DEPARTMENT OF TECHNOLOGY
SECOND YEAR B.TECH
Scheme of Teaching and Examination
Semester – III (Electronics & Communication Technology)

Course code	Course	Teaching Scheme (Hours / Week)				Examination Scheme (Marks)					
						Theory			Practical		
		L	T	P	Credit	Scheme	Max. marks	Min. Passing	Scheme	Max. marks	Min. Passing
EC211	Engineering Mathematics-III	04	---	---	04	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
EC212	Electrical Technology	03	---	---	03	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
EC213	Electronics Circuit Analysis & Design –I	03	---	---	03	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
EC214	Network Analysis	03	---	---	03	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
EC215	Digital Techniques	04	---	---	04	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	---------
EC216	Programming Techniques	02	---	---	02	--------	-------	--------	-------	-------	-------
EC211L	Engineering Mathematics-III Tutorial	---	01	---	01	--------	--------	--------	IOE	50	20
EC212L	Electrical Technology Laboratory	---	---	02	01	--------	--------	--------	IPE	50	20
EC213L	Electronics Circuit Analysis & Design –I Laboratory	---	---	02	01	--------	--------	--------	EPE	50	20
EC214L	Network Analysis Tutorial	---	01	---	01	--------	--------	--------	IOE	50	20
EC215L	Digital Techniques Laboratory	---	---	02	01	--------	--------	--------	EOE	50	20
EC216L	Programming Techniques Laboratory	---	---	02	01	--------	--------	--------	EPE	50	20
	Total	**19**	**02**	**8**	**25**	--------	**500**	--------	--------	**300**	--------

ES 218	Environmental Studies	02	---	---	---	Project* Theory*	30 70	40	--------	--------	------
HS217	Introduction to Performing Arts	02	---	02	---	Evaluation at institute/ department level		Based on total marks obtained out of 50,the grade to be given by the course auditor			

Total contact hours per week: **29+2+2=33**

***** indicates Environmental Studies project evaluation and the theory examination will be at the end of the year i.e. along with Semester IV End Examination.

CIE : Continuous Internal Evaluation
SEE : Semester End Examination
IPE : Internal Practical Evaluation

IOE : Internal Oral Evaluation
EPE : External Practical Evaluation
EOE : External Oral Evaluation

DEPARTMENT OF TECHNOLOGY
SECOND YEAR B.TECH
Scheme of Teaching and Examination
Semester – IV (Electronics and Communication Technology)

Course code	Course	Teaching Scheme (Hours / Week)				Examination Scheme (Marks)					
						Theory			Practical		
		L	T	P	Credit	Scheme	Max. marks	Min. Passing	Scheme	Max. marks	Min. Passing
EC221	Electronics Circuit Analysis & Design -II	04	---	---	04	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
EC222	Communication Technology	04	---	---	04	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
EC223	Linear Integrated Circuits	04	---	---	04	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
EC224	Measurement Techniques	03	---	---	03	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
EC225	Industrial Organization and Management	02	---	---	02	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	---------
EC226	Data Structures	02	---	---	02	--------	-------	--------	-------	--------	-------
EC221L	Electronics Circuit Analysis & Design –II Laboratory	---	---	02	01	--------	-------	--------	EPE	50	20
EC222L	Communication Technology Laboratory	---	---	02	01	--------	-------	--------	EPE	50	20
EC223L	Linear Integrated Circuits Laboratory	---	---	02	01	--------	-------	--------	EOE	50	20
EC224L	Measurement Techniques Laboratory	---	---	02	01	--------	-------	--------	IPE	50	20
EC225L	Industrial Organization and Management Tutorial	---	01	---	01	--------	-------	--------	IOE	50	20
EC226	Data Structures Tutorial	---	01	---	01	--------	-------	--------	IPE	50	20
	Total	**19**	**02**	**08**	**25**	--------	**500**	--------	--------	**300**	--------

ES 218	Environmental studies project work	02	---	---	---	Project- 30 Theory-70	40			
EC227	Soft Skill Development	02	--	---	-----	Evaluation at institute/ department level	Based on total marks obtained out of 50,the grade to be given by the course auditor			

Total contact hours per week: **29+2+2=33**

CIE : Continuous Internal Evaluation
SEE : Semester End Examination
IPE : Internal Practical Evaluation
IOE : Internal Oral Evaluation
EPE : External Practical Evaluation
EOE : External Oral Evaluation

Equivalence of Second Year B.Tech (Electronics and Communication Technology) Semester III and IV

The above detailed syllabus is a revised version of the Second Year B.Tech (Electronics and Communication Technology) Program being conducted by the Shivaji University at the Technology Department of the University. This syllabus is to be implemented from June 2017. (Academic year 2017-18)

The Equivalence for the courses of Electronics and Communication Technology at Second Year B Tech Semester III and IV pre-revised Program under the faculty of Engineering and Technology is as follows.

Second Year B.Tech Semester III (Electronics and Communication Technology)

Sr.No	Second Year B.Tech (Electronics and Communication Technology) Semester III Pre-revised syllabus	Second Year B.Tech(Electronics and Communication Technology) Semester III Revised syllabus	Remark
1.	Engineering Mathematics-III	Engineering Mathematics-III	Fourier series added and Z-transform omitted.
2.	Electrical Technology	Electrical Technology	No change in contents
3.	Electronics Circuit Analysis & Design-I	Electronics Circuit Analysis & Design-I	Syllabus revised
4.	Linear Circuits	Network Analysis	Course title changed
5.	Digital Techniques	Digital Techniques	No change in contents
6.	Programming Techniques-I	Programming Techniques	Course title changed
7.	Environmental studies	Environmental studies	No change in contents
8.	Introduction to performing arts	Introduction to performing arts	No change in contents

Second Year B.Tech Semester IV (Electronics and Communication Technology)

Sr.No	Second Year B.Tech(Electronics and Communication Technology) Semester IV Pre-revised syllabus	Second Year B.Tech(Electronics and Communication Technology)Semester IV Revised syllabus	Remark
1.	Electronics Circuit Analysis & Design-II	Electronics Circuit Analysis & Design-II	contents revised
2.	Communication Technology	Communication Technology	contents revised
3.	Processor Architecture		Course discontinued
4.	Measurement Techniques	Measurement Techniques	No change in contents
5.	Industrial Organization and Management	Industrial Organization and Management	contents revised

6.	Programming Techniques-II		Course discontinued
7.		Linear Integrated Circuits	New course added
8.		Data Structures	New course added
9.	Environmental studies	Environmental studies	No change in contents
10.		Soft skill development	New course added
11.	Introduction to foreign language		Course shifted to third year

Audit course have not been assigned any credits. The students will be evaluated for these courses by the concerned course in charge. There will be grade conferred to the student. The grade will be based on conversion of marks obtained out of 50. (Obtaining passing grade is essential). Please refer to chart in the detail examination scheme. The chart shows the marks range and the respective grade.

DEPARTMENT OF TECHNOLOGY
THIRD YEAR B.TECH
Scheme of Teaching and Examination
Semester – V (Electronics & Communication Technology)

Course code	Course	Teaching Scheme (Hours / Week)				Examination Scheme (Marks)					
						Theory			Practical		
		L	T	P	Credit	Scheme	Max. marks	Min. Passing	Scheme	Max. marks	Min. Passing
EC 311	Digital Communication Technology	04	-	-	04	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
EC 312	Electromagnetic Fields	04	-	-	04	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
EC313	Microcontrollers	04	-	-	04	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
EC 314	Signals & Systems	04	-	-	04	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
EC 315	Computer Network & Data Communication	03	-		03	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	---------
EC 311L	Digital Communication Technology Laboratory	---	---	02	01	--------	-------	--------	EPE	50	20
EC 312L	Electromagnetic Fields Tutorial	---	01	---	01	--------	-------	--------	IOE	50	20
EC 313L	Microcontrollers Laboratory	---	---	02	01	--------	-------	--------	EPE	50	20
EC 314L	Signals & Systems Tutorial	---	01	---	01	--------	-------	--------	IOE	50	20
EC 315L	Computer Network & Data Communication Laboratory	---	---	02	01	--------	-------	--------	EOE	50	20
EC 316L	Electronic System Design Laboratory	---	---	02	01	--------	-------	--------	IPE	50	20
	Total	**19**	**02**	**08**	**25**	--------	**500**	--------	--------	**300**	--------

Audit Course III

HS 311	Research Methodology and Mini Project	01	---	---	----	Evaluation at institute/ department level	Based on total marks obtained out of 50, the grade to be given by the course auditor (teacher)

Total contact hours per week: 29+01=30

CIE : Continuous Internal Evaluation
SEE : Semester End Examination
IPE : Internal Practical Evaluation
IOE : Internal Oral Evaluation
EPE : External Practical Evaluation
EOE : External Oral Evaluation

Note : Tutorials and Practical shall be conducted in batches with batch strength not exceeding 18 students.

