



**G. H. Raisoni College of Engineering
and Management , Wagholi, Pune**
(Autonomous Institute Affiliated to Savitribai Phule
Pune University)



Department of Electronics and Telecommunication

Academic Year: 2018-19

**Under Graduate
Course Book**

TY B.Tech (E&TC)

Semester- V/VI

Engineering | Management | Law | Schools | Other Courses

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Ms.Rupali B. Patil

Dept. Autonomy Coordinator

Dr. Vaibhav Hendre

HOD(E&TC)

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About Department:

- NBA Accredited UG level Electronics and Telecommunication Program.
- Involvement of Experts from IITs, NITs and Reputed Industries in designing of curriculum.
- Recognition of Research Center under Savitribai Phule Pune University (Ph.D Program)
- Department Industry Advisory Board (DIAB)
- MoUs with Industries.
- Choice of electives
- Sponsorship for presenting papers, filing patents
- Remedial Teaching at Multi levels with pre-requisites
- Research Mentorship and Industry Internship
- Industry Supported Labs

INSTITUTE VISION AND MISSION

VISION:-

To achieve excellent standards of quality education by keeping pace with rapidly changing technologies. To create technical manpower of global standards with capabilities of accepting new challenges.

MISSION:-

Our efforts will be dedicated to impart quality and value based education to raise satisfaction level of all stake-holders. Our strength will be directed to create competent engineers. Our endeavor will be to provide all support to promote research and development activities.

DEPARTMENT VISION AND MISSION

VISION:-

To create globally competent and acceptable technical manpower in the ever-changing domain of Electronics & Telecommunication with attributes of self and lifelong learning, thereby transforming challenges into contributions to rapidly changing technologies.

MISSION:-

M1: To impart quality and value based education to the learners by strengthening teaching learning process from innovative curriculum to its rigorous implementation.

M2: To create competent professionals with a feature of life long contributors to technology and mankind.

M3: To engage faculty and students into relevant and outcome oriented R&D activities.

Programme Educational Objectives (PEOs)

A graduate in E&TC will be able to demonstrate:

PEO1: Ability to grasp, comprehend and apply the knowledge acquired from basic sciences, mathematics, program specific core and elective courses to solve real life technical problems.

PEO2: As a self and lifelong learner, ability to deliver and contribute applications, products, services dealing with usage of modern software tools and hardware platforms.

PEO3: Ability to work as cohesive team members to exhibit professional ethics, human values and social awareness in their career.

PEO4: Competencies, excellence in higher education and employability in diversified areas of Electronics and Telecommunication Engineering.

PROGRAM SPECIFIC OUTCOMES(PSOs)

At the end of the programme students will be able to demonstrate:

PSO1: An in-depth understanding of fundamental and application oriented courses in communication systems, signal processing, embedded systems and electronic devices.

PSO2: A rigorous hands-on skills of modeling and simulation by using broad range of programming languages and open source platform.

PSO3: Behavior as a responsible team member contributing to development of prototype, application, product as a part of his/her mini and main project in the field of Electronics and communication systems.

PROGRAM OUTCOMES(POs)

Engineering Graduates will be able to:

1.Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

G. H. Rasoni College of Engineering and Management, Pune

(Autonomous Institute Affiliated to Savitribai Phule Pune University)

Board of Studies members of Electronics and Telecommunication Engineering

SN	Name	Designation	Designation in BOS	E-mail ID	Mobile No
01	Dr. Vaibhav Hendre	Professor & Head (E&TC)	Chairman	vaibhav.hendre@raisoni.net	9921580670
02	Dr. Preeti Bajaj	Director, GHRCE, Nagpur	Special Invitee	principal.ghrce@raisoni.net	9822220369
03	Dr. Jaywant Sankpal	Director	Permanent Invitee	director_ghrcomp@raisoni.net	9604787185
04	Dr. R.S. Bichkar	Professor (E &TC) and Dean (R&D)	Faculty Representative (Specialized faculty in Genetic Algorithm, Image Processing)	rajankumar.bichkar@raisoni.net	9657724108
05	Mr P.N. Matte	Assistant Professor E&TC & Dean Academics	Faculty Representative (Specialized Faculty in VLSI Design Embedded System Design)	pravin.matte@raisoni.net	9922944973
06	Ms. Meeta Bakuli	Assistant Professor UG-E&TC	Faculty Representative (Specialized Faculty in communication)	meeta.bakuli@raisoni.net	9960206474
07	Dr. M.S. Sutaone	Professor (E&TC) college of Engineering Pune	Subject Expert (Specialized Faculty in VLSI Design, Signal & Image Processing)	mssutaone@gmail.com	9923560608
08	Dr. V.M. Gadre	Professor IIT, Bombay	Subject Expert (Specialized Faculty in Digital Signal Processing)	vmgadre@ee.iitb.ac.in	9819007426
09	Dr. A.N. Rajgopalan	Professor IIT, Madras	Subject Expert to be nominated by Vice- Chancellor	raju@ee.iitm.ac.in	044-22574433

SN	Name	Designation	Designation in BOS	E-mail ID	Mobile No
10	Mr. Sanjay Mishra	Vice-President, Cotmac Electronics Pvt. Ltd, Pune	Industry Expert-1	sanjay.mishra @cotmac.com	9890180604
11	Mr. Prasanna Rode	Principal, Architect, Capgemini, Pune	Industry Expert-2	prasanna.rode @capgemini.com	9833289394
12	Mr. Anuj Sharma	Engineer (R&D), KPIT Cummins Info System Ltd., Pune	Alumni Member	asharma614 @yahoo.com	8149002994
13	Mr. S K Waghmare	Assistant Professor , Dean-FY	Co-opted Member (Specialization Faculty in VLSI & RFM EMS)	surendra.waghmare@raisoni .net	9881240358
14	Dr.Milind Khanapurkar	Professor & Head E&TC GHRCE Nagpur	Co-opted Member	milind.khanapurkar@raisoni .net	9922411221
15	Ms. Rupali B. Patil	Assistant Professor UG-E&TC	Co-opted Member(Communication Engg.)	rupalib.patil @raisoni.net	9922411320
16	Mr. Pranav Chippalkatti	Assistant Professor PG-E&TC	Co-opted Member	pranav.chippalkatti@raisoni.net	9730468538
17	Mr. Ashutosh Satpute	UG-Student	Student member-UG	ashutoshsatpute30@gmail.com	9552049697
18	Mr.Anish Polke	PG-Student	Student member-PG	anishpolke@gmail.com	8446292080

T.Y B.Tech(E&TC)

Course Code Details

S. N.	Code	Course Name	Sem	Scheme	Subject	Elective	Offer
1	BECL301	Microcontroller & Applications	V/VI	UG Electronics & Telecommunication 2018-19 (AUTONOMOUS)	Theory	NO	Yes
2	BECP301	Microcontroller & Applications	V/VI	UG Electronics & Telecommunication 2018-19 (AUTONOMOUS)	Practical	NO	Yes
3	BECL309	Microelectronics	V/VI	UG Electronics & Telecommunication 2018-19 (AUTONOMOUS)	Theory	NO	Yes
4	BECP309	Microelectronics	V/VI	UG Electronics & Telecommunication 2018-19 (AUTONOMOUS)	Practical	NO	Yes
5	BECL302	Signal & Systems	V	UG Electronics & Telecommunication 2018-19 (AUTONOMOUS)	Theory	NO	Yes
6	BECL303	Control System Engineering	V	UG Electronics & Telecommunication 2018-19 (AUTONOMOUS)	Theory	NO	Yes
7	BECL304	Digital Communication	V	UG Electronics & Telecommunication 2018-19 (AUTONOMOUS)	Theory	NO	Yes
8	BECP304	Digital Communication	V	UG Electronics & Telecommunication 2018-19 (AUTONOMOUS)	Practical	NO	Yes
9	BHUL301	Engineering Economics & Industrial Management	VI	UG Electronics & Telecommunication 2018-19 (AUTONOMOUS)	Theory	NO	Yes
10	BECL305	Electronics Design Workshop	V	UG Electronics & Telecommunication 2018-19 (AUTONOMOUS)	Theory	NO	Yes
11	BECP305	Electronics Design Workshop	V	UG Electronics & Telecommunication 2018-19 (AUTONOMOUS)	Practical	NO	Yes
13	BECGP304 / BECGP305	GENERAL PROFICIENCY-IV(Advanced Communication Skill)/ General Proficiency –V "Employability Skills& Technical Report Writing	V/VI	UG Electronics & Telecommunication 2018-19 (AUTONOMOUS)	Theory	NO	Yes
14	BECL306	Computer Networks	VI	UG Electronics & Telecommunication 2018-19 (AUTONOMOUS)	Theory	NO	Yes
15	BECL307	Digital Signal Processing	VI	UG Electronics & Telecommunication 2018-19 (AUTONOMOUS)	Theory	NO	Yes
16	BECP307	Digital Signal	VI	UG Electronics	Practical	NO	Yes

