka. “Antenna for all Applications” Tata McGraw Hill 3rd Edition, 2007.
2. A.R.Harish, M. Sachidanada, “Antenna and wave propagation”, Oxford universitypress, 2007.
3. W.L.Stutzman and G.A. Thiele, “Antenna analysis and design”, Johnwiley, 2000.



Department of Electronics and Communication Engineering

Subject Code: BEC18E06	Subject Name : Telecommunication Switching Systems	T / L / ETL	L	T / S.Lr	P / R	C
	Prerequisite: Computer Networks	Ty	3	0/0	0/0	3

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory andLab

OBJECTIVE :

- To get knowledge about the telecommunication industry, its servicestheoretical basics about the performance and operation in telecomnetworks.

COURSE OUTCOMES (COs) : (3- 5)

The Students will be able to

CO1	Describe and apply the fundamentals of telecommunication systems and associated technologies.
CO2	Understand and explain the reasons for switching and the relative merits of the various modes of switching.
CO3	Analyze and design systems related to traffic engineering.
CO4	Analyze the internal design and operation of telephone networks with regard to key signaling systems used in telecommunication networks.
CO5	Understand and analyze the switching techniques used in data networks.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	3	3	1	1	1	1	1	1	1
CO2	1	3	1	3	3	1	1	1	1	1	1	1
CO3	3	3	3	3	1	1	1	1	1	1	1	1
CO4	1	3	3	3	1	1	1	1	1	1	1	1
CO5	1	3	3	3	3	1	1	1	1	1	1	2
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		3		2		2					
CO2	3		3		2		1					
CO3	3		2		3		2					
CO4	3		3		2		3					
CO5	3		3		2		2					

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
						✓						



Department of Electronics and Communication Engineering

BEC18E06	TELECOMMUNICATION SWITCHING SYSTEMS	3	0/0	0/0	3
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UNIT I Introduction 9 HRS

Evolution of Telecommunications, Simple Telephone Communication, Manual switching system, major telecommunication Networks, Strowger Switching System, Crossbar Switching

UNIT II Switching Concepts 9 HRS

SPC-its categorization, Enhanced Services, Two stage networks, Three stage networks, n-stage networks Time multiplexed Space Switching, Time Multiplexed time switching, combination Switching, Three stage combination switching, n-stage combinationswitching.

UNIT III Traffic Engineering 9 HRS

Network Traffic load and parameters, Grade of service and blocking probability, Modeling Switching Systems, Incoming Traffic and Service Time Characterization, Blocking Models and Loss Estimates, Delay systems.

UNIT IV Telephone Networks 9 HRS

Subscriber Loop Systems, Switching Hierarchy and Routing, Transmission Plan, Transmission Systems, Numbering Plan, Charging Plan, Signaling Techniques, In channel signaling, common channel signaling, Cellular mobile telephony.

UNIT V Data Networks 9 HRS

EPABX system – block diagram, working – Data transmission in PSTN, data rates in PSTNs – ISO – OSI reference model – Motivation for ISDN – Networks and protocol architecture, ISDN standards, broadband ISDN, voice dataintegration.

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No. of Hours: 45

Text Books:

1. Thiagarajan Vishwanathan, “Telecommunication Switching Systems and Networks”; PHI Publications.
2. J. E. Flood, “Telecommunications Switching, Traffic and Networks”, Pearson Education.
3. B.Forouzan “Data Communications and Networking”, Pearson Education.

References:

1. John C. Bellamy, “Digital Telephony”, Third Edition; Wiley Publications.
2. Andy Valder, ”Understanding Telecommunication Networks”, IET press



Department of Electronics and Communication Engineering

Subject Code: BEC18E07	Subject Name : REAL TIME OPERATING SYSTEMS	T / L / ETL	L	T / S.Lr	P / R	C						
	Prerequisite: Operating Systems Concepts	Ty	3	0/0	0/0	3						
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory andLab												
OBJECTIVES :												
<ul style="list-style-type: none"> Review of elements and fundamentals of Systems. To understand the embedded tools. To understand the queues and scheduling 												
COURSE OUTCOMES (COs) :												
The Student will be able to												
CO1	Describe the different between the general computing system and the embedded system.											
CO2	Identify different software architecture.											
CO3	Become aware of the elements of RTOS.											
CO4	Implement the design concepts of RTOS.											
CO5	Use the embedded software development tools.											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	1	1	3	1	1	1	1	1	2
CO2	2	3	3	3	3	2	1	1	2	3	2	2
CO3	1	3	3	2	3	1	1	1	3	3	1	2
CO4	1	3	3	3	3	2	1	1	2	2	1	2
CO5	2	2	3	3	3	1	1	1	2	2	1	2
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	1		1		2		2					
CO2	1		2		3		1					
CO3	1		2		2		1					
CO4	1		2		3		2					
CO5	1		2		2		2					
3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					✓							



Department of Electronics and Communication Engineering

BEC18E07	REAL TIME OPERATING SYSTEMS	3	0/0	0/0	3
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UNIT I EMBEDDED SYSTEM FUNDAMENTALS 9 HRS

Introduction, Characteristics of embedded systems and challenges in system design –Design issues in embedded real-time systems, critical performance issues in embedded real-time systems.

UNIT II SURVEY OF SOFTWARE ARCHITECTURES 9 HRS

Round –robin, Round-robin with interrupts, queues. Function- scheduling architecture, Real time operating system architecture, Schedulingarchitecture.

UNIT III ELEMENTS OF REAL TIMEOPERATING SYSTEMS 9 HRS

Tasks & Task states, Tasks & data, Semaphores & shares data, Message Queues, Mailboxes and Pipes, Timer functions, Events, Memory management and Interrupt Routines in an RTOS environment.

UNIT IV BASIC DESIGN USING REAL-TIMEOPERATING SYSTEMS 9 HRS

Principles, encapsulating semaphores & queues, hard real-time scheduling considerations, saving memory space, saving power.

UNIT V EMBEDDED TOOLS 9 HRS

Embedded software development tools- host and target machines, linker/locators for embedded software, getting embedded software into the target system. Debugging techniques- testing on host system, instruction set simulators, the assert, macro using laboratory tools.

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No. of Hours: 45

Text books:

1. Wayne Wolf, “*Computers as Components- Principles of Embedded Computing Systems Design*”, Academicpress, 2001.
2. David E. Simon, “*An Embedded Software Primer*”, Pearson education, 1999.

References:

1. Arnold S. Berger, “*Embedded Systems Design- an Introduction to Processes, Tools & Techniques*”, CMP books, 2002.
2. Jean J. Labrosse, “*Embedded Systems Building Blocks*”, CMP books, 2002.
3. Michael Barr, “*Programming Embedded Systems in C andC++*”, O’Reilly, 1999.



Department of Electronics and Communication Engineering

Subject Code: BEC18E08	Subject Name : Audio Signal Processing	T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Signals and Systems	T	3	0/0	0/0	3

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C:Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVES :

- To study the basic concepts of speech and audio.
- To study the analysis of various M-band filter banks for audio coding
To learn various transform coders for audio coding.
To study the speech processing methods in time and frequency domain.

COURSE OUTCOMES (COs) : (3- 5)

The Students will be able to

CO1	Identify natures of speech generation and modeling.
CO2	Analyze various m – band filter bank for audio coding.
CO3	Infer different audio coding techniques.
CO4	Estimate various speech parameters with appropriate techniques.
CO5	Apply linear predictions coding tool to analyze speech.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	3	3	3	3	2	3	3	3
CO2	3	3	3	3	3	3	3	3	2	3	3	3
CO3	3	3	3	2	3	3	3	3	2	3	3	3
CO4	3	3	3	3	3	3	3	3	2	3	3	3
CO5	3	3	3	3	3	3	3	3	2	3	3	3
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		3		3		3					
CO2	3		3		3		3					
CO3	2		1		3		3					
CO4	3		3		2		3					
CO5	3		2		3		3					

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					✓							



Department of Electronics and Communication Engineering

BEC18E08	Audio Signal Processing	3	0/0	0/0	3
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UNIT I MECHANICS OF SPEECH AND AUDIO 9 HRS

Introduction - Review of Signal Processing Theory-Speech production mechanism – Nature of Speech signal – Discrete time modeling of Speech production – Classification of Speech sounds – Phones – Phonemes – Phonetic and Phonemic alphabets – Articulatory features. Absolute Threshold of Hearing - Critical Bands- Simultaneous Masking, Masking-Asymmetry, and the Spread of Masking- Non simultaneous Masking - Perceptual Entropy - Basic measuring philosophy -Subjective versus objective perceptual testing - The perceptual audio quality measure (PAQM) - Cognitive effects in judging audio quality.

UNIT II TIME-FREQUENCY ANALYSIS: FILTER BANKS AND TRANSFORMS 9HRS

Introduction -Analysis-Synthesis Framework for M-band Filter Banks- Filter Banks for Audio Coding: Design Considerations - Quadrature Mirror and Conjugate Quadrature Filters- Tree- Structured QMF and CQF M-band Banks - Cosine Modulated “Pseudo QMF” M-band Banks - Cosine Modulated Perfect Reconstruction (PR) M-band Banks and the Modified Discrete Cosine Transform (MDCT) - Discrete Fourier and Discrete Cosine Transform - Pre-echo Distortion- Pre echo Control Strategies.

UNIT III AUDIO CODING AND TRANSFORMCODERS 9 HRS

Lossless Audio Coding- Lossy Audio Coding- ISO-MPEG-1A,2A,2A Advanced, 4Audio Coding - Optimum Coding in the Frequency Domain - Perceptual Transform Coder -Brandenburg-Johnston Hybrid Coder - CNET Coders - Adaptive Spectral Entropy Coding -Differential Perceptual Audio Coder - DFT Noise Substitution -DCT with Vector Quantization -MDCT with Vector Quantization.

UNIT IV TIME AND FREQUENCY DOMAIN METHODS FOR SPEECH PROCESSING 9 HRS

Time domain parameters of Speech signal – Methods for extracting the parameters: Energy, Average Magnitude – Zero crossing Rate – Silence Discrimination using ZCR and energy Short Time Fourier analysis – Formant extraction – Pitch Extraction using time and frequency domain methods HOMOMORPHIC SPEECH ANALYSIS: Cepstral analysis of Speech – Formant and Pitch Estimation – Homomorphic Vocoders.

UNIT V LINEAR PREDICTIVE ANALYSIS OF SPEECH 9 HRS

Formulation of Linear Prediction problem in Time Domain – Basic Principle – Auto correlation method – Covariance method – Solution of LPC equations – Cholesky method – Durbin’s Recursive algorithm – lattice formation and solutions – Comparison of different methods – Application of LPC parameters – Pitch detection using LPC parameters – Formant analysis – VELP – CELP.

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No. of Hours: 45

Textbooks:

1. Digital Audio Signal Processing, Second Edition, UdoZölzer, A John Wiley& sons LtdPublicatioons
2. Applications of Digital Signal Processing to Audio And Acoustics Mark Kahrs, Karlheinz Brandenburg, Kluwer Academic Publishers New York, Boston, Dordrecht, London, Moscow.

Reference:

1. *Digital Processing of Speech signals* – L. R. Rabiner and R.W. Schaffer - Prentice Hall – 1978



Department of Electronics and Communication Engineering

Subject Code: BEC18E09	SubjectName : INTELLIGENT INSTRUMENTATION	T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Electronic Circuits	Ty	3	0/0	0/0	3

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C:Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVES :

- Introduce students to the use of various electrical/electronic instruments, their construction, applications, principles of operation, standards and units of measurements .Basic measurement and transducers concepts
- Provide students with opportunities to develop basic skills in the design of electronic equipment are using PLC.

COURSE OUTCOMES (COs) : (3- 5)

The student will be able to

CO1	Well-grounded in their knowledge about various types of transducers, Identify electronics/ electrical instruments, their use, peculiar errors associated with the instruments and how to minimize such errors.
CO2	Understand the basic design techniques of electronic equipment signal generators and signal analyzers.
CO3	Gain knowledge about Instrumentation standard protocols HART and Foundation Fieldbus H1.
CO4	Use various laboratory instruments like cathode ray oscilloscope, function generators and analyze various patterns.
CO5	Develop basic skills in the design of electronic equipment's using PLC

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	2	2	1	1	2	3	3	3	3
CO2	3	3	3	3	3	3	3	2	2	3	2	2
CO3	3	1	1	2	3	3	2	1	3	3	3	3
CO4	3	3	3	2	2	2	3	1	2	3	3	3
CO5	3	3	3	2	2	2	3	1	2	3	3	3
COs / PSO	PSO1		PSO2		PSO3		PSO4					
CO1	3		1		3		3					
CO2	3		3		3		3					
CO3	3		2		3		3					
CO4	3		3		2		3					
CO5	3		3		3		3					

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					✓							



Department of Electronics and Communication Engineering

BEC18E09	INTELLIGENT INSTRUMENTATION	3	0/0	0/0	3
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UNIT I TRANSDUCERS

9 HRS

Transducer definition, classification, and performance characteristics. Potentiometer and its types, loading effect, sensitivity, piezo-resistive, equivalent circuits, charge and voltage sensitivity. Measurements, Instrumentation, Errors in Measurements, Calibration and Standard.

UNIT II SIGNAL GENERATOR AND SIGNAL ANALYZERS

9 HRS

A.F. Generator, Pulse Generator, AM / FM Signal Generator, Function Generator, Sweep Frequency Generator, Wave Analyzers, Spectrum Analyzers, Logic Analyzer, Distortion Analyzers, Network Analyzer.

UNIT III INSTRUMENTATIONST AND ARDPROTOCOLS

9 HRS

Definition of protocol, HART Protocol: Introduction, frame structure, programming, implementation examples, benefits, advantages and limitation. Foundation Field bus H1: Introduction, frame structure, programming, implementation examples, benefits, advantages and limitation. Comparison of HART, Foundation Field bus, Device net, Profibus, Controlnet, Industrial Ethernet.

UNIT IV DATA DISPLAY AND RECORDING SYSTEM

9 HRS

CRO, Single Beam, Dual Trace, Double Beam CRO, Digital Storage and Analog Storage Oscilloscope, Sampling Oscilloscope, Power Scope, Curve Tracer, Analog, Digital Recorders and Printers – Case Study on Lissajous Pattern.

UNIT V COMPUTER CONTROLLED TEST SYSTEM

9 HRS

Programmable logic controllers (PLC) Introduction, architecture, definition of discrete state process control, PLC Vs PC, PLC Vs DCS, relay diagram, ladder diagram, ladder diagram examples, relay sequencers, timers/counters, high speed counter, PLC design, study of at least one industrial PLC.

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No. of Hours: 45

Textbooks:

1. Rangan C.S. “*Instrumentation Devices and Systems*”, Tata McGraw Hill, 1998.
2. Sandeep Redkar, “*Foundation Fieldbus control system*”, RockwellAutomation,2010,
3. A. K. Shawney "*Electronics and Electrical Instrumentation*", Tata McGraw Hill, 1975.

References:

1. Bouwels A.J., “*Digital Instrumentation*”, McGraw Hill, 1986.
2. Barney .C, “*Intelligent Instrumentation* ”, Prentice Hall of India, 1985.
3. Oliver and Cage, “*Electronic Measurements and Instruments and Instrumentation*”, McGraw Hill, 1975.
4. Deobelin, “*Measurements Systems*”, McGraw Hill, 1990.
5. Cooper, “*Electronic Instrumentation and Measurement Techniques*”, Prentice Hall of India, 1988.



Department of Electronics and Communication Engineering

Subject Code:	Subject Name : Advanced Microprocessors	T / L/ ETL	L	T / S.Lr	P/ R	C						
BEC18E10	Prerequisite: Microprocessor and Microcontroller	Lb	0	0/0	3/0	1						
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory andLab												
OBJECTIVES :												
<ul style="list-style-type: none"> • To introduce the concepts in internal programming model of Intel family of microprocessors. • To introduce the programming techniques using MASM, DOS and BIOS functioncalls. • To introduce the architecture programming and interfacing of 16 bit microcontrollers. • To introduce the concepts and architecture of RISC processor 												
COURSE OUTCOMES (COs) : (3- 5)												
The Students will be able to												
CO1	Explain the generalized architecture of advanced microprocessor											
CO2	Develop algorithm/ program of advanced microprocessor or a particular task.											
CO3	Appreciate the microprocessor based system design											
CO4	Analyze the MOTOROLA MC 68000 family											
CO5	Describe about the various RISC processors											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	2	1	2	1	3	3	1	3
CO2	3	3	3	3	2	2	1	2	3	3	3	3
CO3	3	3	2	2	1	1	2	2	1	3	2	3
CO4	3	3	3	3	1	1	3	1	2	2	3	2
CO5	3	3	3	3	1	1	1	1	3	3	1	1
COs/ PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		2		1		1					
CO2	3		3		1		1					
CO3	3		2		2		1					
CO4	3		1		2		2					
CO5	3		1		3		3					
3/2/1 indicates strength of correlation 3 – High, 2 – Medium,1 – Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					✓							



Department of Electronics and Communication Engineering

BEC18E10	ADVANCED MICROPROCESSORS	3 0 0 3
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UNIT I THE INTEL X86 FAMILY 9 HRS

The Intel X86 Family Architecture, 32 bit Processor Evolution Systems Connections and Timing, Instruction and Data Formats, Instruction set of X86 Processors, Addressing Modes.

UNIT II INTEL X86 ASSEMBLY LANGUAGE PROGRAM 9 HRS

Implementation of Strings, Procedures, Macros, BIOS and DOS Services using X86 Assembly Language Programming, Memory and I/O Interfacing, Analog Interfacing and Industrial Control.

UNIT III SYSTEM DEVELOPMENT 9 HRS

Microprocessors Based System Design, TMS 320 Series DSP Based Signal Processing, Microcontroller 8096, architecture, addressing mode and system design.

UNIT IV THE MOTOROLA MC68000 FAMILY 9 HRS

The MC 68000 Architecture, CPU Registrars, Data Formats, Addressing Modes, Instruction Set and Assembler Directors, Memory Management Instruction and Data, Caches, Exception Processing.

UNIT V RISC PROCESSORS 9 HRS

RISC vs CISC, RISC Properties and Evaluation, Advanced RISC Microprocessors, DEC ALPHA, The Power PC family. The SUN SPARC Family, the MIPS RX 100 Family, the Intel 860 Family. The Motorola M88000 Family, HP Precision Architecture.

