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

Department of Electronics & Telecommunication

Under Graduate

Course book

SY BTech (E&TC)

Semester- III/IV

Academic Year 2017-18

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Ms Kavita Joshi
Dept. Autonomy Coordinator

Dr. Vaibhav Hendre
HOD (E&TC)

INDEX

About Department

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

INSTITUTE VISION & 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 promoteResearch& development activities.

DEPARTMENT VISION AND MISSION

VISION:-

To create globally competent and acceptable technical manpower in the ever-changing domain of E&TC with attributes of self and life long 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)

Our graduates in E&TC will be able to demonstrate:

- 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.
- Ability to work as cohesive team members in cross-disciplinary teams applying the principles learned from humanities and management courses.
- As a self and lifelong learner, ability to deliver and contribute applications, products, services dealing with usage of modern software tools and hardware platforms.
- Responsiveness towards environmental issues, human values and professional ethics
- Competencies and Employability in diversified areas of E & TC

POS:

1. An ability to apply knowledge of Mathematics, Science, Engineering &Technology to solve Engineering problems.
2. An ability to analyze design and implement hardware and software of computer systems, control systems, communication systems, embedded systems and instrumentation systems.
3. An ability to design and conduct standard tests.
4. An ability to conduct investigation of complex problems including measurements and analyze and interpret experimental reports and results.
5. An ability to use modern tools.
6. An ability to apply reasoning informed by social, health, safety, legal and cultural issues.
7. An ability to understand environmental contexts and demonstrate knowledge of sustainable development.
8. An ability to apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices.
9. To function effectively as an individual and leader in diverse teams, and in multidisciplinary settings.
10. To communicate effectively on complex engineering activities with the engineering community and with the society at large.
11. To demonstrate knowledge and understanding of the engineering and management principles to own work and in multidisciplinary environments.
12. An ability to engage in independent and lifelong learning in context of technological change.

PSOs

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

- An in-depth understanding of fundamental and application oriented courses in communication systems, signal processing, embedded systems and electronic devices.
- A rigorous hands-on skill with modeling and simulation tools such as multisim,Matlab, C, HDL programming
- Behavior as a responsible team member contributing to development of prototype, application, product as a part of his/her mini and main project
- Competencies to solve real life problems in the E&TC domain at the same time a professional behavior imbibed with human values and professional ethics

BOS LIST

SN	Name	Designation	Designation in BOS	E-mail ID	Mobile No
1	Dr.Vaibhav Hendre	Professor & Head (E&TC)	Chairman	Vaibhav.hendre@raisoni.net	9921580670
2	Dr.Preeti Bajaj	Director, GHRCE, Nagpur	Special Invitee	principal.ghrce@raisoni.net	9822220369
3	Dr.Jaywant Sankpal	Director	Permanent Invitee	director_ghrcemp@raisoni.net	9604787185
4	Dr.R.S.Bichkar	Professor (E &TC) and Dean (R&D)	(Specialized faculty in Genetic Algorithm, Image Processing)	rajankumar.bichkar@raisoni.net	9657724108
5	Mr P.N. Matte	Assistant Professor E&TC & Deputy Director	Faculty Representative (Specialized Faculty in VLSI Design Embedded System Design)	pravin.matte@raisoni.net	9922944973
6	Ms. Meeta Bakuli	Assistant Professor UG-E&TC	Faculty Representative (Specialized Faculty in communication)	meeta.bakuli@raisoni.net	9960206474
7	Mr Pranav Chippallkatti	Assistant Professor UG-E&TC	Faculty Representative	pranav.chippalkatti@raisoni.net	9730468538
8	Dr. M.S. Sutaone	Professor (E&TC) college of Engineering Pune	Subject Expert (Specialized Faculty in VLSI Design, Signal & Image Processing)	mssutaone@gmail.com	09923560608
9	Dr. V.M. Gadre	Professor IIT, Bombay	Subject Expert (Specialized Faculty in Digital Signal Processing)	vmgadre@ee.iitb.ac.in	09819007426
10	Dr. A.N. Rajgopalan	Professor IIT,	Subject Expert to be nominated by Vise Chancellor	raju@ee.iitm.ac.in	044-22574433

11	**Mr. Sanjay Mishra**	**Vice President Cotmac Electronics Pvt. Ltd**	**Industry Expert-1**	**sanjay.mishra@cotmac.com**	**09890180604**
12	**Mr. Prasanna Rode**	**Principal, Architect, Capgemini**	**Industry Expert-2**	**prasanna.rode@capgemini.com**	**9833289394**
13	**Mr. Anuj Sharma**	**Engineer (R&D),KPIT Cummins Info System Ltd.,Pune**	**Alumni Member**	**asharma614@yahoo.com**	**8149002994**
14	**Mr. S K Waghmare**	**Assistant Professor & Head, Incubation Center and Innovation Cell**	**Co-opted Member (Specialization Faculty in VLSI & RFM EMS)**	**surendra.waghmare@raisoni.net**	**9881240358**
15	**Dr.Milind Khanapurkar**	**Professor & Head E&TC GHRCE Nagpur**	**Co-opted Member**	**milind.khanapurkar@raisoni.net**	**9922411221**
16	Ms. Rupali B. Patil	Assistant Professor UG-E&TC	**Co-opted Member** (Communication Engg.)	rupali.patil @raisoni.net	9922411320
17	**Mr.Rajshekhar Sanda**	**UG-Student**	**Student member-UG**	**rajshekharsanda@gmail.com**	**8237293112**
18	**Ms.Supriya Gaikwad**	**PG-Student**	**Student member-PG**	**supriya.gaikwad2407@gmail.com**	**8657908451**

Electronics and Telecommunication Engineering

S.Y BTech

Course Code Details

S.N.	Code	Course Name	Sem	Scheme	Subject	Elective	Offer
1	BEML201	Engineering Mathematics –III	III	UG Electronics & Telecommunication 2017-18 (AUTONOMOUS)	Theory	NO	YES
2	BECL201	Electronic Devices & Circuits	III	UG Electronics & Telecommunication 2017-18 (AUTONOMOUS)	Theory	NO	YES
3	BECP201	Electronic Devices & Circuits	III	UG Electronics & Telecommunication 2017-18 (AUTONOMOUS)	Practical	NO	YES
4	BECL202	Power Electronics	III	UG Electronics & Telecommunication 2017-18 (AUTONOMOUS)	Theory	NO	YES
5	BECP202	Power Electronics	III	UG Electronics & Telecommunication 2017-18 (AUTONOMOUS)	Practical	NO	YES
6	BCOL201	Data Structures	III	UG Electronics & Telecommunication 2017-18 (AUTONOMOUS)	Theory	NO	YES
7	BCOP201	Data Structures	III	UG Electronics & Telecommunication 2017-18 (AUTONOMOUS)	Practical	NO	YES
8	BECL203	Network Theory	III	UG Electronics & Telecommunication 2017-18 (AUTONOMOUS)	Theory	NO	YES
9	BECGP202/ BECGP203	GENERAL PROFICIENCY:- II :Foreign Language/ GENERAL PROFICIENCY- III: Hobby classes	III/ IV	UG Electronics & Telecommunication 2017-18 (AUTONOMOUS)	Theory	NO	YES
10	BECL204	Digital System Design	IV	UG Electronics & Telecommunication 2017-18(AUTONOMOUS)	Theory	NO	YES
11	BECP204	Digital System Design	IV	UG Electronics & Telecommunication 2017-18(AUTONOMOUS)	Practical	NO	YES
12	BECL205	Field Theory	IV	UG Electronics & Telecommunication 2017-18(AUTONOMOUS)	Theory	NO	YES

13	BECL206	Analog Systems &Design	IV	UG Electronics &Telecommunication 2017-18(AUTONOMOUS)	Theory	NO	YES
14	BECP206	Analog Systems & Design	IV	UG Electronics & Telecommunication 2017-18(AUTONOMOUS)	Practical	NO	YES
15	BECL207	Communication Electronics	IV	UG Electronics & Telecommunication 2017-18(AUTONOMOUS)	Theory	NO	YES
16	BECP207	Communication Electronics	IV	UG Electronics & Telecommunication 2017-18(AUTONOMOUS)	Practical	NO	YES
17	BCOL203	Computer Architecture& Organization	IV	UG Electronics & Telecommunication 2017-18(AUTONOMOUS)	Theory	NO	YES
18	BECP208	Modelling& Simulation	IV	UG Electronics & Telecommunication 2017-18(AUTONOMOUS)	Practical	NO	YES