		Processing		&Telecommunication 2018-19 (AUTONOMOUS)			
17	BECL308	Elective – I	VI	UG Electronics & Telecommunication 2018-19 (AUTONOMOUS)	Theory	Yes	NO
18	BECP308	Elective – I	VI	UG Electronics & Telecommunication 2018-19 (AUTONOMOUS)	Practical	Yes	NO
19	BECP310	Minor Project	VI	UG Electronics & Telecommunication 2018-19 (AUTONOMOUS)	Practical	NO	Yes
20	XXXXXXXX	Open Elective	VI	UG Electronics & Telecommunication 2018-19 (AUTONOMOUS)	Theory	Yes	No
21	BECGP304 / BECGP305	GENERAL PROFICIENCY- IV(Advanced Communication Skill)/ General Proficiency –V "Employability Skills& Technical Report Writing	VI/V	UG Electronics & Telecommunication 2018-19 (AUTONOMOUS)	Theory	NO	Yes
22	BECGP306	General Proficiency–VI Research Methodology Workshop	VI	UG Electronics & Telecommunication 2018-19 (AUTONOMOUS)	Theory	NO	Yes

B.Tech. Electronics and Telecommunication

T.Y B.Tech Course Structure

Scheme for T.Y. B.Tech														
Semester-V														
Sub. Code	Name of the Course	Teaching Scheme				Credits	Evaluation Scheme						Duration of Paper/ Practical (Hrs.)	
		Th	Tu	Pr	Total		Theory			Practical		Total		
							TAE (20)	CAE (20)	ESE (60)	Cont. Ass.	Ext.			
PR	OR													
BECL301/ BECL309	Microcontroller & Applications/ Microelectronics	3	1	-	4	4	20	20	60	-	-	-	100	3
BECP301/ BECP309	Microcontroller & Applications/ Microelectronics	-	-	2	2	1	-	-	-	25	25	-	50	3
BECL302	Signal & Systems	3	1	-	4	4	20	20	60	-	-	-	100	3
BECL303	Control System Engineering	3	1	-	4	4	20	20	60	-	-	-	100	3
BECL304	Digital Communication	3	1	-	4	4	20	20	60	-	-	-	100	3
BECP304	Digital Communication	-	-	2	2	1	-	-	-	25	25	-	50	3
BHUL301	Engineering Economics & Industrial Management	3	-	-	3	3	20	20	60	-	-	-	100	3
BECP305	Electronics Design Workshop	-	-	4	4	2	-	-	-	25	-	25	50	3
BECP304 / BECP305	General Proficiency-IV(Advanced Communication Skill)/ General Proficiency –V "Employability Skills& Technical Report Writing	-	-	2	2	Audit Course	-	-	-	-	G		-	-
Total		15	4	10	29	23	100	100	300	75	50	25	650	-

Scheme for T.Y. B.Tech														
SEMESTER-VI														
Sub. Code	Name of the Course	Teaching Scheme					Credits	Evaluation Scheme						Duration of Paper / Practical (Hrs.)
		Th	Tu	Pr.	Total	Theory			Practical			Total		
						TAE (20)		CAE (20)	ESE (60)	Cont. Ass.	Ext.			
											PR		OR	
BECL301/ BECL309	Microcontroller & Applications/ Microelectronics	3	1	-	4	4	20	20	60	-	-		100	3
BECP301/ BECP309	Microcontroller & Applications/ Microelectronics	-	-	2	2	1	-	-	-	25	25	-	50	3
BECL306	Computer Networks	3	1	-	4	4	20	20	60	-	-		100	3
BECL307	Digital Signal Processing	3	1	-	4	4	20	20	60	-	-		100	3
BECP307	Digital Signal Processing	-	-	2	2	1	-	-	-	25	25	-	50	3
BECL308	Elective – I	3	1	-	4	4	20	20	60	-	-		100	3
BECP308	Elective – I	-	-	2	2	1	-	-	-	25	-	25	50	3
BECP310	Minor Project	-	-	2	2	1	-	-	-	25	-	25	50	3
xxxxxxx	Open Elective	3	-	-	3	3	20	20	60	-	-		100	3
BECGP304/ BECGP305	GENERAL PROFICIENCY-IV(Advanced Communication Skill)/ General Proficiency –V "Employability Skills& Technical Report Writing	-	-	2	2	Audit Course	-	-	-	G	-		-	-
BECGP306	General Proficiency–VI Research Methodology Workshop	2	-	-	2	Audit Course	-	-	-	G	-		-	-
	Total	17	4	10	31	23	100	100	300	100	50	50	700	

Elective –I:**BECL308A: Information Theory and Coding Technique****BECL308B: Antenna & Wave Propagation****BECL308C: Television Engineering****BECL308D: Biomedical Instrumentation & Signal Processing****OPEN ELECTIVES:**

OPEN ELECTIVES:			
Sr. No.	Subject Code	Name of Subject	Department
1	BHUL 302	Constitution of India	FY
2	BHUL 303	IPR and Patents	FY
3	BHUL 304	Biosystem in Engineering	FY
4	BEML 301	Optimization Techniques	FY
5	BCOL 312	Software Testing and Quality Assurance	Computer
6	BITL 307	Multimedia System	IT
7	BECL 300	Fuzzy Logic	E&TC
8	BECL 406A	Drives & Control	E&TC
9	BCEL 301	Environmental Engineering	Civil
10	BCEL 311	Integrated Water Resource Planning AND Management	Civil
11	BMEL404	Unconventional Energy Sources	Mechanical
12	BMEL 203	Material Engineering	Mechanical
13	BMEL 317	Industrial & Engineering Management	Mechanical

T.Y B.Tech Course Structure

Scheme for T.Y. B.Tech														
Semester-V														
Sub. Code	Name of the Course	Teaching Scheme					Credits	Evaluation Scheme						Duration of Paper/ Practical (Hrs.)
		Th	Tu	Pr	Total	Theory			Practical		Total			
						TAE (20)		CAE (20)	ESE (60)	Cont. Ass.		Ext. PR OR		
BECL301/ BECL309	Microcontroller & Applications/ Microelectronics	3	1	-	4	4	20	20	60	-	-	-	100	3
BECP301/ BECP309	Microcontroller & Applications/ Microelectronics	-	-	2	2	1	-	-	-	25	25	-	50	3
BECL302	Signal & Systems	3	1	-	4	4	20	20	60	-	-	-	100	3
BECL303	Control System Engineering	3	1	-	4	4	20	20	60	-	-	-	100	3
BECL304	Digital Communication	3	1	-	4	4	20	20	60	-	-	-	100	3
BECP304	Digital Communication	-	-	2	2	1	-	-	-	25	25	-	50	3
BHUL301	Engineering Economics & Industrial Management	3	-	-	3	3	20	20	60	-	-	-	100	3
BECP305	Electronics Design Workshop	-	-	4	4	2	-	-	-	25	-	25	50	3
BECP304 / BECP305	GENERAL PROFICIENCY-IV(Advanced Communication Skill)/ General Proficiency –V "Employability Skills& Technical Report Writing	-	-	2	2	Audit Course	-	-	-	-	G		-	-
Total		15	4	10	29	23	100	100	300	75	50	25	650	-