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No. of Hours: 45

Text Books:

1. B.B. Bery, "The Intel Microprocessors 8086 / 8088, 80186 / 80188, 80286, 80386, 80486, PENTIUM, and PENTIUM Processors", Prentice Hall, 1997.
2. K Udayakumar, B.S. Uma Shankar, "Advanced Microprocessors and IBM PC Assembly Language Programming", Tata McGraw Hill, 1996

References:

1. Daniel Tabak, "Advanced Microprocessors", McGraw Hill, 1995.
2. Douglas V. Hall, "Microprocessors and Interfacing – Programming Hardware", McGraw Hill, 1992.
3. W.A. Tribel & A. Singh, "The 68000 and 68020 Microprocessors – Architecture, Software and Interfacing Techniques", Prentice hall of India, 1991
4. Rifiquzzaman, "Microprocessors – Theory and Applications: Intel and Motorola", Prentice Hall, 1992.
5. Kenneth J. Ayala, "The 8051 Microcontroller, Architecture, Programming and Application", Penram International Publishing (India), 1996.
6. John Peatman, "Design with Microcontrollers", McGraw Hill International, 1988



Department of Electronics and Communication Engineering

Subject Code: BEC18E11	Subject Name : NANO ELECTRONICS	T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Engineering Physics	Ty	3	0/0	0/0	3

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory andLab

OBJECTIVES :

- To learn and understand basic concepts of Nanoelectronics.
- To know the techniques of fabrication and measurement.
- To gain knowledge about Nanostructure devices and logic devices.

COURSE OUTCOMES (COs) : (3- 5)

The Students will be able to

CO1	Introduce the students to Nano electronics, Nano devices, and to identify quantum mechanics behind Nano electronics.
CO2	Demonstrate fabrication and measurement techniques
CO3	Describe the properties of Nano materials
CO4	Define the Nano structure devices
CO5	Understand and explain the principle and application of logic devices.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	3	3	3	3	1	3	2	3
CO2	3	3	3	3	3	3	2	3	3	3	3	3
CO3	3	3	3	3	3	3	3	2	1	3	2	3
CO4	3	3	3	3	3	3	3	3	2	3	2	3
CO5	3	3	3	2	3	3	3	3	2	3	2	3
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		3		3		3					
CO2	3		3		3		3					
CO3	3		3		3		3					
CO4	3		3		3		3					
CO5	3		3		3		3					

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
						✓						



Department of Electronics and Communication Engineering

BEC18E11	NANO ELECTRONICS	3 0/0 0/0 3
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UNIT I INTRODUCTION TO NANO ELECTRONICS 9 HRS

Microelectronics towards biomolecule electronics-Particles and waves- Wave-particle duality- Wave mechanics- Schrödinger wave equation- Wave mechanics of particles: – Atoms and atomic orbitals- Materials for nanoelectronics- Semiconductors- Crystal lattices: Bonding in crystals- Electron energy bands- Semiconductor heterostructures- Lattice-matched and pseudomorphic heterostructures- Inorganic-organic heterostructures- Carbon nanomaterials: nanotubes and fullerenes

UNIT II FABRICATION AND MEASUREMENT TECHNIQUES 9 HRS

Growth, fabrication, and measurement techniques for nanostructures- Bulk crystal and heterostructure growth- Nanolithography, etching, and other means for fabrication of nanostructures and nanodevices- Techniques for characterization of nanostructures- Spontaneous formation and ordering of nanostructures- Clusters and nanocrystals- Methods of nanotube growth- Chemical and biological methods for nanoscale fabrication- Fabrication of nano-electromechanical systems

UNIT III PROPERTIES 9 HRS

Dielectrics-Ferroelectrics-Electronic Properties and Quantum Effects-Magneto electronics – Magnetism and Magneto transport in Layered Structures-Organic Molecules – Electronic Structures, Properties, and Reactions-Neurons – The Molecular Basis of their Electrical Excitability-Circuit and System Design- Analysis by Diffraction and Fluorescence Methods-Scanning Probe Techniques

UNIT IV NANO STRUCTURE DEVICES 9 HRS

Electron transport in semiconductors and nanostructures- Time and length scales of the electrons in solids-Statistics of the electrons in solids and nanostructures- Density of states of electrons in nanostructures- Electron transport in nanostructures-Electrons in traditional low-dimensional structures- Electrons in quantum wells- Electrons in quantum wires- Electrons in quantum dots- Nanostructure devices- Resonant- tunneling diodes- Field-effect transistors- Single-electron-transfer devices- Potential-effect transistors- Light-emitting diodes and lasers- Nano-electro mechanical system devices- Quantum-dot cellular automata

UNIT V LOGIC DEVICES AND APPLICATIONS 9 HRS

Logic Devices-Silicon MOSFETs-Ferroelectric Field Effect Transistors-Quantum Transport Devices Based on Resonant Tunneling-Single-Electron Devices for Logic Applications-Superconductor Digital Electronics-Quantum Computing Using Superconductors-Carbon Nanotubes for Data Processing-Molecular Electronics

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No. of Hours: 45

Text Books:

1. Vladimir V. Mitin, Viatcheslav A. Kochelap, Michael A. Stroscio, “Introduction to Nanoelectronics: Science, Nanotechnology, Engineering, and Applications”, Cambridge University Press 2011
2. Supriyo Datta, “Lessons from Nanoelectronics: A New Perspective on Transport”, World Scientific 2012
3. George W. Hanson, “Fundamentals of Nanoelectronics”, Pearson 2009

References:

1. Korokin, Anatoli; Rosei, Federico (Eds.), “Nanoelectronics and Photonics”, Springer, 2008.
2. Mircea Dragoman, Daniela Dragoman, “Nanoelectronics: principles and devices”, CRC Press, 2006.
3. Karl Gosser, Peter Glösekötter, Jan Dienstuhl, “Nanoelectronics and Nanosystems: From Transistors to Molecular and Quantum Devices“, Springer, 2004.
4. W. R. Fahrner, Nanotechnology and Nanoelectronics: Materials, Devices, Measurement Techniques (Springer Verlag Berlin Heidelberg 2005).
5. Mark A. Reed, Takhee Lee, “Molecular nanoelectronics”, American Scientific Publishers, 2003.



Department of Electronics and Communication Engineering

Subject Code: BEC18E12	Subject Name : Computer Architecture						T / L/ ETL	L	T / S.Lr	P/ R	C	
	Prerequisite: NIL						T	3	0/0	0/0	3	
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C:Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab												
OBJECTIVE :												
<ul style="list-style-type: none"> To enable the students to familiarize about hardware design basic structure and behavior of the various functional modules of the computer. 												
COURSE OUTCOMES (COs) : (3- 5)												
The Students will be able to												
CO1	Get an overview of typical computer system with respect to its technology.											
CO2	Understand different types of architecture operations in computer systems.											
CO3	Analyze processor and various control units along with handling different types of hazards in a computer system.											
CO4	Understand different level of parallelism and challenges in a computer system.											
CO5	Categorize different types of memory and I/O based techniques in a computer system.											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	2	2	1	2	1	1	1	2	1	2
CO2	1	2	2	2	1	1	1	1	1	2	1	2
CO3	1	1	1	2	1	1	1	3	2	2	3	1
CO4	1	1	3	3	1	2	2	2	2	3	2	1
CO5	1	1	1	1	1	1	1	1	2	3	2	2
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	1		2		2		2					
CO2	1		2		2		2					
CO3	1		2		3		1					
CO4	1		1		3		1					
CO5	1		2		2		2					
3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					✓							



Department of Electronics and Communication Engineering

BEC18E12	COMPUTER ARCHITECTURE	3 0/0 0/0 3
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UNIT I OVERVIEW & INSTRUCTIONS 9 HRS

Eight ideas – Components of a computer system – Technology – Performance – Power wall – Uniprocessors to multiprocessors; Instructions – operations and operands – representing instructions – Logical operations – control operations – Addressing and addressing modes.

UNIT II ARITHMETIC OPERATIONS 9 HRS

ALU - Addition and subtraction – Multiplication – Division – Floating Point operations – Subword parallelism.

UNIT III PROCESSOR AND CONTROL UNIT 9 HRS

Basic MIPS implementation – Building datapath – Control Implementation scheme – Pipelining – Pipelined datapath and control – Handling Data hazards & Control hazards – Exceptions.

UNIT IV PARALLELISM 9 HRS

Instruction-level-parallelism – Parallel processing challenges – Flynn's classification – Hardware multithreading – Multicore processors

UNIT V MEMORY AND I/O SYSTEMS 9 HRS

Memory hierarchy - Memory technologies – Cache basics – Measuring and improving cache performance - Virtual memory, TLBs - Input/output system, programmed I/O, DMA and interrupts, I/Oprocessors.

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No.of Hours: 45

Text Book:

1. David A. Patterson and John L. Hennessey, “Computer organization and design”, Morgan Kaufman / Elsevier, Fifth edition, 2014.

References:

1. V.Carl Hamacher, Zvonko G. Varanescic and Safat G. Zaky, “Computer Organisation“, VI th edition, Mc Graw-Hill Inc,2012.
2. William Stallings “Computer Organization and Architecture”, Seventh Edition , Pearson Education, 2006.
3. Vincent P. Heuring, Harry F. Jordan, “Computer System Architecture”, Second Edition, Pearson Education, 2005.
4. Govindarajalu, “Computer Architecture and Organization, Design Principles and Applications”, first edition, Tata McGraw Hill, New Delhi, 2005.
5. John P. Hayes, “Computer Architecture and Organization”, Third Edition, Tata Mc Graw Hill, 1998.



Department of Electronics and Communication Engineering

Subject Code: BEC18E13	Subject Name : NEXT GENERATION IP NETWORKS	T / L/ ETL	L	T / S.L r	P/ R	C						
	Prerequisite: Computer Networks	Ty	3	0/0	0/0	3						
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory andLab												
OBJECTIVES :												
<ul style="list-style-type: none"> To have a complete understanding of IPV6 architecture To learn the key features of IPV6 To know the techniques for avoiding network congestion 												
COURSE OUTCOMES (COs) : (3- 5)												
The Students will be able to												
CO1	Understand the key features of IPV6 architecture											
CO2	Analyze the transmission and security of IPV6 protocol											
CO3	Interpret the advantages of IPV6 over other networks											
CO4	Develop a wireless network architecture											
CO5	Apply their ideas for controlling and avoiding network congestion											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	3	3	3	3	1	1	1	1	1	2
CO2	1	1	1	3	1	3	1	1	1	1	1	1
CO3	1	3	1	1	3	1	2	1	3	1	1	1
CO4	1	1	1	1	1	3	1	1	1	2	1	1
CO5	1	1	1	3	1	1	1	1	1	3	1	1
COs / PSOs	PSO1		PSO2		PSO3		PSO 4					
CO1	1		3		1		1					
CO2	2		1		3		1					
CO3	1		3		1		1					
CO4	2		1		3		1					
CO5	1		3		1		1					
3/2/1 indicates strength of correlation 3 – High, 2 – Medium,1 – Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical	Soft Skills			
					✓							



Department of Electronics and Communication Engineering

Subject Code: BEC18E14	Subject Name : NEURAL NETWORKS AND ITS APPLICATIONS						T / L/ ETL	L	T / S.Lr	P/ R	C	
	Prerequisite:None						Ty	3	0/0	0/0	3	
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory andLab												
OBJECTIVE :												
<ul style="list-style-type: none"> To study the various neural network algorithms and its application in patternrecognition. 												
COURSE OUTCOMES (COs) :												
The students will be able to												
CO1	Describe the basic concepts of art neural networks.											
CO2	Explain about BPN and BAM											
CO3	Implement the concept of simulated annealing and CPN											
CO4	Interpret the concepts of SOM and ART.											
CO5	Implement BPN algorithm.											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	1	1	1	1	1	3	2	3
CO2	3	3	2	2	1	1	1	1	2	3	1	2
CO3	3	3	3	3	3	2	2	2	3	2	3	2
CO4	3	2	3	3	2	1	1	1	1	3	2	2
CO5	3	3	3	3	2	1	2	1	1	1	1	1
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	1		2		2		3					
CO2	1		2		3		1					
CO3	3		2		3		1					
CO4	1		1		3		2					
CO5	1		2		1		3					
3/2/1 indicates strength of correlation 3 – High, 2 – Medium,1 – Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical	Soft Skills			
					✓							



Department of Electronics and Communication Engineering

BEC18E14	NEURAL NETWORKS AND ITS APPLICATIONS	3	0/0	0/0	3
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UNIT I INTRODUCTION TO ARTIFICIAL NEURAL NETWORKS 9 HRS

Neuro – Physiology – General Processing Element – ADALINE – LMS Learning Rule – MADALINE – Perception Networks

UNIT II BPN AND BAM 9 HRS

Back Propagation Network – Updating of Output and Hidden Layer Weights – Application of BPN – Associative Memory – Bi-Directional Associative Memory - Hopfield Memory – Traveling Sales Man Problem

UNIT III SIMULATED ANNEALING AND CPN 9 HRS

Annealing, Boltzmann Machine–Learning–Application–Counter Propagation Network–Architecture – Training – Application.

UNIT IV SOM AND ART 9 HRS

Self-Organizing Map – Learning Algorithm – Feature Map Classifier – Applications – Architecture of Adaptive Resonance Theory – Pattern Matching in ART Network. Neocognitron: Architecture of Neocognitron – Data Processing and Performance of Architecture of Spatio – Temporal Networks for Speech Recognition

UNIT V CASE STUDY 9 HRS

Implementation of BPN Algorithm in a Computer Language - Application of Neural Networks for Pattern Recognition - Data Comparison - Hopfield Networks for an n-bit A/D Converter

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No. of Hours: 45

Text books:

1. Laurence Fausett, “*Fundamentals of Neural Networks: Architecture, Algorithms and Applications*”, Prentice Hall, 1994.
2. J.A. Freeman and B.M. Skapura, “*Neural Networks, Algorithms Applications and Programming Techniques*”, Addison-Wesley, 1990.

References:

1. Martin T. Hagan, Howard B. Demuth “*Neural Networks Design*”, 2nd Edition, Martin Hagan, 2014.
2. Simon Haykin, “*Neural Networks and Learning Machines*” -3/E - Pearson/ Prentice Hall, 2009.



Department of Electronics and Communication Engineering

Subject Code: BEC18E15	SubjectName : OPTICAL COMMUNICATION	T / L/ ETL	L	T / S.Lr	P/ R	C						
	Prerequisite: Digital communication	Ty	3	0/0	0/0	3						
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory andLab												
OBJECTIVES :												
<ul style="list-style-type: none"> To learn the basic elements of optical fiber transmission link, types of fibers, slicing and connectors. To understand the different kind of loss and system designconsideration. To learn the various optical source materials, LED structures, quantum efficiency, Laser diodes and different fiberamplifiers. To learn the fiber optical receivers such as PIN, APD diodes, noise performance in photo detector, receiver operation andconfiguration. 												
COURSE OUTCOMES (COs) : (3- 5)												
The students will be able to												
CO1	Understand the various optical laws and its properties											
CO2	Design any types of fibers.											
CO3	Design lossless fibers.											
CO4	Include newer technique for designing optical sources.											
CO5	Design efficient optical detectors using innovative idea.											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	2	2	3	2	1	3	2	3
CO2	3	2	1	2	2	1	2	3	2	3	3	3
CO3	3	1	1	3	2	1	2	1	1	3	2	2
CO4	3	1	1	3	2	1	2	1	1	3	2	2
CO5	3	3	3	3	3	1	2	3	3	3	3	3
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	1		3		2		2					
CO2	1		3		3		1					
CO3	2		3		1		2					
CO4	2		3		1		1					
CO5	1		3		2		2					
3/2/1 indicates strength of correlation 3 – High, 2 – Medium,1 – Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					✓							



Department of Electronics and Communication Engineering

BEC18E15	OPTICAL COMMUNICATION	3	0/0	0/0	3
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UNIT I OPTICS 9 HRS

Reflection-Refraction – Diffraction – Laws of Reflection – Laws of Refraction – Critical Angle- Total Internal Reflection – Focusing, Imaging –Basics of Mirrors and Lenses – Chromatic and Spherical Telescopes

UNIT II OPTICAL FIBERS 9 HRS

The General System – Evolution of Fiber Optical System – Elements of an Optical Fiber Transmission Link – Cylindrical Fiber – Single Mode Fibers and Multimode Fibers - Fiber Splicing and Connectors

UNIT III OPTICAL LOSSES AND DESIGN 9 HRS

Absorption Losses, Scattering Losses – Bending Losses – Core and Cladding Losses – Signal Distortion in SM Fibers - Point to Point Links – System Design Consideration — Line Power Budget – Rise Time Budget.

UNIT IV OPTICAL SOURCES 9 HRS

Direct and Indirect Band Gap Material – LED Structures - LED Power and Efficiency – Modulation – Laser Diodes Structures and Radiation Pattern – Single Mode Lasers – Modulation of Laser Diodes.

UNIT V OPTICAL DETECTORS 9 HRS

PIN and APD Diodes – Photo Detector Noise, SNR, Detector Response Time, Avalanche Multiplication Noise – Comparison of Photo Detectors – Fundamentals Receiver Operation – FET Pre-amplifiers

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No. of Hours: 45

Textbooks:

1. Gerd Keiser, “*Optical Fiber Communication System*”, McGraw Hill, International, Singapore 3rd ed., 2000.
2. John M. Senior, “*Optical Fiber Communication principles and practice*”, Prentice Hall of India private limited, 1996.
3. Rajiv Ramaswami and Kumar N. Sivarajan, “*A Practical Perspective*”, Harcourt Asia Pvt, Ltd., Second Edition, 2004.