B.Tech. Electronics and Telecommunication

Course Structure

Scheme for S.Y. B.Tech.													
SEMESTER-III													
Subject Code	**Name of the Course**	**Teaching Scheme**				**Credits**	**Evaluation Scheme**						**Duration of Paper/ Practical (Hrs.)**
							Theory			**Practical**		**Total**	
		Th	**Tu**	**Pr**	**Total**		**TAE (20)**	**CAE (20)**	**ESE (60)**	**Cont. Ass.**	**Ext.**		
BEML201	Engineering Mathematics –III	3	1	-	4	4	20	20	60	-	-	100	3
BECL201	Electronic Devices & Circuits	3	1	-	4	4	20	20	60	-	-	100	3
BECP 201	Electronic Devices & Circuits	-	-	2	2	1	-	-	-	25	25	50	3
BECL203	Network Theory	3	1	-	4	4	20	20	60	-	-	100	3
BECL202/ BECL207	Power Electronics / Communication Electronics	3	1	-	4	4	20	20	60	-	-	100	3
BECP202 / BECP207	Power Electronics / Communication Electronics	-	-	2	2	1	-	-	-	25	-	25	-
BCOL201 / BCOL203	Data Structures / Computer Architecture & Organization	3	1	-	4	4	20	20	60	-	-	100	3
		3	-	-	3	3	20	20	60	-	-	100	3
BCOP201	Data Structures	-	-	4	4	2	-	-	-	25	25	50	-
BECGP202 / BECGP203	GENERAL PROFICIENCY:-II :Foreign Language / GENERAL PROFICIENCY-III: Hobby classes	1	-	2	3	Audit Course	-	-	-	G	-	-	-
	Total	16	5/4	10	31/ 26	24/ 21	100	100	300	75/ 50	50/25	625/575	

B.Tech. Electronics and Telecommunication

Course Structure

Group A

Scheme for S.Y. B.Tech.													
SEMESTER-III													
Subject Code	**Name of the Course**	**Teaching Scheme**				**Credits**	**Evaluation Scheme**						**Duration of Paper/ Practical (Hrs.)**
							Theory			**Practical**		**Total**	
		Th	**Tu**	**Pr**	**Total**		**TAE (20)**	**CAE (20)**	**ESE (60)**	**Cont. Ass.**	**Ext.**		
BEML201	Engineering Mathematics –III	3	1	-	4	4	20	20	60	-	-	100	3
BECL201	Electronic Devices & Circuits	3	1	-	4	4	20	20	60	-	-	100	3
BECP 201	Electronic Devices & Circuits	-	-	2	2	1	-	-	-	25	25	50	3
BECL203	Network Theory	3	1	-	4	4	20	20	60	-	-	100	3
BECL202	Power Electronics	3	1	-	4	4	20	20	60	-	-	100	3
BECP202	Power Electronics	-	-	2	2	1	-	-	-	25	-	25	-
BCOL201	Data Structures	3	1	-	4	4	20	20	60	-	-	100	3
BCOP201	Data Structures	-	-	4	4	2	-	-	-	25	25	50	-
BECGP203	GENERAL PROFICIENCY-III: Hobby classes	1	-	2	3	Audit Course	-	-	-	G	-	-	-
	Total	16	5	10	31	24	100	100	300	75	50	625	

Group B

Scheme for S.Y. B.Tech.													
SEMESTER-III													
Subject Code	**Name of the Course**	**Teaching Scheme**				**Credits**	**Evaluation Scheme**						**Duration of Paper / Practical (Hrs.)**
							Theory			**Practical**		**Total**	
		Th	**Tu**	**Pr**	**Total**		**TAE (20)**	**CAE (20)**	**ESE (60)**	**Cont. Ass.**	**Ext.**		
BEML201	Engineering Mathematics –III	3	1	-	4	4	20	20	60	-	-	100	3
BECL201	Electronic Devices & Circuits	3	1	-	4	4	20	20	60	-	-	100	3
BECP201	Electronic Devices & Circuits	-	-	2	2	1	-	-	-	25	25	50	3
BECL203	Network Theory	3	1	-	4	4	20	20	60	-	-	100	3
BECL207	Communication Electronics	3	1	-	4	4	20	20	60	-	-	100	3
BECP207	Communication Electronics	-	-	2	2	1	-	-	-	25	-	25	-
BCOL203	Computer Architecture& Organization	3	-	-	3	3	20	20	60	-	-	100	3
BECGP202	GENERAL PROFICIENCY:-II :Foreign Language	1	-	2	3	Audit Course	-	-	-	G	-	-	-
	Total	16	4	6	26	21	100	100	300	50	25	575	

SEMESTER IV

Scheme for S.Y													
SEMESTER-IV													
Sub. Code	**Name of the Course**	**Teaching Scheme**				**Credits**	**Evaluation Scheme**						**Duration of Paper / Practical (Hrs.)**
							Theory			**Practical**		**Total**	
		Th	**Tu**	**Pr**	**Total**		**TAE (20)**	**CAE (20)**	**ESE (60)**	**Cont Ass.**	**Ext.**		
BECL204	Digital System Design	3	1	-	4	4	20	20	60	-	-	100	3
BECP204	Digital System Design	-	-	2	2	1	-	-	-	25	25	50	3
BECL205	Field Theory	3	1	-	4	4	20	20	60	25	-	125	3
BECL206	Analog Systems & Design	3	1	-	4	4	20	20	60	-	-	100	3
BECP206	Analog Systems & Design	-	-	2	2	1	-	-	-	25	25	50	3
BECP208	Modeling & Simulation	-	-	2	2	1	-	-	-	25	-	25	3
BECL202/ BECL207	Power Electronics / Communication Electronics	3	1	-	4	4	20	20	60	-	-	100	3
BECP202 / BECP207	Power Electronics / Communication Electronics	-	-	2	2	1	-	-	-	25	-	25	-
BCOL201 / BCOL203	Data Structures / Computer Architecture & Organization	3	1	-	4	4	20	20	60	-	-	100	3
		3	-	-	3	3	20	20	60	-	-	100	3
BCOP201	Data Structures	-	-	4	4	2	-	-	-	25	25	50	-
BECGP202 / BECGP203	GENERAL PROFICIENCY:-II :Foreign Language / GENERAL PROFICIENCY-III: Hobby classes	1	-	2	3	Audit Course	-	-	-	G	-	-	-
	Total	**16**	**5/4**	**14/10**	**35/30**	**26/23**	**100**	**100**	**300**	**150/ 125**	**75/ 50**	**725/ 675**	-

SEMESTER IV

Group A

Scheme for S.Y														
SEMESTER-IV														
Sub. Code	**Name of the Course**	**Teaching Scheme**				**Credits**	**Evaluation Scheme**						**Duration of Paper / Practical (Hrs.)**
							Theory			**Practical**		**Total**	
		Th	**Tu**	**Pr**	**Total**		**TAE (20)**	**CAE (20)**	**ESE (60)**	**Cont Ass.**	**Ext.**		
BECL204	Digital System Design	3	1	-	4	4	20	20	60	-	-	100	3
BECP204	Digital System Design	-	-	2	2	1	-	-	-	25	25	50	3
BECL205	Field Theory	3	1	-	4	4	20	20	60	25	-	125	3
BECL206	Analog Systems & Design	3	1	-	4	4	20	20	60	-	-	100	3
BECP206	Analog Systems & Design	-	-	2	2	1	-	-	-	25	25	50	3
BECP208	Modeling & Simulation	-	-	2	2	1	-	-	-	25	-	25	3
BECL207	Communication Electronics	3	1	-	4	4	20	20	60	-	-	100	3
BECP207	Communication Electronics	-	-	2	2	1	-	-	-	25	-	25	-
BCOL203	Computer Architecture& Organization	3	-	-	3	3	20	20	60	-	-	100	3
BECGP202	GENERAL PROFICIENCY:-II :Foreign Language	1	-	2	3	Audit Course	-	-	-	G	-	0	-
	Total	**16**	**4**	**10**	**30**	**23**	**100**	**100**	**300**	**125**	**50**	**675**	-

Group B

Scheme for S.Y													
SEMESTER-IV													
Sub. Code	**Name of the Course**	**Teaching Scheme**				**Credits**	**Evaluation Scheme**						**Duration of Paper / Practical (Hrs.)**
							Theory			**Practical**		**Total**	
		Th	**Tu**	**Pr**	**Total**		**TAE (20)**	**CAE (20)**	**ESE (60)**	**Cont Ass.**	**Ext.**		
BECL204	Digital System Design	3	1	-	4	4	20	20	60	-	-	100	3
BECP204	Digital System Design	-	-	2	2	1	-	-	-	25	25	50	3
BECL205	Field Theory	3	1	-	4	4	20	20	60	25	-	125	3
BECL206	Analog Systems & Design	3	1	-	4	4	20	20	60	-	-	100	3
BECP206	Analog Systems & Design	-	-	2	2	1	-	-	-	25	25	50	3
BECP208	Modeling & Simulation	-	-	2	2	1	-	-	-	25	-	25	3
BECL202	Power Electronics	3	1	-	4	4	20	20	60	-	-	100	3
BECP202	Power Electronics	-	-	2	2	1	-	-	-	25	-	25	-
BCOL201	Data Structures	3	1	-	4	4	20	20	60	-	-	100	3
BCOP201	Data Structures	-	-	4	4	2	-	-	-	25	25	50	-
BECGP203	GENERAL PROFICIENCY-III: Hobby classes	1	-	2	3	Audit Course	-	-	-	G	-	0	-
	Total	**16**	**5**	**14**	**35**	**26**	**100**	**100**	**300**	**150**	**75**	**725**	**-**