SECTION A

Scheme for T.Y. B.Tech														
Semester-V														
Sub. Code	Name of the Course	Teaching Scheme					Credits	Evaluation Scheme						Duration of Paper/ Practical (Hrs.)
		Th	Tu	Pr	Total	Theory			Practical			Total		
						TAE (20)		CAE (20)	ESE (60)	Con t. Ass.	Ext.			
											PR		OR	
BECL301	Microcontroller & Applications	3	1	-	4	4	20	20	60	-	-	-	100	3
BECP301	Microcontroller & Applications	-	-	2	2	1	-	-	-	25	25	-	50	3
BECL302	Signal & Systems	3	1	-	4	4	20	20	60	-	-	-	100	3
BECL303	Control System Engineering	3	1	-	4	4	20	20	60	-	-	-	100	3
BECL304	Digital Communication	3	1	-	4	4	20	20	60	-	-	-	100	3
BECP304	Digital Communication	-	-	2	2	1	-	-	-	25	25	-	50	3
BHUL301	Engineering Economics & Industrial Management	3	-	-	3	3	20	20	60	-	-	-	100	3
BECP305	Electronics Design Workshop	-	-	4	4	2	-	-	-	25	-	25	50	3
BECP304 / BECP305	GENERAL PROFICIENCY-IV(Advanced Communication Skill)/ General Proficiency –V "Employability Skills& Technical Report Writing	-	-	2	2	Audit Course	-	-	-	-	G	-	-	-
Total		15	4	10	29	23	100	100	300	75	50	25	650	-

SECTION B

Scheme for T.Y. B.Tech

Semester-V

Sub. Code	Name of the Course	Teaching Scheme				Credits	Evaluation Scheme						Duration of Paper / Practical (Hrs.)	
		Th	Tu	Pr	Total		Theory			Practical				
							TA E (20)	CAE (20)	ESE (60)	Con t. Ass.	Ext.			Total
											PR	OR		
BECL309	Microelectronics	3	1	-	4	4	20	20	60	-	-	-	100	3
BECP309	Microelectronics	-	-	2	2	1	-	-	-	25	25	-	50	3
BECL302	Signal & Systems	3	1	-	4	4	20	20	60	-	-	-	100	3
BECL303	Control System Engineering	3	1	-	4	4	20	20	60	-	-	-	100	3
BECL304	Digital Communication	3	1	-	4	4	20	20	60	-	-	-	100	3
BECP304	Digital Communication	-	-	2	2	1	-	-	-	25	25	-	50	3
BHUL301	Engineering Economics & Industrial Management	3	-	-	3	3	20	20	60	-	-	-	100	3
BECP305	Electronics Design Workshop	-	-	4	4	2	-	-	-	25	-	25	50	3
BECP304 / BECP305	GENERAL PROFICIENCY-IV(Advanced Communication Skill)/ General Proficiency –V "Employability Skills & Technical Report Writing	-	-	2	2	Audit Course	-	-	-	-	G		-	-
Total		15	4	10	29	23	100	100	300	75	50	25	650	-

Scheme for T.Y. B.Tech

SEMESTER-VI

Sub. Code	Name of the Course	Teaching Scheme					Credits	Evaluation Scheme						Duration of Paper / Practical (Hrs.)
		Th	Tu	Pr.	Total	Theory			Practical			Total		
						TAE (20)		CAE (20)	ESE (60)	Cont. Ass.	Ext.			
											PR		OR	
BECL301/ BECL309	Microcontroller & Applications/ Microelectronics	3	1	-	4	4	20	20	60	-	-		100	3
BECP301/ BECP309	Microcontroller & Applications/ Microelectronics	-	-	2	2	1	-	-	-	25	25	-	50	3
BECL306	Computer Networks	3	1	-	4	4	20	20	60	-	-		100	3
BECL307	Digital Signal Processing	3	1	-	4	4	20	20	60	-	-		100	3
BECP307	Digital Signal Processing	-	-	2	2	1	-	-	-	25	25	-	50	3
BECL308X	Elective – I	3	1	-	4	4	20	20	60	-	-		100	3
BECP308X	Elective – I	-	-	2	2	1	-	-	-	25	-	25	50	3
BECP310	Minor Project	-	-	2	2	1	-	-	-	25	-	25	50	3
XXXXXXX	Open Elective	3	-	-	3	3	20	20	60	-	-		100	3
BECP304/ BECP305	GENERAL PROFICIENCY-IV(Advanced Communication Skill)/ General Proficiency –V "Employability Skills& Technical Report Writing	-	-	-	2	Audit Course	-	-	-	G	-		-	-
BECP306	General Proficiency–VI Research Methodology Workshop	2	-	-	2	Audit Course	-	-	-	G	-		-	-

	Total	17	4	10	31	23	100	100	300	100	50	50	700	
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Elective –I:

BECL308A: Information Theory and Coding Technique

BECL308B: Antenna & Wave Propagation

BECL308C: Television Engineering

OPEN ELECTIVES:			
Sr. No.	Subject Code	Name of Subject	Department
1	BHUL 302	Constitution of India	FY
2	BHUL 303	IPR and Patents	FY
3	BHUL 304	Biosystem in Engineering	FY
4	BEML 301	Optimization Techniques	FY
5	BCOL 312	Software Testing and Quality Assurance	Computer
6	BITL 307	Multimedia System	IT
7	BECL 300	Fuzzy Logic	E&TC
8	BECL 406A	Drives & Control	E&TC
9	BCEL 301	Environmental Engineering	Civil
10	BCEL 311	Integrated Water Resource Planning AND Management	Civil
11	BMEL404	Unconventional Energy Sources	Mechanical
12	BMEL 203	Material Engineering	Mechanical
13	BMEL 317	Industrial & Engineering Management	Mechanical

BECL308D: Biomedical Instrumentation & Signal Processing

SECTION A

Scheme for T.Y. B.Tech														
Semester-V														
Sub. Code	Name of the Course	Teaching Scheme					Credits	Evaluation Scheme						Duration of Paper/ Practical (Hrs.)
		Th	Tu	Pr	Total	Theory			Practical			Total		
						TAE (20)		CAE (20)	ESE (60)	Con t. Ass.	Ext.			
											PR		OR	
BECL301	Microcontroller & Applications	3	1	-	4	4	20	20	60	-	-	-	100	3
BECP301	Microcontroller & Applications	-	-	2	2	1	-	-	-	25	25	-	50	3
BECL302	Signal & Systems	3	1	-	4	4	20	20	60	-	-	-	100	3
BECL303	Control System Engineering	3	1	-	4	4	20	20	60	-	-	-	100	3
BECL304	Digital Communication	3	1	-	4	4	20	20	60	-	-	-	100	3
BECP304	Digital Communication	-	-	2	2	1	-	-	-	25	25	-	50	3
BHUL301	Engineering Economics & Industrial Management	3	-	-	3	3	20	20	60	-	-	-	100	3
BECP305	Electronics Design Workshop	-	-	4	4	2	-	-	-	25	-	25	50	3
BECP304 / BECP305	GENERAL PROFICIENCY-IV(Advanced Communication Skill)/ General Proficiency –V "Employability Skills& Technical Report Writing	-	-	2	2	Audit Course	-	-	-	-	G		-	-
Total		15	4	10	29	23	100	100	300	75	50	25	650	-

SECTION B

Scheme for T.Y. B.Tech

Semester-V

Sub. Code	Name of the Course	Teaching Scheme				Credits	Evaluation Scheme						Duration of Paper / Practical (Hrs.)	
		Th	Tu	Pr	Total		Theory			Practical				
							TA E (20)	CAE (20)	ESE (60)	Con t. Ass.	Ext.			Total
											PR	OR		
BECL309	Microelectronics	3	1	-	4	4	20	20	60	-	-	-	100	3
BECP309	Microelectronics	-	-	2	2	1	-	-	-	25	25	-	50	3
BECL302	Signal & Systems	3	1	-	4	4	20	20	60	-	-	-	100	3
BECL303	Control System Engineering	3	1	-	4	4	20	20	60	-	-	-	100	3
BECL304	Digital Communication	3	1	-	4	4	20	20	60	-	-	-	100	3
BECP304	Digital Communication	-	-	2	2	1	-	-	-	25	25	-	50	3
BHUL301	Engineering Economics & Industrial Management	3	-	-	3	3	20	20	60	-	-	-	100	3
BECP305	Electronics Design Workshop	-	-	4	4	2	-	-	-	25	-	25	50	3
BECP304 / BECP305	GENERAL PROFICIENCY-IV(Advanced Communication Skill)/ General Proficiency –V "Employability Skills & Technical Report Writing	-	-	2	2	Audit Course	-	-	-	-	G		-	-
Total		15	4	10	29	23	100	100	300	75	50	25	650	-