References:

1. J. Gower, “Optical communication system”, Prentice Hall of India, 2001.
2. Govind P. Agrawal “Fiber-Optic Communication Systems”, Wiley India 3rdEdition
3. C. Siva Ram Moorthy and Mohan Gurusamy, “WDM Optical Networks: Concept, Design and Algorithms”, Prentice Hall of India, 1st Edition, 2002.54
4. P.E. Green, Jr., “Fiber Optic Networks”, Prentice Hall, NJ, 1993.
5. Biswanath Mukherjee, “Optical WDM Networks”, Springer Series, 2006.
6. <https://ocw.mit.edu/courses/mechanical-engineering/2-71-optics-spring-2009/lecture-slides/>



Department of Electronics and Communication Engineering

Subject Code: BEC18E16	Subject Name : Radar and Navigational Aids	T / L / ETL	L	T / S.Lr	P / R	C						
	Prerequisite: Engineering Physics	T	3	0/0	0/0	3						
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C:Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab												
OBJECTIVES :												
<ul style="list-style-type: none"> • To become familiar with fundamentals of RADAR • To gain in-depth knowledge about the different types of RADAR and their operations • Need for signal detection in RADAR and various detection techniques • To become familiar with RADAR navigation techniques 												
COURSE OUTCOMES (COs) : (3- 5)												
The Students will be able to												
CO1	Derive and discuss the Range equation and the nature of detection.											
CO2	apply Doppler principle to radars and hence detect moving targets, cluster, also to understand tracking radars											
CO3	refresh principles of antennas and propagation as related to radars, also study of transmitters and receivers											
CO4	understand principles of navigation, in addition to approach and landing aids as related to navigation											
CO5	Understand navigation of ships from shore to shore.											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	1	1	1	1	1	1	1	2	1	2
CO2	2	3	2	1	1	1	1	1	1	3	1	3
CO3	1	2	2	2	2	2	2	2	2	3	2	1
CO4	1	2	2	2	2	2	2	2	2	3	2	1
CO5	1	1	1	1	1	2	1	1	1	3	1	2
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	2		2		3		2					
CO2	2		3		2		3					
CO3	1		3		2		1					
CO4	1		2		2		2					
CO5	1		2		3		2					
3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	✓ Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			



Department of Electronics and Communication Engineering

BEC18E16	RADAR AND NAVIGATIONAL AIDS	3 0/0 0/0 3
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UNIT I RANGE AND EQUATION AND TYPES OF RADAR 9 HRS

Range Parameters, Pulsed Radars, Signal to Noise Ratio, Integration of Pluses Beam Parameters, System Losses and Propagation Effects MTI; CW and Pulse-Doppler Radar, Delay Lines Tracking Radar, Mono pulse, Sequential, Simultaneous, Conical Scan and Monopulse Trackers, Beacons.

UNIT II TRANSMITTER, RECEIVERS AND ANTENNA 9 HRS

Klystron, Magnetron, TWT Amplifiers and Oscillators, Crossed Fields Devices, Parabolic Cassegrainian, Coefficient, Squares Antennas, Radomes, Feeds, Receivers, Performance Figures, Displays Scope and PPI Duplexers.

UNIT III DETECTION OF RADAR SIGNAL AND NOISE 9 HRS

MF, Correlation Detection, Detector Characteristics, Automatic Detection, CFAR Receiver, Pulse Compression and Classification of Targets with Radar.

UNIT IV PROPAGATION OF RADAR WAVES AND CLUTTER 9 HRS

Plane Earth and Spherical Earth Problem, Refraction and Diffraction, GTD Analyzers, Surface and Sea Clutter, Detection of Targets, Effects of Weather on Radar.

UNIT V RADAR TOPICS AND NAVIGATIONAL AIDS 9 HRS

Synthetic Aperture, Over the Horizon Radar, ARSR, ASR, Bistatic and Monostatic Radars, LORAN, ILS, GCA, Direction Finder, VOR Concepts, Airborne Doppler Navigation.

Practical component P: Include case studies / applicationscenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No. of Hours: 45

Text Books:

1. M.I. Skoinik "Introduction to Radar Systems:; McGraw Hill1981.
2. N.S. Nagaraja, Elements of Electronic Navigation Systems, 2nd Edition, TMH, 2000.

References:

1. F.E. Terman, "Electronics and Radio Engineering" McGraw Hill.
2. Peyton Z. Peebles:; "Radar Principles", John Wiley, 2004.
3. J.C Toomay, "Principles of Radar", 2nd Edition –PHI, 2004.



Department of Electronics and Communication Engineering

Subject Code: BEC18E17	Subject Name : Advanced Digital System						T / L/ ETL	L	T / S.Lr	P/ R	C	
	Prerequisite: Digital Electronics						T	3	0/0	0/0	3	
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C:Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab												
OBJECTIVES :												
<ul style="list-style-type: none"> To enable the students the ability to design complex sequential circuits To equip the students with the ability to detect and correct faults using various algorithms 												
COURSE OUTCOMES (COs) : (3- 5)												
The Students will be able to												
CO1	Design a synchronous sequential circuit											
CO2	Design an asynchronous sequential circuit											
CO3	Design faults and apply testing algorithms for its functionality											
CO4	Understand the principles of programmable devices for design of sequential circuit											
CO5	Understand the operating of emerging programmable logic devices.											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	2	2	3	2	2	2	2
CO2	3	3	3	3	3	3	2	2	1	2	2	1
CO3	3	3	3	3	3	2	3	2	2	1	2	2
CO4	3	3	3	3	3	3	2	2	2	3	3	2
CO5	3	2	2	3	3	3	3	2	2	3	2	2
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		3		3		2					
CO2	3		3		3		2					
CO3	3		3		2		2					
CO4	3		3		2		2					
CO5	3		3		3		1					
3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					✓							



Department of Electronics and Communication Engineering

BEC18E17	ADVANCED DIGITAL SYSTEM	3	0/0	0/0	3
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UNIT I SEQUENTIAL CIRCUIT DESIGN 9 HRS
Analysis of Clocked Synchronous Sequential Networks (CSSN), Modeling of CSSN, State Stable Assignment and Reduction, Design of CSSN, Design of Iterative Circuits, ASM Chart, ASM Realization, Design of Arithmetic circuits for Fast adder- Array Multiplier.

UNIT II ASYNCHRONOUS SEQUENTIAL CIRCUIT DESIGN 9 HRS
Analysis of Asynchronous Sequential Circuit (ASC) – Flow Table Reduction – Races in ASC – State Assignment Problem and the Transition Table – Design of ASC – Static and Dynamic Hazards – Essential Hazards – Data Synchronizers – Designing Vending Machine Controller – Mixed Operating Mode Asynchronous Circuits.

UNIT III FAULT DIAGNOSIS AND TESTABILITY ALGORITHMS 9 HRS
Fault Table Method – Path Sensitization Method – Boolean Difference Method – Kohavi Algorithm – Tolerance Techniques – The Compact Algorithm – Practical PLA's – Fault in PLA – Test Generation – Masking Cycle – DFT Schemes – Built-in Self Test.

UNIT IV SYNCHRONOUS DESIGN USING PROGRAMMABLE DEVICES 9 HRS
Programming Techniques -Re-Programmable Devices Architecture- Function blocks, I/O blocks, Interconnects, Realize combinational, Arithmetic, Sequential Circuit with Programmable Array Logic; Architecture and application of Field Programmable Logic Sequence.

UNIT V NEW GENERATION PROGRAMMABLE LOGIC DEVICES 9 HRS
Fold back Architecture with GAL, EPLD, EPLA, PEEL, PML; PROM – Realization State Machine using PLD – FPGA – Xilinx FPGA – Xilinx 2000 - Xilinx 3000

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No. of Hours: 45

Text Books:

1. Donald G. Givone, "Digital principles and Design", Tata McGraw Hill 2002.
2. Stephen Brown and Zvonk Vranesic, "Fundamentals of Digital Logic with VHDL Design", Tata McGraw Hill, 2002

References:

1. Donald G. Givone, "Digital principles and Design", Tata McGraw Hill 2002.
2. Stephen Brown and Zvonk Vranesic, "Fundamentals of Digital Logic with VHDL Design", Tata McGraw Hill, 2002
3. Mark Zwolinski, "Digital System Design with VHDL", Pearson Education, 2004.
4. Parag K Lala, "Digital System design using PLD", BS Publications, 2003.
5. John M Yarbrough, "Digital Logic applications and Design", Thomson Learning, 2001.
6. Nripendra N Biswas, "Logic Design Theory", Prentice Hall of India, 2001.
7. Zvi kohavi, "Finite and switching automatic theory," publications.



Department of Electronics and Communication Engineering

Subject Code: BEC18E18	Subject Name : Embedded System	T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Microprocessor and Microcontroller	Ty	3	0/0	0/0	3

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory andLab

OBJECTIVE:

- To enable the students to learn the design issues in microcontrollers and their performance metrics.

COURSE OUTCOMES (COs) : (3- 5)

The Students will be able to

- CO1** Understand the architecture of 8051 and 68HC11 microcontroller.
- CO2** Write simple programs using assembly & C language.
- CO3** Comprehend the principle of embedded software development
- CO4** Apply interrupt routines for the measurement of period, frequency
- CO5** Demonstrate the interfacing of microcontrollers with peripheral devices

Mapping of Course Outcomes with Program Outcomes (POs)

COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	1	2	2	1	1	1	2	1	2
CO2	2	3	2	2	3	1	1	1	3	2	2	2
CO3	2	2	3	3	3	1	1	1	3	2	2	2
CO4	1	3	3	3	3	1	2	2	2	2	2	2
CO5	1	2	3	3	3	2	2	2	3	2	3	2
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	1		2		2		2					
CO2	1		2		2		1					
CO3	1		2		3		2					
CO4	1		2		2		2					
CO5	1		2		3		2					

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
						✓						



Department of Electronics and Communication Engineering

BEC18E18	EMBEDDED SYSTEM	3 0/0 0/0 3
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UNIT I 68HC11 AND 8051 MICROCONTROLLER 9 HRS
Embedded Computer systems: - Applications, Software issues, Memory Mapped Architecture, 68HC11 Architecture and Different Addressing Modes, Study of Intel 8051 Microcontroller Architecture and Instruction Set

UNIT II PIC MICROCONTROLLER 9 HRS
Programming of PIC Micro Controllers- Architecture of PIC Micro Controllers - Instruction Set of PIC Micro Controllers. Simple Assembly language and C Program for PIC Microcontroller

UNIT III SOFTWARE DEVELOPMENT 9 HRS
Software Development: - Quality Programming, Memory Allocation, Self-Documenting Code, Abstraction, Modular Software Development Device Drivers, Threads Recursion

UNIT IV INTERUPPTS AND MEASUREMENTS 9 HRS
Interfacing method: Blind Cycle Counting Synchronization, Gadget Synchronization, Printer Interfacing Interrupt Synchronization: Reentrant programming, FIFO Queue, 6811 Interrupts Polled Versus Vectored Interrupts Timing Generation and Measurements: MC8811 Input Capture, Period Measurements, Output Compare, Square Wave Generation Frequency Measurements.

UNIT V I/O DEVICES AND INTERFACING 9 HRS
Serial I/O devices: RS232 Specifications, Communication Protocols, MC6811 SCI and SPI. Parallel port Interfaces: Input Switches and Keyboard, output LED, Stepper Motor. Memory Interfacing: Address Switching, Memory Interface, examples for MC6816, Introduction to High speed I/O Interfacing.

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No. of Hours: 45

Text Books:

1. Jonathan.W.Valvano, "Embedded Microcomputer system", Brooks/COLE Thomson learningseries
2. John B Peatman "Design with PIC Microcontroller" Latest Edison

References:

1. Jonathan.W.Valvano, "Embedded Microcomputer System", Brooks/COLE Thomson learning Series.
2. John B Peatman "Design with PIC Microcontroller" Latest Edison.
3. MykePredko TMH. "Programming and customizing the Microcontroller"



Department of Electronics and Communication Engineering

Subject Code: BEC18E19	Subject Name : QUANTUM COMPUTING						T / L/ ETL	L	T / S.Lr	P/ R	C	
	Prerequisite: Engineering Physics						Ty	3	0/0	0/0	3	
<p>L : Lecture T: Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab</p>												
<p>OBJECTIVES :</p> <ul style="list-style-type: none"> To understand the building blocks of a quantum computer. To understand the principles, quantum information and limitation of quantum operations formalizing. To understand the various quantum algorithms. 												
<p>COURSE OUTCOMES (COs) : (3- 5) The Students will be able to</p>												
CO1	Demonstrate the importance of quantum computing and superposition states.											
CO2	Explain Quantum operators and its applications.											
CO3	Build quantum circuits with the knowledge of various quantum gates.											
CO4	Apply the concept of different quantum algorithms and have the insight of QKD.											
CO5	Identify Quantum errors and correct it using Quantum error correcting codes.											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	1	2	2	1	2	2	1	2	3
CO2	3	3	2	2	1	1	1	2	2	1	2	3
CO3	3	3	3	2	3	1	1	2	2	2	3	3
CO4	2	2	2	3	3	1	1	2	2	2	2	2
CO5	3	3	3	2	3	2	2	2	2	2	2	2
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		3		3		2					
CO2	3		3		3		2					
CO3	3		3		2		3					
CO4	3		3		2		3					
CO5	3		3		2		3					
3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					✓							



Department of Electronics and Communication Engineering

BEC18E19	QUANTUM COMPUTING	3 0/0 0/0 3
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UNIT I INTRODUCTION 9 HRS

Introduction to Quantum Computing- Power of Quantum Computing- Quantum Information- Quantum Computers.The Wave and the Corpuscular Nature of Light Photon Behavior, State Description, Measurement in Multiple Bases, Superposition States – The Superposition probability Rule.

UNIT II QUANTUMMECHANICS 9 HRS

Quantum Postulates – State space, Evolution, Quantum Measurement, Distinguishing Quantum states, Projective measurements, POVM measurements -Quantum Mechanics-Hilbert Space-Linear Operators Tensor and Outer Products-Quantum Operators- Application Quantum mechanism: Super dense Coding - Double Silt Experiments.

UNIT III QUBITS AND QUANTUMGATES 9 HRS

Qubits, Bloch Sphere Representation-Rotation Operation-The Measurement of a Single Qubits-A Pair of Qubits- Bell States- Qubits as Spin Half- Integer Particles- Qubits as Polarized Photon-Entanglement, Exchange of Information / Teleportation – Quantum Coping Circuit - The Non-Cloning Theorem-Quantum Gates – Universal Quantum Gate Gates – Matrix Representation – Quantum Circuits- Single and Multiple Qubit Controlled Operations.

UNIT IV QUANTUM ALGORITHM 9 HRS

Turing Machine - Quantum Parallelism-Deutsch’s Problem, Deutsch – Jozsa Algorithm -QFT(Quantum Fourier Transform)-Short’s Factoring Algorithm-Simon’s Algorithm-Quantum Search Algorithm-Quantum key distribution - Mathematical Models of Quantum Computers - Introduction Different implementations of quantum computer.

UNIT V QUANTUMERRORCORRECTION 9 HRS

Quantum error correction and simple examples – The Three Qubit flip code, Three Qubit Phase flip code, The Shor Code - Brief Introduction to Quantum Computing Software - Quantum error-correcting codes:Error models, Criteria for a good code: reversible operations.

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No. of Hours: 45

Textbooks:

1. Dan C. Marinescu, Gabriela M. Marinescu, “*Approaching Quantum Computing*”, Pearson Education, 2008-09.
2. M.A. Neilson and I.L .Chuang “*Quantum computing and Quantum information*”, Cambridge University Press, 2009.
3. Vishal Sahani “*Introduction to Quantum Computing*”, TATA McGraw-Hill Publishing Company Limited.

References:

1. A.Yu.Kitaev, A.H.Shen, M.N.Vyalyi, “Classical and Quantum Computation”, American Mathematical Society.
2. Mark.M.Wilde, “Quantum information theory” Cambridge University Press.
3. J.A.Jones, “Quantum information, Computation and Communication” Cambridge University Press.
4. Scott Aaronson, “Quantum Computing since Democritus”, Cambridge University Press, 2013.



Department of Electronics and Communication Engineering

Subject Code: BEC18E20	Subject Name : Power Electronics	T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Solid State Devices	T	3	0/0	0/0	3

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C:Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVES :

- To study about power electronic circuits for voltage and current control and protection.
- To learn the switching characteristics of transistors and SCRs. Series and parallel functions of SCRs, Programmable triggering methods of SCR.
- To learn controlled rectification AC supplies.
- To study of converters and inverters.
- To learn about motor control, charges, SMPS and UPS.

COURSE OUTCOMES (COs) : (3- 5)

The Students will be able to

CO1	Understand the operation of power electronic devices.
CO2	Apply the triggering of SCR for natural and forced commutation.
CO3	Design phase controlled convertors using power diodes.
CO4	Develop different types of inverters and choppers.
CO5	Apply the concepts of power electronics in industries and HVDC system.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	2	2	2	2	2	2	1	2
CO2	3	2	3	3	2	2	2	2	1	2	1	2
CO3	3	3	3	2	3	1	2	1	1	2	2	1
CO4	2	3	3	3	1	1	1	1	1	2	1	2
CO5	3	3	3	3	1	1	1	1	1	2	1	2
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		2		2		2					
CO2	2		3		2		2					
CO3	3		2		2		1					
CO4	3		3		2		1					
CO5	3		2		2		1					

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					✓							



Department of Electronics and Communication Engineering

Subject Code: BEC18E21	Subject Name : High Speed Switching Architecture	T / L/ ETL	L	T / S.Lr	P/ R	C						
	Prerequisite: Computer Networks	Ty	3	0/0	0/0	3						
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C:Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab												
OBJECTIVE :												
<ul style="list-style-type: none"> • To equip the students with the concepts of high speed switching techniques in ATM networks 												
COURSE OUTCOMES (COs) : (3- 5)												
The Students will be able to												
CO1	Describe the basic concepts of High speed switching network											
CO2	Interpret the switching concepts and LAN switching technology											
CO3	Classify blocking & non – blocking architecture.											
CO4	Operate quivering methods in ATM switches.											
CO5	Explain addressing model & switching topologies.											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	1	2	1	1	2	3	2	2
CO2	3	3	3	3	2	1	3	3	3	1	3	1
CO3	2	3	2	1	1	1	2	2	3	2	1	3
CO4	3	3	3	3	1	2	1	1	3	1	1	3
CO5	3	3	3	2	1	2	2	2	2	3	3	1
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	2		1		1		1					
CO2	3		3		3		2					
CO3	3		2		3		1					
CO4	3		3		1		1					
CO5	2		1		2		1					
3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					✓							



Department of Electronics and Communication Engineering

BEC18E21	HIGH SPEED SWITCHING ARCHITECTURE	3 0/0 0/0 3
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UNIT I HIGH SPEED NETWORK

9 HRS

Introduction-LAN, WAN, Network evolution through ISDN to B-isdn, Transfer mode and control of B-ISDN, SDH multiplexing structure, ATM standard, ATM Adaption layers

UNIT II LANSWITCHINGTECHNOLOGY

9 HRS

Switching concepts, Switch forwarding techniques, Switch path control, LAB switching, cut through forwarding, Store and forward, Virtual LANS

UNIT III ATM SWITCHING ARCHITECTURE

9 HRS

Switch models, blocking networks-Basic-and-enhanced banyan networks, sorting networks merge sorting, Re-arrange able networks-full-and-partial connection networks, Non-blocking networks-Recursive network construction, comparison of non-blocking network, Switches with deflection routing-shuffle switch, Tandem banyan

UNIT IV QUEUES IN ATM SWITCHES

9 HRS

Internal Queuing-Input, Output and shared queuing multiple queuing networks Combined input, Output and shared queuing-performance analysis of Queued Switches

UNIT V IP SWITCHING

9 HRS

Addressing model, IP Switching types-flow driven and topology driven solutions, IP over ATM address and next hop resolution, Multicasting, Ipv6 over ATM

Practical component P: Include case studies / application scenarios

Research component R : Future trends / research areas / Comparative Analysis

Total No. of Hours: 45

Text Books:

1. Ranier Handel, Manfred N Huber, Stefan Schroder, "ATM Networks- concepts protocols applications", 3rd Edition, Addison Wesley, New York, 1999.
2. Achille Pattavina, "Switching Theory: Architecture and performance in broadband ATM Networks", John Wiley & Sons Ltd., New York. 1998.