DEPARTMENT OF TECHNOLOGY
THIRD YEAR B.TECH
Scheme of Teaching and Examination
Semester – VI (Electronics & Communication Technology)

Course code	Course	Teaching Scheme (Hours / Week)				Examination Scheme (Marks)					
						Theory			Practical		
		L	T	P	Total	Scheme	Max. marks	Min. Passing	Scheme	Max. marks	Min. Passing
EC 321	Digital Signal Processing	04	---	---	04	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
EC 322	Operating Systems	03	---	---	03	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
EC 323	Antenna & Wave propagation	04	---	---	04	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
EC 324	ARM & Embedded Systems	03	---	---	03	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
EC 325	Control Systems	04	---	---	04	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	---------
EC 321L	Digital Signal Processing Laboratory	---	---	02	01	--------	-------	--------	EPE	50	20
EC 322L	Operating Systems Tutorial	---	01	---	01	--------	-------	--------	IOE	50	20
EC323L	Antenna & Wave propagation Laboratory	---	---	02	01	--------	-------	--------	EPE	50	20
EC324L	ARM & Embedded Systems Laboratory	---	---	02	01	--------	-------	--------	EOE	50	20
EC325L	Control Systems Tutorial	---	01	---	01	-------	-------	--------	IOE	50	20
EC 326L	Mini Project and Seminar Laboratory	---	---	02	02	-------	-------	-------	IPE	50	20
	Total	**18**	**02**	**08**	**25**	--------	**500**	--------	--------	**300**	--------

Audit Course IV

HS321	Introduction to foreign language	02	---	---	----	Evaluation at institute/ department level	Based on total marks obtained out of 50,the grade to be given by the course auditor

Total contact hours per week: 28+02=30

CIE : Continuous Internal Evaluation
SEE : Semester End Examination
IPE : Internal Practical Evaluation
IOE : Internal Oral Evaluation
EPE : External Practical Evaluation
EOE : External Oral Evaluation

Note : Tutorials and Practical shall be conducted in batches with batch strength not exceeding 18 students.

After the end of semester 6 students shall undergo industrial training for minimum two weeks and submit industrial training report to guide in semester 7. Marks and grades of industrial training shall be included in Major project (phase I). 50% marks of Major project phase-I are allotted for Industrial training done after sem. 6 and 50 % marks for students performance in Major project (Phase-I).

Equivalence of Third Year B.Tech (Electronics and Communication Technology) Semester V and VI

The above detailed syllabus is a revised version of the Third Year B.Tech (Electronics and Communication Technology) Program being conducted by the Shivaji University at the Technology Department of the University. This syllabus is to be implemented from June 2018. (Academic year 2018-19)

The Equivalence for the courses/courses of Electronics and Communication Technology at Third Year B Tech Semester V and VI pre-revised Program under the faculty of Engineering and Technology is as follows.

Third Year B.Tech Semester V (Electronics and Communication Technology)

Sr.No	Third Year B.Tech (Electronics and Communication Technology) Semester V Pre-revised syllabus	Third Year B.Tech(Electronics and Communication Technology) Semester V Revised syllabus	Remark
1.		Digital Communication Technology	Course removed from sem 6 and included in sem 5.
2.	Electromagnetic Fields	Electromagnetic Fields	No change in syllabus
3.	Microcontrollers	Microcontrollers	Syllabus revised
4.	Signals & systems	Signals & systems	Syllabus revised
5.	Computer Networks and data communication	Computer Networks and data communication	Syllabus revised
6.	Electronic System Design	Electronic System Design	No change in syllabus
7.	Linear Integrated Circuits		Course removed and shifted to SY ECT sem. 4
8.			
9.			
10.			

Third Year B.Tech Semester VI (Electronics and Communication Technology)

Sr. No	Third Year B. Tech (Electronics and Communication Technology) Semester VI Pre-revised syllabus	Third Year B. Tech (Electronics and Communication Technology) Semester VI Revised syllabus	Remark

1.	Digital Signal Processing	Digital Signal Processing	No Change
2.	Digital Communication Technology		Course removed and shifted to sem. 5
3.	Optical Fiber Communication		Course removed and included in sem.VIII
4.	VLSI Design		Course removed and included in sem.VII
5.	Control Systems	Control Systems	No change
6.	Mini project and Seminar	Mini project and Seminar	No Change
7.		Operating Systems	New course included
8.		Antenna and wave propagation	New course included
9.		ARM and Embedded Systems	Course removed from sem VIII and included in sem VI
10.	Presentation and Communication Techniques	Presentation and Communication Techniques	No Change

Audit course have not been assigned any credits. The students will be evaluated for these courses by the concerned course in charge. There will be grade conferred to the student. The grade will be based on conversion of marks obtained out of 50. (Obtaining passing grade is essential). Please refer to chart in the detail examination scheme. The chart shows the marks range and the respective grade.

DEPARTMENT OF TECHNOLOGY
FINAL YEAR B.TECH
Scheme of Teaching and Examination
Semester – VII (Electronics & Communication Technology)

Course code	Course	Teaching Scheme (Hours / Week)				Examination Scheme (Marks)					
						Theory			Practical		
		L	T	P	Credit	Scheme	Max. marks	Min. Passing	Scheme	Max. marks	Min. Passing
EC 411	Audio and Video Engineering	3	-	-	3	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
EC 412	Industrial and Power Electronics	3	-	-	3	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
EC413	VLSI Design	3	-	-	3	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
EC 414	Microwave Engineering	4	-	-	4	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
EC 415	Elective-I	3	-	-	3	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	---------
EC 416L	Major project (Phase-I)	-	-	2	4	--------	-------	--------	IPE	50	20
EC 411L	Audio and Video Engineering Laboratory	-	-	2	1	--------	-------	--------	EPE	50	20
EC 412L	Industrial and Power Electronics Laboratory	-	-	2	1	--------	-------	--------	EPE	50	20
EC 413L	VLSI Design Laboratory	-	-	2	1	--------	-------	--------	EOE	50	20
EC 414L	Microwave Engineering Laboratory	-	-	2	1	--------	-------	--------	IPE	50	20
EC 415L	Elective-I Tutorial	-	1	-	1	--------	-------	--------	IOE	50	20
	Total	**16**	**01**	**10**	**25**	--------	**500**	--------	--------	**300**	--------

Audit Course III

HS 411	Professional Ethics	02	---	---	----	Evaluation at institute/ department level	Based on total marks obtained out of 50, the grade to be given by the course auditor (teacher)

Total contact hours per week: 27+02=29

CIE : Continuous Internal Evaluation
SEE : Semester End Examination
IPE : Internal Practical Evaluation
IOE : Internal Oral Evaluation
EPE : External Practical Evaluation
EOE : External Oral Evaluation

Note : Tutorials and Practical shall be conducted in batches with batch strength not exceeding 18 students.

DEPARTMENT OF TECHNOLOGY

FINAL YEAR B.TECH

Scheme of Teaching and Examination

Semester – VIII (Electronics & Communication Technology)

Course code	Course	Teaching Scheme (Hours / Week)				Examination Scheme (Marks)					
						Theory			Practical		
		L	T	P	Total	Scheme	Max. marks	Min. Passing	Scheme	Max. marks	Min. Passing
EC421	Broadband Communication	3	-	-	3	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
EC422	Satellite and Radar Engineering	3	-	-	3	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
EC423	Optical Fiber Communication	3	-	-	3	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
EC424	Wireless Networks	4	-	-	4	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
EC425	Elective-II	3	-	-	3	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	---------
EC426	Major Project (Phase-II)	-	-	2	4	--------	-------	--------	EPE	50	20
EC421L	Broadband Communication Tutorial	-	1	-	1	--------	-------	--------	IOE	50	20
EC422L	Satellite and Radar Engineering Laboratory	-	-	2	1	--------	-------	--------	EPE	50	20
EC423L	Optical Fiber Communication Laboratory	-	-	2	1	--------	-------	--------	IPE	50	20
EC424L	Wireless Networks Laboratory	-	-	2	1	-------	-------	--------	EOE	50	20
EC425 L	Elective –II Tutorial	-	1	-	1	-------	-------	-------	IOE	50	20
	Total	**16**	**02**	**08**	**25**	--------	**500**	--------	--------	**300**	--------

Audit Course IV

HS421	Introduction to Indian Constitution	02	---	---	----	Evaluation at institute/ department level	Based on total marks obtained out of 50,the grade to be given by the course auditor

Total contact hours per week: 26+02=28

CIE : Continuous Internal Evaluation
SEE : Semester End Examination

IPE : Internal Practical Evaluation
IOE : Internal Oral Evaluation
EPE : External Practical Evaluation
EOE : External Oral Evaluation

Note : Tutorials and Practical shall be conducted in batches with batch strength not exceeding 18 students.

Equivalence of Final Year B.Tech (Electronics and Communication Technology) Semester VII and VIII

The above detailed syllabus is a revised version of the Final Year B.Tech (Electronics and Communication Technology) Program being conducted by the Shivaji University at the Technology Department of the University. This syllabus is to be implemented from June 2019. (Academic year 2019-20)

The Equivalence for the courses/courses of Electronics and Communication Technology at Final Year B Tech Semester VII and VIII pre-revised Program under the faculty of Engineering and Technology is as follows.

Final Year B.Tech Semester VII (Electronics and Communication Technology)

Sr.No	Final Year B.Tech (Electronics and Communication Technology) Semester VII Pre-revised syllabus	Final Year B.Tech(Electronics and Communication Technology) Semester VII Revised syllabus	Remark
1.	Audio and Video Engineering	Audio and Video Engineering	No Change
2.	Industrial and Power Electronics	Industrial and Power Electronics	No Change
3.	Microwave Engineering	Microwave Engineering	No Change
4.	Mobile and cellular communication		Course removed
5.	Elective-I	Elective-I	Few more electives added
6.	Major Project (phase-I)	Major Project (phase-I)	Performance of Industrial training undergone at the end of Sem. VI will be considered along with major project (phase-I) work in sem. VII.
7.		VLSI Design	Course removed from sem. VI and added in Sem. VII
8.	Professional Ethics	Professional Ethics	No Change
9.			
10.			