B.Tech. Electronics and Telecommunication

Syllabus of Semester-III

<table>
<tr><th colspan="3">BEML201: ENGINEERING MATHEMATICS – III</th></tr>
<tr><td>Teaching Scheme:</td><td>Examination Scheme (Theory)</td><td>Examination Scheme(Laboratory)</td></tr>
<tr><td>Lectures: 3 Hrs/Week
Tutorials: 1 Hr/Week
Practical: Nil</td><td>TAE: 20 Marks
CAE : 20 Marks
ESE : 60 Marks</td><td>Cont. Ass.: Nil
Practical: Nil</td></tr>
<tr><td>Credit</td><td>4</td><td></td></tr>
<tr><td colspan="3">Prerequisite(If any): Engineering Mathematics-I (BEML101), Engineering Mathematics-II (BEML110)</td></tr>
<tr><td colspan="3">Course Objectives:</td></tr>
<tr><td colspan="3">1. To develop skills to use Laplace Transform and its applications in the field of Electronics and Telecommunication engineering.</td></tr>
<tr><td colspan="3">2. To develop skills to use Fourier Transform and Z- Transform and its applications in the field of Electronics and Telecommunication engineering.</td></tr>
<tr><td colspan="3">3. To introduce complex variables and its application in the field of Electronics and Telecommunication engineering.</td></tr>
<tr><td colspan="3">4. To introduce Partial Differential Equations and its applications in the field of Electronics and Telecommunication engineering</td></tr>
<tr><td colspan="3">Course Outcome: student shall be able to</td></tr>
<tr><td colspan="3">1. Use Laplace Transform in analyzing Electronics and Communication systems.</td></tr>
<tr><td colspan="3">2. Solve problems related to Fourier transform and applications to Communication systems and Signal processing.</td></tr>
<tr><td colspan="3">3. Solve problems related to Z-transform and applications to Communication systems and Signal processing</td></tr>
<tr><td colspan="3">4. Apply concepts of complex variables to solve engineering problem.</td></tr>
<tr><td colspan="3">5. To develop the ability to solve PDE & apply it for analysis of electrical circuit.</td></tr>
<tr><td colspan="3">6. To translate a physical problem into a mathematical model and find solution of model by selecting and applying suitable mathematical method.</td></tr>
<tr><td colspan="2">Course Contents</td><td>Hrs</td></tr>
</table>

Unit -I: Laplace Transforms:	8
Laplacetransform:definition andtheirsimple properties, transform of derivatives and integrals, evaluation of integrals by L.T. ,inverse L.T. &its properties , convolution theorem, Laplace transforms of periodic function & Unit step function, applications of Laplace transforms to solve ordinary differential equations	
Unit -II: Fourier Transform (FT)	8
Fourier Transform (FT): Complex exponential form of Fourier series, Fourier integral theorem, Fourier Sine &Cosine integrals, Fourier transform, Fourier Sine and Cosine transforms and their inverses.	
Unit –III: Z-Transform (ZT)	6
Z-Transform (ZT): Introduction, Definition, Standard properties, Z T of standard sequences and their inverses Solution of difference equations.	
Unit -IV: Partial Differential Equation	
Partial Differential equation of first order first degree i.e. Lagrange's form. Linear non homogeneous Partial Differential equation of nth order with constant coefficient, method of separation of variables. Application to transmission lines.	8
Unit V-:Complex Differentiation	
FunctionsofComplexvariables,Analyticfunctions,Cauchy-Riemannequations,Conformal mapping, Bilinear transformation	6
Unit - VI: Complex Integration	
Cauchy's Integral theorem, Cauchy's integral formula, Laurent's series, Residue theorem. contour integration	6

Text Books:
1. Erwin Kreyszig, "Advanced Engineering Mathematics", 9e, Wiley India
2. B. S. Grewal, "Higher Engineering Mathematics" Khanna Publication, Delhi.
Reference Books:
1. Jain, R.K. and Iyengar, S.R.K, Advanced Engineering Mathematics, Third Edition, New Delhi, Narosa Publishers, 2007
2. M. D. Greenberg, "Advanced Engineering Mathematics", 2e, Pearson Education
3. PeterV. O'Neil, "Advanced Engineering Mathematics", 7e, Cengage Learning

BECL201: ELECTRONIC DEVICES & CIRCUITS		
Teaching Scheme:	**Examination Scheme (Theory)**	**Examination Scheme (Laboratory)**
Lectures: 3Hrs/Week **Tutorials:** 1Hr/Week **Practical:** 2Hrs/Week	**TAE:**20 Marks **CAE :**20 Marks **ESE:**60 Marks	**Cont. Ass.:** 25 Marks **Practical:** 25 Marks
Credit	**4**	**1**
Course-Prerequisite: Engineering Physics (BPHL102), Basic Electronics Engineering (BECL105)		
Course- Co requisite: Network Theory (BECL203)		
Course Objective:		
1. To gain knowledge of electronics devices and semiconductor physics.		
2. To study need of electronics devices and its applications.		
3. To familiarize the student with the analysis and design of analog circuits.		
Course Outcome:		
At the end of the course the student shall be able:		
1. Understand the functions, operations and applications half wave and full wave rectifiers.		
2. Analyze, design, simulate, built, test the working of BJT and different configurations.		
3. Design and analyze oscillators and amplifiers.		
4. Design and classification of different amplifiers with their operations in different modes.		
5. Analyze functioning of unipolar devices.		
6. Study of different CMOS circuits& real applications.		
Course Contents		**Hrs**
Unit I: RECTIFIERS & FILTERS		8
Half and full wave & bridge rectifiers with filters, all circuits with details working, analysis, Problems, designs of those rectifiers.		
Unit II: BI-POLAR JUNCTION TRANSISTORS		8
Theory of operation, Static Characteristics, Break down voltages, Current voltage, Power Limitations, Ebers-moll Model, Continuity Equation, Biasing BJT, Different Biasing arrangement, Stability factor, thermal runaway, Power Transistors. CE, CB, CC Classification and Characteristics, Small Signal Analysis, Regulators: Design of Shunt &		

Series regulators, Introduction to SMPS.	
Unit III: FEEDBACK AMPLIFIERS & OSCILLATORS	8
Feedback Amplifiers, Classification of Oscillators, Stability, Bark Hausen Criteria, Design of RC, LC and Crystal Oscillators.	
Unit IV: POWER AMPLIFIER	8
Classification A, B, AB, C, Efficiency, Push Pull Configuration (A, B, AB) Complementary symmetry, Second Harmonic and Cross over Distortion, Design of Power Amplifiers (Class A and Class AB), Design of class A Small signal amplifiers, Emitter follower, Applications.	
Unit V: UNIPOLAR DEVICES	7
Field Effect Transistor, MOSFET, NMOS, PMOS Principles of operation and characteristics, Biasing arrangement, small signal analysis of CG, CB and CD	
Unit VI: CMOS Circuits	7
An introduction to CMOS, Diode and MOSFET , Transistors, MOSFET Switches, Transmission Gate, Inverter - DC, AC Analysis. Advance topics on the subject.	

Text Books:
1. Christos C Halkias, Jacob Millman, Jit
2. Satyabrata, Millman's Electronic Devices and Circuits, 2nd Edition, The McGraw-Hill Company, 2011
3. S Salivahanan, N Suresh Kumar, Electronics Devices and Circuits, 3rd Edition, McGraw Hill, 2008
4. Millman and Halkies, 'Integrated Electronics', 2nd Edition, McGraw-Hill Inc, 2009
Reference Books:
1. Robert L. Boylestad, Louis Nashelsky,
2. Electronics devices and Circuits and Theory, 10th Edition, Pearson India, 2009
3. Nagrath I J, Electronics Devices and Circuits, 3rd Edition, Phi Learning Pvt Ltd, 2009
4. One reference book need to add.
5. Sung MO Kang Leblebici, 4 th Edition
6. CMOS Digital Integrated circuits, McGraw Hill Inc.