References:

1. Ranier Handel, Manfred N Huber, Stefan Schroder, "ATM Networks- concepts protocols applications", 3rd Edition, Addison Wesley, New York,1999
2. AchillePattavina, "Switching Theory: Architecture and performance in broadband ATM Networks", John Wiley & Sons Ltd., New York.1998
3. Christopher Y Metz, "Switching protocols & Architectures", McGraw Hill Professionals publishing, NewYork.1998.



Department of Electronics and Communication Engineering

Subject Code: BEC18E22	Subject Name : INFORMATION CODING TECHNIQUES	T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Digital Communication	Ty	3	0/0	0/0	3

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory andLab

OBJECTIVES :

- To have a complete understanding of error–control coding.
- To understand encoding and decoding of digital data streams.
- To introduce methods for the generation of these codes and their decoding techniques.
- To have a detailed knowledge of compression and decompression techniques.
- To introduce the concepts of multimedia communication.

COURSE OUTCOMES (COs) : (3- 5)

The Students will be able to

CO1	Understand the various coding theorems in information theory
CO2	Interpret the digital modulation techniques in digital coding
CO3	Analyze the different coding methods and apply it for error correction
CO4	Demonstrate the different compression techniques
CO5	Develop a code for audio/video signals

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	3	2	2	2	1	2	1
CO2	3	3	3	3	3	2	2	3	1	2	1	1
CO3	3	3	3	3	3	3	3	2	1	2	3	2
CO4	3	3	3	3	2	3	2	2	2	3	2	1
CO5	3	3	3	2	2	3	2	2	2	2	2	1
COs/ PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		3		3		2					
CO2	3		3		3		2					
CO3	3		3		2		1					
CO4	3		3		2		2					
CO5	3		3		2		1					

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
						✓						



Department of Electronics and Communication Engineering

BEC18E22	INFORMATION CODING TECHNIQUES	3	0/0	0/0	3
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UNIT I INFORMATION ENTROPY FUNDAMENTALS 9 HRS

Uncertainty, Information and Entropy – Source coding Theorem – Huffman coding – Shannon Fano coding – Discrete Memory less channels – channel capacity – channel coding Theorem – Channel capacity Theorem.

UNIT II DATA AND VOICE CODING 9 HRS

Differential Pulse code Modulation – Adaptive Differential Pulse Code Modulation – Adaptive sub band coding – Delta Modulation – Adaptive Delta Modulation – Coding of speech signal at low bit rates (Vocoders, LPC).

UNIT III ERROR CONTROL CODING 9 HRS

Linear Block codes – Syndrome Decoding – Minimum distance consideration – cyclic codes – Generator Polynomial – Parity check polynomial – Encoder for cyclic codes – calculation of syndrome – Convolutional codes.

UNIT IV COMPRESSION TECHNIQUES 9 HRS

Principles – Text compression – Static Huffman Coding – Dynamic Huffman coding – Arithmetic coding – Image Compression – Graphics Interchange format – Tagged Image File Format – Digitized documents – Introduction to JPEG standards.

UNIT V AUDIO AND VIDEO CODING 9 HRS

Linear Predictive coding – code excited LPC – Perceptual coding, MPEG audio coders – Dolby audio coders – Video compression – Principles – Introduction to H.261 & MPEG Video standards.

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No. of Hours: 45

Textbooks:

1. Simon Haykin, “Communication Systems”, John Wiley and Sons, 4th Edition, 2001.
2. Fred Halsall, “Multimedia Communications, Applications Networks Protocols and Standards”, Pearson Education, Asia 2002; Chapters: 3, 4, 5.

References:

1. Mark Nelson, “Data Compression Book”, BPB Publication, 1992.
2. Watkinson J, “Compression in Video and Audio”, Focal Press, London, 1995.



Department of Electronics and Communication Engineering

Subject Code: BEC18E23	Subject Name : MICROWAVE ENGINEERING	T / L / ETL	L	T / S.Lr	P / R	C
	Prerequisite: Transmission Lines and Waveguides, Antenna and Wave Propagation	Ty	3	0/0	0/0	3

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory andLab

OBJECTIVES :

- To study Microwave sources and amplifiers.
- To study passive microwave components and their S- Parameter analysis.
- To study Microwave semiconductor devices & applications.

COURSE OUTCOMES (COs) : (3- 5)

The students will be able to

CO1	Understand the characteristics of microwave passive devices and their scattering parameter analysis.
CO2	Understand the concept of microwave generators and amplifiers.
CO3	Understand the concepts of microwave solid state devices and their characteristics.
CO4	Understand the concepts of microwave transistors in RF circuits.
CO5	Measure different parameters like frequency, wavelength, power, VSWR in RF circuits.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	3	3	1	2	1	1	1	1	1
CO2	2	3	3	3	3	1	1	1	2	2	1	1
CO3	3	2	2	2	3	1	2	1	1	1	1	1
CO4	3	2	2	2	2	3	1	1	3	1	1	2
CO5	3	3	3	3	3	3	1	1	1	2	1	3
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	1		2		1		2					
CO2	1		3		1		2					
CO3	1		2		1		1					
CO4	1		3		2		2					
CO5	1		3		1		3					

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					✓							



Department of Electronics and Communication Engineering

BEC18E23	MICROWAVE ENGINEERING	3 0/0 0/0 3
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UNIT I MICROWAVE PASSIVE DEVICES 9 HRS

Transmission Lines for use at Microwave Frequencies – Attenuators, Directional Couplers, Terminators, Phase Shifters, Faraday Rotation Isolators and Circulators, Field Displacement Isolators, Microwave Filters, Frequency Meters, Hybrid Junctions – Scattering Analysis.

UNIT II MICROWAVE GENERATORS 10 HRS

Limitations of Conventional Tubes at Very High Frequencies – Velocity – Modulated Tubes, Two – Cavity Klystron Amplifiers, Reflex Klystron Oscillators – Periodic Slow Wave Structures and their Use in Travelling Wave Tube Amplifiers, Focusing Techniques, TWTA Performance Characteristics – Electron Motion in Crossed Electric and Magnetic Fields - Magnetron Oscillators, Hartree Equation Rieke Diagram and Performance Charts.

UNIT III MICROWAVE SOLID-STATE DEVICES 9 HRS

Varactor Diodes, Manley – Rowe Relations, Low Noise Parametric Amplifiers – Transferred – Electron Devices and Their Operation, Cavity – Controlled Modes, LSA Mode-Avalanche – Transit Time Devices and Their Operation, TRAPATT Mode, BARITT mode, PIN Diodes and Their use as Attenuators and Switches.

UNIT IV MICROWAVE CIRCUITS 8 HRS

Small – Signal Equivalent Circuits, High-Frequency Applications, Performance Criteria and Limitations of BJTs and FETs – HEMTs – Fabrication Techniques.

UNIT V MICROWAVE MEASUREMENTS 9 HRS

Slotted - Line Techniques – Measurements of Wavelength – Measurement of Low and High VSWR – Measurement of Frequency and Frequency Meters – Measurement of Insertion Loss and Attenuation by Substitution Methods – Measurement of Low and High Powers at Microwave Frequencies – Modern Measurement Techniques using Automatic Network Analyzer and Spectrum Analyzer.

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No. of Hours: 45

Textbooks:

1. Annapurna Das, Sisir. K. Das, “*Microwave Engineering*”, Tata McGraw Hill Co., Ltd., 1999. Reprint 2001.
2. Samuel Y. Liao: “*Microwave Devices and Circuits*”, Prentice Hall of India – 3rd Edition(2003)
3. Subal Kar , “*Microwave Engineering*”, Universities press(India) private limited – 1st Edition (2016)

References:

1. D.M. Pozer, "Microwave Engineering", Addison – Wesley, 1998.
2. R.E. Collins: “Foundations for Microwave Engineering”, IEEE Press Second Edition (2002)
3. David K. Cheng, ”Field and Waves in Electromagnetism”, Pearson Education, 1989.



Department of Electronics and Communication Engineering

Subject Code: BEC18E24	Subject Name : Optical Network and Switching Techniques	T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Optical Communication	Ty	3	0/0	0/0	3

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory andLab

OBJECTIVES :

- To learn basic elements of opticalcommunication
- To understand networks and switchingtechniques

COURSE OUTCOMES (COs) : (3- 5)

The Students will be able to

CO1	Understand the basic elements of optical fiber.
CO2	Understand the concept of switching network in OSI layer. .
CO3	Explain all types of optical networks.
CO4	Analyze multiple access methods in WDM.
CO5	Understand the all optical switches.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	3	1	1	1	1	1	1	1	3
CO2	3	3	1	1	1	1	3	1	1	1	3	1
CO3	1	3	3	1	1	3	1	1	1	3	1	1
CO4	1	3	3	1	3	1	3	1	1	3	1	3
CO5	3	1	1	3	1	1	3	1	1	1	1	3
COs / PSOs	PSO1	PSO2	PSO3	PSO4								
CO1	3	2	1	1								
CO2	3	2	1	1								
CO3	2	3	2	2								
CO4	1	3	2	2								
CO5	3	3	1	1								

3/2/1 indicates strength of correlation 3 – High, 2 – Medium,1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					✓							



Department of Electronics and Communication Engineering

BEC18E24	OPTICAL NETWORK AND SWITCHING TECHNIQUES	3 0/0 0/0 3
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UNIT I INTRODUCTION 9 HRS

Optical communication – Basics of sources, transmitters, Modulators, Optical fiber, photo detectors, and receivers – Switching in networks – circuit switched – Packet switched – cell switched – Virtual circuit switched – Burst switched (fast circuit switched) – Transmission /Asynchronous – synchronous.

UNIT II SWITCHING NETWORKS 9 HRS

Layering in packet switched networks – motivation – commonly used abstraction: Physical layer – Data link layer – Network layer – Transport layer – Application layer – Layering in circuit switched networks – Physical layer – Multiplexing standards – Signaling – CAS, CCS, SS7 concept – Data plane – management plane – control plane – concept.

UNIT III OPTICAL TRANSMITTER AND RECEIVERS 9 HRS

First generation networks – SDH/SONET – Computer interconnections – ESCON – Fiber channel – HIPPI – FDDI – ATM –DQDB – Components – description – Mode locked laser (for ps pulses) – Tunable filters – multiplexers – De-multiplexers – Tunable wavelength convertors – Optical amplifiers. Fiber – EDFA – SOA – Tunable transmitters – Tunable receivers – Dispersion compensating fibers – Multiplexing techniques – SDM – TDMA – WDMA (OFDMA) – DWDM – SCM – CDMA – Protocols for single channel broadcast networks – ALOHA, CSMA/CD – Problems with CSMA/CD – Definition of high speed network.

UNIT IV MULTIPLE ACCESS METHODS 9 HRS

Classifications of multiple access methods – Random access – Reserved access – Scheduled access – Multichannel multiple access protocols – Desirable characteristics of protocol – Scalability – Fairness – TTTR – TTFR – FTTR – FTFR – Problem of wavelength stability – Multi hop WDM network – Shuffle net – MSN – Wavelength routed networks – Mesh – Ring – Traffic grooming problem – IP over optical framework – ASON – MpeS – Burst switched network (buffer less networks).

UNIT V OPTICAL SWITCHES 9 HRS

All –optical circuit switches – All–optical packet switches – Broadcast and select – Wavelength routed – Spaced switch based – Discussion on various switch architectures – Packet buffering techniques: Travelling type – Recirculating type: Protection and restoration – Restoration mechanism: Restoration timing issues – Path protection- Span protection – P –cycles.

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No. of Hours: 45

Text Books:

1. Gerd Keiser, "Optical Fiber Communication" Mc Graw -Hill International, 4 th Edition. 2010.
2. Hussein T.Mouftah and Jaafar M.H.Elmirghani, "Photonic Switching Technology – Systems and Networks“, IEEE Press, New York -10016-5997, ISBN – 0-7803-4707-2.
3. C.Siva Rama Murthy and Mohan Gurusamy, "WDM Optical Networks – Concepts, Design and Algorithms”, Prentice Hall of India Pvt. Ltd, New Delhi–2002.

References:

1. John M. Senior, "Optical Fiber Communication”, Second Edition, Pearson Education, 2007.
- Ramaswami, Sivarajan and Sasaki "Optical Networks”, Morgan Kaufmann, 2009.
2. J.Senior, "Optical Communication, Principles and Practice", Prentice Hall of India, 3rd Edition, 2008.
3. J.Gower, "Optical Communication System", Prentice Hall of India, 2001.
4. Uyles Black, "Optical Network: Third Generation Transport System”, Pearson Education, 1st edition, 2002.



Department of Electronics and Communication Engineering

Subject Code: BEC18E25	Subject Name : Device Modeling	T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Solid State Devices	T	3	0/0	0/0	3

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C:Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVES :

- To understand passive devices and structures
- To understand the integrated BJT and MOS devices

COURSE OUTCOMES (COs) : (3- 5)

The Students will be able to

CO1	Study the types and structures of resistors & capacitors in IC.
CO2	Understand the dynamic & static behavior of integrated diodes.
CO3	Learn different models of integrated BJT.
CO4	Study the modeling of MOSFETS & their characteristics.
CO5	Learn the small signal & large signal modeling of devices using SPICE.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	1	2	3	2	3	2	3	2
CO2	3	3	3	3	3	2	3	3	2	2	3	3
CO3	3	3	3	3	3	1	3	2	3	1	3	3
CO4	3	3	3	3	3	2	3	3	3	2	3	3
CO5	3	3	3	3	3	2	3	3	3	2	3	3
COs/ PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		3		2		3					
CO2	3		3		3		3					
CO3	3		2		3		3					
CO4	3		3		3		3					
CO5	3		3		3		3					

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					✓							



Department of Electronics and Communication Engineering

Subject Code: BEC18E26	Subject Name : VLSI Technology	T / L / ETL	L	T / S.Lr	P / R	C
	Prerequisite: Solid State Devices	T	3	0/0	0/0	3

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C:Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To enable the students to understand various design flow in VLSI and their applications in fuzzy systems

COURSE OUTCOMES (COs) : (3- 5)

The Students will be able to

CO1	Study the fabrication of CMOS transistor & its layout.
CO2	Understand the interconnection resistance & capacitance & their extraction.
CO3	Learn the distribution of clock signals in a chip.
CO4	Do VLSI implementation of FLC and study about testing techniques.
CO5	Design different types of adders and multiplier.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	1	2	1	3	2	3	3	3	3
CO2	3	3	2	3	3	2	3	2	3	3	3	3
CO3	3	3	3	2	3	3	3	2	3	2	3	3
CO4	3	3	3	3	3	3	3	1	3	2	3	3
CO5	3	3	3	3	3	3	3	2	3	3	3	3

COs / PSOs	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2	3
CO2	3	3	2	3
CO3	3	3	3	3
CO4	3	3	2	3
CO5	3	3	3	3

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills
					✓				



Department of Electronics and Communication Engineering

BEC18E26	VLSI TECHNOLOGY	3 0/0 0/0 3
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UNIT I VLSI DESIGN FLOW 9 HRS

Design hierarchy concepts of regularity, modularity & locality VLSI Design styles - CMOS Fabrication Technology- Introduction, Fabrication Process flow- basic steps, CMOS n-well process, Advanced CMOS fabrication technologies, layout design rules-Introduction-Full – custom Mask Layout design – CMOS Layout design rules – CMOS inverter Layout design – Layout of CMOS NAND & NOR gates – Complex CMOS Logicgates

UNIT II PARASITIC EXTRACTION & PERFORMANCE ESTIMATION FROM PHYSICAL STRUCTURE 9 HRS

Introduction – Reality with inter connection – MOSFET capacitances-interconnect capacitance estimation – interconnect resistance estimation

UNIT III CLOCK SIGNALS & SYSTEM TIMING 9 HRS

On chip clock generation & distribution using ring & pierce crystal oscillator – non – overlapping clock signals and gate level implementation – H-tree clock distribution N/W – clock skew reduction – Zero – Skew clock routing N/W- Clock distribution N/W for DEC alpha μ p chips

UNIT IV TESTABILITY OF INTEGRATED SYSTEMS-VLSI FOR FUZZY LOGIC SYSTEMS 9 HRS

Design constraints – Testing – The rule of ten – terminology – Failures in CMOS – Combinational Logic Testing – Practical Ad-Hoc DFT guidelines – Scan design techniques- Integrated implementations of FLC, Digital implementation of FLC's, Analog implementation of FLC's, Mixed digital / analog implementations of Fuzzy systems, CAD automation for FLC DESIGN, NN implementing fuzzysystems.

UNIT V ARITHMETIC FOR DIGITAL SYSTEMS 9 HRS

Introduction – notation systems – Principles of generation & propagation – 1 bit full adder – Enhancement Techniques for Adders – multi operand – Adders – Multiplication – Addition and Multiplication in Galois Fields GF(2ⁿ)

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No. of Hours: 45

Text Books:

1. Cheng. SZE, "VLSI Technology"., Prentice Hall of India.
2. Douglas A. Pucknell and Kamran Eshraghian, "Basic VLSI Design Systems and Circuits", Prentice Hall of India Pvt Ltd., 1993.