SHIVAJI UNIVERSITY, KOLHAPUR- Syllabus w.e.f. 2019-20

Final Year B.Tech Semester VIII (Electronics and Communication Technology)

Sr. No	Final Year B. Tech (Electronics and Communication Technology) Semester VIII Pre-revised syllabus	Final Year B. Tech (Electronics and Communication Technology) Semester VIII Revised syllabus	Remark
1.	Broadband Communication	Broadband Communication	No Change
2.	Satellite Communication		Course removed
3.	Antennas and Radar Engineering		Course removed
4.	ARM and Embedded Systems		Course removed from sem. VIII and included in sem. VI
5.	Elective-II	Elective-II	More elective courses added.
6.	Major Project (Phase-II)	Major Project (Phase-II)	No Change
7.		Optical Fiber Communication	Course removed from sem. 6 and added to sem. 8.
8.		Wireless and Mobile Communication	Course removed
9.		Satellite and Radar Communication	Course removed
10.	Constitution of India	Constitution of India	No change

Audit course have not been assigned any credits. The students will be evaluated for these courses by the concerned course in charge. There will be grade conferred to the student. The grade will be based on conversion of marks obtained out of 50. (Obtaining passing grade is essential). Please refer to chart in the detail examination scheme. The chart shows the marks range and the respective grade.

LIST OF ELECTIVES

Sr. No.	**Elective-I**
1	Automotive Electronics
2	Speech and audio processing
3	Real Time Operating Systems
4	Mechatronics
5	Micro Electro Mechanical Systems
6	Wireless sensor networks
7	Robotics
8	PLC and automation

Sr. No.	**Elective II**
1	Fuzzy logic and applications
2	High speed digital design
3	Digital Image Processing
4	Biomedical Instrumentation and Technology
5	Remote Sensing and GIS
6	RF circuit design
7	Artificial Intelligence & Neural Networks
8	Software Defined Radio

DEPARTMENT OF TECHNOLOGY
SECOND YEAR B.TECH
Scheme of Teaching and Examination
Semester – III (Electronics & Communication Technology)

Course code	Course	Teaching Scheme (Hours / Week)				Examination Scheme (Marks)					
						Theory			Practical		
		L	T	P	Credit	Scheme	Max. marks	Min. Passing	Scheme	Max. marks	Min. Passing
EC211	Engineering Mathematics-III	04	---	---	04	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
EC212	Electrical Technology	03	---	---	03	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
EC213	Electronics Circuit Analysis & Design –I	03	---	---	03	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
EC214	Network Analysis	03	---	---	03	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
EC215	Digital Techniques	04	---	---	04	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	---------
EC216	Programming Techniques	02	---	---	02	--------	-------	--------	-------	-------	-------
EC211L	Engineering Mathematics-III Tutorial	---	01	---	01	--------	--------	--------	IOE	50	20
EC212L	Electrical Technology Laboratory	---	---	02	01	--------	--------	--------	IPE	50	20
EC213L	Electronics Circuit Analysis & Design –I Laboratory	---	---	02	01	--------	--------	--------	EPE	50	20
EC214L	Network Analysis Tutorial	---	01	---	01	--------	--------	--------	IOE	50	20
EC215L	Digital Techniques Laboratory	---	---	02	01	--------	--------	--------	EOE	50	20
EC216L	Programming Techniques Laboratory	---	---	02	01	--------	--------	--------	EPE	50	20
	Total	**19**	**02**	**08**	**25**	--------	**500**	--------	--------	**300**	--------

ES 218	Environmental Studies	02	---	---	---	Project* Theory*	30 70	40	--------	--------	------
HS217	Introduction to Performing Arts	02	---	02	---	Evaluation at institute/ department level		Based on total marks obtained out of 50,the grade to be given by the course auditor			

Total contact hours per week: **29+2+2=33**

***** indicates Environmental Studies project evaluation and the theory examination will be at the end of the year i.e. along with Semester IV End Examination.

CIE : Continuous Internal Evaluation

SEE : Semester End Examination
IPE : Internal Practical Evaluation
IOE : Internal Oral Evaluation
EPE : External Practical Evaluation
EOE : External Oral Evaluation

DEPARTMENT OF TECHNOLOGY
SECOND YEAR B.TECH
Scheme of Teaching and Examination
Semester – IV (Electronics and Communication Technology)

Course code	Course	Teaching Scheme (Hours / Week)				Examination Scheme (Marks)					
						Theory			Practical		
		L	T	P	Credit	Scheme	Max. marks	Min. Passing	Scheme	Max. marks	Min. Passing
EC221	Electronics Circuit Analysis & Design -II	04	---	---	04	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
EC222	Communication Technology	04	---	---	04	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
EC223	Linear Integrated Circuits	04	---	---	04	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
EC224	Measurement Techniques	03	---	---	03	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
EC225	Industrial Organization and Management	02	---	---	02	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	---------
EC226	Data Structures	02	---	---	02	--------	-------	--------	-------	--------	-------
EC221L	Electronics Circuit Analysis & Design –II Laboratory	---	---	02	01	--------	-------	--------	EPE	50	20
EC222L	Communication Technology Laboratory	---	---	02	01	--------	-------	--------	EPE	50	20
EC223L	Linear Integrated Circuits Laboratory	---	---	02	01	--------	-------	--------	EOE	50	20
EC224L	Measurement Techniques Laboratory	---	---	02	01	--------	-------	--------	IPE	50	20
EC225L	Industrial Organization and Management Tutorial	---	01	---	01	--------	-------	--------	IOE	50	20
EC226	Data Structures Tutorial	---	01	---	01	--------	-------	--------	IPE	50	20
	Total	**19**	**02**	**08**	**25**	--------	**500**	--------	--------	**300**	--------

ES 218	Environmental studies project work	02	--	--	--	Project* - 30 Theory*-70	40			
EC227	Soft Skill Development	02	--	---	-----	Evaluation at institute/ department level	Based on total marks obtained out of 50,the grade to be given by the course auditor			

Total contact hours per week: **29+2+2=33**

CIE : Continuous Internal Evaluation
SEE : Semester End Examination
IPE : Internal Practical Evaluation
IOE : Internal Oral Evaluation
EPE : External Practical Evaluation
EOE : External Oral Evaluation

Equivalence of Second Year B.Tech (Electronics and Communication Technology) Semester III and IV

The above detailed syllabus is a revised version of the Second Year B.Tech (Electronics and Communication Technology) Program being conducted by the Shivaji University at the Technology Department of the University. This syllabus is to be implemented from June 2017. (Academic year 2017-18)

The Equivalence for the courses of Electronics and Communication Technology at Second Year B Tech Semester III and IV pre-revised Program under the faculty of Engineering and Technology is as follows.

Second Year B.Tech Semester III (Electronics and Communication Technology)

Sr.No	Second Year B.Tech (Electronics and Communication Technology) Semester III Pre-revised syllabus	Second Year B.Tech(Electronics and Communication Technology) Semester III Revised syllabus	Remark
1.	Engineering Mathematics-III	Engineering Mathematics-III	Fourier series added and Z-transform omitted.
2.	Electrical Technology	Electrical Technology	Contents modified
3.	Electronics Circuit Analysis & Design-I	Electronics Circuit Analysis & Design-I	Contents modified
4.	Linear Circuits	Network Analysis	Course title changed
5.	Digital Techniques	Digital Techniques	No change in contents
6.	Programming Techniques-I	Programming Techniques	Course title changed
7.	Environmental studies	Environmental studies	No change in contents
8.	Introduction to performing arts	Introduction to performing arts	No change in contents

Second Year B.Tech Semester IV (Electronics and Communication Technology)

Sr.No	Second Year B.Tech(Electronics and Communication Technology) Semester IV Pre-revised syllabus	Second Year B.Tech(Electronics and Communication Technology) Semester IV Revised syllabus	Remark
1.	Electronics Circuit Analysis & Design-II	Electronics Circuit Analysis & Design-II	Contents modified
2.	Communication Technology	Communication Technology	Contents modified
3.	Processor Architecture	----------	Course discontinued

4.	Measurement Techniques	Measurement Techniques	----------
5.	Industrial Organization and Management	Industrial Organization and Management	Contents modified
6.	Programming Techniques-II	----------	Course discontinued
7.		Linear Integrated Circuits	New course added
8.		Data Structures	New course added
9.	Environmental studies	Environmental studies	No change in contents
10.		Soft skill development	New Course added
11.	Introduction to Foreign Language		Course shifted to Third Year

Audit course have not been assigned any credits. The students will be evaluated for these courses by the concerned course in charge. There will be grade conferred to the student. The grade will be based on conversion of marks obtained out of 50. (Obtaining passing grade is essential). Please refer to chart in the detail examination scheme. The chart shows the marks range and the respective grade.

Detailed Evaluation and Examination Scheme

1. Out of total 100 theory marks, 50 marks are assigned for Continuous Internal Evaluation (CIE). In CIE, obtaining minimum 20 marks is essential. It is similar to term work, the completion of which is mandatory to become eligible to appear for the Semester End Examination (SEE). Failing to complete the term in a particular course i.e. not obtaining 20 marks in CIE out of 50 shall be treated as term not granted in that course and it is on the part of the course teacher to officially inform the particular case through the respective Program Coordinator and the Director to the University Examination Section. The section will take a kind note of the same and it will not issue the hall ticket of the particular students for the SEE in the particular course/s.
2. CIE (50 marks) includes :
    - Internal Test - I, of 20 marks in 5^{th} week on 1^{st} & 2^{nd} unit
    - Internal Test - II, of 20 marks in 10^{th} week on 3^{rd} & 4^{th} unit
    - Activities for the students: 10 marks. It is at the course owners' discretion to get the assignments of varied nature completed by the students. However, the course teacher will plan to cover those course objectives that suit course learning outcomes and program outcomes that may not be covered in the internal tests.
3. For the Semester End Examination (SEE), 100 marks (3 hours) paper will be set and finally it will be converted to 50 marks. The students must secure

minimum 40 % i.e. 20 marks in SEE as the University examination passing head.