BECP201: ELECTRONIC DEVICES & CIRCUITS	**Total Hrs: 30**
LIST OF EXPERIMENTS:	
Note: Perform any 10 experiments from the given list.	
1. To calculate ripple factor of full wave rectifier with and without filter.	
2. To plot the characteristics of clipper circuit & to perform simulation on Multisim	
3. To plot the characteristics of clamper circuit & to perform simulation on Multisim.	
4. To design Zener Diode as a Voltage Regulator & to perform simulation on Multisim.	
5. To design a transistor shunt voltage regulator on Multisim.	
6. To design emitter follower type of voltage regulator using darlington pair and simulate it on Multisim	
7. To design pushpull class A power amplifier and simulate it on Multisim	
8. To design class AB audio power amplifier and simulate it on Multisim	
9. To design Hartley oscillator and simulate it on Multisim.	
10. To design a Wein Bridge Oscillator and simulate it on Multisim.	
11. To design RC Phase Shift Oscillator and simulate it on Multisim.	
12. To plot the drain & transfer characteristics of FET in CS mode & to perform simulation on Multisim.	
13. To verify frequency response of single stage RC coupled amplifier & to perform simulation on Multisim.	
14. To design a CMOS inverter using microwind.	
15. Open Ended experiments.	

BECL202: POWER ELECTRONICS

Teaching Scheme:	Examination Scheme (Theory)	Examination Scheme(Laboratory)
Lectures:3 Hrs/Week **Tutorials:** 1Hr/Week **Practical:** 2Hr/Week	**TAE:**20 Marks **CAE :**20 Marks **ESE:** 60 Marks	**Cont. Ass.:** 25 Marks **Practical:** Nil
Credit	**4**	**1**

Course-Prerequisites: Basic Electrical Engineering (BEEL106), Basic Electronics Engineering (BECL105)

Course Objectives:

1. To study characteristics & working of modern power electronic devices.
2. To study the working & applications of controlled converters &Inverters for different loads.
3. To study DC motors &its working using controlled converters.
4. To study cyclo converters.

Course Outcomes:

At the end of the course the student shall be able to:

1. To learn the characteristics of power electronics devices.
2. To learn different gating circuits for thyristor turn-on.
3. Ability to analyze various single phase power converter and inverter circuits and understand their applications.
4. Foster ability to understand the use of power converters in commercial and industrial applications
5. To develop skills to build, and troubleshoot power electronics circuits.
6. To learn the simulation of power electronics circuits.

Course Contents	Hrs
Unit I: Thyristors and Its characteristics	6
Construction & steady characteristics of SCR, SCR ratings, Triac its construction & its working, Unijunction Transistors, Triggering circuits for SCR	
Unit II: Line commutated converters with R and RL load	8
Concept of line & forced communication, 1ϕsemi & full converters (R-RL load) in details & effect of Free wheeling diode.	
Unit III: Line commutated converters with motor load	8
Dc Motors construction &its working, 1ϕ semi and full converters for speed control of DC	

motors. Single phase cyclo converters.	
Unit IV: Static controllable switches	8
Characteristic and working of MOSFET, IGBT, over voltage and over current protection, snubber circuit.	
Unit V: D.C. Choppers	6
Step down chopper & step up chopper for R & RL, 2 Quad & 4 Quad Choppers, and Applications of choppers.	
Unit VI: Single phase and three phase inverters	6
Single phase bridge inverters with R & RL Load, Single phase PWM Inverters, Three Phase voltage source Inverters with balanced R Load, Advance topics on the subject	

Text Books:

1. M.H. Rashid, Power Electronics Circuits , Devices and Applications, 4th Edition, Pearson Education Publication, 2013
2. C. W. Lander, Power Electronics, 3rd Edition, Paper Back Publication, 1993
3. Dr. P. S. Bimbhra, Power Electronics, 4th Edition, Khanna Publishers, 2012
4. M.S. Jamil Asghar, ”Power Electronics”, PHI 2004,New Delhi.

Reference Books:

1. P.C.Sen, Power Electronics, 30th reprint, 30th Reprint Tata McGraw Hill, 2001
2. Dr. M. Ramamoorthy, An Introduction to Thyristors and their Applications, 2nd Edition, East-West Press, 1991
3. Ned Mohan,T.Undeland & W. Robbins,”Power Electronic Converters applications & design” 2nd edition, John Wiley &sons,Singapore.

BECP202 POWER ELECTRONICS	**Total Hrs: 30**
LIST OF EXPERIMENTS:	
Note: Perform any 8 experiments from the given list.	
1. To study and plot V-I characteristics of SCR	
2. To study and plot V-I characteristics of MOSFET	
3. To study and plot V-I characteristics of IGBT	
4. To study Triggering ckts for SCR.	
5. To study and plot the characteristics of single-phase converter	
6. To study & plot the characteristics of Inverters	
7. To study and plot characteristics of DC chopper	
8. To Plot the characteristics of single phase Semi/Full converter in PSim Software.	
9. To Plot the characteristics of single phase Inverter in PSim Software.	

BCOL201: DATA STRUCTURES		
Teaching Scheme:	**Examination Scheme (Theory)**	**Examination Scheme (Laboratory)**
Lectures:3 Hrs/Week **Tutorials:** 1 Hr/Week **Practical:**4Hr/Week	**TAE:**20 Marks **CAE :**20 Marks **ESE:**60 Marks	**Cont. Ass:** 25 Marks **Ext. :** 25 Marks
Credit :	**4**	**2**

Pre-requisite: Programming in C (BITL104)

Course Objective:

1. To gain knowledge about basic concepts of data structures.
2. To learn the representation, implementation and applications of linear data structures
3. To acquire knowledge of stacks and queues with their applications
4. To aware about the concepts of trees with their applications.
5. To learn and design the algorithm for graphs with their applications.
6. To get the knowledge of tables and multi-way trees.

Course Outcome:

Graduates shall be able to:

1. Describe concepts of data structures.
2. Know the concepts of linked list
3. Apply the knowledge to implement the algorithms for stacks and queues..
4. Describe the applications of trees
5. Describe the concepts of graphs and its applications.
6. Apply the knowledge of tables and multi way trees in different applications.

Course Contents	**Hrs**
Unit I: Review of C	7
Functions: Parameter passing call by value and call by reference, scope rules, functions and pointers, function returning pointer and pointer to function, String manipulations using arrays, pointer to pointer. Structure and Union: Passing and returning structure as parameter for function, structure and pointer, Recursion: Definition, writing recursive functions & how recursion works.	
Unit II: Sorting and searching techniques	7
Need of sorting and searching, sorting order & stability in sorting.	

Sorting Techniques: Algorithms for Bubble sort, Selection sort, Insertion sort, Shell sort, Radix sort, Quick sort and Merge sort. Analysis of Bubble, Insertion and Quick sorting technique for best, worst and average case, Concept of Internal & External sorting. **Searching Techniques:** Algorithms for Sequential search, Binary search, Fibonacci search & concept of Index Sequential search, analysis of sequential and binary searching technique for best, worst and average case.	
Unit III: Linear Data Structures using Link List Organization	8
Limitations of static memory allocation. Dynamic memory allocation in C. Concept of linked organization, Singly linked list, Doubly linked list, Circular linked list. Operations like insertion, deletion, traversal & other operations on these data structures. **Applications:** Representation & manipulation of polynomials using circular linked lists, Application of doubly linked list in dynamic storage management.	
Unit IV: Stacks and Queue	8
Stacks: Concept of stack as ADT, Representation and implementation of stack using sequential & linked organization. Applications of Stacks:, Arithmetic expression conversion & evaluation, reversing a string, parsing: well- formed parenthesis checking. **Queues:** Concept of queue as ADT, Representation and implementation of linear queue & circular queue using sequential organization. Applications of Queues: Job scheduling, Queue simulation, Categorizing data, **Types of Queue:** Priority Queue, DEQUE.	
Unit V: Trees	9
Basic tree concepts, binary trees and their properties, representation using linked organization, full and complete binary trees, converting tree to a binary tree, binary tree traversals, Binary search trees & operations. BST as an ADT, Threaded binary trees, Insertion and deletion of nodes in in-order threaded binary tree, pre-order, in-order and post order traversals of in-order threaded binary tree, AVL tree, and applications of trees: Gaming and Expression trees.	
Unit VI: Graphs	**7**
Graph as an ADT, operations, graphs storage structures: Adjacency list, Adjacency Matrix, Traversals: DFS, BFS, Minimum spanning trees: Kruskal's and Prim's. Algorithm for shortest path and topological sorting.	

Text Books:
1. Horowitz, Sahani, "Fundamentals of Data Structures in C" second edition, Universities Press.
Reference Books:
1. Thomos H. Corman, Charls E. Leiserson, Ronald E. Rivest, Clifford Stein,"Introduction to Algorithms", Third Edition, Prentice Hall India Learning Pvt. Ltd.
2. Data Structures using c,Aron M. Tanenbaum, Pearson Education, 1 Edition(2003).