SECTION A:

SEMESTER-VI														
Sub. Code	Name of the Course	Teaching Scheme					Credits	Evaluation Scheme						Duration of Paper / Practical (Hrs.)
		Th	Tu	Pr.	Total	Theory			Practical		Total			
						TAE (20)		CAE (20)	ESE (60)	Cont. Ass.		Ext. PR OR		
BECL309	Microelectronics	3	1	-	4	4	20	20	60	-	-		100	3
BECP309	Microelectronics	-	-	2	2	1	-	-	-	25	25	-	50	3
BECL306	Computer Networks	3	1	-	4	4	20	20	60	-	-		100	3
BECL307	Digital Signal Processing	3	1	-	4	4	20	20	60	-	-		100	3
BECP307	Digital Signal Processing	-	-	2	2	1	-	-	-	25	25	-	50	3
BECL308X	Elective – I	3	1	-	4	4	20	20	60	-	-		100	3
BECP308X	Elective – I	-	-	2	2	1	-	-	-	25	-	25	50	3
BECP310	Minor Project	-	-	2	2	1	-	-	-	25	-	25	50	3
XXXXXXX	Open Elective	3	-	-	3	3	20	20	60	-	-		100	3
BECGP304/ BECGP305	GENERAL PROFICIENCY-IV(Advanced Communication Skill)/ General Proficiency –V "Employability Skills& Technical Report Writing	-	-	2	2	Audit Course	-	-	-	G	-		-	-
BECGP306	General Proficiency–VI Research Methodology Workshop	2	-	-	2	Audit Course	-	-	-	G	-		-	-
	Total	17	4	10	31	23	100	100	300	100	50	50	700	

SECTION B

SEMESTER-VI														
Sub. Code	Name of the Course	Teaching Scheme					Credits	Evaluation Scheme						Duration of Paper / Practical (Hrs.)
		Th	Tu	Pr.	Total	Theory			Practical		Total			
						TAE (20)		CAE (20)	ESE (60)	Cont. Ass.		Ext.		
												PR	OR	
BECL301	Microcontroller & Applications	3	1	-	4	4	20	20	60	-	-		100	3
BECP301	Microcontroller & Applications	-	-	2	2	1	-	-	-	25	25	-	50	3
BECL306	Computer Networks	3	1	-	4	4	20	20	60	-	-		100	3
BECL307	Digital Signal Processing	3	1	-	4	4	20	20	60	-	-		100	3
BECP307	Digital Signal Processing	-	-	2	2	1	-	-	-	25	25	-	50	3
BECL308X	Elective – I	3	1	-	4	4	20	20	60	-	-		100	3
BECP308X	Elective – I	-	-	2	2	1	-	-	-	25	-	25	50	3
BECP310	Minor Project	-	-	2	2	1	-	-	-	25	-	25	50	3
XXXXXXX	Open Elective	3	-	-	3	3	20	20	60	-	-		100	3
BECGP304/ BECGP305	GENERAL PROFICIENCY-IV(Advanced Communication Skill)/ General Proficiency –V "Employability Skills& Technical Report Writing	-	-	2	2	Audit Course	-	-	-	G	-		-	-
BECGP306	General Proficiency–VI Research Methodology Workshop	2	-	-	2	Audit Course	-	-	-	G	-		-	-
	Total	17	4	10	31	23	100	100	300	100	50	50	700	

B.Tech (Electronics and Telecommunication)

SEMESTER V

SYLLABUS

TY B.Tech (E&TC)

Teaching Scheme:	Examination Scheme (Theory)	Examination Scheme(Laboratory)
Lectures: 3Hrs/Week Tutorials: 1 Hr/Week Practical: 2Hr/Week	TAE: 20 Marks CAE : 20 Marks ESE : 60 Marks	Cont. Ass.: 25 marks Practical: 25 marks
Credit	4	1
Prerequisite(If any): Fundamentals of Digital systems, Basic C programming		
Course Objective:		
1. To understand architecture and features of Microcontroller		
2. To learn interfacing of real world input and output devices		
3. To study various hardware and software tools for developing applications		
4. To understand the applications of Microprocessors and Microcontrollers		
Course Outcome:		
1. Understand the importance of microcontroller in designing embedded application		
2. Able to use the hardware and software tools		
3. Develop interfacing to real world devices		
Course Contents	Hrs	
Unit – I :Introduction to 8051 microcontroller	08	
Microprocessor and Microcontroller architecture, comparison, advantages and applications of each, Harvard and Von Neumann architecture, RISC and CISC comparison, study of 8 bit controllers, Overview of MCS-51 architecture, memory organization , Overview of Instruction set, Sample programs (assembly)		
Unit – II : 8051 Interfacing - I	08	
Port structure , interrupt structure, Timers and its modes, delay calculations, Programming Timer 0 &1 using assembly language, serial communication, Data transmission and reception using Serial port and its programming using assembly language.		
Unit – III : 8051 Interfacing - II	08	
Interfacing of: LEDS, Keypad, 7-segment multiplexed display, LCD, ADC 0809. Interfacing of: DAC, Relay, buzzer, Temperature sensors, Stepper motor. (All programs in assembly). . Design of		

DAS Programming environment: Study of software development tool chain (IDE).	
Unit – IV : PIC Microcontroller Architecture	
PIC 10, PIC12, PIC16, PIC18 series features, comparison and applications. PIC18FXX architecture, registers, Program and data memory Organization, pin out diagram, BOD, power down modes and configuration bit settings, timer and its programming in C .Overview of instruction set	
Unit – V : Real World Interfacing Part I	08
Port structure, Interrupt Structure (Legacy and priority mode) of PIC18FWith SFRS, use of timer with interrupt, Interfacing of switches. LED, LCD, Keypad, UART, CCP modes, Capture, Compare and PWM generation, DC Motor speed control with CCP: All programs in embedded C	
Unit – VI : Real World Interfacing Part II	08
Basics of Serial Communication Protocol: Study of RS232,RS 485, I2C,SPI, MSSP structure(SPI & I2C),UART, Sensor interfacing using ADC, RTC(DS1306) with I2C and EEPROM with SPI. All programs in embedded C.	

BECP301 :Microcontroller & Applications
Microcontrollers List of Practical's: Minimum 10 experiments

(Experiment number 1,2, 3, 5, 6, 7, 8, 11, 12 are compulsory; Any one from 4 and 9,10 and 13)
1. Write basic assembly language using 8051microcontroller for A. Addition, Subtraction, multiplication and Division B. Programs on Memory transfer.
2. Parallel port interacting of LEDS—Different programs (flashing, Rolling etc.)
3. Waveform Generation using DAC
4. Interfacing of Multiplexed 7-segment display
5. Interfacing of LCD to 8051 (4 / 8 bit modes)
6. Interfacing of Stepper motor to 8051- software delay using Timer
7. Write a program for interfacing button, LED, relay & buzzer as follows On pressing button1 relay and buzzer is turned ON and LED's start chasing from left to right On pressing button2 relay and buzzer is turned OFF and LED start chasing from right to left .
8. Interfacing 4X4 keypad and displaying key pressed on LCD.
9. Generate square wave using timer with interrupt
10. Interfacing serial port with PC both side communication.
11. Interfacing EEPROM 24C128 using SPI to store and retrieve data
12. Interface analog voltage 0-5V to internal ADC and display value on LCD
13. Generation of PWM signal for DC Motor control.