References:

1. Cheng., SZE., "VLSI Technology"., Prentice Hall of India,
2. Douglas A. Pucknell and Kamran Eshraghian, "Basic VLSI Design Systems and Circuits", Prentice Hall of India Pvt Ltd., 1993.
3. Horspool, Gorman, "The ASIC Handbook", Tata McGraw Hill Publications. 1999.
4. Randall .L. Geiger and P. E. Allen, "VLSI Design Techniques for Analog and Digital Circuits", McGraw Hill International Company, 1990.



Department of Electronics and Communication Engineering

Subject Code: BEC18E27	Subject Name : Biomedical Instrumentation	T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Measurement and Instrumentation, Control Systems	Ty	3	0/0	0/0	3

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory andLab

OBJECTIVES :

- To study the methods of recording various biopotentials
- To study how to measure biochemical and various physiological information
- To understand the working of units which will help to restore normal functioning
- To understand the use of radiation for diagnostic and therapy
- To understand the need and technique of electrical safety in Hospitals

COURSE OUTCOMES (COs) :

The students will able to

CO1	Enable the students to develop knowledge of how instruments work in the various department and laboratories of a hospital and thereby recognize their limitations.
CO2	Interpret technical aspects of medicine.
CO3	Familiarize students with various medical equipment's and their technical aspects. Understand medical diagnosis and therapy.
CO4	Introduce students to the measurements involved in some medical equipment's.
CO5	Understanding the problem and ability to identify the necessity of equipment's to a specific problem.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	1	1	1	3	3	3	3	1	3	3
CO2	1	1	1	2	1	3	3	2	3	1	2	2
CO3	1	2	1	2	1	3	3	3	3	2	3	2
CO4	1	1	1	1	2	3	3	3	3	2	2	2
CO5	1	2	2	1	2	3	3	3	3	2	2	2
COs/ PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	1		1		3		2					
CO2	1		2		3		1					
CO3	1		2		3		2					
CO4	3		2		3		3					
CO5	3		2		3		2					

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
						✓						



Department of Electronics and Communication Engineering

BEC18E27	BIOMEDICAL INSTRUMENTATION	3	0/0	0/0	3
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UNIT I BASIC PHYSIOLOGY 9 HRS

Cells and their Structures – Transport of Ions Through Cell Membrane – Resting and Excited State – Trans membrane Potential – Action Potential – Bio-Electric Potential – Nervous System – Physiology of Muscles – Heart and Blood Circulation – Respiratory System – Urinary System.

UNIT II BASIC TRANSDUCER PRINCIPLES AND ELECTRODES 9 HRS

The Transducer Principles – Active Transducers – Passive Transducers – Transducer for Bio-Medical Application – Electrode Theory- Bio-Potential Electrode – Bio-Chemical Transducer.

UNIT III CARDIO VASCULAR SYSTEM 9 HRS

The Heart and Cardiovascular System – Blood Pressure – Characteristics of Blood Flow – Heart Sounds - Electro Cardiograph – Measurements of Blood Pressure – Measurement of Blood Flow and Cardiac O/P Plethysmography – Measurements of Heart Sounds

UNIT IV X-RAY AND RADIO ISOTOPE INSTRUMENTATION 9 HRS

X-ray Imaging Radiography – Fluoroscopy – Image Intensifiers – Angiography - Medical use of Radioisotopes – Beta Radiations – Detectors – Radiation Therapy.

UNIT V BIO-TELEMETRY 9 HRS

Introduction to Bio-Telemetry – Physiological Parameters Adaptable to Bio-Telemetry – The Components of Bio-Telemetry Systems – Implantable Units – Applications of Telemetry in Patient Care – Application of Computer in Bio-Medical Instrumentation, Anatomy of Nervous System – Measurement from the Nervous System – EEG – EMG.

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No. of Hours: 45

Text books:

1. M. Arumugam, "Bio-medical Instrumentation" – Anuradha Agencies Publishers, 1992.
2. Khandpur, "Handbook on Biomedical Instrumentation" – Tata McGraw Hill Co Ltd., 1989.

References:

1. Leusis Cromwell Fred, J. Werbell and Erich A.pfraffer, "Biomedical instrumentation and Measurements" – Prentice Hall of India, 1990.
2. Joseph J. Carr and John M. Brown, "Introduction to Biomedical equipment Technology", John Wiley and Sons, New York, 1997.



Department of Electronics and Communication Engineering

Subject Code: BEC18E28	Subject Name : Embedded Software Design						T / L/ ETL	L	T / S.Lr	P/ R	C	
	Prerequisite: Basic C Programming						Ty	3	0/0	0/0	3	
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C:Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab												
OBJECTIVE :												
<ul style="list-style-type: none"> To implement software design for an embedded system using C and assembly level programs 												
COURSE OUTCOMES (COs) : (3- 5)												
The Students will be able to												
CO1	Understand the concept of basic embedded system											
CO2	Write a simple program using C and assembly											
CO3	Differentiate the methods of IO programming using interrupts											
CO4	Applying scheduling methods for multi-threaded programming											
CO5	Demonstrate the principle of shared memory and memory management											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	1	1	2	1	1	1	1	1	2
CO2	1	2	2	2	3	1	1	1	1	2	3	2
CO3	1	3	2	3	3	1	1	1	1	2	2	1
CO4	1	3	3	3	3	1	1	2	3	2	2	2
CO5	1	2	3	3	3	2	2	3	2	2	3	2
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	1		1		1		1					
CO2	2		2		3		1					
CO3	1		2		3		1					
CO4	2		2		3		2					
CO5	1		1		3		2					
3/2/1 indicates strength of correlation 3 – High, 2 – Medium,1 – Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					✓							



Department of Electronics and Communication Engineering

BEC18E28	Embedded Software Design	3 0/0 0/0 3
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UNIT I INTRODUCTION TO EMBEDDED SYSTEM AND DATA REPRESENTATION 9HRS

Embedded system-Design goals for embedded software- Real time and multi-tasking-Embedded processors and languages-Building an embedded application-Data representation-Fixed precision binary numbers-Binary representation of Integers and real numbers-ASCII and BCD number.

UNIT II PROGRAMMING IN C AND ASSEMBLY LANGUAGE 9 HRS

Integer data types – useful typedefs and defines - manipulating bits in memory and I/O ports – Accessing memory – mapped I/O devices – structures -variant access – programming in assembly – register usage conventions – addressing options – instruction sequencing – procedure call and return – parameter passing – retrieving parameters.

UNIT III INPUT OUTPUT PROGRAMMING 9 HRS

I/O instructions – synchronization, transfer rate and latency – polled waiting loops – interrupt driven I/O-interrupt service routine-Buffers and queues –ISR in assembly and C – Non-maskable interrupts - Software interrupts – Exceptions - direct memory access – comparison of methods .

UNIT IV CONCURRENT SOFTWARE AND SCHEDULING 9 HRS

Foreground/background systems - Multi threaded programming – shared resources and critical sections – thread states – pending threads – context switching – round-robin scheduling – priority based scheduling – assigning priorities – deadlock –watchdog timers.

UNIT V MEMORY MANAGEMENT AND SHARED MEMORY 9 HRS

Objects in C – scope – lifetime –automatic allocation – static allocation – Dynamic allocation-recognizing shared objects – reentrant functions – read only data – accessing shared memory.

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No. of Hours: 45

Text Books:

1. Daniel W. Lewis, “Fundamentals of embedded software where C and assembly meet”, Pearson Education, 2002.
2. Steve Heath, “Embedded system design”, Elsevier, 2003.

References:

1. Daniel W. Lewis, “Fundamentals of embedded software where C and assembly meet”, Pearson Education, 2002.
2. Steve Heath, “Embedded system design”, Elsevier, 2003.
3. David E. Simon, “An Embedded Software Primer”, Pearson Education, 2003.



Department of Electronics and Communication Engineering

Subject Code: BEC18E29	Subject Name : Spread Spectrum Communication	T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Communication Theory, Digital Communication	T	3	0/0	0/0	3

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C:Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To enable the students to learn the concepts of spread spectrum systems and their performance metrics

COURSE OUTCOMES (COs) : (3- 5)

The Students will be able to

CO1	Describe the basic principles of DSSS & FHSS.
CO2	Performance analysis on the spread spectrum modulation formats.
CO3	Observe the various typeof spread spectrum modulation formats.
CO4	Recognize the difference & benefits of spreading codes.
CO5	Estimate the spreading code acquisition and tracking circuits.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	1	1	3	2	2	3	2	2
CO2	3	3	2	3	2	3	3	2	2	2	3	2
CO3	3	3	3	3	3	3	2	3	2	3	2	3
CO4	3	3	3	3	2	2	2	1	2	3	3	3
CO5	3	3	3	3	3	3	3	2	3	2	3	2
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		2		2		3					
CO2	3		3		2		2					
CO3	3		3		3		3					
CO4	2		3		3		2					
CO5	3		3		2		3					

3/2/1 indicates strength of correlation 3 – High, 2 – Medium,1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					✓							



Department of Electronics and Communication Engineering

BEC18E29	SPREAD SPECTRUM COMMUNICATION	3 0/0 0/0 3
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UNIT- I INTRODUCTION 9 HRS
Communication in the presence of pulse noise jamming - Low probability detection scheme - Director Sequence Spread Spectrum (DSSS) and Frequency Hop Spread Spectrum Systems and examples of Spread Spectrum Systems

UNIT- II PERFORMANCE CHARACTERIZATION OF DIGITAL DATA TRANSMISSION 9 HRS
Detection of binary signals in AWGN - Quadrature multiplexed signaling schemes - Signaling through band limited channels - Equalization of digital data transmission system - Realization imperfections – Degradations in performance.

UNIT- III SPREAD SPECTRUM SYSTEMS 9 HRS
Direct sequence spread spectrum methods employing BPSK, QPSK and MSK - Frequency Hop spread spectrum methods - Coherent slow frequency Hop technique - Non coherent slow and fast frequency Hop spread spectrum techniques - Hybrid DS/FH spread spectrum - Complex envelope representation of spread spectrum systems.

UNIT- IV BINARY SHIFT REGISTER SEQUENCES FOR SPREAD SPECTRUM SYSTEMS 9 HRS
Definition - PN sequence generator fundamentals - Maximal length sequences - Properties, Power spectrum and Polynomial tables for maximal length sequences - Gold codes - Rapid Acquisition systems - Non-linear code generators.

UNIT- V SYNCHRONIZATION OF SPREAD SPECTRUM SYSTEMS 9 HRS
Optimal tracking of wideband signals - Early-late tracking loops - Code tracking loops for FHSS - Optimum synchronization techniques - Multiple dwell and sequential detectors - Synchronization using a matched filter - Synchronization by estimating the received spreading code.

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No.of Hours: 45

Text Books:

1. Ziemer, R.E & Peterson, R.L., "Digital Communication and Spread Spectrum Systems", Mac millan Publishing Co., 1985.
2. Holms, J.K., "Coherent Spread Spectrum systems", Wiley Interscience, 1982.

References:

1. Ziemer, R.E & Peterson, R.L., "Digital Communication and Spread Spectrum Systems", Mac millan Publishing Co., 1985.
2. Holms, J.K., "Coherent Spread Spectrum systems", Wiley Interscience, 1982.
3. Dixon, R.C., "Spread Spectrum Systems", Wiley Interscience, 1976.
4. Charles E Cook.,etal, "Spread-Spectrum Communications", IEEE Press, Inc, NewYork.



Department of Electronics and Communication Engineering

Subject Code: BEC18E30	Subject Name : Network Management	T / L / ETL	L	T / S.Lr	P / R	C
	Prerequisite: Computer Networks	T	3	0/0	0/0	3

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C:Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To enable the students learn the concepts of managing the various categories of networks and analyzes its performance.

COURSE OUTCOMES (COs) : (3- 5)

The Students will be able to

CO1	Understand the fundamentals of various network topologies.
CO2	Categorize different models of networking & their functionalities.
CO3	Analyze different models of SNMP and their working.
CO4	Appreciate & analyze the diverse functions of broad band network management.
CO5	Analyze the different applications of network management.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	1	3	1	1	1	1	1	1	3
CO2	3	3	1	1	3	1	1	1	1	1	1	1
CO3	3	3	1	3	3	1	1	1	1	1	1	1
CO4	1	3	1	3	1	1	2	1	1	1	1	1
CO5	1	3	3	1	1	1	1	1	1	1	1	1
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		1		2		1					
CO2	1		3		1		1					
CO3	1		3		1		2					
CO4	3		1		2		3					
CO5	1		3		1		3					

3/2/1 indicates strength of correlation 3 – High, 2 – Medium,1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					✓							



Department of Electronics and Communication Engineering

BEC18E30	NETWORK MANAGEMENT	3 0/0 0/0 3
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UNIT– I FUNDAMENTALS OF COMPUTER NETWORK TECHNOLOGY 9 HRS

Network Topology, LAN, Network node components – Hubs, Bridge, Gateways, Switches, WAN, ISDN – Transmission Technology, communication protocols and standards

UNIT–II OSI NETWORK MANAGEMENT 9 HRS

OSI Network management model – Organizational model – Information model, communication model. Abstract Syntax Notation – Encoding structure, Macros Functional model CMIP / CMIS

UNIT– III INTERNET MANAGEMENT (SNMP) 9 HRS

SNMP-Organizational model – system Overview, The information model, communication model- Functional model, SNMP proxy server, Management information, protocol remote monitoring

UNIT– IV BROAD BAND NETWORK MANAGEMENT 9 HRS

Broadband networks and services, ATM Technology-VP, VC, ATM Packet, Integrated service, ATM LAN emulation, Virtual LAN. ATM Management Information base, Role of SNMD and ILMI in ATM Management, M1, M2, M3, M4 Interface. ATM Digital Exchange Interface Management

UNIT–V NETWORK MANAGEMENT APPLICATIONS 9 HRS

Configuration management, Fault management, performance management, Event Correlation Techniques security Management Service Level Management

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No. of Hours: 45

Text Books:

1. Mani Subramaniyan, “Network Management Principles and Practice”, Addison Wesley, New York 2000.
2. Lakshmi G. Raman, “Fundamentals of Telecommunication Network Management”, Eastern

References:

1. Mani Subramaniyan, “Network Management Principles and Practice”, Addison Wesley, New York, 2000.
2. Lakshmi G. Raman, “Fundamentals of Telecommunication Network Management”, Eastern Economy Edition IEEE, Press, New Delhi, 1999.
3. Salah Aiiarous, Thomas Plevayk, “Telecommunications Network Management Technologies and Implementations”, eastern Economy Edition IEEE press, New Delhi. 1998.



Department of Electronics and Communication Engineering

Subject Code: BEC18E31	Subject Name : Satellite Communication	T / L/ ETL	L	T / S.Lr	P/ R	C						
	Prerequisite: Communication Systems	Ty	3	0/0	0/0	3						
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory andLab												
OBJECTIVES :												
<ul style="list-style-type: none"> Overview of satellite systems in relation to other terrestrialsystems Study of satellite orbits andlaunching. Study of earth segment and space segmentcomponents Study of satellite access by varioususers. Study of DTH and compressionstandards. 												
COURSE OUTCOMES (COs) :												
The students will be able to												
CO1	Be aware of various element of orbital machine.											
CO2	Identify and interpret various multiple access and switching techniques.											
CO3	Explain the concepts involved in satellite link design											
CO4	Explain the principles, concepts and operation of satellite communication systems											
CO5	Explore the various process of earth station design.											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	2	2	2	2	1	2	1	2
CO2	3	3	3	2	3	1	1	3	3	3	3	3
CO3	3	3	3	3	2	1	1	1	2	3	2	2
CO4	3	3	3	3	2	1	1	1	2	3	1	2
CO5	3	3	3	2	3	2	2	1	3	2	1	3
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		2		2		2					
CO2	3		3		3		2					
CO3	3		3		2		2					
CO4	3		3		2		2					
CO5	3		2		1		1					
3/2/1 indicates strength of correlation 3 – High, 2 – Medium,1 – Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					✓							



Department of Electronics and Communication Engineering

Subject Code: BEC18E32	Subject Name : Operating Mobile communication	T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Digital Communication	Ty	3	0/0	0/0	3

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory andLab

OBJECTIVES :

- To make the students learn the concepts of basic cellularcommunication
- To learn about the various propagationmodels
- To develop mobile applications and design a M2Mcommunication

COURSE OUTCOMES (COs) : (3- 5)

The Students will be able to

CO1	Understand basic wireless systems and standards
CO2	Apply cellular concepts in designing a mobile communication system
CO3	Understand various propagation models and multipath fading channels
CO4	Apply the OS fundamentals to develop native applications
CO5	Design a M2M communication for latest IOS applications

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	1	2	1	1	1	1	1	2
CO2	1	3	3	3	1	1	1	2	1	2	1	1
CO3	3	1	3	1	1	1	1	1	2	1	2	1
CO4	1	3	3	3	3	1	2	1	1	1	1	2
CO5	1	3	3	3	3	1	1	1	2	1	1	1
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	1		3		2		2					
CO2	3		3		2		1					
CO3	3		3		1		1					
CO4	3		1		2		2					
CO5	1		3		1		3					

3/2/1 indicates strength of correlation 3 – High, 2 – Medium,1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					✓							



Department of Electronics and Communication Engineering

BEC18E32	OPERATING MOBILE COMMUNICATION	3	0/0	0/0	3
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UNIT I INTRODUCTION TO WIRELESS SYSTEMS AND STANDARDS 9 HRS

Introduction to wireless communication: Evolution of mobile communications, mobile radio systems- Examples, trends in cellular radio and personal communications. 2G, EDGE, 3G, 4G (LTE) and 5G, VoIP, Wi-Fi and Bluetooth, Wireless Networks and Standards, WLL, Blue tooth. AMPS, GSM, IS-95 and DECT

UNIT II CELLULAR CONCEPT AND SYSTEM DESIGN FUNDAMENTALS 9 HRS

Cellular Concept: Frequency reuse, channel assignment, hand off, Interference and system capacity, tracking and grade of service, Improving Coverage and capacity in Cellular systems.

UNIT III MOBILE RADIO PROPAGATION 9 HRS

Free space propagation model, reflection, diffraction, scattering, link budget design, Outdoor Propagation models, Indoor propagation models, Small scale Multipath propagation, Impulse model, Small scale Multipath measurements, parameters of Mobile multipath channels, types of small scale fading, statistical models for multipath fading channels.