BCOP201: DATA STRUCTURES	**Total : 20 Hrs**
Guidelines for Instructor's Manual	
The instructor's manual is to be developed as a hands-on resource and reference. The instructor's manual need to include prologue (about University/program/ institute/ department/foreword/ preface etc), University syllabus, conduction & Assessment guidelines, topics under consideration-concept, objectives, outcomes.	
Guidelines for Student's Lab Journal	
The laboratory assignments are to be submitted by student in the form of journal. Journal consists of prologue, Certificate, table of contents, and handwritten write-up of each assignment (Title, Objectives, Problem Statement, Outcomes, software & Hardware requirements, Date of Completion, Assessment grade/marks and assessor's sign, Theory- Concept, conclusion/analysis). As a conscious effort and little contribution towards Green IT and environment awareness, attaching printed papers as part of write-ups and program listing to journal may be avoided.	
Guidelines for Lab /TW Assessment	
Continuous assessment of laboratory work is done based on overall performance and lab performance of student. Each lab assignment assessment should assign grade/marks based on parameters with appropriate weightage. Suggested parameters for overall assessment as well as each lab assignment assessment include- timely completion, performance, innovation, efficiency, punctuality and neatness.	
Guidelines for Laboratory Conduction	
The instructor is expected to frame the assignments by understanding the prerequisites, technological aspects, utility and recent trends related to the topic. The assignment framing policy need to address the	

average students and inclusive of an element to attract and promote the intelligent students. The instructor may set multiple sets of assignments and distribute among batches of students. It is appreciated if the assignments are based on real world problems/applications.
Guidelines for Practical Examination
Both internal and external examiners should jointly set problem statements. During practical assessment, the expert evaluator should give the maximum weightage to the satisfactory implementation of the problem statement. The supplementary and relevant questions may be asked at the time of evaluation to test the student‘s for advanced learning, understanding of the fundamentals, effective and efficient implementation. So encouraging efforts, transparent evaluation and fair approach of the evaluator will not create any uncertainty or doubt in the minds of the students. So adhering to these principles will consummate our team efforts to the promising start of the student's academics.

LIST OF EXPERIMENTS:

1. Write a program to perform Set operations - Union, Intersection, Difference, and Symmetric Difference.
2. Write a program to perform various string operations such as Copy, Length, Reversing, Palindrome, and Concatenation and to find occurrence substring with and without using library functions.
3. Implement Sorting Methods using functions- Bubble Sort, Selection Sort and Quick Sort.
4. Implement Sorting Methods using Insertion Sort, and Shell Sort, and Merge Sort.
5. Implement Searching Methods-Sequential Search, Binary Search.
6. Write a menu driven program to perform following operations on SLL: Create, Insert – Start, end, between, Search & delete -- Start, end, between, Reverse without creating temporary list, Display.
7. Perform polynomial addition using a CLL.
8. Implement Stack using an array and use this stack to perform conversion of an expression from infix to postfix form.
9. Implement Stack using a linked list. Use this stack to perform evaluation of a postfix expression.
10. Implement binary tree using linked list and perform recursive and non-recursive traversals.
11. Implement in-order threaded binary tree using linked list and perform traversals.
12. Implement graph using adjacency list or matrix and perform DFS and BFS.
13. Implement graph using adjacency matrix and generate minimum spanning tree using Prim's algorithm.
14. Determine single source shortest paths for a graph represented using adjacency matrix.
15. Mini Project - Implement the Mini Project of Student Database using Linked list for following requirements:

    a. Creation of Student Database in memory containing student ID, Name, Name Initials, Address, Contact No and Date of Birth .

    b. Insertion, Deletion, Modification of student record for a given student ID.

    c. Sorting on name initials and searching a particular student record on name initials.

BECL203: NETWORK THEORY

Teaching Scheme:	Examination Scheme (Theory)	Examination Scheme (Laboratory)
Lectures:3 Hrs/Week **Tutorials:** 1Hr/Week **Practical:** Nil	**TAE:**20 Marks **CAE :**20 Marks **ESE:**60 Marks	**Practical:**Nil
Credit :	**4**	

Course-Prerequisite: Basic Electrical Engineering (BEEL106)

Course-Co requisite: Electronic Devices & Circuits BECL 201), Engineering Mathematics –III (BEML201)

Course Objective:

1. To introduce the concept of circuit elements lumped circuits, circuit laws and reduction.
2. To study the loop and nodal analysis of networks in ac and dc systems.
3. To study the transient response of series and parallel A.C. circuits.
4. To study the concept of coupled circuits and two port networks.

Course Outcome:

At the end of the course the student shall be able to:

1. Solve circuits using nodal and mesh analysis.
2. Simplify the networks using different theorems.
3. Analyse steady state response of a network using Fourier analysis.
4. Implement RC& RL network using Laplace transformation.
5. Understand transient behaviour in frequency and time domain.
6. Design two port networks.

Course Contents	Hrs
Unit I: Nodal & Mesh Analysis	7
Nodal and Mesh analysis basic equilibrium equations, matrix approach for complicated network, containing voltage, current sources, Mutual Inductances, source Transformations, Duality.	
Unit II: Network Theorems	7
Superposition, Reciprocity, Thevenin's, Norton's, maximum power transfer, compensation, Tellegen's theorem as applied to A.C. circuits.	
Unit III: Fourier Analysis	7
Trigonometric and exponential Fourier series. Discrete spectra and symmetry of waveforms, synthesis, steady state response of a network to non-sinusoidal periodic inputs. Fourier transforms and continuous spectra.	

Unit IV: Laplace Transformation	
Laplace transformation and its properties, partial fractions, singularity functions, waveform synthesis. Analysis of RC& RL network with and without initial conditions with Laplace transformation, evaluation of initial & final conditions.	7
Unit V: Network Function	
Transient behaviors, concept of complex frequency, Driving points and transfer functions, poles, zeros of admittance function, their properties, sinusoidal response from Pole-zero locations, convolution theorem and integral solution.	7
Unit VI: Two Port Network	
Two port network parameters and inter connections study of series and parallel resonance in A.C. Three phase unbalanced circuits and power calculations. Advance topics on the subject	7

Text Books:
1. Van Valkenburg, 'Network Analysis, 3rd Edition, Prentice Hall of India, 2001
2. Kelkar and Pandit, Linear Network Theory, 1st Edition, Pratibha Publication, 1995
Reference Books:
1. Sudhakar and S.P. Shyam Mohan, Circuit and Network, 2nd Edition, Tata McGraw Hill, 2002
1. D. Roy Choudhary, Network and System, 1st Edition, New Age International Publication, 1998
2. G.K. Mittal, Network Analysis, 11th Edition, Khanna Publication, 2003
3. B.R. Gupta, Network Systems & Analysis, 2nd Edition, S. Chand publication, 2005

BECGP202:GENERAL PROFICIENCY-II: Foreign Language		
Teaching Scheme:	**Examination Scheme (Theory)**	**Examination Scheme (Laboratory)**
Lectures:1Hrs/Week **Tutorials:** Nil **Practical:** 2Hr/Week	**TAE:** Nil **CAE :** Nil **ESE:** Nil	**Cont. Ass.: Grade** **Practical:** Nil
Credit :	**Audit Course**	
Prerequisite (If any): Nil		
Course Objective:		
1. To learn foreign languages to improve inter personal skills.		
2. To enable improving business communications and having access to literature in globally recognized languages.		
3. To help communicate at international forums and explore opportunities for employment.		
Course Outcome:		
Upon successful completion of the course, students will be able to:		
1. Have basic communication and insight into their own language and culture.		
2. To have the knowledge of language script.		
3. Communicate effectively in more than one globally recognized languages like French, Spanish, German, Japanese, etc.		
4. Interact with technical and business communities at international forums.		
5. Act with greater awareness of self, of other cultures, and their own relationship to those cultures.		
6. Gain direct access to additional bodies of knowledge.		

Topic	Learning Goals	Activities
The Alphabets and accents	Pronunciations techniques	Worksheet and charts
Number 1 to 20		
Greetings & Salutations,	Articles , Personal Pronoun Day timing	Daily routines forms of respects , Vocabulary
Family and relations	Shapes and colors , Possessive Pronouns , Gender , Negative Sentence	Relations, Day of week
Weather and Seasons	Climate , Fabrics & Clothes , sizes , interrogatives , Basic verbs	Group Activities , Paragraph writing including , Names of months , Seasons, Sky , Stars
House & Household things.	Describing neighborhood Present Tense	Furniture , Household articles, Colors
Visit to supermarket	Learning the shopping etiquettes , vocabulary of food items , conversing with shopkeepers etc , Plurals	Project on vocabulary of vegetables and fruits , Bakery products , Group Activity / Role play
Timing , Telephonic Conversions	How to Ask time , converse on telephone	Timing and clock (Hours & Minutes)
Visit to city , Prominent places and park	Nature, Directions, Means of transportations, Tenses contd….	Self introductions , Role-play , preparing charts
In Restaurant/Hotel	Ordering eatables , Table manner .Verbs	Enhancing vocabulary of food Dishes , cutlery
Visit to Doctor.	Health matters, illness. Commonly used verbs contd.	Worksheets , projects
French / German /Spanish culture – monuments , delicacies , wines visa vis Indian culture Diwali festival	Vocabulary of clothes , Accessories , Cuisines , Beverages , Adjectives	Presentations by students , situation based conversations
Receiving Guests/ Entertaining people / Good Bye’s	Customs , Traditions , Manners , welcome & Audieu’s	Activities , Role play , Assignments