BECL 309: Microelectronics		
Teaching Scheme:	Examination Scheme (Theory)	Examination Scheme(Laboratory)

Lectures: 3Hrs/Week	TAE: 20 Marks	Cont. Ass.: 25 marks
Tutorials: 1	CAE : 20 Marks	Practical: 25 marks
Practical: 2Hrs/Week	ESE : 60 Marks	
Credit	4	1
Prerequisite(If any): Basic Electronics Engineering (BECL105),Electronics Devices & Circuits (BECL 201)		
Course Objectives:		
1. To study fundamental concepts in VLSI systems design.		
2. To nurture students with CMOS analog circuit designs.		
3. To study evaluation procedure and the performance parameters of CMOS designs		
4. To learn different processing technologies used for VLSI design.		
Course Outcome: student shall be able to		
1. Understand the fabrication process of MOS devices and design rules of CMOS technology.		
2. Integrate the VLSI circuits for complex systems.		
3. Implement CMOS Circuits with the help of back-end tool.		
4. analyze performance parameters of MOS devices		
5. design digital applications using CMOS		
Course Contents		Hrs
Unit -I: MOS Transistor Theory		
Review of MOS devices, MOS structure,long channel I-V characteristics. PMOS, NMOS, CMOS, MOS capacitance Model, CV Characteristics.		6
Unit -II: DC Characteristics and Delay Models		
CMOS Inverter: Static CMOS Inverter DC Characteristics, Beta Ratio Effects, Noise Margin, Pass Transistor DC Characteristics. RC delay Model, Linear Delay Model.		7
Unit –III: CMOS Logic		
Study of CMOS logic- Combination logic gates, Compound gates, Multiplexers, MOS Memory. Static & Dynamic logic circuits, Domino& Zipper logic, Pseudo NMOS logic,Tristate buffers, Transmission Gate.		7
Unit -IV: Non Ideal I-V effects of MOS and Power		
Mobility Degradation and Velocity Saturation, Channel Length Modulation, Threshold voltage effects, Leakage, Temperature Dependence. Power Dissipation: Static, Dynamic.		6
Unit V-: CMOS Fabrication and Layout		

CMOS Fabrication process, Process Technology, Inverter cross section, layout design rules, stick diagram representation, latch-up.	7
Unit - VI: Analog CMOS Design	
Current sink and source, Current mirror. Active load, and Push-pull inverters. Common source, Common drain, Common gate amplifiers.	7
Text Books:	
1. Sung-Mo Kang & Yusuf Leblebici, CMOS Digital	
2. Integrated Circuits Analysis & Design-3, 3rd Edition, McGraw Hill, 2003 J.M.Rabaey A Chandrakasan, B.Nikolic,	
3. Digital Integrated Circuit' A design perspective, 2nd Edition, Springer, 2009	
Reference Books:	
4. BehzadRazavi, Design of Analog CMOS Integrated Circuits, 2 nd Edition, CRC Press, 2013	
5. Allen Holberg, "Analog CMOS Design", Oxford University Press	
6. Neil H. E. Weste, David Money Harris, "CMOS VLSI Design: A Circuit &System Perspective", Pearson Publication	
7. http://nptel.ac.in/courses/nptel_download.php?subjectid=106105034	

BCEP 309: Microelectronics

List of Experiments:

Experiment numbers 1 to 8 are compulsory.

1. Prepare layout in multi metal layers and simulate CMOS Inverter also observe VTC and calculate switching threshold.
2. Prepare layout in multi metal layers and simulate CMOS NAND, NOR circuits.
3. Prepare/Generate layout in multi metal layers and simulate 2:1 Mux by conventional method and by using Transmission gates. Comparison of them.
4. Prepare layout in multi metal layers and simulate Single bit SRAM cell.
5. Prepare/Generate layout in multi metal layers and simulate D Flip flop
6. Design and Implement Half adder circuit using DSCH3 and Microwind Tool.
7. Design & simulate CMOS Combinational logic for minimum 4 variables using DSCH3 and Microwind Tool.
8. Design & simulate Common Source amplifier/Voltage follower circuit using DSCH3 and Microwind Tool.

BECL302: SIGNAL & SYSTEMS		
Teaching Scheme:	Examination Scheme (Theory)	Examination Scheme(Laboratory)
Lectures: 3 Hrs/Week	TAE: 20 Marks	Cont. Ass.: Nil
Tutorials: 1 Hr/Week	CAE : 20 Marks	Practical: Nil
Practical: Nil	ESE : 60 Marks	
Credit	4	
Prerequisite(If any): Network Theory(BECL201), Communication Electronics:(BECL 202)		
Course Objectives:		
1. To understand the mathematical description of continuous and discrete time signals and systems		
2. To classify signals into different categories.		
3. To analyse Linear Time Invariant (LTI) systems in time and transform domains		
4. To build basics for understanding of courses such as signal processing, control system and communication		
5. To develop basis of probability and random variables.		
Course Outcome: On completion of the course, student will be able to		
1. Understand mathematical description and representation of continuous and discrete time signals and systems.		
2. Develop input output relationship for linear shift invariant system and understand the convolution operator for continuous and discrete time system		
3. Understand and resolve the signals in frequency domain using Fourier series and Fourier transforms.		
4. Understand the limitations of Fourier transform and need for Laplace transform and develop the ability to analyze the system in s- domain.		
5. Understand the basic concept of probability, random variables & random signals and develop the ability to find correlation, CDF, PDF and probability of a given event.		
Course Contents		Hrs
Unit –I : INTRODUCTION TO SIGNALS AND SYSTEMS		08
Introduction and Classification of signals: Definition of signal and systems, communication and control systems as examples. Sampling of analog signals, sampling theorem, Continuous time and discrete time signal, Classification of signals as even, odd, periodic and non-periodic, deterministic and non-deterministic, energy and power. Elementary signals used for testing: Operations on signals: Amplitude scaling, addition, multiplication, differentiation, integration,		

time scaling, time shifting and time folding. Systems: Definition, Classification: linear and non-linear, time variant and invariant, causal and noncausal, static and dynamic, stable and unstable, invertible.	
Unit -II: LINEAR TIME INVARIANT SYSTEM	
System modeling: Input-output relation, definition of impulse response, convolution sum, convolution integral, computation of convolution integral using graphical method for unit step to unit step, unit step to exponential, exponential to exponential, unit step to rectangular and rectangular to rectangular only. Computation of convolution sum. Properties of convolution. System interconnection, system properties in terms of impulse response, step response in terms of impulse response.	06
Unit -III: FOURIER SERIES	
Fourier series (FS) representation of periodic Continuous Time (CT) signals, Dirichlet condition for existence of Fourier series, orthogonality, basis functions, Amplitude and phase response, FS representation of CT signals using trigonometric and exponential Fourier series. Applications of Fourier series, properties of Fourier series and their physical significance.	06
Unit IV-: FOURIER TRANSFORM	
Fourier Transform (FT) representation of aperiodic CT signals, Dirichlet condition for existence of Fourier transform, evaluation of magnitude and phase response, FT of standard CT signals, FT of standard periodic CT signals, Properties and their significance, Interplay between time and frequency domain using sinc and rectangular signals, Fourier Transform for periodic signals.	07
Unit - V: LAPLACE TRANSFORM AND ITS APPLICATIONS	
Definition of Laplace Transform (LT), Limitations of Fourier transform and need of Laplace transform, ROC, Laplace transform of standard periodic and aperiodic functions, properties of Laplace transform and their significance, Laplace transform evaluation using properties, Inverse Laplace transform based on partial fraction expansion, stability considerations in S domain.	07
Unit - VI: PROBABILITY AND RANDOM SIGNALS	
Probability: Experiment, sample space, event, probability, conditional probability and statistical independence, Bayes theorem, Uniform and Gaussian probability models. Random variables: Continuous and Discrete random variables, cumulative distributive function, Probability density function, properties of CDF and PDF. Statistical averages, mean, moments and expectations,	06

standard deviation and variance. Introduction to Correlation: Autocorrelation, Cross correlation, and their properties.	
Text Books:	
1. Simon Haykins and Barry Van Veen, “Signals and Systems”, 2nd Edition, Wiley India.	
2. Charles Phillips, “Signals, Systems and Transforms”, 3rd Edition, Pearson Education.	
Reference Books:	
1. M.J. Roberts “Signal and Systems”, Tata McGraw Hill 2007.	
2. Shaila Apte, “Signals and Systems-principles and applications”, Cambridge University press, 2016.	
3. Mrinal Mandal and Amir Asif, Continuous and Discrete Time Signals and Systems, Cambridge University Press, 2007.	
4. Peyton Peebles, “Probability, Random Variable, Random Processes”, 4th Edition, Tata Mc Graw Hill.	
5. A. NagoorKanni “Signals and Systems”, 2nd edition, Mc Graw Hill.	
6. NPTEL video lectures : Prof. Aditya K. Jagannatham https://onlinecourses.nptel.ac.in/noc18_ee02/preview	