4. Final theory marks (out of 100) will be the addition of CIE (out of 50 marks) and SEE (out of 50 marks).
5. Internal Practical/Oral Evaluation (IPE/IOE) will be on the basis of Internal Oral/ Practical/Tutorials/Seminar in which students must secure minimum 40% i.e. 20 marks. It is similar to the term work the completion of which is mandatory to be eligible to appear for the Semester End Examination (SEE).
6. External Practical/Oral Evaluation (EPE/EOE) will be conducted under the supervision by some external course expert. The minimum score 40% i.e. 20 marks is required to be secured as the University's passing head in EPE/EOE.
7. *Semester End Examination duration will be 4 hrs.
8. Equivalence for the Course: As elaborated at the end of this whole curriculum document.

Academic Autonomy:

1. Flexibility in deciding Structure and Contents of Curriculum with reasonable frequency for changes in the same.

2. Continuous Assessment of Students performance with newly adopted - Credit System based on award of grade.

3. Credits are simply a means of attaching relative values to courses of different components. These are a currency of learning and in general regarded as a measure of the time typically required to achieve a given curricular outcome.

4. All courses (Courses) under each Program/Discipline are unitized.

Credit system:

Education at the Institute is organized around the semester-based credit system of study. The prominent features of the credit system are a process of continuous evaluation of a student's performance/progress and flexibility to allow him/her to progress at an optimum pace suited to his/her ability or convenience. Each course by every student needs to fulfill minimum requirements of credits for continuation.

A student's performance/progress is measured by the number of credits that he/she has earned, i.e. completed satisfactorily. Based on the course credits and grades obtained by the student, grade point average is calculated. A minimum grade point average is required to be maintained for satisfactory progress and continuation in the Program. Also a minimum number of earned credits and a minimum grade point average should be acquired in order to qualify for the degree. All Programs are defined by the total credit requirement and a pattern of credit distribution over courses of different categories.

Course credits assignment:

Each course, except a few special courses, has a certain number of credits assigned to it depending upon its lecture, tutorial and laboratory contact hours in a week. This weightage is also indicative of the academic expectation that includes in-class contact and self-study outside of class hours.

Lectures and Tutorials: One lecture or tutorial hour per week per semester is assigned one credit.

Practical/Laboratory: One laboratory hour per week per semester is assigned half credit.

Example: Course: Chemistry-I: 5 credits (4-0-2)

The credits indicated for this course are computed as follows:

4 hours/week lectures = 4 credits

0 hours/week tutorial = 0 credit

2 hours/week practical = 2 *x* 0.5 = 1 credit

The contact hours in this case of **5** credits course is 6 hours per week. (**4** h Lectures + **0** h Tutorial + **2** h Practical=6 hours per week.)

For each lecture or tutorial credit, the self study component is 1 hour/week and 2 hours/week. In the above example, the student is expected to devote 3 + 1 = 4 hours per week on self study for this course, in addition to class contact of 5 hours per week.

Earning credits:

At the end of every course, a letter grade is awarded in each course for which a student had registered. On obtaining a pass grade, the student accumulates the course credits as earned credits. A student's performance is measured by the number of credits that he/she has earned and by the weighted grade point average.

The credit system enables continuous evaluation of a student's performance and allows the students to progress at an optimum pace suited to individual ability and convenience.

Features of Credit System at Shivaji University, Kolhapur:

Every course is allotted credits based on its academic importance/weightage.

1. All Courses may not have same credits.
2. There will be 23 to 28 Credits / Semester.
3. Absolute Grading System with 7 Passing Grades viz. AA, AB, BB, BC, CC, CD, DD and FF for failure.
4. Getting FF grade in 4 heads in one academic year, he/she is considered as failed.
5. Continuous Evaluation: Unit Test I i.e. T_1 [20 marks], and Unit Test II i.e. T_2 [20 marks]. Activities will be for 10 marks and the course owner/in charge will have discretion to decide the nature of activities.
6. Standardization of courses: Each course is unitized in 6 numbers. Unit Test I on units I and II while Unit Test II on units III & IV, SEE will be based on all the units of the course curriculum.
7. Unit Test I & Unit Test II will be supervised and evaluated by internal course teachers while SEE will be evaluated mostly by external and internal teachers as joint examiner ships.
8. Any request for re-test will not be entertained after internal test.

9. For both the semesters' failure courses, re-examination will be only after the even Semester End Examination. No re-examination will be conducted for odd semester courses in even semester or vice-versa.

Attendance rule:

All students must attend every lecture, tutorial and practical class. However, to account for late registration, sickness or other such conditions, the attendance requirement will be a minimum of 75 % of the classes actually held. A student with less than 75 % attendance in a course during the semester, in lectures, tutorials and practical taken together (as applicable), will be awarded the 'F' grade in that course irrespective of his/her performance in the tests.

Taking into account the consolidated attendance record for the whole semester, the course in charge in consultation with the Program Coordinator will award 'XX' grade to the student who is deficient in attendance. For the purpose of attendance calculation, every scheduled practical class will be counted as one unit irrespective of the number of contact hours.

Attendance record will be maintained based upon roll calls (or any equivalent operation) in every scheduled lecture, tutorial and practical class. The course owner will maintain and consolidate attendance record for the course (lectures, tutorials and practical together, as applicable).

Evaluation system:

1. Semester Grade Point Average (SGPA) =

$$\frac{\sum (\text{course credits in passed courses X earned grade points})}{\sum (\text{Course credits in registered courses})}$$

2. Cumulative Grade Point Average (CGPA) =

$$\frac{\sum (\text{course credits in passed courses X earned grade points) of all Semesters}}{\sum (\text{Course credits in registered courses) of all Semesters}}$$

3. At the end of B. Tech Program, student will be placed in any one of the divisions as detailed below:

   Ist Division with distinction: CGPA $\geq$ 8.25 and above

   Ist Division : CGPA $\geq$ 6.75 and < 8.25

II[nd] Division : CGPA $\geq$ 6.25 and < 6.75

As per AICTE Handbook (2011-12), gradation is as follows:

Grade Points	Equivalent Percentage Range
6.25	55
6.75	60
7.25	65
7.75	70
8.25	75

Conversion of CGPA to corresponding equivalent percentage marks for CGPA>5.0 may be obtained using the following equation:

Equivalent Percentage marks = (Respective CGPA x 10) – 7.5

An example of these calculations is given below:

Typical academic performance calculations - I semester

Course no.	**Course credits**	**Grade awarded**	**Earned credits**	**Grade points**	**Points Secured**
Col 1	Col 2	Col 3	Col 4	Col 5	Col 6 (Col 4* Col 5)
MALXXX	5	CC	5	6	30
CSLXXX	4	CD	4	5	20
PHLXXX	4	AA	4	10	40
PHPXXX	2	BB	2	8	16
MELXXX	4	FF	0	0	0
TTNXXX	2	AB	2	9	18
Total	21		17	38	124

1. Semester Grade Point Average (SGPA) =

$$\frac{(124)}{(21)} = 5.90$$

2. Cumulative Grade Point Average (CGPA) =

Cumulative points earned in all passed courses = 124 (past semesters) + 124 (this sem.) = 248 Cumulative earned credits = 23 (past semesters) + 21 (this sem.) = 44

$$\frac{\sum (124 + 124)}{} = 5.63$$

$\sum (23 + 21)$

Chart for marks range and its corresponding grade and grade points

Marks Range	Grade Points	Grade	Description of Performance
91-100	10	AA	Outstanding
86-90	09	AB	Excellent
76-85	08	BB	Very Good
66-75	07	BC	Good
56-65	06	CC	Fair
46-55	05	CD	Average
40-45	04	DD	Poor
Below 40	00	FF	Fail
--	--	$	Passed in first attempt
--	--	PP	Passed (Audit Course)
--	--	NP	Not Passed (Audit Course)
--	--	** 2^{nd} *** 3^{rd} **** 4^{th}	One grade punishment for 2^{nd} ,3^{rd}, 4^{th}, …attempt,

Audit Courses:

Additional courses shall be included as audit courses from the third semester onwards. While the performance of the student in audited courses shall be included in the Grade Card, these grades do not contribute to SGPA or CGPA of the concerned student.

Award of Degree:

Following rules prevail for the award of degree:

1. A Student has registered and passed all the prescribed courses under the general institutional and departmental requirements.
2. A student has obtained CGPA$\geq$ 4.5.
3. A student has paid all the institute dues and satisfied all the requirements prescribed.
4. A student has no case of indiscipline pending against him/her.

5. Institute authorities shall recommend the award of B.Tech degree to a student who is declared to be eligible and qualified for above norms.

CGPA Improvement Policy for award of degree:

An opportunity shall be given to a student who has earned all the credits required by the respective program with CGPA greater than or equal to 4.00 but less than 4.50, to improve his/her grade by allowing him/her to appear for 100% examinations of maximum two theory courses of seventh and eighth semester. However, CGPA shall be limited to 4.5 even though the performance of a student as calculated through modified CGPA becomes greater than 4.5.