Syllabus of Semester-IV

BECL204: DIGITAL SYSTEM DESIGN		
Teaching Scheme:	**Examination Scheme (Theory)**	**Examination Scheme (Laboratory)**
Lectures:3 Hrs/Week **Tutorials:** 1Hr/Week **Practical:** 2 Hr/Week	**TAE:**20 Marks **CAE :**20 Marks **ESE:**60 Marks	**Practical:** Nil
Credit	**4**	**1**
Course-Prerequisite: Basic Electronics Engineering (BECL105), Electronic Devices & Circuits (BECL201)		
Course-Co requisite: Computer Architecture & Organization (BCOL203)		
Course Objective:		
1. To impart fundamentals of digital system design		
2. To study system modelling using VHDL.		
3. To study CPLD and FPGA Architecture.		
Course Outcome:		
At the end of the course the student shall be able to:		
1. Model digital systems using VHDL.		
2. Analyze the delays introduced in any model.		
3. Write correct synthesizable System VHDL models along with test benches.		
4. Design digital systems that are reconfigurable for testing.		
5. Simulate and synthesize programming models for digital circuits		
6. Understand various architectures for hardware implementation.		
Course Contents		**Hrs**
Unit I: Introduction Introduction to VHDL, Methodologies, design Units, data objects, VHDL data types, Attributes.		6
Unit II: VHDL Statements and concept of delays Concurrent and sequential statements, inertial and transport delays, delta delay, signal drivers.		6
Unit III: Programming concepts Subprograms – Functions, Procedures, generic, generate, package, IEEE standard logic library, file I/O, test bench, component declaration, instantiation, configuration.		8

Unit IV: Combinational System Design	8
Combinational logic circuit design and VHDL implementation of following circuits – fast adder, Subtractor, decoder, encoder, multiplexer, ALU, barrel shifter, 4X4 key board encoder, multiplier, divider, Hamming code encoder and correction circuits.	
Unit V: sequential System Design	8
Synchronous sequential circuits design – finite state machines, Mealy and Moore, state assignments, design and VHDL implementation of FSMs, Linear feedback shift register.	
Unit VI: Introduction to PLDS	6
Introduction to place & route process, Introduction to ROM, PLA, PAL, Architecture of FPGA(Xilinx / Altera). Advanced trends in digital system design.	

Text Books:

1. Stephen Brown, Zvonko Vranesic, Fundamentals of Digital Logic with VHDL design, 4th Edition, TMH, 2006
2. S.S. Limaye, 'VHDL A Design Oriented Approach', 4th Edition, The McGraw Hill, 2009
3. Manjita Shrivastava, Digital Design HDL-based approach, 2nd Edition, Cenage Learning, 2011

Reference Books:

1. J Bhasker, VHDL Primer, 3rd Edition, Pearson Education, 2007
2. Douglas Perry, VHDL, 3rd Edition, TMH, 2008
3. Zainalabedin Navabbi, VHDL, 3rd Edition,
4. McGraw-Hill professional, 2007

BECP204: DIGITAL SYSTEM DESIGN	
LIST OF EXPERIMENTS	**30 Hrs**
Note: Perform any 10 experiments from given list	
1. Write a VHDL code for different logic gates.	
2. Design 4:1 multiplexer and write a VHDL code for same using data flow style of modelling.	
3. Design 4-to-16 decoder by combining two 3-to-decoders and write a VHDL code for same using behavioural style of modelling.	
4. Design BCD to & segment decoder and write a VHDL code for same using behavioural style of modelling.	
5. Design of F/F and write a VHDL code for same using behavioural style of modelling.	
6. Design half adder and full adder and write a VHDL code for same using dataflow style of modelling..	
7. Design a 9-bit Parity generator circuit and write a VHDL code for the same using structural style of modelling.	
8. Design a Decade Counter using J-K flip-flops and write a VHDL code for the same using structural style of modelling.	
9. Design Three –bit up-down counter and write a VHDL code for the same using structural style of modelling.	
10. Design of Finite state machine to detect a sequence “1011” using Mealy model .and write VHDL code for the same.	
11. Implementation & Testing of Counter on Xilinx FPGA	
12. Implementation & Testing of Clock circuits on Xilinx FPGA.	
13. Design a 4 bit comparator	
14. Design 16:1 MUX using 4:1 MUX using structural style of modeling.	
15. Design Arithmetic and Logic Unit.	
16. Open ended experiments.	

BECL205: FIELD THEORY		
Teaching Scheme:	**Examination Scheme (Theory)**	**Examination Scheme (Laboratory)**
Lectures:3Hrs/Week **Tutorials:** 1 Hrs/Week **Practical:** Nil	**TAE:** 20 Marks **CAE :** 20 Marks **ESE:** 60 Marks	**Cont. Ass.: 25 Marks** **Practical: Nil**
Credit	**4**	
Course-Prerequisite: Engineering Mathematics-I (BEML101) Engineering Mathematics-II (BEML 102), Engineering Mathematics –III (BEML 201)		
Course Objective:		
1. To study electric and magnetic fields from stationary and dynamic charge and current distributions.		
2. To study and understand properties of waves, its propagation and waveguides.		
3. To impart knowledge of radiations, dipoles and potentials in electromagnetic fields.		
4. To inculcate the fundamentals of antennas and its parameters		
Course Outcome:		
At the end of the course the student shall be able to:		
1. Apply vector calculus to understand the behavior of static electric fields and static magnetic fields in standard configurations		
2. Understand the concepts of magnetic fields.		
3. Understand the concept of Maxwell's equation for static and time varying fields.		
4. Workout simplified solutions to problems of electromagnetic wave propagations, waveguides.		
5. To analyse the behavior of EM waves in different medias		
6. To understand the fundamentals of antenna and its parameters and to apply on the basic problems of antennas		
Course Contents		
Unit I: ELECTROSTATICS		8
Introduction to Cartesian, cylindrical and spherical coordinate systems, Concept of Gradient Divergence and curl, Electric field intensity, flux density, Gauss's law, divergence, divergence theorem, Electric potential and potential gradient.		
Unit II: MAGNETOSTATICS		6
Current density and continuity equation, B-S law, Ampere's circuital law and applications, Magnetic flux and Flux density, Scalar and Vector magnetic potentials.		

Unit III: MAXWELL'S EQUATIONS AND BOUNDARY CONDITIONS	6
Maxwell's equations for steady fields. Maxwell's equations for time varying fields. Electric and magnetic boundary conditions.	
Unit IV: ELECTROMAGNETIC WAVES	8
Electromagnetic wave equation, wave propagation in free space, in a perfect dielectric, and perfect conductor, skin effect, Poynting vector and Poynting theorem, reflection and refraction of uniform plane wave at normal incidence plane, reflection at oblique incident angle	
Unit V: WAVEGUIDES	6
Introduction, wave equation in Cartesian coordinates, Rectangular waveguide, TE, TM,TEM waves in rectangular guides, wave impedance, losses in waveguide, introduction to circular waveguide.	
Unit VI: RADIATION	6
Retarded potential, Electric and magnetic fields due to oscillating dipole (alternating current element), power radiated and radiation resistance, application to short monopole and dipole. Antenna Efficiency, Beam width, Radiation Intensity, Directive Gain Power Gain and Front To Back Ratio. Advance topics on the subject	

Text Books:
1. W.H Hayt. and J.A. Buck, Engineering Electromagnetics, 7th Edition, Tata Mc-Graw Hill, 2006
2. A.U.Tinguria, Fundamentals of Electromagnetic Fields, 3rd Edition, Denett& Co., 2010
Reference Books:
1. K. D. Prasad, Antenna & wave propagation, 3rd Edition, PHI Publication, 2009
2. E.C. Jordan and K.C. Balamin, Electromagnetic
3. Waves and Radiating System, 2nd Edition, Prentice Hall of India Private Limited, 1985
4. J.D Krauss, Electromagnetics, 3rd Edition, Mc-Graw Hill, 1984
5. Rao, Elements of Engineering Electromagnetics, 6th Edition, Pearson education, 2006

Assignment:

Students have to submit 5 assignments out of 7 assignments.(Assignment questions given during semester)

BECL206: ANALOG SYSTEMS AND DESIGN

Teaching Scheme:	Examination Scheme (Theory)	Examination Scheme(Laboratory)
Lectures:3 Hrs/Week **Tutorials:** 1Hr/Week **Practical:** 2Hr/Week	**TAE:**20 Marks **CAE :**20 Marks **ESE:**60 Marks	**Cont. Ass.: 25 Marks** **Practical: 25 Marks**
Credit	**4**	**1**

Course-Prerequisite: Basic Electronics Engineering (BECL105)

Course-Co requisite: Digital System Design (BECL204)

Course Objective:

1. To understand analog circuits and systems.
2. To know linear and nonlinear applications of operational amplifier ICs.
3. To study frequency response of different circuits based on operational amplifier applications.
4. To study and use different ICs such as timers for applications.