UNIT IV OPERATING SYSTEM 9 HRS

Different OS Platforms - Windows, Android, iOS; Process for Software OS installation – Requirements for testing - Native applications – Secured environment

UNIT V M2M COMMUNICATION 9 HRS

Low Power and Battery Operated IOT Communication, Bluetooth Low Energy (BLE), Zigbee, Z-Wave, LoRa, Narrow Band-Internet of Things (NB-IOT), Cat-M/LTE-M

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total Number of Hours: 45

Text Books:

1. T.S.Rappaport, “Wireless Communications: Principles and Practice, Second Edition, Pearson Education/ Prentice Hall of India, Third Indian Reprint 2003.
2. Arash Habibi Lashkari, Mohammadreza Moradhaseli, “ Mobile Operating Systems and Programming : Mobile Communications “VDM Verlag Dr. Müller (July 7, 2011),

References:

1. R. Blake, “Wireless Communication Technology”, Thomson Delmar, 2003.
2. W.C.Y.Lee, "Mobile Communications Engineering: Theory and applications, Second Edition, McGraw- Hill International, 1998.
3. Stephen G. Wilson, “Digital Modulation and Coding”, Pearson Education, 2003.
4. <https://www.iotforall.com/cellular-iot-explained-nb-iot-vs-lte-m/>



Department of Electronics and Communication Engineering

Subject Code:	Subject Name : Sensors and its Applications	T / L / ETL	L	T/SLr	P/R	C						
BEC18CE1	Prerequisite: Engineering Physics	Ty	3	0/0	0/0	3						
L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab												
OBJECTIVE :												
<ul style="list-style-type: none"> • To equip the students with fundamentals of sensors, types, characteristics, properties and its applications. 												
COURSE OUTCOMES (COs) : (3- 5)												
The Students will be able to												
CO1	Elaborate the concepts of sensor and its characteristics											
CO2	Interpret the sensor properties and principles sensors											
CO3	Distinguish the working of different types of sensors											
CO4	Analyze and implement sensors in diverse networks											
CO5	Integrate the working of sensors in different applications.											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	3	3	3	2	2	2	2	2	2	2
CO2	1	3	3	2	2	2	2	1	2	2	2	2
CO3	3	3	2	3	2	1	2	1	2	2	2	1
CO4	1	1	3	3	3	1	2	1	2	2	2	1
CO5	1	1	3	3	3	1	3	1	2	2	2	2
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		3		2		3					
CO2	3		3		3		3					
CO3	3		3		2		3					
CO4	3		3		3		3					
CO5	3		3		2		3					
3/2/1 indicates Strength of Correlation 3- High, 2- Medium, 1-Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					✓							



Department of Electronics and Communication Engineering

Subject Code: BEC18CE2	Subject Name : CRYPTOGRAPHY AND NETWORK SECURITY	T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Computer Networks	Ty	3	0/0	0/0	3

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory andLab

OBJECTIVES :

- To study the various cryptographic algorithms, firewall.
- To study Integrity, Authentication.
- To study about wireless network securityconcepts.

COURSE OUTCOMES (COs) :

The students will be able to

CO1	Identify different types of attacks and techniques used for transmission of information.
CO2	Encrypt and decrypt messages using different types of ciphers.
CO3	Verify message using well know signature generation and verification algorithms.
CO4	To have a clear knowledge on network security, web security and firewalls.
CO5	To test and identify the various security attack issues in wireless systems.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	1	2	1	1	3	3	2	3
CO2	3	3	3	3	3	3	1	2	2	3	3	3
CO3	3	3	3	3	2	3	1	2	3	3	2	3
CO4	3	2	3	3	3	3	2	2	1	3	2	3
CO5	3	3	3	3	3	3	1	3	3	3	3	2
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		2		2		3					
CO2	3		3		2		1					
CO3	3		3		2		2					
CO4	3		1		1		3					
CO5	3		3		3		2					

3/2/1 indicates strength of correlation 3 – High, 2 – Medium,1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					✓							



Department of Electronics and Communication Engineering

BEC18CE2	CRYPTOGRAPHY AND NETWORK SECURITY	3	0/0	0/0	3
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UNIT I INTRODUCTION ON SECURITY 9 HRS

Security Goals, Types of Attacks: Passive attack, active attack, attacks on confidentiality, attacks on Integrity and availability. Security services and mechanisms, Techniques: Cryptography, Steganography, Revision on Mathematics for Cryptography.

UNIT II SYMMETRIC & ASYMMETRIC KEY ALGORITHMS 9 HRS

Substitution Ciphers, Transposition Ciphers, Stream and Block Ciphers, Data Encryption Standards (DES), Advanced Encryption Standard (AES), RC4, Principle of asymmetric key algorithms, RSA Key distribution.

UNIT III INTEGRITY, AUTHENTICATION AND KEY MANAGEMENT 9 HRS

Message Integrity, Hash functions: SHA, Digital signatures: Digital signature standards. Authentication Entity Authentication: Biometrics, Key management Techniques, Introduction to Quantum Cryptography.

UNIT IV NETWORK SECURITY, FIREWALLS AND WEBSECURITY 9 HRS

Introduction on Firewalls, Types of Firewalls, Firewall Configuration and Limitation of Firewall. IP Security Overview, IP security Architecture, authentication Header, Security payload, security associations, Key Management. Web security requirement, secure sockets layer, transport layer security, secure electronic transaction, dual signature

UNIT V WIRELESS NETWORK SECURITY 9 HRS

Security Attack issues specific to Wireless systems: Worm hole, Tunneling, DoS WEP for Wi-Fi network, Security for 4G networks: Secure Ad hoc Network, Secure Sensor Network

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No. of Hours: 45

Text Books:

1. Behrouz A. Fourouzan, “*Cryptography and Network security*” Tata McGraw- Hill, 2008.
2. William Stallings, “*Cryptography and Network security: principles and practice*”, 2nd Edition, Prentice Hall of India, New Delhi, 2002.
3. Atul Kahate, “*Cryptography and Network security*”, 2nd Edition, Tata McGraw- Hill, 2008.

References:

1. R.K.Nichols and P.C. Lekkas, “Wireless Security”, Mc Graw-Hill Professional, New York, NY, USA, 2001.
2. H. Yang et al., "Security in Mobile Ad Hoc Networks: Challenges and Solution", IEEE Wireless Communications, Feb. 2004.
3. Securing Ad Hoc Networks, IEEE Network Magazine, vol. 13, no. 6, pp. 24-30, December 1999.



Department of Electronics and Communication Engineering

Subject Code: BEC18CE3	Subject Name : ADVANCED MICROCONTROLLER						T / L/ ETL	L	T / S.Lr	P/ R	C	
	Prerequisite: Microprocessor and Microcontroller						Ty	3	0/0	0/0	3	
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory andLab												
OBJECTIVE :												
<ul style="list-style-type: none"> To learn the usage of ARM processor, Texas MSP430 												
COURSE OUTCOMES (COs) :												
The students will be able to												
CO1	Understand the concepts of CISC architecture.											
CO2	Learn the programming of ARM processor.											
CO3	Implement the application of ARM processor.											
CO4	Learn the architecture and usage of Texas MSP 430.											
CO5	Implement peripheral applications using Texas MSP 430.											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	3	3	1	1	2	2	2	2
CO2	3	2	3	2	3	3	1	1	2	2	2	2
CO3	3	2	3	2	3	3	1	1	2	2	2	2
CO4	3	2	3	2	3	3	1	1	2	2	2	2
CO5	3	2	3	2	3	3	1	1	2	2	2	2
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		3		2		3					
CO2	3		3		2		3					
CO3	3		3		2		3					
CO4	3		3		2		3					
CO5	3		3		2		1					
3/2/1 indicates strength of correlation 3 – High, 2 – Medium,1 – Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					✓							



Department of Electronics and Communication Engineering

BEC18CE3	ADVANCED MICROCONTROLLER	3	0/0	0/0	3
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UNIT I HIGH PERFORMANCE CISC ARCHITECTURE–PENTIUM 9 HRS

CPU Architecture - Bus Operations – Pipelining – Branch predication – floating point unit - Operating Modes –Paging – Multitasking – Exception and Interrupts – Instruction set –addressing modes – Programming the Pentiumprocessor

UNIT II HIGH PERFORMANCE RISC ARCHITECTURE– ARM 9 HRS

Organization of CPU – Bus architecture –Memory management unit - ARM instruction set- Thumb Instruction set- addressing modes – Programming the ARM processor

UNIT III ARM APPLICATION DEVELOPMENT 9 HRS

Exception handling - Interrupt handling - Embedded Operating Systems - Integrated Development Environment - Peripheral Interface - Application of ARM Processor - Cache - Memory Managementunits

UNIT IV TEXAS MSP430 9 HRS

Architecture of MSP430 - Memory - Addressing Modes - Instruction Set - Clock System - Interrupts - Interrupt Service Routine - Functions and Subroutines

UNIT V DESIGN USING TEXAS MSP430 9 HRS

LCD Display - LED - Automatic Control - Timers - Watchdog Timer - ADC - DAC - SPI - I2C - UART - Low Power Embedded System Design using MSP430

Practical component P : Include case studies / application scenarios

Research component R : Future trends / research areas / Comparative Analysis

Total No. of Hours: 45

Text Books:

1. James L. Antonakos, "The Pentium Microprocessor " Pearson Education, 1997.
2. Steve Furber, " ARM System –On –Chip Architecture"2nd Edition Addison Wesley, 2000.
3. David Seal, "ARM Architecture Reference Manual", 2nd Edition Addison Wesley, 2007.
4. John Davies, Newnes, MSP430 Microcontroller Basics, 2008.

References:

1. Gene .H. Miller." Micro Computer Engineering," Pearson Education, 2003.
2. John B. Peatman, "Design with PIC Microcontroller, Prentice Hall, 1997.
3. Chris Nagy, Embedded System Design using TI MSP430 Series, Elsevier Publications, 2003.



Department of Electronics and Communication Engineering

Subject Code: BEC18CE4	Subject Name : ELECTROMAGNETIC FIELD THEORY						T / L/ ETL	L	T / S.Lr	P/ R	C	
	Prerequisite: Vector Calculus, Basic physics						Ty	3	0/0	0/0	3	
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory andLab												
OBJECTIVES :												
<ul style="list-style-type: none"> To evaluate static magneticfields To understand how materials affect electric and magneticfields To understand the relation between the fields under time varyingsituations To understand principles of propagation of uniform planewaves. 												
COURSE OUTCOMES (COs) :												
The students will be able to												
CO1	Understand the sources and effects of Electromagnetic fields.											
CO2	Apply electrostatic postulates to determine various parameters.											
CO3	Demonstrate their ability to determine magneto static energy and force.											
CO4	Develop an analogy between field theory and circuit theory.											
CO5	Use transmission line equation to evaluate line parameters.											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	2	1	2	2	3	1	2	1	3
CO2	3	2	1	2	2	2	2	2	1	3	1	2
CO3	2	2	3	2	2	3	2	3	2	3	3	2
CO4	1	2	3	3	3	2	2	2	1	3	2	2
CO5	2	2	3	2	2	2	2	2	2	2	1	2
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	1		2		2		2					
CO2	2		3		2		2					
CO3	2		3		2		2					
CO4	2		3		2		1					
CO5	2		2		2		2					
3/2/1 indicates strength of correlation 3 – High, 2 – Medium,1 – Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					✓							



Department of Electronics and Communication Engineering

BEC18CE4	ELECTROMAGNETIC FIELD THEORY	3	0/0	0/0	3
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UNIT: I INTRODUCTION 9 HRS
 Sources and Effects of Electromagnetic Fields – Vector Fields – Co-Ordinate Systems-Rectangular, Cylindrical, & Spherical Coordinate Systems–Expressions for Grad, Div, Curl in Cylindrical & Spherical Coordinates.

UNIT: II ELECTROSTATIC 9 HRS
 The Field Concept – Sources Of Electromagnetic Fields, Changes – Columb’s Law – Electric Field Intensity – Electric Flux – Gauss’s Law – Potential – Laplace And Poisson’s Equations – Electrostatic Energy – Dielectrics – Capacitance.

UNIT: III MAGNETOSTATICS 9 HRS
 Lorentz Law Of Force, Magnetic Field Intensity – Biot–Savart Law - Ampere’s Law –Magnetic Flux Density (B) – Boundary Conditions – Scalar And Vector Potential – Magnetic Force – Torque – Inductance – Energy Density – Magnetic circuits.

UNIT: IV ELECRO MAGNETIC FIELDS 9 HRS
 Faraday’s Laws, Induced Emf – Transformer And Motional Emf – Forces And Energy Inquasi-Stationary Electromagnetic Fields - Maxwell’s Equations (Differential And Integral forms) – Displacement Current – Relation Between Field Theory And Circuit Theory.

UNIT: V ELECTRO MAGNETIC WAVES 9 HRS
 Generation – Electro Magnetic Wave Equations – Wave Parameters; Velocity, Intrinsic Impedance, Propagation Constant – Waves In Free Space, Loss And Lossless Dielectrics, Conductors-Skin Depth, Poynting Vector – Transmission Line Equations.

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No. of Hours: 45

Text Books:

1. Mathew N. O. SADIKU, "*Elements of Electromagnetics*", Oxford University Press Inc. First India edition, 2007
2. William H. Hayt & John A. Buck, "*Engineering Electromagnetics*", Tata Mc-Graw-Hill 7th Edition 2005.

References:

1. John D Kraus, "*Electromagnetics*", Tata McGraw Hill Book Co., New York, Third Edition, 1989.
2. Joseph A Edminister, "*Theory and Problems of Electro Magnetics*", Schaums Outline Series Tata McGraw Hill book company New York, 1986.



Department of Electronics and Communication Engineering

Subject Code: BEC18CE5	Subject Name : TRANSMISSION LINES & WAVE GUIDES						T / L/ ETL	L	T / S.Lr	P/ R	C	
	Prerequisite: Electromagnetic Field Theory						Ty	3	0/0	0/0	3	
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory andLab												
OBJECTIVES :												
<ul style="list-style-type: none"> To become familiar with propagation of signals throughlines. To understand signal propagation at Radiofrequencies. To understand radio propagation in guided systems. To become familiar with resonators. 												
COURSE OUTCOMES (COs) :												
The students will be able to												
CO1	Determine wave parameters of a transmission line.											
CO2	Understand the attenuation and reflection of different types of transmission lines.											
CO3	Apply smith chart technique to determine reflection coefficient of a line.											
CO4	Study the behavior of TE, TM & TEM wave in parallel plane wave guides.											
CO5	Analyze the behavior of TE, TM & TEM mode in circular and rectangular wave guides.											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	1	1	2	2	1	3	1	3
CO2	3	2	3	3	3	1	2	1	1	3	1	2
CO3	2	3	3	3	3	1	1	1	1	2	1	2
CO4	3	2	2	3	2	3	1	1	1	1	1	3
CO5	2	2	2	2	3	2	1	1	1	1	1	3
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		3		1		3					
CO2	3		2		1		3					
CO3	2		3		1		3					
CO4	3		2		1		3					
CO5	2		2		2		3					
3/2/1 indicates strength of correlation 3 – High, 2 – Medium,1 – Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					✓							



Department of Electronics and Communication Engineering

BEC18CE5	TRANSMISSION LINES & WAVE GUIDES	3 0/0 0/0 3
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UNIT I TRANSMISSION LINE BASICS 9 HRS

Different types of transmission lines – Definition of Characteristic impedance – The transmission line as a cascade of T-Sections - Definition of Propagation Constant, Basic transmission line equation- Wave Characteristics of an infinite transmission line, Transmission line parameters.

UNIT II ATTENUATION AND REFLECTION 9 HRS

Waveform distortion – Distortion less transmission line – The telephone cable – Inductance loading of telephone cables. Input impedance of lossless lines, Conditions for minimum attenuation – Reflection on a line not terminated by Z_0 – Reflection factor and reflection loss

UNIT III STANDING WAVES 9 HRS

The Line at Radio Frequencies: Standing waves and standing wave ratio on a line – One eighth wave LineThe quarter wave line and impedance matching – The half wave line. TheSmith Chart – Application of the Smith Chart –Single stub matching and double stubmatching.

UNIT IV GUIDED WAVES 9 HRS

Waves between parallel planes of perfect conductors – Transverse electric and transverse magnetic WavesCharacteristics of TE and TM Waves – Transverse Electromagnetic waves – Velocities of propagation – Attenuation of TE and TM waves in parallel planeguides

UNIT V RECTANGULAR AND CIRCULAR WAVE GUIDES 9 HRS

Transverse Magnetic Waves in Rectangular Wave guides – Transverse Electric Waves in Rectangular Waveguides-Impossibility of TEM waves in waveguides - Solution of field equations in cylindrical co-ordinates – TM and TE waves in circular guides

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No. of Hours: 45

Text Books:

1. J.D. Ryder “*Networks, Lines and Fields*”, PHI, New Delhi, 2003. (Unit I &II)
2. E.C. Jordan and K.G. Balmain “*Electro Magnetic Waves and Radiating System,*” PHI, New Delhi, 2003.

References:

1. Ramo, Whineery and Van Duzer: “*Fields and Waves in Communication Electronics*” John Wiley, 2003.
2. David M. Pozar: “*Microwave Engineering*” – 2nd Edition – JohnWiley.
3. David K. Cheng,”*Field and Waves in Electromagnetism*”, Pearson Education, 1989.