B.Tech (Electronics & Communication Technology)
Program Educational Objectives (PEOs), Program Outcomes (POs) and Program Specific Outcomes (PSOs) of the Program:

Program Educational Objectives (PEOs):	
PEO1	Providing strong fundamentals to graduates in Mathematics, Science and Engineering to enable them to provide solutions for problems in electronics, communications and other relevant disciplines.
PEO2	Provide sound theoretical and practical knowledge in electronics and communication engineering to enable them to contribute in growth of industry and progress of society.
PEO3	Development of analytical and thinking abilities for research and development activities, leadership and entrepreneurship.
PEO4	Motivate the qualities required for team work, inter-personal communications, and professional skills and to act as good human being and responsible citizenship.
Program Outcomes (POs)	
PO1	Apply the knowledge of fundamentals of mathematics, science and electronics engineering to solve the complex engineering problems.
PO2	Identify, formulate, review research literature and analyze the problem using knowledge of science and engineering.
PO3	Designing societal and environmental friendly systems and solutions for engineering problems.
PO4	Applying research based knowledge and methods to solve the complex problems.
PO5	Application and use of modern engineering tools and techniques to solve real world problems.

PO6	Applying knowledge for assessment of social, health, safety, legal and cultural issues related to professional engineering practice.
PO7	Understanding the impact of professional engineering solutions in societal and environmental contexts and to demonstrate the need of sustainable development.
PO8	Applying ethical principles and professional ethics while executing responsibilities.
PO9	Giving best performance as an individual and as a team member.
PO10	Effectively communicate the engineering activities with society and engineering community using design documents, reports, presentations etc.
PO11	Applying principles of engineering and management for managing the projects.
PO12	Ability of life-long learning and adapting the technological changes.
Program Specific Outcomes(PSOs)	
PSO1	Ability to analyze, simulate and design the circuits and systems.
PSO2	Ability to solve industrial, societal problems using tools and techniques in electronics engineering.

Class & Semester	:	**S. Y. B.Tech (Electronics & Communication Technology) Part II, Semester III**					
Course Title	:	**Engineering Mathematics-III**				*Course Code*:	: EC 211
Teaching Scheme (Hours)	:	**Lectures 4 hours/weeks = 4 x 13 weeks= 52 hours** **Tutorial= 00 hour/week** **Practical= 02 hours/week**				*Total Credits*	: **04+01 +00 =05**
Evaluation Scheme (Marks)	:	**CIE = 50** **SEE = 50**	**IPE=Nil** **IOE=50** **EPE= Nil**	: : :	**Grand Total=150**	*Duration of SEE*	: **3 hours**
Revision:	:	**Third**				*Month*	: **December 2016**

Pre-requisites **:** Knowledge of 11th and 12th standard mathematics, Knowledge of Engineering mathematics-I & II

Type of Course	**:**	Theory
Course Domain	**:**	Basic science
Skills Imbibed	**:**	Cognitive: Recall, Understand, Apply, Analyze, Synthesize, Evaluate

Course Assessment Methods:

1. Continuous Internal Evaluation: Unit Test I & Unit Test II
2. Semester End Examination.

Course Objectives:

1. Study linear differential equations
2. Study partial differential equations
3. Study Laplace transform
4. Study fourier series and transform
5. Study probability
6. Study vector differentiation

Course Outcomes:

1. Solve linear differential equations
2. Apply LDE to electrical circuits
3. Solve circuit and signal related problems using mathematical tools.
4. Apply Fourier series and transform to signals.
5. Learn and apply theory of probability.
6. Learn and apply vector differentiation.

Curriculum Content	**Hours**
UNIT-I Linear Differential Equations Linear Differential Equations with constant coefficients, Homogenous Linear differential equations, method of variation of parameters, Applications of LDE with constant coefficients to Electrical systems.	8
UNIT-II Partial Differential Equation Four standard forms of partial differential equation of first order.	8
UNIT–III Laplace Transform Definition, properties of Laplace transforms, transforms of	9

derivatives, transforms of integral, Inverse Laplace transforms, Convolution theorem. Applications to initial value boundary problems, Heaviside Unit step function, Diracdelta function, Periodic function.

UNIT-IV Fourier series and Fourier transform 9

Fourier series- Fourier Cosine series, Fourier sine series, Half range cosine series, half range sine series, full range series, Fourier transforms- Fourier sine and cosine transforms, complex form of Fourier integral, Finite Fourier sine and cosine transforms.

UNIT- V Probability 9

Definitions of Random variable, Discrete and continuous random variable, Expected value of random variable, Variance, Moments and moment generating functions. Probability mass function and probability density function, Probability distribution for random variables , Binomial, Poisson and Normal distributions

UNIT -VI Vector Differentiation 9

Differentiation of vectors, Gradient of scalar point function, Directional derivative, Divergence of vector point function, Curl of a vector point function. Irrotational and solenoidal vector field.

Text Books :

1. J. N. Wartikar & P. N.Wartikar , "A text book of Applied Mathematics: Vol. I, II and III" Vidyarthi Griha Prakashan, Pune.

2. Dr. B. S. Grewal. "Higher Engineering Mathematics"

3. N. P. Bali, Ashok Saxena and N. Ch. S. N.Iyengar " A textbook of Engineering Mathematics"Laxmi Publication, Delhi.

Reference Books :

1. Erwin Kreyszig. "Advanced Engineering Mathematics"

Class & Semester	:	**S. Y. B.Tech (Electronics & Communication Technology), Part II, Semester III**

Course Title	:	**Engineering Mathematics-III Tutorial**						*Course Code*:	:	**EC 211L**
Teaching Scheme (Hours)	:	**2 hr /week= 2 x13= 26 hours**						*Credits*	:	**1**
Evaluation Scheme (Marks)	:	**IPE** **IOE**	: :	**Nil** **50**	**EPE** **EOE**	: :	**Nil** **Nil**	*Duration of Exam (in case of External Evaluation)*	:	**03 hours**
Revision:	:	**Third**						*Month*	:	**December 2016**

Pre-requisites : Knowledge of 11th and 12th standard mathematics, Knowledge of Engineering mathematics-I & II

Type of Course : Tutorial

Course Domain : Basic science

Skills Imbibed : Cognitive: Understand, Apply, Analyze, Evaluate, Create

Course Assessment Methods:

Internal oral examination, tutorial assessment

Practical List :

Minimum 10 tutorials based on syllabus

Lab Manual :

Nil

Class & Semester	:	**S. Y. B.Tech (Electronics & Communication Technology) Part II, Semester III**			
Course Title	:	**Electrical Technology**	*Course Code*:	:	EC 212
Teaching Scheme (Hours)	:	**Lectures** **3 hours/weeks = 3 x 13 weeks= 39 hours**	*Total Credits*	:	**03+00 +01 =04**

		Tutorial= 00 hour/week **Practical= 02 hours/week**						
Evaluation Scheme (Marks)	:	**CIE =50** **SEE = 50**	**IPE=Nil** **IOE=Nil** **EPE= 50**	: : :	**Grand Total=150**	*Duration of SEE*	:	**3 hours**
Revision:	:	**Third**				*Month*	:	**December 2016**

Pre-requisites **:** Good knowledge of engineering mathematics, fundamentals of physics

Type of Course **:** Theory & practical

Course Domain **:** Core

Skills Imbibed **:** Cognitive: Recall, Understand, Apply, Analyze, Synthesize, Evaluate

Course Assessment Methods:

1. Continuous Internal Evaluation: Unit Test I & Unit Test II
2. Semester End Examination.

Course Objectives:

1. Analysis and design of armature and field system for DC motor
2. To study speed control methods and starters for DC and AC machine.
3. Describe and apply fundamental concepts for operation of three phase transformer
4. To Study of different power factor correction techniques with their practical importance.
5. Analysis and design of the special purpose machine.
6. To study the fundamental concepts of basic of Power transmission and distribution

Course Outcomes:

1. Understand the working principle, performance, control and applications of AC, DC Machines and Transformer.
2. Understand the working and performance analysis of Transmission and Distribution of power.
3. Analyze unregulated power supplies.
4. Analyze and Carry out basic experiments on AC, DC machine
5. Analyze and solve AC, DC machine and Transformer related problems.
6. Design and experiment with DC machine and transformer.

Curriculum Content **Hours**

UNIT.1 DC Machines

DC Generator: Construction features, emf equation of dc generator, methods of excitation, losses condition for maximum efficiency, armature reaction, commutation, methods of improving commutation, characteristics of separately excited and self excited dc generator. 6

DC Motor: Working principle, voltage equation, condition for maximum power, characteristics, operating characteristics of dc motor, torque developed, starting, speed control methods, swinburn's and break test of dc shunt motor.

UNIT.2 Poly Phase Circuits

Generation of polyphase voltages , Relationship between line & phase values for star & delta connections.Active, Reactive and Power factor measurement in three phase balanced circuits by two wattmeter metods. (Numerical treatment). 6

UNIT.3 Three Phase Transformers and Induction Motors

Three Phase transformers: Construction, connections, Scott connection, V-V Connection, Instrument transformers, Current transformers and potential transformers. 12

Induction Motor – Three Phase Induction Motors Rotating magnetic field, construction & principle of operation, slip, rotor frequency, development of equivalent circuit, torque equation, maximum torque, torque – speed characteristics, speed control. Starting methods, motor ratings. Induction motor as generalized transformer (Numerical treatment).