Course Outcome:

At the end of the course the student shall be able to:

1. Understand basic OP-AMP fundamentals in design, evaluation and analysis of analog applications.
2. Design and Analyze general linear applications of operational amplifiers.
3. Analyze basic structure of OP-AMP theoretically and mathematically.
4. Analyze, Implement, and simulate different types of filters and oscillators.
5. Design, built and test nonlinear circuits.
6. Design, built, test, and implement basic timer applications and regulate power supply.

Course Contents	Hrs
Unit I: OPERATIONAL AMPLIFIER FUNDAMENTALS	8
Operational Amplifier, Basic Op-Amp Configuration, an Op-Amp with Negative Feedback, Voltage Series and Voltage Shunt Configurations, Difference amplifiers, Instrumentation Amplifier, Specification of an Op-Amp, Offset Voltages and Currents, CMRR, Slew Rate	
Unit II: GENERAL LINEAR APPLICATIONS	**7**
Constant Current Source and Voltage Source, Summing, Scaling and Averaging Amplifiers, Voltage To Current Converter with Floating And Grounded Load, Current To Voltage Converter, Integrator and Differentiator	
Unit III: STRUCTURE OF OP-AMP	**7**

Differential Amplifier, Cascaded Differential Amplifier Stages and Level Translator, AC and DC Analysis of Cascade Amplifier, Design of two stage direct-coupled amplifier.	
Unit IV: ACTIVE FILTERS AND OSCILLATORS	8
Classification of Filters , Active Filters, First to Sixth – Order Butterworth filter , Multiple–Feedback Filters (Band Pass And Band Reject Filters) IGMF configuration, All Pass Filter, Cascade Design Of Filters, Classification of Oscillators, Design of Op-amp based Phase Shift And Wein Bridge Oscillators, Square, Triangular And Saw Tooth Wave Generators	
Unit V: NON-LINEAR CIRCUITS	6
Schmitt Trigger, Voltage Comparator, Voltage Limiters And Window Detector, Clippers And Clampers, Peak Detector, Precision Rectifiers, Analog Switches	
Unit VI: SPECIAL ICs APPLICATIONS	6
The 555 Timer, Phase Locked Loops IC565, ICL8038 & XR2206 Function Generator, Voltage Controlled Oscillator Basic Operation, IC based Voltage Regulator Circuits, Dual Track Voltage Regulator, Three - Terminal Regulator(Fixed Regulator) Voltage Adjustment AndCurrent Boosting of Fixed Regulator, Merits and Drawbacks of Linear Regulators, Advance topics on the subject	

Text Books:

1. RamakantGayawad., Op-Amps And Linear Integrated Circuits, 3rd Edition, PHI, 1993
2. K.R.Botkar, Integrated Electronics, Khanna Publishers,1996

Reference Books:

1. Franco, 'Design With Operational Amplifiers And Analog Integrated Circuits', 2nd Edition, McGraw-Hill., 1992
2. Coughlin and Driscol, Op-Amps And Linear Integrated Circuits', 5th Edition, PHI,1998
3. Sedra and Smith, 'Microelectronic Circuits', 4th Edition, Oxford University Press, 1996

BECP206: ANALOG SYSTEMS AND DESIGN	
LIST OF EXPERIMENTS	**30 Hrs**
1. Design and verify gain and frequency response of Inverting and Non-inverting amplifier using IC 741. Show its simulation results on multisim.	
2. Design and verify gain and frequency response of Integrator and Differentiator ckt. Using IC 741. Show its simulation results on multisim.	
3. Verify Op-amp parameters (a) CMRR (b) Slew Rate.	
4. Design and verify Multi vibrator circuits using IC	
5. To design 2nd order Low Pass Filter.	
6. To study the frequency Vs gain characteristic of Low Pass Filter using multisim.	
7. Design of Low Voltage Regulator using IC 723. Simulate and observe the regulated waveform on multisim.	
8. To design RC-phase shift oscillator and simulate using multisim.	
9. Design ,built and test square wave generator	
10. Design, built and test Schmitt trigger.	
11. Design built, test half, full, bridge precision rectifier.	
12. Design & simulate zener shunt regulator using multisim.	
13. Design any IC regulator application using multisim.	
14. Open ended experiment.	
15. Open ended experiments.	

BECL207:COMMUNICATION ELECTRONICS		
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:** Nil
Credit	**4**	**1**

Course-Prerequisite: Basic Electronics Engineering (BECL105), Engineering Mathematics – III (BEML201), Electronic Devices & Circuits (BECL201)

Course Co-requisites: Field Theory (BECL205)

Course Objective:

1. To understand the basic concept of communication and different modulation systems
2. To understand the concept of multiplexing.
3. To understand theory of digital modulation.
4. To understand working of radio receivers.

Course Outcome:

At the end of the course the student shall be able to:

1. To acquire the basic knowledge/fundamentals of a communication system.
2. Generate AM wave & demodulate the same.
3. Generate FM signals & to detect the same. .
4. Perform & analyze PAM, PWM & PPM signals.
5. Multiplex & Demultiplex various signals.
6. To acquire the knowledge of various digital modulation techniques.

Course Contents	**Hrs**
Unit I: INTRODUCTION TO COMMUNICATION, RADIATION AND PROPAGATION	6
Block Schematic of Communication System, Base Band Signals and their bandwidth requirements, RF Bands, Carrier signals, Concept of Radiation and Electromagnetic waves, Mechanism of Propagations: Ground Wave, Sky Wave, Space Wave, Concept of Fading and diversity reception.	
Unit II: AMPLITUDE MODULATION AND DETECTION	8
Generation of AM (DSBFC) and its spectrum ,AM Modulators (DSBFC & DSBSC) & power calculations , modulation index, SSB modulation , SSB-SC modulation, AM demodulators, Block Diagram of AM Receiver, AM Detection methods.	

Unit III: FREQUENCY MODULATION AND RADIO RECEIVERS	
Angle modulation, Narrow band & wide band FM, Modulation index, Bandwidth frequency modulation spectrum, Bessel's Function and its mathematical analysis, Phase Modulation, Generation of FM (Direct & Indirect Method),FM transmitters, FM detection using Phase lock loop(PLL) ,Slope detector, Balanced Slope detector etc.	8
Unit IV: PULSE MODULATION TECHNIQUES	
Introduction to Sampling, Sampling theorem, Nyquist criteria, sampling Techniques, Types of sampling- ideal, natural, flat top, Aliasing & Aperture effect. PAM, PWM & PPM.	**6**
Unit V: DIGITAL MULTIPLEXERS	
Frequency Division multiplexing, Time Division Multiplexing. Introduction to Digital multiplexers and their classification, Introduction to PCM, Delta modulation, ADPCM	**6**
Unit VI: DIGITAL MODULATION TECHNIQUES	
PSK, FSK, QPSK, MSK, and DPSK. Advance topics on the subject	

BECP207: COMMUNICATION ELECTRONICS	
LIST OF EXPERIMENTS:	**30Hrs**
Note: Transmitter and Receiver experiments are mandatory and to be carried out at radio Frequency (preferably above 500 KHz).	
Perform any 10 experiments from the given list	
1. AM Generation (DSB-FC): Calculation of modulation index by graphical method.	
2. Envelop Detector-Practical diode detector, Observe effect of change in RC time constant.	
3. Generation of DSB-SC with the help of balanced Modulator IC1496 &1596 & its detection.	
4. SSB modulator using Filter method / phase shift method & its detection.	
5. AM transmitter: Measure total power of transmitter with the help of Spectrum Analyzer or Wattmeter, Observe variation in total power by varying modulating signal level	
6. A)Frequency modulator using varactor diode and NE 566 VCO, calculation of modulation index	
7. B)FM demodulator using such as IC565 (PLL based)	
8. Measurement of performance characteristics of Receiver: Sensitivity, selectivity, Fidelity.	
9. Generation of PWM/PPM signal using IC on breadboard.	
10. Experimental study of Generation & detection of PSK/FSK/QPSK signals.	
11. Mini Project: Build & test AM/FM transmitter (Mandatory)	
12. Following assignments may be performed using suitable software(Any two)	
13. Generate AM waveform for given modulation index, signal frequency and carrier frequency.	