Department of Electronics and Communication Engineering

Subject Code: BEC18L14	Subject Name : Microprocessor and Microcontroller Laboratory							T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Microprocessor and Microcontroller							Lb	0	0/0	3/0	1
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory andLab												
OBJECTIVE :												
<ul style="list-style-type: none"> To introduce the basic concepts of microprocessor and to develop students in the assembly language programming skills, applications of microprocessor and microcontroller 												
COURSE OUTCOMES (COs) : (3- 5)												
The Students will be able to												
CO1	Write assembly language programming in 8085 and 8086 microprocessor											
CO2	Interface peripherals with 8086 microprocessor											
CO3	Understand the 8051 ALP and implement stepper motor control using the concepts.											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	2	2	2	2	3	3	3
CO2	3	3	3	3	3	2	2	2	2	3	3	3
CO3	3	3	3	3	3	2	2	2	2	3	3	2
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		3		3		3					
CO2	3		3		2		3					
CO3	3		3		3		3					
3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
							✓					



Department of Electronics and Communication Engineering

BEC18L14	MICROPROCESSOR AND MICROCONTROLLER LABORATORY	0 0/0 3/0 1
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LIST OF EXPERIMENTS

8086 MICROPROCESSOR:

1. BASIC ARITHMETIC AND LOGICAL OPERATIONS (8085 &8086)
2. AVERAGE OF NNUMBERS
3. SORTING ANDSEARCHING
4. SQUARE AND SQUARE ROOT OF A GIVENNUMBER
5. CODECONVERSION
6. BLOCK MOVEMENT OFDATA

INTERFACING WITH 8086MICROPROCESSOR:

1. WAVE FORM GENERATION USING 8255PPI
2. KEYBOARD AND DISPLAYINTERFACE
3. MATRIXDISPLAY
4. TRAFFIC LIGHTCONTROLLER
5. ADC AND DACINTERFACING
6. SERIAL PORTCOMMUNICATION

8051 MICROCONTROLLER

1. BASIC ARITHMETIC AND LOGICAL OPERATIONS
2. SQUARE AND SQUARE ROOT OF A GIVENNUMBER
3. 2'S COMPLEMENT OF A GIVENNUMBER
4. AVERAGE OF NNUMBERS
5. STEPPER MOTORCONTROL

Reference:

1. Lab manual, Department of ECE, DR.MGR UNIVERSITY.



Department of Electronics and Communication Engineering

Subject Code: BEC18L15	Subject Name : BASICS OF ROBOTICS LABORATORY	T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Microprocessor and Microcontroller lab	Lb	0	0/0	3/0	1

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory andLab

OBJECTIVE :

- To understand the different robotic configurations and their sub systems.

COURSE OUTCOMES (COs) : (3- 5)

The Students will be able to

CO1	Visualize the configurations of various types of robots.
CO2	Understanding the components of robots like arms, linkages, drive systems and end effectors.
CO3	Measure the performance of robots.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	2	2	3	2	2	3	3
CO2	3	3	3	3	3	3	2	3	2	3	3	3
CO3	3	3	2	2	3	3	2	2	3	2	3	3
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		3		3		3					
CO2	3		3		3		3					
CO3	3		3		3		3					

3/2/1 indicates strength of correlation 3 – High, 2 – Medium,1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
							✓					



Department of Electronics and Communication Engineering

BEC18L15	BASICS OF ROBOTICS LABORATORY	0	0/0	3/0	1
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LIST OF EXPERIMENTS

1. SIMPLE ROBOT CIRCUIT
2. BUILD A LIGHT-TRACKING ROBOT
3. SIMPLE INSECT ROBOT
4. LINE FOLLOWER ROBOT
5. TWO-LEGGED WALKING ROBOT
6. ROBOT CONTROL USING 555 TIMER
7. INTERFACING SWITCH TO TURN ON BAR GRAPH LEDS. (IMPLEMENTING A “PUSH TO ON” INDICATOR)
8. LCD INTERFACING TO DISPLAY ALPHANUMERIC CHARACTERS.
9. LCD INTERFACING TO DISPLAYING INTEGER VALUES ON THE LCD.
10. GENERATION OF DELAY USING TIMER AND TURNING ‘ON’ THE BUZZER
11. INDICATION OF THE VALUE OF COUNTER ON LCD
12. DC MOTOR INTERFACING

Reference:

1. *Lab manual, Department of ECE, DR.MGR UNIVERSITY.*



Department of Electronics and Communication Engineering

Subject Code: BEC18L16	Subject Name : C++ AND DATA STRUCTURES	T /	L	T /	P /	C
	LABORATORY	L/		S.Lr	R	
	Prerequisite: Programming lab	Lb	0	0/0	3/0	1

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory andLab

OBJECTIVES :

- To implement different oops conceptspractically.
- To implement stacks and queuesprogrammatically.
- To implement different types of linkedlists.
- To implement different treeconcepts.
- To perform sorting using various types ofalgorithms.

COURSE OUTCOMES (COs) : (3- 5)

The Students will be able to

CO1	Implement and demonstrate different object oriented programming concepts.
CO2	Implement stacks and queues programmatically.
CO3	Implement and demonstrate different types of linked lists.
CO4	Perform programmatically different operations involving trees.
CO5	Perform sorting using various types of algorithms.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	2	2	3	3	2	2	3
CO2	3	3	3	3	3	2	2	2	3	2	2	3
CO3	3	3	3	3	3	2	2	2	3	2	2	3
CO4	3	3	3	3	3	3	2	2	3	2	2	2
CO5	3	3	3	3	3	3	2	2	3	2	2	2

COs / PSOs	PSO1	PSO2	PSO3	PSO4
CO1	3	2	3	3
CO2	3	2	3	3
CO3	3	2	3	3
CO4	3	2	3	2
CO5	3	2	3	2

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills
							✓		



Department of Electronics and Communication Engineering

BEC18L16	C++ AND DATA STRUCTURES LABORATORY	0	0/0	3/0	1
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LIST OF EXPERIMENTS

1. IMPLEMENTATION OF CONTROL STATEMENTS
2. IMPLEMENTATION OF ARRAYS (SINGLE AND MULTI-DIMENSIONAL)
3. IMPLEMENTATION OF CONSTRUCTOR AND DESTRUCTOR
4. IMPLEMENTATION OF OVERLOADING FUNCTIONS.
5. CONCEPT OF INHERITANCE
6. IMPLEMENTATION OF STACK (USING ARRAYS AND POINTERS)
7. IMPLEMENTATION OF QUEUE (USING ARRAYS AND POINTERS)
8. SINGLE LINKED LIST
9. DOUBLY LINKED LIST
10. BINARY TREE TRAVERSALS
11. BINARY SEARCH TREE
12. QUICK SORT
13. HEAPSORT
14. MERGESORT

Reference:

1. *Lab manual, Department of ECE, DR.MGR UNIVERSITY.*



Department of Electronics and Communication Engineering

Subject Code: BEC18L17	Subject Name : Antenna & Wave Propagation Laboratory						T / L/ ETL	L	T / S.Lr	P/ R	C	
	Prerequisite: Antenna & Wave Propagation						Lb	0	0/0	3/0	1	
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory andLab												
OBJECTIVE :												
<ul style="list-style-type: none"> To analyze study and plot the radiation patterns of different categories of antennas used in various telecommunications based applications. 												
COURSE OUTCOMES (COs) : (3- 5)												
The Students will be able to												
CO1	Analyze and plot the radiation pattern of simple dipole, half wave dipole and folded dipole antenna.											
CO2	Discuss and plot the radiation pattern of 5 element Yagi Uda, log periodic helical antennas..											
CO3	Describe and plot the radiation of and different types of antenna array parabolic antenna and analyze various types of parabolic reflectors with their feed systems antenna array.											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	1	1	1	1	1	1	2
CO2	1	3	3	3	3	1	1	1	1	1	1	1
CO3	3	3	3	1	3	1	1	1	1	1	1	1
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		3		2		1					
CO2	3		3		2		1					
CO3	3		2		2		1					
3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
							✓					



Department of Electronics and Communication Engineering

BEC18L17	ANTENNA & WAVE PROPAGATION LABORATORY	0	0/0	3/0	1
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LIST OF EXPERIMENTS

1. TO STUDY AND PLOT THE RADIATION PATTERN OF SIMPLE DIPOLEANTENNA.
2. TO STUDY AND PLOT THE RADIATION PATTERN OF HALF WAVE DIPOLEANTENNA.
3. TO STUDY AND PLOT THE RADIATION PATTERN OF FOLDED DIPOLEANTENNA.
4. TO STUDY AND PLOT THE RADIATION PATTERN OF 5 ELEMENT YAGI UDAANTENNA.
5. TO STUDY AND PLOT THE RADIATION PATTERN OF LOG PERIODICANTENNA.
6. TO STUDY AND PLOT THE RADIATION PATTERN OF HELICALANTENNA.
7. TO STUDY AND PLOT THE RADIATION PATTERN OF CUT PARABOLIC ANTENNA WITH SIMPLE DIPOLEFEED.
8. TO STUDY VARIOUS TYPES OF PARABOLIC REFLECTORS AND THEIR FEEDSYSTEMS.
9. TO STUDY AND PLOT THE RADIATION PATTERN OF BROAD SIDE ANTENNAARRAY.
10. TO STUDY AND PLOT THE RADIATION PATTERN OF END FIRE ANTENNAARRAY.

Reference:

1. *Lab manual, Department of ECE, DR.MGR UNIVERSITY.*



Department of Electronics and Communication Engineering

Subject Code: BEC18L18	Subject Name : Telecommunication Switching Systems Laboratory						T / L/ ETL	L	T / S.Lr	P/ R	C	
	Prerequisite: Telecommunication Switching Systems						Lb	0	0/0	3/0	1	
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory andLab												
OBJECTIVE :												
<ul style="list-style-type: none"> This lab aims at introducing to the students about the practical knowledge about telecommunication systems and its various applications. 												
COURSE OUTCOMES (COs) : (3- 5)												
The Students will be able to												
CO1	Demonstrate the operation of EPABX system											
CO2	Analyze the different modulation and multiple access techniques											
CO3	Develop a program to digitize audio signals											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	2	2	2	2	1	1	1	1	1	2
CO2	2	2	2	3	3	1	2	2	2	2	2	3
CO3	2	2	3	3	3	2	2	3	1	2	1	2
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		3		2		2					
CO2	3		2		3		3					
CO3	3		2		2		2					
3/2/1 indicates strength of correlation 3 – High, 2 – Medium,1 – Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
							✓					



Department of Electronics and Communication Engineering

BEC18L18	Telecommunication Switching Systems Laboratory	0	0/0	3/0	1
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LIST OF EXPERIMENTS

1. STUDY OF EPABX SYSTEM AND ITS FEATURES.
2. TO PERFORM PCM.
3. TO PERFORM SIMULATION OFFDMA
4. TO WRITE AND ANALYZE TRAFFICMEASUREMENT.
5. TO STUDY ,PERFORM SOUND ,SPEECH ,DIALER AND KEY BOARD MATRIX SECTION OFTELEPHONE
6. TO STUDY, PERFORM VOLTAGE DROPPER, LINE IN/PROTECTOR AND RINGER SECTION OFTELEPHONE.
7. TO IMPLEMENT A BASIC SWITCHING SYSTEM USINGSIMULINK.
8. SIMULATION OF TIME SLOT INTERCHANGEALGORITHM
9. TO PERFORM DIGITIZATION OF SPEECH SIGNAL BY WRITING PROGRAM IN SCILAB /MATLAB.
10. TO STUDY AND PERFORM TDMPCM

Reference:

1. *Lab manual, Department of ECE, DR.MGR UNIVERSITY.*



Department of Electronics and Communication Engineering

Subject Code: BEC18L19	Subject Name : Audio Signal Processing Laboratory	T / L/ ETL	L	T / S.Lr	P/ R	C						
	Prerequisite: Communication Laboratory	Lb	0	0/0	3/0	1						
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory andLab												
OBJECTIVE :												
<ul style="list-style-type: none"> • To give students a hands on experience in audio processing and its usage in realtime scenarios. 												
COURSE OUTCOMES (COs) : (3- 5)												
The Students will be able to												
CO1	Using MATLAB estimate pitch and harmonic noise ratio in audio signals											
CO2	Apply Fourier transform and Chroma features for analyzing audio signals.											
CO3	Examine the enhancement of speech signal using microphone arrays.											
CO4	Tabulate the results for audio signal experiments using statistical method											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	3	1	2	2	2	2	2	2	2
CO2	3	3	2	3	1	2	2	2	2	2	2	2
CO3	3	3	2	3	2	2	2	2	2	2	2	2
CO4	3	3	1	3	1	2	1	2	2	2	2	2
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		3		2		3					
CO2	3		3		2		2					
CO3	3		3		2		2					
CO4	3		3		2		2					
3/2/1 indicates strength of correlation 3 – High, 2 – Medium,1 – Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
							✓					



Department of Electronics and Communication Engineering

BEC18L19	Audio Signal Processing Laboratory	0	0/0	3/0	1
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LIST OF EXPERIMENTS

1. BASICS OF MATLAB
2. PITCH ESTIMATION AND HARMONIC TO NOISE RATIO ESTIMATION
3. SHORT-TIME FOURIER TRANSFORM AND CHROMA FEATURES
4. SPEECH ANALYSIS
5. SPEECH ENHANCEMENT USING MICROPHONE ARRAYS
6. STATISTICAL METHODS FOR AUDIO EXPERIMENTS

Reference:

1. *Lab manual, Department of ECE, DR.MGR UNIVERSITY.*



Department of Electronics and Communication Engineering

Subject Code: BEC18OE1	Subject Name : Internet of Things and its Applications	T / L/ ETL	L	T / S.Lr	P/ R	C						
	Prerequisite: Sensor, Linux Basics	T	3	0/0	0/0	3						
L : Lecture T: Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab												
OBJECTIVES :												
<ul style="list-style-type: none"> To study basics of IoT. To study IoT with Cloud environment. To study IoT applications. 												
COURSE OUTCOMES (COs) : (3- 5)												
The students will be able to												
CO1	Design IoT based devices.											
CO2	Implement new approach based on IoT											
CO3	Design IoT systems with Cloud environment.											
CO4	Various IoT devices can be studied.											
CO5	Understand new applications based on IoT.											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	2	3	2	2	2	3	3
CO2	3	2	2	3	3	2	2	2	2	2	3	3
CO3	3	2	3	3	3	2	2	2	2	2	3	3
CO4	3	3	2	3	3	2	2	2	1	2	3	3
CO5	3	2	3	3	3	2	2	2	1	2	3	3
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		3		3		3					
CO2	3		3		2		3					
CO3	3		3		2		3					
CO4	3		3		1		3					
CO5	2		3		1		3					
3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
						✓						



Department of Electronics and Communication Engineering

Subject Code: BEC18OE2	SubjectName : Cellular Mobile Communication	T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Communication systems, Computer Networks	Ty	3	0/0	0/0	3

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory andLab

OBJECTIVES :

- It deals with the fundamental cellular radio concepts such as frequency reuse and handoff.
- It presents different ways to radio propagation models and predict the large scale effects of radio propagation in many operating environment.

COURSE OUTCOMES (COs) : (3- 5)

The students will be able to

CO1	Understand basic concepts in mobile communication.
CO2	Apply the concepts in establishing a PSTN.
CO3	Understand basic concepts in cellular technology.
CO4	Understand different propagation models for improving system coverage.
CO5	Apply the latest wireless systems and standards.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	3	3	3	3	1	3	1	2
CO2	3	3	3	1	2	2	2	3	2	2	2	2
CO3	3	3	3	3	3	3	1	1	3	3	2	3
CO4	3	3	3	3	3	3	3	2	3	3	3	3
CO5	3	3	3	2	3	2	3	3	3	3	3	3
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		3		2		2					
CO2	3		3		2		2					
CO3	3		3		2		3					
CO4	3		3		2		3					
CO5	3		3		3		3					

3/2/1 indicates strength of correlation 3 – High, 2 – Medium,1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
						✓						



Department of Electronics and Communication Engineering

BEC18OE2	CELLULAR MOBILE COMMUNICATION	3 0/0 0/0 3
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UNIT I INTRODUCTION TO MOBILE COMMUNICATION 9 HRS

History and Evolution of mobile radio system – Types of mobile wireless system/services – Paging, cellular, WLL, FTTH, Wi-Fi, and Future trends in Personal wireless system.

UNIT II PSTN TECHNOLOGY 9 HRS

Difference between simplex, half-duplex and duplex transmissions – basic understanding of telephone set – history and evolution of Central Exchange Switching – Operator Switch Boards (PBX) – intraoffice and interoffice calls – Extended Area Service (EAS) – circuit switching, packet switching & TDM switching – DTMF signaling – dial register – in band & out-of-band signaling.

UNIT III CELLULAR CONCEPT 9 HRS

Structure of a cell – Basic cellular terminologies – Principle of Frequency Reuse – Principle of Channel assignment and its types – Types of channel interference – Different types of handoff strategies

UNIT IV INTERFERENCE AND MOBILE RADIO COMMUNICATION 9 HRS

Interferences in Cellular Systems – Methods to improve cell coverage - Free space propagation model, reflection, diffraction, scattering, link budget design, Outdoor Propagation models and Indoor propagation models

UNIT V WIRELESS SYSTEMS AND STANDARDS 9 HRS

GSM, IS-95, DECT, AMPS, GPRS, UMTS, WLAN, WPAN, WMAN, Ultra Wideband communications, 4G/LTE and beyond 4G. Telecom standards and wireless standards.

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No. of Hours: 45

TEXT BOOKS:

1. Marion Cole, "Introduction to Telecommunications: Voice, Data and Internet", Pearson Education, 2nd edition, 2008.
2. Anu A. Gokhale, "Introduction to Telecommunications", Delmar, 2nd edition, 2005.
3. T.S. Rappaport, "Wireless Communication, Principle and Practice", Prentice Hall, NJ, 1996.
4. Roy Blake, "Wireless Communication technology", Thomson Learning, 1st Edition, 2001.

REFERENCES:

1. Pete Moulton, Jason Moulton, "The Telecommunication Survival Guide", Pearson Education, 2001.
2. Roger L. Freeman, "Telecommunication System Engineering", Wiley-India, 4th edition, 2004.
3. W.C.Y. Lee, "Mobile Communication Engineering", (2/e), McGraw-Hill, 1998.
4. Dharma P. Agarwal, "Introduction to wireless and Mobile systems", Thomson Learning, II Edition, 2006.