UNIT.4 Power factor Measurement and correction

Significance of power factor Causes of low power factor, Disadvantages of low power factor, power factor correction methods (Numerical treatment). 6

UNIT.5 Special purpose Machines

Construction, working Principle, types and applications - AC/DC Tachogenerators, single phase induction and stepper motors. 12

UNIT.6 Basic of Power transmission and distribution

Operation of different power plants using block diagram-different terminologies like load factor, diversity factor, plant utilization factors etc. Classification of transmission lines, transmission line parameters, ABCD constants, Voltage regulation, Ferranti effect, efficiency of transmission line. 3-phase 3-wire and 3-phase 4-wire distribution system, feeders, distributors, main lines, comparison of various distribution systems. 6

Reference Books :

1. Text of Electrical Technology ;Vol -2; B. L. Theraja, and A. K. Theraja; S. Chand Publication

2. Electrical machines BY Ashfaq Hussain; Dhanpatrai and Co.

3. Principles of Electrical power systems by J. B. Gupta.

4. Generalized theory of rotating machines By P S Bhimra

Class & Semester	:	**S. Y. B.Tech (Electronics & Communication Technology), Part II, Semester III**

Course Title	:	**Electrical Technology Laboratory**					*Course Code*:	:	**EC 212L**
Teaching Scheme (Hours)	:	**2 hr /week= 2 x13= 26 hours**					*Credits*	:	**1**
Evaluation Scheme (Marks)	:	**IPE**	:	**50**	**EPE**	: **Nil**	*Duration of Exam (in case of External Evaluation)*	:	**03 hours**
		IOE	:	**Nil**	**EOE**	: **Nil**			
Revision:	:	**Third**					*Month*	:	**December 2016**

Pre-requisites	:	Good knowledge of engineering mathematics, fundamentals of physics
Type of Course	:	Practical
Course Domain	:	Core
Skills Imbibed	:	Cognitive: Understand, Apply, Analyze, Evaluate, Create

Course Assessment Methods:

Practical Journal Assessment, External Practical Examination

Practical List :

Minimum 10 experiments based on syllabus

1. Study of Break load test on DC motor

2. To perform Open Circuit and Short circuit Test on a transformer and find its efficient and

regulation.

3. Speed control of DC Shunt Motor using a) Armature control and b) field control methods

4. To obtain Magnetizing Characteristics, Internal & External Characteristic of Self Excited DC Shunt Generator. Also obtain the critical filed resistance of the machine from magnetizing Characteristics.

5. To conduct direct load test on a D.C. compound generator with a) Shunt field alone b) Cumulative and differential compounding for short and long shunt connections.

6. To obtain Speed-Torque characteristics of DC Series Motor

7. To obtain Speed-Torque characteristics of DC Shunt Motor.

8. To study different starters of D. C. motor.

9. To study different starters of three phase induction motor

10. To perform No load and Block rotor test on induction motor and plot equivalent circuit

11. To Study the effect of Inserting resistance on rotor of Slip ring induction motor.

12. Power factor measurement of series RLC circuit

13. To find the voltage regulation of synchronous machine

14. To study capacitor start and capacitor run induction motor

15. Find Voltage regulation and efficiency of Medium transmission line

16. Find Voltage regulation and efficiency of Long transmission line

17. To study various power factor improvement methods

18. To study the block diagram of various power plants

19. Active and reactive power measurement by using two wattmeter method

Lab Manual

- Institute's Laboratory Course Manual and equipment wise Standard Operating Procedure to follow.

<table>
<tr><td>Class & Semester</td><td>:</td><td colspan="5">S. Y. B.Tech (Electronics & Communication Technology)
Part II, Semester III</td></tr>
<tr><td colspan="8"></td></tr>
<tr><td>Course Title</td><td>:</td><td colspan="2">Electronics Circuit Analysis and Design-I</td><td colspan="2">Course Code:</td><td>:</td><td>EC 213</td></tr>
<tr><td rowspan="3">Teaching Scheme (Hours)</td><td rowspan="3">:</td><td colspan="2">Lectures
3 hours/weeks = 3 x 13 weeks= 39 hours</td><td colspan="2" rowspan="3">Total Credits</td><td rowspan="3">:</td><td rowspan="3">03+00 +01 =04</td></tr>
<tr><td colspan="2">Tutorial= 00 hour/week</td></tr>
<tr><td colspan="2">Practical= 02 hours/week</td></tr>
<tr><td>Evaluation Scheme (Marks)</td><td>:</td><td>CIE = 50
SEE = 50</td><td>IPE=Nil
IOE=Nil
EPE= 50</td><td>:
:
:</td><td>Grand Total=150</td><td>Duration of SEE</td><td>:</td><td>3 hours</td></tr>
<tr><td>Revision:</td><td>:</td><td colspan="3">Third</td><td>Month</td><td>:</td><td>December 2016</td></tr>
</table>

Pre-requisites	**:**	Good knowledge of engineering mathematics, fundamentals of physics
Type of Course	**:**	Theory & Practical
Course Domain	**:**	Core
Skills Imbibed	**:**	Cognitive: Recall, Understand, Apply, Analyze, Synthesize, Evaluate

Course Assessment Methods:

1. Continuous Internal Evaluation: Unit Test I & Unit Test II, assignments
2. Semester End Examination.

Course Objectives:

1. To introduce analysis and design of unregulated power supplies with their advantages and disadvantages..
2. To study discrete voltage regulator circuits.

3. To study fixed and adjustable voltage regulators.

4. Study of different transistor biasing techniques with their advantages and disadvantages.

5. To study and analyze the voltage amplifiers.

6. To study multistage amplifiers.

Course Outcomes:

1. Understand the basic principles of electronics circuit design.
2. Analyze unregulated power supplies.
3. Analyze and design voltage regulator circuits.
4. Study the working principle and characteristics of electronics circuit.
5. Analyze and design voltage amplifiers, tuned amplifiers.
6. Design and experiment with basic electronic circuits.

Curriculum Content

Hours

UNIT I. Unregulated power supplies **07**

Review of rectifiers, analysis of different parameters, PIV, TUF, efficiency, ripple factor, regulation, etc. specifications and ratings of diodes. Filters – types of filters, analysis for ripple factor and regulation. Design of unregulated power supplies with and without filters,
Different types of filters and their design

UNIT II. Voltage Regulators **07**

Need of voltage regulator, Stabilization factors, Analysis & Design of zener voltage regulator, transistorized series and shunt voltage regulators , transistor series voltage regulator with error amplifier, protection circuits

UNIT III. IC Regulators **05**

Study and design of regulators using IC's:78XX, 79XX, IC 723, LM317, Switching regulator: Introduction and study of LM3524 IC

UNIT IV. Transistor Biasing **07**

Need of biasing, DC load line analysis, operating point, thermal

runaway. Analysis of different biasing circuits: fixed bias, collector to base bias & voltage divider bias. Stability factor, General expression for stability factor, stability factor for all biasing circuits. Design of biasing circuits, Compensation techniques: Thermistor and diode compensation.

UNIT V. Voltage Amplifier **07**

H-Parameters, Hybrid model for transistor (CE, CB& CC configuration), Generalized H-parameter analysis of transistor amplifier for Voltage Gain, Current gain, Input resistance & Output resistance taking Rs into consideration, approximate H-parameter model for CE,CB & CC. Classification of voltage amplifiers, Detailed study of Single stage RC coupled amplifier & Emitter follower. Analysis for voltage gain, current gain, input resistance & Output resistance. Design of single stage RC coupled amplifier & Emitter follower. Frequency response of single stage RC coupled amplifier

UNIT VI. Design of Amplifiers

06

Design of multistage RC coupled amplifier, Low frequency response Effect of emitter bypass capacitor(CE) & Coupling capacitor(Cc), Amplifier response to square wave, percentage Sag calculation, High frequency response: Hybrid p model , Derivation for CE short circuit & resistive current gain, ß cutoff, cutoff frequency, approximate amplifier high freq. response to square wave, gain bandwidth product. Design of direct and transformer coupled amplifiers, feedback in amplifiers

Text Books :

1. Allen Mottershed –'Electronic devices & circuits'-Prentice- Hall India

2. J. Millman & C.Halkias -'Electronic devices & circuits'-2nd Edition- Tata McGraw Hill Publication

3. N.C. Goyal & R.K. Khetan-' A Monograph on Electronics Design Principles'-5th, Edition-Khanna Publishers

4. J.B.Gupta, 'Electronic Devices and circuits', Katson books

Reference Books :

1. David A. Bell –'Electronic devices & circuits'- 4th Edition- Prentice- Hall India

2. Robert L. Boylsted, Louis Nashelsky- 'Electronic devices & circuit theory'- 9th edition- Pearson Education

3. National Semiconductor Data Manual.

Note for question paper setter:

• Question paper shall consist of approximately 75% analysis & design based problems and approximately 25% theory should be covered.

Class & Semester	:	**S. Y. B.Tech (Electronics & Communication Technology), Part II, Semester III**									
Course Title	:	**Electronics Circuit Analysis and Design-I Laboratory**						*Course Code*:	:	**EC 213L**	
Teaching Scheme (Hours)	:	**2 hr /week= 2 x13= 26 hours**						*Credits*	:	**1**	
Evaluation Scheme (Marks)	:	**IPE** **IOE**	: :	**Nil** **Nil**	**EPE** **EOE**	: :	**50** **Nil**	*Duration of Exam (in case of External Evaluation)*	:	**03 hours**	
Revision:	:	**Third**						*Month*	:	**December 2016**	

Pre-requisites : Good knowledge of engineering mathematics, fundamentals of physics

Type of Course : Practical

Course Domain : Core

Skills Imbibed : Cognitive: Understand, Apply, Analyze, Evaluate, Create

Course Assessment Methods:

Practical Journal Assessment, External Practical Examination

Practical List :

Minimum 10 experiments based on syllabus. 8 experiments should be hardware based and 2 experiments should be simulation based.