Text Books:
1. Kennedy, Davis, Electronics Communication System, 4th Edition, TMH, 2010
2. Roddy & Coolen, Communication Electronics, 4th Edition, PHI, 2010
3. Frenzel, Communication Electronics Principles and Applications, 3rd Edition, TATA McGraw-Hill, 3rd Edition, 2011
4. U.A.Bakshi, A.P.Godse, Communication Engineering, 3rd Edition, Technical Publications, 2009
Reference Books:
1. B.P.Lathi, Modern Digital & Systems, 3rd Edition, Oxford Press Publication, 1998
2. Simon Haykin, Digital Communication, 3rd Edition, Wiley and sons, 2003
3. John G.Prokis, Digital Communication, 3rd Edition, TMG, 2002
4. Shanmugham, Digital Communication, 4th Edition, Wiley student, 2009

BCOL203: COMPUTER ARCHITECTURE & ORGANIZATION		
Teaching Scheme:	**Examination Scheme (Theory)**	**Examination Scheme (Laboratory)**
Lectures:3Hrs/Week **Tutorials:** Nil **Practical:** Nil	**TAE:**20 Marks **CAE :**20 Marks **ESE:**60 Marks	**Practical:** Nil
Credit :	**3**	
Course-Prerequisite: Basic Electronics Engineering (BECL105)		
Course Objective:		
1. To introduce basic fundamental units of a computer system.		
2. To perform arithmetic operations using various algorithms.		
3. To develop skills to understand control unit design.		
4. To build concepts of memory system.		
5. To study communication of I/O devices.		
6. To enhance knowledge of parallel system.		
Course Outcome:		
Upon successful completion of the course, students will be able to		
1. Describe fundamental units of computer system.		
2. Apply concept of fixed and floating point arithmetic.		
3. Identify different types of control unit.		
4. Analyze organization and design of memory system.		
5. Identify different ways of communicating with I/O devices and interfaces.		
6. Describe working of parallel systems.		
Course Contents		**Hrs**
Unit I: Basic Structure of Computers		7
The Evolution of Computers, Functional Units, Basic operational concepts , Bus Structure, Performance Measures , System Architecture, VLSI Era, Von Neumann Architecture. Addressing modes, Execution of a Complete Instruction.		
UNIT II: DATA PATH UNIT		8
Data Representation, Fixed and Floating point numbers, Signed numbers,Fixed-Point Arithmetic, Booths Algorithm, Division: Restoring and Non Restoring algorithms, Arithmetic Logic unit, Floating point representations, IEEE standards, Floating point arithmetic.		
UNIT III: PROCESSING UNIT		6

Basic Concept, Hardwired control, Micro programmed Control, Coprocessor, Pipeline Control, Pipeline Performance.	
UNIT IV: MEMORY ORGANIZATION	8
Characteristics of memory, Internal and External Memory, Types of memory: RAM: SRAM, DRAM, SDRAM,RDRAM ROM: PROM, EPROM, EEPROM, Cache Memory, Virtual Memory, Associative Memory, Secondary Memory, Performance	
UNIT V: INPUT /OUTPUT ORGANIZATION	7
I/O mapped I/O and memory mapped I/O, interrupts and interrupts Handling Mechanisms,Direct Access Memory, Buses: synchronous vs. asynchronous, Interface Circuits, Standard I/O Interface: PCI,SCSI,USB. Computer Peripheral: I/O devices such as magnetic disk, magnetic tape, CDROM, USB systems.	
UNIT VI: PARALLEL ORGANIZATIONS	7
Superscalar Processors, Multiple Processor Organizations, Symmetric Multiprocessors, Clusters, Non -uniform Memory Access, Vector Computations, Bus allocation Schemes. RISC: Instruction execution characteristics, use of large register file, compiler based register optimization, RISC architecture and pipelining. RISC Vs CISC.	

Text Books:

1. John Hayes, 'Computer Architecture and Organization", McGraw Hill, 3rd Edition.
2. V.C.Hamacher, Z.G. Vranesic and S.G.Zaky, 'Computer Organization', McGraw Hill, 5th edition, 2002.

Reference Books:

1. S. Tanenbaum, "Structured Computer Organization" 4th Edition, Pearson Education.
2. M. Mano, "Computer System and Architecture", Pearson Education.
3. W. Stallings, "Computer Organization & Architecture", Pearson Education.

BECP208: MODELING&SIMULATION		
Teaching Scheme:	**Examination Scheme (Theory)**	**Examination Scheme(Laboratory)**
Lectures: Nil **Tutorials:** Nil **Practical:** 2 Hrs/Week	**TAE:** Nil **CAE :** Nil **ESE :** Nil	**Cont. Ass.:** 25 **Practical:** Nil
Credit	**0**	**1**

Prerequisites: Basic Electronics Engineering (BECL105), Electronics Devices & Circuits(BECL201]

Course-co requisite : Analog Systems Design (BECL206)

Course Objectives:

1. To select and apply appropriate simulation tools and techniques.
2. To study the modeling of systems using various tools.
3. To obtain and study the results of models designed on advanced simulation tools

Course Outcome: student shall be able to

1. Design and Simulate the linear and non-liner based analog and digital circuits for engineering applications.
2. Apply different simulation tools for desired simulation results and apply visualization techniques to support the simulation process.
3. Analyze simulation challenges and research and implement realistic solutions.
4. Understand timing, power, energy and other performance indicators of circuits and systems.
5. Design simulation strategy for various circuits and systems.
6. Research, implement, analysis and improve circuits and systems implementation and performance.

List of Experiments [Any 10 Experiments]	
1. Introduction of T Spice & Tanner/Mentor Graphics.	
2. Design current mirror using tanner/Mentor Graphics.	
3. Design sample and hold circuit using tanner/Mentor Graphics.	
4. Design cascade current mirror using tanner/Mentor Graphics.	
5. Design Differential amplifier using tanner/Mentor Graphics.	
6. Design Three MOSFET voltage divider using tanner/Mentor Graphics	
7. Design common source amplifier using tanner/Mentor Graphics.	
8. Design Feedback amplifiers using Tanner/Mentor Graphics.	
9. Design a Pulse Code Modulation System usingsimulink	
10. Design of Signal processing blocksetusing MATLAB	
11. Design of multi-order system using MATLAB	

12. Open Ended modeling experiments	

Text Books:
1. Allen Holberg, "Analog CMOS Design", Oxford University Press
Reference Books:
1. Rudra Pratap, "MATLAB7", Oxford University Press, 2006.
2. Modelling and Simulation using MATLAB-Simulink by Dr. Shailendra Jain, Wiley Publication January 2015.

BECGP203: GENERAL PROFICIENCY-III: Hobby Classes		
Teaching Scheme:	**Examination Scheme (Theory)**	**Examination Scheme (Laboratory)**
Lectures:1Hrs/Week **Tutorials:** Nil **Practical:** 2Hrs/Week	**TAE:** Nil **CAE :** Nil **ESE:** Nil	**Cont. Ass.: Grade**
Credit	**Audit Course**	
Prerequisite: Nil		
Course Objective:		
1. To enhance the inherent qualities of oneself and provide a platform to show hidden talents.		
2. To nurture one's special capability and interest in activities like sports, drama, singing etc.		
3. To help express oneself and be more compatible with outer world in the hobby domain.		
4. To enhance creativity & imagination to flow freely.		
Course Outcome:		
Upon successful completion of the course students will be able to:		
1. To explore and demonstrate the inherent talents within		
2. To fruitfully engage themselves in creative activities during spare time.		
3. To create balance between academic & work life.		
4. Acts as a stress buster in the stressed life.		
5. Students are guided to develop self-expression and communication skills.		
6. To help one learn a new skill and increase self-confidence and boosts self esteem.		

Topics	Activities
Stress management sessions	Yoga, pranayam, meditation, relaxation techniques
Outdoor activities	Nature walks, treks, cycling, horse riding
Painting	Canvas, fabric , Sketching, knife, glass
Music (vocals and instrument)	Singing, Guitar, Synthesizer, Harmonium, Piano, Flute
Dance	Bharatnatyam, Kathak
Indoor sports	Chess, carom, table tennis
Movie club	Motivational movies and documentaries to be shown
Other creative skills	Embroidery , knitting, use of making things from waste materials, photography, puzzle solving

Department of Electronics & Telecommunication

Vision:

To create globally competent and acceptable technical manpower in the ever-changing domain of E&TC with attributes of self and life long learning, there by 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 (PEO):

Our graduates in E&TC will be able to demonstrate:

- 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.
- Ability to work as cohesive team members in cross-disciplinary teams applying the principles learned from humanities and management courses.
- As a self and lifelong learner, ability to deliver and contribute applications, products, services dealing with usage of modern software tools and hardware platforms.
- Responsiveness towards environmental issues, human values and professional ethics
- Competencies and Employability in diversified areas of E & TC

PSO:

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

- An in-depth understanding of fundamental and application oriented courses in communication systems, signal processing, embedded systems and electronic devices.
- A rigorous hands-on skill with modeling and simulation tools such as multisim, Matlab, C, HDL programming
- Behavior as a responsible team member contributing to development of prototype, application, product as a part of his/her mini and main project
- Competencies to solve real life problems in the E&TC domain at the same time a professional behavior imbibed with human values and professional ethics.