BECL303: CONTROL SYSTEM ENGINEERING		
Teaching Scheme:	Examination Scheme (Theory)	Examination Scheme(Laboratory)
Lectures: 3 Hrs/Week	TAE: 20 Marks	Cont. Ass.: Nil
Tutorials: 1 Hr/Week	CAE : 20 Marks	Practical: Nil
Practical: Nil	ESE : 60 Marks	
Credit	4	
Prerequisite(If any): Signal & Systems (BECL302),		
Course Objectives:		
1. To impart the knowledge of fundamental concepts of control systems and mathematical modeling of the system		
2. To understand the concept of time response and frequency response of the system and to us for stability & analysis of the system		
3. To study and design compensators and controllers for control systems.		
4. To model systems and signal flow graph and evaluate the properties of the overall systems		
Course Outcome: student shall be able to		
1. Develop the mathematical models from a given physical system and study it for obtaining time response and frequency response. Learn the stability of a physical system using graphical tools such as Bode plots, Nyquist plot, Root locus etc.		
2. Perform experiment on real-time systems with an objective of studying its performance, stability, controllability and observability.		
3. Perform time domain and frequency domain analysis of control systems required for stability analysis.		
4. Perform time domain and frequency domain correlation analysis		
5. Apply root-locus, Frequency Plots technique to analyze control systems		
6. Express and solve system equations in state variable form		
Course Contents		Hrs
Unit -I: Mathematical modeling and control system components		
Introduction to need for automation and automatic control ,use of feedback, broad spectrum of system application, Mathematical modeling,(Electrical & Electromechanical) diff. Equations., transfer functions, block diagram, signal flow graphs, application to elementary systems, simplifications, effect of feedback on parameter variations.		10
Unit -II: Time response analysis		8

Time response of system, first order and second order system, standard inputs, concept of gain and time constants, Steady state error, type of control system, approximate methods for higher order system.	
Unit –III: Stability of control systems	
Stability of control systems, conditions of stability, characteristics equations, Routh- Hurwitz criterion, special cases for determining relative stability.	5
Unit -IV: Root locus analysis	
Root location and its effect on time response, elementary idea of root locus, effect of addition of pole and zero on proximity of imaginary axis.	8
Unit V:- Frequency response analysis	
Frequency response method of analyzing linear system, Nyquist and Bode Plots, Stability and accuracy analysis from frequency response, open loop and close loop frequency response, Nyquist Criterion, Effect of variation of gain and addition of pole and zero on response plot, stability margin in frequency response.	8
Unit - VI: State variable techniques	
State variable method of analysis, characteristics of system state, choice of state variables, representation of vector matrix differential equation, standard form, relation between transfer function and state variables. Advance topics on the control system, Observability, controllability	6

Text Books:

1. Automatic Control Systems– by B. C. Kuo and Farid Golnaraghi – John wiley and son’s, 8th edition, 2003.
2. Control Systems Engineering – by I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers, 5th edition, 2007.
3. Control Systems – A. Anand Kumar, Prentice Hall of India Pvt. Ltd.,

Reference Books:

1. Modern Control Engineering – by Katsuhiko Ogata – Prentice Hall of India Pvt. Ltd., 5th edition, 2010.
2. Control Systems Engineering - by NISE 5th Edition – John wiley.
3. “Modeling & Control Of Dynamic Systems” by Narciso F. Macia George J. Thaler, Thomson Publishers.
4. Curtis D Johnson, Process Control Instrumentation Technology, Eighth Edition, PHI Private Limited, New Delhi, 2011

Reference Links

1. <http://nptel.ac.in/courses/108101037/>: Prof. S.D. Agashe
2. <http://nptel.ac.in/downloads/108103008/>: Dr. Indrani Kar and Prof. S. Majhi

BECL304: DIGITAL COMMUNICATION		
Teaching Scheme:	Examination Scheme (Theory)	Examination Scheme (Laboratory)
Lectures: 3Hrs/Week	TAE: 20 Marks	Cont. Ass.: 25Marks
Tutorials: 1Hr/Week	CAE : 20 Marks	Practical: 25Marks
Practical: 2Hrs/Week	ESE : 60 Marks	
Credit	4	1
Prerequisite (If any): Communication Electronics (BECL207),		
Course Objectives:		
1. To understand the building blocks of digital communication system.		
2. To prepare mathematical background for communication signal analysis.		
3. To understand and analyze the signal flow in a digital communication system.		
4. To analyze error performance of a digital communication system in presence of noise		
5. To understand concept of spread spectrum communication system.		
Course Outcome: On completion of the course, student will be able to		
1. Understand working of waveform coding techniques and analyze their performance		
2. Analyze the performance of a baseband and pass band digital communication system in terms of error rate and spectral efficiency.		
3. Perform the time and frequency domain analysis of the signals in a digital communication system.		
4. Design of digital communication system.		
5. Analyze Performance of spread spectrum communication system		
Course Contents		Hrs
Unit -I: Digital Transmission of Analog Signal		
Introduction to Digital Communication System: Block Diagram and transformations, Basic Digital Communication Nomenclature. Digital Versus Analog Performance Criteria, Sampling Process, PCM Generation and Reconstruction, Quantization Noise, Non-uniform Quantization and Companding, Delta Modulation, Adaptive Delta Modulation, DPCM.		8
Unit -II: Baseband Digital Transmission		
Digital Multiplexing: Multiplexers and hierarchies, Data formats and their spectra, synchronization: Bit Synchronization, Scramblers, Frame Synchronization. Inter-symbol interference		7
Unit -III: Baseband Receiver		
Signal space representation : Geometric representation of signal, Conversion of continuous AWGN channel to vector channel, Likelihood functions, Coherent Detection of binary signals in presence of noise,		7

Optimum Filter, Matched Filter, Probability of Error of Matched Filter.	
Unit -IV: Passband Digital Transmission	
Pass band transmission model, Signal space diagram, Generation and detection, Error Probability derivation and Power spectra of coherent BPSK, BFSK and QPSK. Geometric representation, Generation and detection of - M-ary PSK, M-ary QAM, Non-coherent DPSK	8
Unit V-:Random Signal & Noise	
Introduction, Mathematical definition of a random process, Stationary processes, Mean, Correlation & Covariance function, Ergodic processes, Transmission of a random process through a LTI filter, Power spectral density, Gaussian process, noise, Narrow band noise, Representation of narrowband noise in terms of in phase & quadrature components.	8
Unit - VI: Spread Spectrum techniques:	
Introduction, Pseudo noise sequences, A notion of spread spectrum, Direct sequence spread spectrum with coherent BPSK, Signal space dimensionality & processing gain, Probability of error, Concept of jamming, Frequency hop spread spectrum. Advance topics in Digital Communication	7

Text Books:
1. Bernard Sklar, ‘Digital Communications (Fundamentals and applications)’, Second Edition, Pearson Education Asia, 2013
2. A.B Carlson, P B Crully, J C Rutledge, —Communication Systems, Fourth Edition, McGraw Hill Publication.
3. Simon Haykin, ‘ Digital Communication’, Student Edition, Wiley Eastern, 2004
Reference Books/Online Courses:
1. B. P. Lathi, ‘Modern Digital and Analog Communication Systems’, Third edition, Oxford University press, 1998
2. Taub, Schilling, —Principles of Communication System, Fourth Edition, McGraw Hill.
3. NPTEL Online Course: " Principles of Digital Communications " by Dr. Shabbir N. Merchant Link: https://onlinecourses.nptel.ac.in/noc18_ee27/preview

BECP304: DIGITAL COMMUNICATION**Note : Perform any 7 experiments from Group A and any 2 from Group B Group A**

1	Study of PCM.
2	Study of DM /ADM.
3	Study of Generation & detection of BPSK
4	Study of Generation & detection of QPSK.
5	Study of Generation & detection of BFSK.
6	Study of line codes (NRZ, RZ, POLAR RZ, BIPOLAR (AMI), MANCHESTER) & their spectral analysis.
7	Study of Detection of digital base band signal in presence of noise.
8	Study of Generation of PN Sequence and its spectrum.
9	Study of Generation & detection of DS-SS coherent BPSK & its spectrum.
Group B	
1	Program for implementation to simulate PCM/ DM/ADM system.
2	Simulation of any digital communication system using Simulink or similar software.
3	Simulation program for calculation and plotting the error probability of BPSK/QPSK. Comparison of theoretical and practical BERs.
4	Simulation program for Constellation diagram of any pass band modulated signal in presence of noise.