1. Study of ratings of Electronic components and lab equipment.

2. Design & analysis of Half wave rectifier (HWR) with & without filter by calculating performance parameters

3. Design & analysis of Full wave rectifier (FWR) with & without filter by calculating performance parameters

4. Design & analysis of Bridge rectifier with & without filter by calculating performance parameters

5. Design & analysis of Zener shunt regulator.

6. Design & analysis of Transistorized shunt regulator.

7. Design & analysis of series pass regulator with & without pre- regulator.

8. Design & analysis of Voltage divider biasing circuit.

9.Design of IC based fixed voltage regulators

10. Design of IC based adjustable voltage regulators

11. Determination of H-parameters from transistor CE characteristics.

12. Calculation of performance parameters (Av, Ai, Ri, Ro) for single stage RC

coupled amplifier.

13. Study of Frequency response of single stage stage RC coupled amplifier.

14. Study of square wave response of RC coupled amplifier & calculation of Sag & rise time (tr).

15. Design of multistage amplifier.

16. Comparative study of voltage amplifiers (with & without feedback).

17. Design & analysis of voltage series feedback amplifier.

Lab Manual :

- Institute's Laboratory Course Manual and equipment wise Standard Operating Procedure to follow.

Reference Books **:**

1. David A. Bell –'Electronic devices & circuits'- 4th Edition- Prentice- Hall India

2. Robert L. Boylsted, Louis Nashelsky- 'Electronic devices & circuit theory'- 9th edition- Pearson Education

3. National Semiconductor Data Manual.

Class & Semester	:	**S. Y. B.Tech (Electronics and Communication Technology) Part II, Semester III**					
Course Title	:	**Network Analysis**			*Course Code*:	:	**EC 214**
Teaching Scheme (Hours)	:	**Lectures 3 hours/weeks=3 x 13 weeks= 39 hours minimum** **Tutorial= 01 hour/week** **Practical= Nil**			*Total Credits*	:	**03+01 = 04**
Evaluation Scheme (Marks)	:	**CIE =50** **SEE = 50**	**IPE= Nil** **IOE= 50** **EPE= Nil**	: : :	**Grand Total=150**	*Duration of SEE*	:	**3 hours**
Revision:	:	**Third**			*Month*	:	**December 2016**

Pre-requisites **:** Engineering Mathematics I and II, Electronic devices and circuits.

Type of Course **:** Theory & Tutorial

Course Domain **:** Core

Skills Imbibed **:** Cognitive: Recall, Understand, Apply, Analyze, Synthesize, Evaluate
Affective : Awareness, Respond, Value, Organize

Course Assessment Methods:

1. Continuous Internal Evaluation: Unit Test I & Unit Test II, Tutorial.
2. Semester End Examination.

Course Objectives:

1. To introduce basic theorems used for network analysis.
2. To teach two port networks and its parameters
3. To clarify series and parallel resonance and its use.
4. To demonstrate linear system behavior using pole zero plot
5. To impart design methods filter and attenuator.

Course Outcomes:

1. Apply appropriate network theorem to find circuit solution.
2. Understand AC resonant circuits.
3. Solve circuit using different network theorems.
4. Calculate parameters of two port network.
5. Simulate different R-L-C circuits for AC/DC input.
6. Design different filters and attenuator.

CURRICULUM CONTENT **Hours**

UNIT.1. CIRCUIT FUNDAMENTALS **09**

Voltage sources, Current sources, Conversion of voltage sources to current sources and vice a versa. Network terminology :- Node ,Junction, Branch, Loop, Network solution by branch current method, Loop or Mesh current method, Node voltage method, Star delta connection and conversion Network Theorems:- Thenenins Theorem, Nortans Thereon , Maximum Power Transfer Theorem, Superposition Theorem, Millmans theorem, Substitution theorem.

UNIT.2. RESONANCE CIRCUITS **10**

Series resonance circuit, Frequency response of a series resonant circuit, Q factor, Bandwidth, selectivity, Effect of Q on bandwidth and selectivity, Relation between bandwidth and Q, Impedance of a series resonant circuit, Resonance by variation of L and C, Parallel resonant circuit and effect of resistance of a capacitance, Frequency response of parallel resonant circuit.

UNIT.3. TWO- PORT NETWORK **09**

Two- port network parameters, r, y, z, h, A B C D relation between the parameters, Inter-conversion of two port networks, cascade connection series connection, series parallel connection, T and M network representation of a two port network.

UNIT.4. NETWORK FUNCTIONS

Laplace transform, Transform of a voltage and current, Transform of circuit elements, Network functions, Poles and zeros of the network functions, Pole zero plot, Physical significance of poles and zeroes, Stability, Two-port network parameters in the frequency domain Transient response: - step input response in R-L circuit, step input response in R-C circuit, step input response in R-L-C circuit, ac transients. **10**

UNIT.5. FILTERS

Definitions, classification and characteristics of different filters, filter fundamentals such as attenuation constant(alpha), phase shift (beta), propagation constant (gamma), characteristic impedance (Zo), decibel, neper.Design and analysis of constant K, M derived and composite filters (low pass, high pass, band pass, and band stop filters): T and PI sections. **06**

UNIT.6. ATTENUATORS

definitions, classification, relation between neper and decibel, analysis and design of T type, PI type, alpha lattice, bridged –T and L types attenuators. **07**

Text Books **:**

1. “"A.Sudhakar, Shymmohan S. Palli, ‘Circuit and Network – Analysis and Synthesis’, 3rd Edition, Tata McGraw Hill Publication.

Reference Books **:**

1. D. Roy Choudhuri, ‘Networks and Systems’, New Age International Publisher.
2. A. Chakrabarti, ‘Circuit theory (Analysis and Synthesis)’, IIIrd edition, Dhanpat Rai and Co.
3. M.E.Van Valkenburg, ‘Network Analysis’, IIIrd edition, Pearsons Education/PHI.
4. Josheph Edministrar, ‘Theory and Problems of Electronic Circuit (Schaum’s Series) – Tata McGraw Hill Publication.
5. Soni Gupta, ‘Electrical Circuit Analysis’, Dhanpat Rai and Co.
6. Boylestad, ‘Introductory Circuit Analysis’, Universal Book Stall, New Delhi.

Note for Paper Setter: Question paper should consist of 70% of numerical and 30% of theory questions.

Class & Semester	:	**S. Y. B.Tech (Electronics and Communication Technology) Part II, Semester III**			
Course Title	:	**Network Analysis Tutorial**	*Course Code*:	:	**EC 214L**
Teaching Scheme	:	**1 hr /week= 1 x13= 13 hours**	*Credits*	:	**1**

(Hours)											
Evaluation Scheme (Marks)	:	**IPE** **IOE**	: :	**Nil** **50**	**EPE** **EOE**	: :	**Nil** **Nil**	*Duration of Exam (in case of External Evaluation)*	:	**Nil**
Revision:	:	**Third**						*Month*	:	**December 2016**

Pre-requisites **:** Engineering mathematics-I, Engineering mathematics-II and engineering mathematics-III

Type of Course **:** Tutorial

Course Domain **:** Core

Skills Imbibed **:** Cognitive: Understand, Apply, Analyze, Evaluate, Create

Course Assessment Methods:

Tutorial Assessment, Internal Oral Examination.

Tutorials:

Minimum ten tutorials should be conducted based on theory curriculum.

Six tutorials should be based on the six units in curriculum. These tutorials include variety of the numerical.

Four tutorials should be done on any simulation tool like PSPICE, MultiSim etc. which may include but not limited to
- Solving AC or DC circuits.
- Finding response of the passive linear circuits.
- Bias point analysis of passive network.

Reference Books **:**

1. D. Roy Choudhuri, 'Networks and Systems', New Age International Publisher.
2. A. Chakrabarti, 'Circuit theory (Analysis and Synthesis)', IIIrd edition, Dhanpat Rai and Co.
3. M.E.Van Valkenburg, 'Network Analysis', IIIrd edition, Pearsons Education/PHI.
4. Josheph Edministrar, 'Theory and Problems of Electronic Circuit (Schaum's Series) – Tata McGraw Hill Publication.
5. Soni Gupta, 'Electrical Circuit Analysis', Dhanpat Rai and Co.
6. Boylestad, 'Introductory Circuit Analysis', Universal Book Stall, New Delhi

Class & Semester	:	**S. Y. B.Tech (Electronics and Communication**

<table>
<tr><td></td><td></td><td colspan="5">Technology) Part II, Semester III</td></tr>
<tr><td colspan="7"></td></tr>
<tr><td>Course Title</td><td>:</td><td colspan="2">Digital Techniques</td><td>Course Code:</td><td>:</td><td>EC 215</td></tr>
<tr><td rowspan="3">Teaching Scheme (Hours)</td><td rowspan="3">:</td><td colspan="2">Lectures
4 hours/weeks=4x 13 weeks= 52 hours minimum</td><td rowspan="3">Total Credits</td><td rowspan="3">:</td><td rowspan="3">04+00+01 = 05</td></tr>
<tr><td colspan="2">Tutorial- Nil</td></tr>
<tr><td colspan="2">Practical= 02 hours/week</td></tr>
<tr><td>Evaluation Scheme (Marks)</td><td>:</td><td>CIE = 50
SEE = 50</td><td>IPE=Nil
IOE=Nil
EOE= 50</td><td>:
:
:</td><td>Grand Total=150</td><td>Duration of SEE</td><td>:</td><td>3 hours</td></tr>
<tr><td>Revision:</td><td>:</td><td colspan="3">Third</td><td>Month</td><td>:</td><td>December 2016</td></tr>
</table>

Pre-requisites	**:**	Basic knowledge of Mathematics, logic and Electronic circuit devices
Type of Course	**:**	Theory
Course Domain	**:**	Core
Skills Imbibed	**:**	Cognitive: Recall, Understand, Apply, Analyze, Synthesize, Evaluate

Course Assessment Methods:

1. Continuous Internal Evaluation: Unit Test I & Unit Test II, Regular Tutorial, home assignments
2. Semester End Examination.