Department of Electronics and Communication Engineering

Subject Code: BEC18OE3	Subject Name : Satellite and its Applications	T / L/ ETL	L	T / S.Lr	P/ R	C						
	Prerequisite: Communication Systems	Ty	3	0/0	0/0	3						
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory andLab												
OBJECTIVES:												
<ul style="list-style-type: none"> To learn the basics of spacecraft subsystem To understand the operation of domestic satellite system To apply the principle of satellite in remote sensing technology 												
COURSE OUTCOMES (COs) :												
The students will be able to												
CO1	Understand the principle of orbital mechanics											
CO2	Understand the elements of satellite system											
CO3	Analyze the various domestic satellite systems											
CO4	Apply the concepts in designing earth station											
CO5	Appraise the applications of satellites in remote sensing											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	2	1	3	1	1	1	2	3	1
CO2	3	3	1	1	1	1	3	1	3	1	1	2
CO3	3	1	1	1	1	2	1	3	1	3	1	1
CO4	3	1	3	1	2	1	1	1	1	1	1	3
CO5	3	1	1	3	1	1	1	1	2	1	1	1
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		1		2		1					
CO2	3		3		1		1					
CO3	3		1		2		2					
CO4	1		3		1		3					
CO5	3		1		1		3					
3/2/1 indicates strength of correlation 3 – High, 2 – Medium,1 – Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
						✓						



Department of Electronics and Communication Engineering

BEC18OE3	SATELLITE AND ITS APPLICATIONS	3	0/0	0/0	3
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UNIT I ELEMENTS OF ORBITAL MECHANICS 9 HRS

Kepler's laws of planetary motion - Newton's laws of gravitation- Orbital Equation- Orbital Elements- Orbital Perturbation; Tracking and Orbital Determination- Orbital Correction / Control

UNIT II ELEMENTS OF SATELLITE SYSTEM 9 HRS

Space Environment - Spacecraft Configuration- Spacecraft Subsystem- Payload- Reliability Consideration – Spacecraft Integration and Testing.

UNIT III DOMESTIC SATELLITE SYSTEMS AND LAUNCH VEHICLES 9 HRS

The INSAT System- International System: INTELSAT- IMMARSAT- Satellite Based Personal Communication- LEO- MEO- GEO Systems- PSLV and GSLV

UNIT IV EARTH STATION DESIGN 9 HRS

Earth Station Configuration- Receiver and Transmitter Subsystems- Terminal Equipment: Telephone / Video Interface-Echo Suppressor- FM Digitizers- Elements of Frequency Co-ordination and Control.

UNIT V APPLICATIONS OF SATELLITES 9 HRS

Satellite Broadcasting- Satellite TV Systems. Remote sensing satellites - satellite remote sensing in various important areas- such as environmental issues- agriculture- forestry- urban issues and water management - usage of satellite data models in remote sensing- analysis of data from various climate zones and applications in research and society.

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No. of Hours: 45

TEXT BOOKS:

1. T. Pratt and C.W. Bostian, "*Satellite Communication*" John Wiley & Son-1986.
2. A. Abdul Namith, "*Satellite Communication*" Lakshmi Publications.

REFERENCES:

1. B.N. Agarwal, "Design of Geosynchronous Spacecraft", Prentice Hall-1986.
2. D. Roddy, "Satellite Communication", Prentice Hall-1989.
3. M. Richharia "Satellite Communication Systems Design Principles" Macmillan Press Ltd. Second Edition, 2003.
4. <http://www.ceinsys.com/blog/applications-of-satellite-imagery-remote-sensing-data/>



Department of Electronics and Communication Engineering

Subject Code: BEC18OE4	Subject Name : Fundamentals of Sensors	T / L/ ETL	L	T / S.Lr	P/ R	C						
	Prerequisite: Physics	Ty	3	0/0	0/0	3						
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory andLab												
OBJECTIVES :												
<ul style="list-style-type: none"> • To understand basic fundamentals of sensor. • To study sensor characteristics. • To understand sensor properties of elements. 												
COURSE OUTCOMES (COs) :												
The students will be able to												
CO1	Understand basics of sensors.											
CO2	Study sensor characteristics.											
CO3	Describe sensor properties.											
CO4	Testing of sensing principles.											
CO5	Study various sensor elements.											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO1 1	PO1 2
CO1	3	2	3	3	2	1	2	1	2	2	2	2
CO2	3	2	2	3	2	1	2	1	2	2	2	2
CO3	3	2	2	2	2	1	2	1	1	2	2	3
CO4	2	2	2	2	2	1	1	1	1	2	2	3
CO5	2	2	2	2	2	1	1	1	1	2	2	2
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		2		2		3					
CO2	3		2		2		3					
CO3	3		3		2		3					
CO4	3		3		2		3					
CO5	2		2		1		3					
3/2/1 indicates strength of correlation 3 – High, 2 – Medium,1 – Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
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Department of Electronics and Communication Engineering

BEC18OE4	FUNDAMENTALS OF SENSORS	3	0/0	0/0	3
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UNIT I SENSOR FUNDAMENTALS 9HRS

Basic Sensor Technology - Sensor Systems - Sensor Characteristics - Signals, and Systems – Sensor Classification

UNIT II SENSOR CHARACTERISTICS 9 HRS

Transfer Function - Span (Full-Scale Input) - Full-Scale Output – Accuracy- Calibration -- Calibration Error –Hysteresis – Nonlinearity - Saturation

UNIT III SENSOR PROPERTIES 9 HRS

Repeatability - Dead Band – Resolution -Special Properties - Output Impedance - Excitation. - Dynamic Characteristics - Environmental Factors - Reliability

UNIT IV PHYSICAL PRINCIPLES OF SENSING 9 HRS

Electric Charges, Fields, and Potentials - Capacitance – Magnetism – Induction – Resistance - Piezoelectric Effect -

UNIT V SENSOR ELEMENTS 9 HRS

Mechanical Elements - Thermal Elements - Electrical Elements - Application Characteristic - Uncertainty

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No. of Hours: 45

TEXT BOOKS:

- 1) Jacob Fraden, “Handbook Of Modern Sensors Physics, Designs, and Applications”
- 2) Jon S. Wilson, ” Sensor Technology Handbook.

REFERENCES:

- 1) Ian Sinclair , “ Sensors and Transducers” eBook ISBN: 9780080516998 Hardcover ISBN: 9780750649322



Department of Electronics and Communication Engineering

Subject Code: BEC18OE5	Subject Name : Basics of Microprocessor and Microcontroller	T / L/ ETL	L	T / S.Lr	P/ R	C						
	Prerequisite: Digital Electronics	Ty	3	0/0	0/0	3						
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory andLab												
OBJECTIVES :												
<ul style="list-style-type: none"> To study the architecture, addressing modes, and assembly language program of 8085 microprocessor. To understand the concepts of different peripherals and their applications To learn the functions of 8051 microcontroller. 												
COURSE OUTCOMES (COs) :												
The students will be able to												
CO1	Write assembly language program in 8085 and 8086 and understand the design of advanced processors.											
CO2	Show their ability to interface peripherals with microprocessors											
CO3	Done the inference of advanced peripheral with 8085.											
CO4	Demonstrate their skills in writing an ALP in 8051.											
CO5	Apply their understanding to do a project to develop an application using 8085.											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	2	3	1	1	1	2	2	1
CO2	3	3	3	3	3	3	1	2	1	2	2	2
CO3	2	2	2	2	3	3	2	3	1	2	3	2
CO4	3	3	3	3	3	1	2	3	1	2	1	3
CO5	3	2	1	2	2	2	3	1	3	2	3	3
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		3		2		1					
CO2	3		3		1		1					
CO3	2		3		1		2					
CO4	3		2		1		2					
CO5	1		1		2		3					
3/2/1 indicates strength of correlation 3 – High, 2 – Medium,1 – Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
						✓						



Department of Electronics and Communication Engineering

Subject Code: BEC18OE6	Subject Name : Industry 4.0 Concepts	T / L/ ETL	L	T / S.Lr	P/ R	C						
	Prerequisite: Internet of Things	Ty	3	0/0	0/0	3						
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory andLab												
OBJECTIVES :												
<ul style="list-style-type: none"> Students will demonstrate an understanding of the fundamentals of the core areas in Industry4.0. Students will gain deep insights into how smartness is being harnessed in industries 												
COURSE OUTCOMES (COs) : (3- 5)												
The Students will be able to												
CO1	Understand the opportunities and challenges in the fourth industrial revolution.											
CO2	Describe, discuss and relate IoT techniques adopted for an industry.											
CO3	Understand the importance of various technologies involved in enabling industry 4.0.											
CO4	Understand the power of Cloud Computing in a networked economy.											
CO5	Interpret technologies available in IIoT.											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	3	3	3	3	3	3	2	3	3
CO2	3	2	2	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3	3	3
CO4	3	2	3	3	3	3	3	3	3	3	3	3
CO5	2	2	3	3	3	3	3	3	3	3	3	3
COs/ PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		3		2		3					
CO2	3		3		2		3					
CO3	2		1		1		3					
CO4	1		2		3		3					
CO5	3		1		3		3					
3/2/1 indicates strength of correlation 3 – High, 2 – Medium,1 – Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
						✓						



Department of Electronics and Communication Engineering

BEC18OE6	INDUSTRY 4.0 CONCEPTS	3	0/0	0/0	3
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UNIT I Introduction to Industry 4.0 9 HRS

The various Industrial Revolutions – Digitalization and the Networked Economy – Drivers, Enablers, Compelling Forces and Challenges for Industry 4.0 – The Journey sofar: Developments in USA, Europe, China and other countries – Comparison of Industry 4.0 Factory and Today’s Factory – Trends of Industrial Big Data and Predictive Analytics for Smart Business Transformation.

UNIT II Road to Industry 4.0 9 HRS

Internet of Things (IoT) & Industrial Internet of Things (IIoT) & Internet of Services – Smart Manufacturing – Smart Devices and Products – Smart Logistics – Smart Cities – Predictive Analytics

UNIT III Technologies for enabling Industry 4.0 9 HRS

Cyber physical systems – Robotic Automation and Collaborative Robots – Support System for Industry 4.0 – Mobile Computing – Related Disciplines – Cyber Security.

UNIT IV Resources 9 HRS

Resource- based view of a firm – Data as a new resource for organizations – Harnessing and sharing knowledge in organizations – Cloud Computing Basics – Cloud Computing and Industry – SmartFactories

UNIT V IIoT Technologies 9 HRS

Industry 4.0 laboratories –IIoT Reference Architecture – Designing Industrial Internet Systems – Examining the Middleware Transport Protocols – IIoT WAN Technologies and Protocols - Securing the Industrial Internet.

Practical component P: Include case studies / application scenarios

Research component R: Future trends / research areas / Comparative Analysis

Total No. of Hours: 45

TEXT BOOKS:

1. Alp Ustundag and Emre Cevikcan, “*Industry 4.0: Managing the Digital Transformation*”, Springer Series in Advanced Manufacturing.
2. Alasdair Gilchrist, “*Industry 4.0: The Industrial Internet of Things*”, A press Publications.

REFERENCES:

1. Rajesh Agnihotri and Samuel New, “*Industry 4.0 Data Analytics*”, Createspace Independent Pub (US)



Department of Electronics and Communication Engineering

Subject Code: BEC18OL1	Subject Name : Sensors and IoT Lab						T / L/	L	T /	P/	C	
	Prerequisite: Programming in C						Lb	0/0	0/0	0/3	1	
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory andLab												
OBJECTIVES :												
<ul style="list-style-type: none"> To design experiments based on sensor with IOT. To design experiments based on IOT with cloud environment. 												
COURSE OUTCOMES (COs) : (3- 5)												
The Students will be able to												
CO1	Implement C source code to interface sensors with IoT.											
CO2	Design simple projects using sensors.											
CO3	Design experiments based on IoT with cloud environment.											
CO4	Implement sensors to design an application.											
CO5	Design new application using different sensors.											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	1	2	1	2	2	3	3
CO2	3	2	2	3	3	1	2	1	2	2	3	3
CO3	3	2	3	3	3	1	2	1	2	2	3	3
CO4	3	2	2	3	3	2	2	1	2	2	3	3
CO5	3	2	3	3	3	1	2	1	2	2	3	2
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		3		2		3					
CO2	3		3		2		3					
CO3	3		3		2		3					
CO4	3		3		1		3					
CO5	3		3		1		3					
3/2/1 indicates strength of correlation 3 – High, 2 – Medium,1 – Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
							✓					



Department of Electronics and Communication Engineering

BEC18OL1	SENSORS AND IOT LAB	0	0/0	0/3	1
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LIST OF EXPERIMENTS

1. TO FAMILIARIZE WITH INTEL GALILEO GEN2 BOARD AND UNDERSTAND THE PROCEDURE OF CREATION AND COMPILATION OF C SOURCE CODE.
(PRE-LOADED EXAMPLES)
2. WRITE A CODE TO CONTROL THE BRIGHTNESS OF LED USING INTEL GALILEO GEN 2 BOARD.
3. TO WRITE C SOURCE CODE TO INTERFACE TEMPERATURE SENSOR WITH INTEL GALILEO GEN 2 AND DISPLAY THE TEMPERATURE ON SERIAL MONITOR.
4. TO WRITE C SOURCE CODE TO INTERFACE HUMIDITY SENSOR WITH INTEL GALILEO GEN 2 AND DISPLAY THE TEMPERATURE ON SERIAL MONITOR.
5. INTERFACE MOTION SENSOR, WITH INTEL GALILEO GEN 2 TO GIVE ALERT WHEN MOTION IS DETECTED.
6. TO WRITE C SOURCE CODE TO INTERFACE SOUND DETECTOR WITH INTEL GALILEO GEN 2.
7. TO WRITE C SOURCE CODE TO INTERFACE ACCELEROMETER WITH INTEL GALILEO GEN 2 AND DISPLAY THE VALUES IN SERIAL MONITOR.
8. TO WRITE C SOURCE CODE TO PERFORM GAS SENSOR INTERFACING WITH INTEL GALILEO GEN 2 BOARD.
9. TO INTERFACE A FLAME AND SMOKE SENSOR WITH INTEL GALILEO GEN 2 IN CLOUD SERVICE.
10. DESIGN A SMART LIGHTING SYSTEM USING LIGHT SENSOR, MOTION SENSOR AND INDICATE THE STATUS OF THE LIGHT IN CLOUD SERVICE

Reference:

1. *Lab manual, Department of ECE, DR.MGR UNIVERSITY.*



Department of Electronics and Communication Engineering

Subject Code:	Subject Name : Robotics Control Lab	T / L / ETL	L	T / S.Lr	P/ R	C
BEC18OL2	Prerequisite: Microprocessor and Microcontroller lab	Lb	0	0/0	0/3	1

L : Lecture T: Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory andLab

OBJECTIVE :

- To understand the different robotic configurations and their subsystems.

COURSE OUTCOMES (COs) : (3- 5)

The Students will be able to

CO1	Built simple robots using motor driver IC and sensor module.
CO2	Apply programming knowledge to interface various devices with arduino.
CO3	Design robots using timer and delay
CO4	Develop and measure the performance of robots.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	2	2	2	2	3	2	1	2
CO2	3	3	3	3	3	1	2	2	3	1	2	2
CO3	3	3	3	2	3	2	2	1	3	2	2	2
CO4	3	3	3	3	3	1	2	2	3	1	2	2
COs / PSO	PSO1	PSO2	PSO3	PSO4								
CO1	3	2	2	3								
CO2	3	3	2	3								
CO3	3	2	2	3								
CO4	3	2	2	2								

3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
								✓				



Department of Electronics and Communication Engineering

BEC18OL2	ROBOTICS CONTROL LAB	0	0/0	0/3	1
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LIST OF EXPERIMENTS

1. SIMPLE ROBOT CIRCUIT
2. BUILD A LIGHT-TRACKING ROBOT
3. SIMPLE INSECT ROBOT
4. LINE FOLLOWER ROBOT
5. TWO-LEGGED WALKING ROBOT
6. ROBOT CONTROL USING 555 TIMER
7. STUDY OF AVR STUDIO AND CODE DEBUGGING
8. INTERFACING SWITCH TO TURN ON BAR GRAPH LEDS. (IMPLEMENTING A “PUSH TO ON” INDICATOR)
9. LCD INTERFACING TO DISPLAY ALPHANUMERIC CHARACTERS.
10. LCD INTERFACING TO DISPLAYING INTEGER VALUES ON THE LCD.
11. GENERATION OF DELAY USING TIMER AND TURNING ‘ON’ THE BUZZER
12. INDICATION OF THE VALUE OF COUNTER ON LCD
13. DC MOTOR INTERFACING
14. PWM CONTROL OF THE DC MOTOR

Reference:

1. *Lab manual, Department of ECE, DR.MGR UNIVERSITY.*



Department of Electronics and Communication Engineering

Subject Code: BEC18OL3	Subject Name : Basics of MATLAB						T / L/ ETL	L	T / S.Lr	P/ R	C	
	Prerequisite: NIL						Lb	0	0/0	0/3	1	
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory andLab												
OBJECTIVES :												
<ul style="list-style-type: none"> • Be familiar with the MATLAB GUI and basic toolboxes • Be exposed to vector and matrix operations • Be familiar with arithmetic, logical and relational operations on matrix 												
COURSE OUTCOMES (COs) : (3- 5)												
The Students will be able to												
CO1	Be familiar with the MATLAB GUI and basic tool boxes											
CO2	Be exposed to vector and matrix operations											
CO3	Be familiar with arithmetic, logical and relational operations on matrix											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	3	1	2	2	3	3	3	2
CO2	3	2	3	2	3	1	2	1	3	3	3	2
CO3	3	2	3	3	3	2	2	2	3	3	3	3
COs / PSOs	PSO1		PSO2		PSO3		PSO4					
CO1	3		3		2		3					
CO2	3		3		3		3					
CO3	3		3		3		3					
3/2/1 indicates strength of correlation 3 – High, 2 – Medium, 1 – Low												
Category		H	M									
				Program Core	Program Electives	Open Electives	✓ Practical / Project	Internships / Technical Skill	Soft Skills			



Department of Electronics and Communication Engineering

BEC18OL3	BASICS OF MATLAB	0	0/0	0/3	1
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LIST OF EXPERIMENTS

1. INTRODUCTION TO SDK OF MATLAB
2. BASIC SYNTAX AND SCALAR ARITHMETIC OPERATIONS AND CALCULATIONS
3. WORKING WITH FORMULAS
4. ARITHMETIC OPERATIONS IN MATRIX DATA
5. MATRIX OPERATIONS (INVERSE, TRANSPOSE)
6. READING AN IMAGE FILE
7. READING FROM AND WRITING TO A TEXTFILE
8. INTRODUCTION TO TOOL BOXES
9. DATA VISUALIZATION AND PLOTTING
10. RELATIONAL OPERATORS IN DATA
11. LOGICAL OPERATION IN DATA
12. LOOPS IN MATLAB
13. COMPUTING EIGEN VALUE FOR A MATRIX
14. RANDOM NUMBER GENERATION - MONTE CARLO METHOD

Reference:

1. *Lab manual, Department of ECE, DR.MGR UNIVERSITY.*