BHUL301: ENGINEERING ECONOMICS & INDUSTRIAL MANAGEMENT		
Teaching Scheme:	Examination Scheme (Theory)	Examination Scheme(Laboratory)
Lectures: 3Hrs/Week Tutorials: Nil Practical: Nil	TAE: 20 Marks CAE : 20 Marks ESE : 60 Marks	Cont. Ass.: Nil Ext: Nil
Credit	3	
Prerequisite(If any): GENERAL PROFICIENCY:-II :Foreign Language (BECGP202), GENERAL PROFICIENCY-III: Hobby classes(BECGP203), GENERAL PROFICIENCY-IV(Advanced Communication Skill)(BECGP304)		
Course Objectives:		
1. To deal with the concepts of economics and management with and engineering perspective		
2. To produce graduates with the ability to adopt a system approach to design, develop, Implement and innovate integrated systems that include people, materials, information, equipment and energy.		
3. To enable students to understand the interactions between engineering, business, technological and environmental spheres in the modern society.		
4. To cultivate the practices of independent learning on the part of the students that will prepare them to function effectively for diverse careers and lifelong learning.		
5. To enable students to understand their role as engineers and their impact to society at the national and global context.		
Course Outcome: At the end of the course the student shall be able to:		
1. Understand the interaction between engineering , business management, technological environmental spheres in modern society		
2. Practice basic principles of managerial economics, accounting and financial management technique for effective business decision making		
3. Understand different Policies.		
4. Understand concept of management.		
5. Get overview of Management scope useful in Industry.		
6. Get motivation for Entrepreneurship		
Course Contents:		Hrs
Unit -I: Economics Demand		7
Demand Utility and indifference curves, Approach to Analysis of demand, elasticity of demand, Measure of demand elasticity, Factors of Production, Advertising elasticity,		

Marginalize.	
Unit -II: Market Structure	
Laws of Return and costs, price and output determination under perfect competition, monopoly, monopolistic, competition, oligopoly, Depreciation and methods for its determination.	8
Unit -III: Business Economics	
Functions of central and commercial banks Inflation, Deflation, Stagflation, Direct and Indirect Taxes, Monetary and cycles, New economic policy, Liberalization, Globalization, Privatization, Market friendly state. Fiscal policy of the government, Meaning and phases of business.	7
Unit -IV: Basics of Industrial Management	
Definition, Nature and scope of management, Functions of management- Planning, organizing, Directing, Controlling, Communicating	8
Unit -V: Marketing	
Meaning of marketing management, Concept of marketing, Marketing Mix, Administrative and cost plus pricing, Channel of distribution, Advertising and sales promotion.	7
Unit -VI: Financial Management	
Meaning, Nature and scope of financial management, Brief outline of profit and loss account, Balance sheet, Budget and their importance, Ratio Analysis, Principles of costing.	8

Text Books:
1. K.K.Dewett, Modern economics theory, S Chand & Co, 2006
2. Dr D. M. Mithani, Managerial Economics: Theory & Applications, Himalaya publication, 2008
3. Prasanna Chandra, Financial Management: Theory and Practice, 8th Edition, Tata McGraw Hill, 2012
Reference Books:
1. L M Prasad, Principles and Practice of Management, 4th Edition, Sultan Chand & Co, 2009
2. Namakumari, Ramaswamy, Marketing Management, 6th Edition, McGraw-Hill, 2006
Website Links
https://onlinecourses.nptel.ac.in/noc18_me26/preview :Dr. Inderdeep Singh

BECP305: ELECTRONICS DESIGN WORKSHOP

Teaching Scheme:	Examination Scheme (Theory)	Examination Scheme(Laboratory)
Lecture :Nil	TAE: Nil	Cont. Ass.: 25 Marks
Tutorials: Nil	CAE : Nil	Oral:25 Marks
Practical:4Hrs/Week	ESE: Nil	
Credit	-	2
Prerequisite(If any):		
Course Objectives: The objective of this course is to provide students with		
1. Knowledge of electronic product development process.		
2. Understanding to work multidisciplinary team.		
3. Knowledge to design small electronic system based on microcontroller 8051.		
4. Understanding the working of various communication protocol.		
Course Outcome: The students will attain the ability of electronic product development process.		
1. The students will be able to perform work with multidisciplinary team.		
2. The students will be able to design small electronic system on different platform.		
3. Shall be able to design an electronic system/sub-system and validate its performance by simulation.		
4. The students will be able to understand the working of various communication protocol. Entify and test the electronic components used in systems.		
5. Shall be able to interface network with IoT Platform.		
Syllabus :		
Practical I : Electronic System Design		
Types of PCB, PCB artwork components (pads, tracks, footprints) and their metrics, Netlists, Power planes, Use of Circuit Simulation Tools.		
Practical II: Design of SMPS.		
General block diagram of SMPS, Advantages of SMPS, Comparison between SMPS and Linear Power Supply, Basic concept of switching regulator, Basic topologies, Step down converter, Step up converter, Fly back Converter, Forward converter. Performance parameters of SMPS. Selection Criteria of Switching element, Switching diode, Filter capacitor and inductor, PWM circuit, High frequency transformer design (steps only), Protection Circuits for SMPS.		
Practical II : Design of Data Acquisition Systems (DAS)		
Need of DAQ, Block diagram of DAQ, Application Areas of DAQ, Performance parameters of DAQ, Selection of Sensor, Transducers, and Actuator, Interfacing of sensor, Need of signal conditioners, Design of signal conditioning circuits, Selection criteria for ADC and DAC, Selection		

Criteria of Microcontrollers, PC Interfacing using serial communication like RS-232, USB, Overview of storage interface (like SD-Card, Serial EEPROM), Display interfaces (like 7-segment and LCD), GUI Development.
<p>Practical IV : Design of Communication System</p> <p>Designing a basic block diagram and detailing of any one section out of following (One only)</p> <ol style="list-style-type: none"> 1. Modulator – Demodulator Design(AM / FM / FSK) 2. Design of Mixer 3. Audio / Power Amplifier 4. HF Oscillator, Cascaded Amplifier
<p>Practical V : Evolution of IoT in electronics System</p> <p>Business values, IoT Architecture, IoT Platform, Application Areas, ESP Board, Interfacing with Cloud.</p>
Text Book :
1. Conl. T. Ulrich, Steven D. Eppinger, “ Product design & development”, Mc Graw Hill Companier.
2. The 8051 microcontroller & embedded system of M. Ali Mazidi Reference Books: 1. Architecture, Programming, interfacing and system design by Raj Kamal, Pearson Education. 2. Printed circuit Board Design and technology by Walter C. Bosshart.
3. PCB Technology by Khandpur.

Reference Books:
1. Architecture, Programming, interfacing and system design by Raj Kamal, Pearson Education.
2. Printed circuit Board Design and technology by Walter C. Bosshart.
3. PCB Technology by Khandpur.
4. Concept in Reliability by Srinath L. S, East West Press
NPTEL Link -
<ol style="list-style-type: none"> 1. Electronic Design Automation Prof. Indranil Sengupta Department of Computer Science and Engineering Indian Institute of Technology, Kharagpur - http://nptel.ac.in/courses/106105083/ 2. CAD for VLSI Design by V. Kamakoti and Shankar Balchandran - http://nptel.ac.in/courses/106106088/

Guidelines:

a) Students are expected to Design and simulate all assignments during the semester in a group. Group shall consist of **maximum of three** students.

b) **For hardware based assignments:** Paper design should be functionally verified with an appropriate EDA tool (NI Multisim/Orcad/Pspice / Altium Designer suite etc.) and prepare the document which consist of : 1. Problem statement (Different for each group) 2. Specifications 3. Block Diagram 4. Component Selection 5. Design Calculations 6. Simulation results 7. Bill of Material 8. Conclusion **9.** Datasheets 10. Detailed circuit diagram

BECGP304: GENERAL PROFICIENCY-IV(Advanced Communication Skill)		
Teaching Scheme:	Examination Scheme (Theory)	Examination Scheme(Laboratory)
Lectures: Nil Tutorials: Nil Practical: 2Hrs/Week	TAE: Nil CAE : Nil ESE : Nil	Cont. Ass.: Nil Practical: Grade
Credit		Audit Course
Prerequisite(If any):Nil		
Course Objectives:		
1. To make them aware of advanced techniques of public speaking, one to one interaction and social ethics.		
2. To communicate and express efficiently and assertively		
Course Outcome:		
1. Apply the knowledge of phonetics and phonology to articulate speech.		
2. Demonstrate ability to analyze, evaluate and summarize charts, graphs and presentations.		
3. Circumvent ideas and views assertively for effective public speaking.		
Contents		
Unit 1 : Vocabulary Building		
Objective : To enable the student to learn new words that he/she can use while communicating.		
Outcomes : By the end of the teaching sessions, student will be able to learn and express and it will help especially towards recruitment activities Methodology : Group of words to be taught from Greek and Latin root words. (Norman Lewis)		
Unit 2 : Reading Ability Enhancement Objective		
To enable the students to read and comprehend information, pronounce words correctly and to follow directions given.		
Outcomes : By the end of the session the student will be able to learn how to read information and improve his/her diction, voice & pronunciation Methodology : Read editorials from newspaper aloud so that the student will hear in his/her own voice and modulate accordingly.		
Unit 3: Expression Ability Enhancement		
Objective : To enable the student to express himself or herself without inhibitions, in simple and correct English towards placement.		
Outcome : By the end of the sessions the student will be able to talk freely and assertively giving examples from his/her own life experiences.		
Methodology : Allows the students to talk freely, how their strengths, weakness, opportunities and		

threats to groups or individually in the session.

Unit 4: Current News Awareness

Objective : To make the student aware of the national and international affairs going on in the world around him/her

Outcome :By the end of the session the students will be aware of the goings on in terms of current affairs for the whole week.

Methodology : Group work with assigned sectors and presentations.

Unit 5 : Sentence formation

Objective : To enable students to speak and write grammatically correct sentences for proper knowledge transfer.

Outcome : By the end of the session the students will learn to write and speak sentences without commonly made grammatical mistakes. **Methodology :** Give students sentences with errors and ask them to correct it. Tell them to construct a paragraph on any given topic

Unit 6: Extempore

Objective : To enable the students to speak without preparation as in a recruitment GD or PI.

Outcome : By the end of the session the students will understand how to organize their thoughts very quickly and talk about the given topic.

Methodology : Each student to be given a simple topic in the session and asked to speak for 2-3 minutes in the session

Unit 7 : 3 C report writing

Objective:- To know about the company, its competitors and customers

Outcome : By the end of the session the students will learn how to prepare a 3 C report.

Methodology : Each student to choose a company to prepare the 3 C report by researching on all the departments of the company

Unit 8 : Debate

Objective : To prepare the students on how to take a stand and present something assertively.

Outcome : By the end of the session the student will be able to understand how to disagree with each other without getting into a conflict.

Methodology : Topics to be given to teams in the previous session for preparation for and against themotion.

Unit 9: Presentation practice

Objective : To prepare the students on how to talk in front of an audience.

Outcome : By the end of the session the students will understand all about content, target audience, body

language

Methodology : Topics to be given to students in the previous session and individually presented in the class for 2-3 minutes

Unit 10 : Competition Sessions

Objective : To enable the students to compete with each other and prove their quality

Outcome : By the end of the sessions the students will understand healthy competition, ambition to succeed and benchmark themselves.

Methodology : Topics, evaluation sheets and short listing to be carried out before declaring the winner.

BECGP305:GENERAL PROFICIENCY –V "EMPLOYABILITY SKILLS & TECHNICAL REPORT WRITING"		
Teaching Scheme:	Examination Scheme (Theory)	Examination Scheme(Laboratory)
Lectures: Nil	TAE : Nil	Cont. Ass.: Nil
Tutorials: Nil	CAE : Nil	Practical : Grade
Practical: 2Hrs/Week	ESE : Nil	
Credit		Audit Course
Prerequisite(If any):		
Course Objectives:		
1. To make students communicate their knowledge and feelings with a purpose.		
2. To perform effectively in one to one and group discussion meetings and in public		
3. To make students more focused for enhancing employability prospects.		
Course Outcome: Student shall be able to:		
1. Write more accurate and effective technical reports.		
2. Create favorable environment for better recruitment.		
3. Perform better in group discussion and interview.		
4. To have skills for aptitude tests..		
5. To have essential communication skills (writing, verbal and non-verbal)		
6. To have presentation skill and be ready for facing interviews.		
Course Contents		
Unit 1: Communication & Interpersonal Skills		
Contents: Creative and innovative techniques of self-introduction and practice to introduce within 30 secs and to include only relevant points. feedback will be given immediate after performance		
Methodology : Script on Self- Introduction , Practicing of the script		
Unit 2: Tips on Aptitude Test Preparations & Cracking		
Contents : Various areas/sections related to Aptitude Test		
Methodology : Practicing& Discussion		
Unit 3: Aptitude Test Practice		
Contents : Various areas/sections related to Aptitude Test		
Methodology : Practicing & Discussion		
Unit 4: CV Making Workshop		

Contents : Guiding the students to prepare the CV addressing to specific needs of the different fields and use of technical terminologies accordingly

Methodology : Workshop mode - Students to prepare the resume and immediate correction and suggestions will provided.

Unit 5: FINAL CV SOFT AND HARD COPY

Contents : Guiding the students to prepare the CV addressing to specific needs of the different fields and use of technical terminologies accordingly.

Methodology : Workshop mode - Students to prepare the resume and immediate correction and suggestions will provided

Unit 6: Tips on Aptitude Test preparations & Cracking

Contents : Various areas/sections related to Aptitude Test

Methodology : Practicing & Discussion

Unit 7. : Aptitude Test Practice

Contents : Various areas/sections related to Aptitude Test

Methodology: Practicing & Discussion

Unit 8 : Group Discussion

Contents : Students will be given practice of putting their points , initiating, summarizing, concluding and leading the discussion. Do's & Don'ts of GD, Tips & Techniques

Methodology : Interactive & Discussion Mode

Unit 9: Problem Solving Skills

Methodology : Interactive & Discussion Mode

Contents : Example & Exercise Based

Unit 10 : Aptitude Test Practice

Methodology : Practicing& Discussion

Contents : Various areas/sections related to Aptitude Test

Unit 11. : Presentation Skills

Methodology : Verbal Presentation on a topic to specified audience, with the help of audio-visual aids

Contents : Creating effective power point presentation; using verbal communication to make your point; being prepared for likely queries

Unit 12:Presentation Skills

Methodology: Verbal Presentation on a topic to specified audience, with the help of audio-visual aids

Contents: Creating effective power point presentation; using verbal communication to make your point; being prepared for likely queries

Unit 13 : Group Discussion

Methodology: Interactive & Discussion Mode

Contents : Students will be given practice of putting their points , initiating, summarizing, concluding and leading the discussion. Do's & Don't of GD, Tips & Techniques

Unit 14: Personal Interview

Methodology: Simulation method with mock practice. Knowledge of Types of Interview questions- Behavioral, Competence, EQ , General and Technical

Contents: Guided exercises in proper English writing, with proper use of basic grammar and punctuations etc. Stress on ability to express thoughts in a simple way.

Unit 15: Personal Interview

Methodology : Simulation method with mock practice. Knowledge of Types of Interview questions- Behavioral, : Competence , EQ , General and Technical .

Contents: One To One Interview with Faculty

Unit 16 : Body Language

Methodology :Script on Self- Introduction , Practicing of the script , Competition on Self- Introduction.

Contents :Creative and innovative techniques of self-introduction and practice to introduce within 30 secs and to include only relevant points. Guidance-Dressing, Stress control and how to enter the interview room . One to one feedback will be given immediate after performance.

Unit 17:Aptitude Test Practice

Methodology: Practicing& Discussion

Contents : Various areas/sections related to Aptitude Test