Course Objectives:

1. The course will introduce the student with fundamental concept of digital techniques
2. To acquire the basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits.
3. To prepare students to perform the analysis and design of various digital

electronic circuits.

4. To develop skill to build, and troubleshoot digital circuits.

Course Outcomes:

After successfully completion of this course student will be able to

1. Understand number systems and its arithmetic operations and Illustrate Use of Boolean algebra.

2.Formulate and apply Karnaugh Map to reduce Boolean expressions and logic circuits to their simplest forms.

3.Design of combinational circuits like comparators multiplexers, de-multiplexers, encoder, decoder and different code converters.

4.Understand working of flip-flops, its characteristics and conversion using truth table.

5.Design of sequential circuit like counters and shift registers.

6. Understand characteristics and interfacing of logic families and remembering concept of memory technology.

Curriculum Content

Hours

UNIT.1. Binary Codes and Boolean algebra **07**

Signals : Analog and Digital, Binary Number System. Addition, Subtraction, Multiplication, Division of binary numbers, Subtraction using 2's complement method. Binary codes: weighted and non weighted codes, self complementary codes, BCD, Excesses-3, Gray codes, Alphanumeric codes, ASCII Codes.

Boolean algebra: Boolean Laws and Expression using Logic Gates, Realization of different gates using Universal gates, De-Morgan's Theorem, Duality Theorems.

UNIT.2. Boolean Function minimization Techniques **10**

Standard forms: SOP, POS, Simplification of Switching function & representation (Maxterm & Minterm), Boolean expression & representation using logic gates, Propagation delay in logic gate. *Karnaugh map*: K-map, mapping and minimization of SOP and POS expression, Don't care condition, conversion from SOP to POS and POS to SOP form using K-map, Minimization of multiple output circuits, Quine Mc-cluskey method minimization technique, prime implicant table, Don't care condition.

UNIT.3. Combinational Circuits Design **10**

Adder & Subtractor(Half and Full), Parallel Binary adder, BCD Adder, Binary multipliers, Code Converters, parity bit generator, Comparators, Decoder, BCD to 7-segment Decoder, Encoders, Priority Encoders, Multiplexers, De Multiplexers, Introduction to RAM, PAL, PLA.

UNIT.4. Sequential Circuits Elements **09**

Introduction to sequential circuit, Flip-flop & Timing Circuits: SR latch, Gated latch, Tri state logic, Edge triggered flip-plop: - D, JK, T Flip-flop, flip-flop asynchronous inputs ,characteristic table of Flip-flop, excitation table of Flip-flop, master slave JK flip flop, inter conversion of Flip-flop. Study of timing parameters of flip-flop.

UNIT.5. Shift Registers and Counters **10**

Shift registers: buffer register, controlled buffer register. Data transmission in shift resistor SISO, SIPO, PISO, PIPO, Bidirectional shift register, universal shift registers. *Counter*: Classification, Ripple or asynchronous counter, Effect of propagation delay in ripple counters, up-down counter, Design of Mod-n counter, synchronous counter, Ring counter, Johnson counter. Introduction to FSM.

UNIT.6. Logic Families and Memory Technology

06

Digital IC specification terminology, Logic families: TTL, CMOS, ECL families, Interfacing of TTL to CMOS & CMOS to TTL. *Memory Technology:* Memory organization, Expanding memories, Classification of Memory.

Text Books **:**

1. A. Anand Kumar 'Fundamentals of Digital Circuits'. PHI Publications

2. R.P. Jain-'Modern Digital Electronics' IIIrd Edition- Tata Mc Graw Hill, Publication

Reference Books **:**

1. Willim I. Fletcher.'An Engineering Approach to Digital Design' PHI

2. Norman Balabanian Bradle Carlson. 'Digital Logic Design Principals.' Wiley Publication.

3. Rajkamal 'Digital Systems Principals and Design' Pearson Education

4. A.P. Malvino, D.P. Leach 'Digital Principles & Applicatios' -VIth Edition-TMH publication.

5. M. Morris Mano 'Digital Design' (Third Edition). PHI Publications

Note for paper setter:

• Question paper shall consist of approximately 50% design based on combinational and sequential circuits and 50% theory.

Class & Semester	:	**S. Y. B.Tech (Electronics and Communication Technology), Part II, Semester III**									
Course Title	:	**Digital Techniques Laboratory**						*Course Code*:	:	**EC 215L**	
Teaching Scheme (Hours)	:	**2 hr /week= 2 x13= 26 hours**						*Credits*	:	**1**	
Evaluation Scheme	:	**IPE** **IOE**	: :	**Nil** **Nil**	**EPE** **EOE**	: :	**Nil** **50**	*Duration of Exam (in case of External*	:	**03 hours**	

(Marks)								*Evaluation)*		
Revision:	:	**Third**						*Month*	:	**December 2016**

Pre-requisites **:** Laboratory work in Electronics circuits and devices.

Type of Course **:** Practical

Course Domain **:** Core

Skills Imbibed **:** Cognitive: Understand, Apply, Analyze, Evaluate, Create

Course Assessment Methods:

Practical Journal Assessment and External oral Examination

Practical List :

1. Study of basic gates using TTL, CMOS: 7432, 4011, 4050, 4070,4071,40106
2. Study of Static I/O and transfer Characteristic of TTL.
3. Study of Static I/O and transfer Characteristic of CMOS.
4. Study of Universal gates (NAND, NOR)
5. K map based implementation of combinational logic
6. Half and Full Adder, Half and Full Subtractor
7. 4 bit parallel Adder / Subtractor using IC 7483
8. Code Converters (Binary to Gray, Excess 3 to Binary)
9. Comparator using IC 7485
10. Implementation of combinational logic using MUX
11. Study of Decoder and DEMUX (IC 74138)
12. Study of 7 segment decoder driver. (IC 7447)
13. Study of Flip Flops (SR FF, D FF, JK FF, T FF)
14. Design Built and test MOD N counter
15. Design Built and test Shift Register

16. Design and implementation of Johnson Counter

17. Design 3 bit sequence detector

Lab Manual:

- Institute's Laboratory Course Manual and equipment wise Standard Operating Procedure to follow.

Note for Laboratory Experiment:

- Minimum 10 Experiments on basis of above mention list or Syllabus.
- 8 Experiment should be on hardware realization or Kits.
- 2 experiments on any Simulation tool e.g. Pspice, MultiSIm etc.

<table>
<tr><td>Class & Semester</td><td>:</td><td colspan="5">S. Y. B.Tech (Electronics & Communication Technology)
Part II, Semester III</td></tr>
<tr><td colspan="8"></td></tr>
<tr><td>Course Title</td><td>:</td><td colspan="3">Programming techniques</td><td>Course Code:</td><td>:</td><td>EC 216</td></tr>
<tr><td rowspan="3">Teaching Scheme (Hours)</td><td rowspan="3">:</td><td colspan="3">Lectures
2 hours/weeks = 2 x 13 weeks= 26 hours</td><td rowspan="3">Total Credits</td><td rowspan="3">:</td><td rowspan="3">02+00 +01 =03</td></tr>
<tr><td colspan="3">Tutorial= 00 hour/week</td></tr>
<tr><td colspan="3">Practical= 02 hours/week</td></tr>
<tr><td>Evaluation Scheme (Marks)</td><td>:</td><td>CIE = Nil
SEE = Nil</td><td>IPE=Nil
IOE=Nil
EPE= 50</td><td>:
:
:</td><td>Grand Total=50</td><td>Duration of SEE</td><td>:</td><td>3 hours</td></tr>
<tr><td>Revision:</td><td>:</td><td colspan="3">Third</td><td>Month</td><td>:</td><td>December 2016</td></tr>
</table>

Pre-requisites	**:**	Good knowledge of engineering mathematics
Type of Course	**:**	Practical
Course Domain	**:**	Core
Skills Imbibed	**:**	Cognitive: Recall, Understand, Apply, Analyze, Synthesize, Evaluate

Course Assessment Methods:

1. External Practical Examination

Course Objectives:

1. Study concepts of object oriented programing.
2. Familiar with C programming
3. Understand constructors and destructors
4. Understand polymorphism, inheritance
5. Learn pointers
6. Learn file handling

Course Outcomes:

1. Understand basic concepts of programming.
2. Experiment with C compiler
3. Develop code in C language to accomplish given task
4. Make use of advanced OOP features in programming.
5. Demonstrate programming skills.
6. Explain features of OOP language.

Curriculum Content

Hours

UNIT.1. Introduction 4

Object oriented programming [C++], applications of OOP & C++,dynamic initialization of variables, storage classes. Functions in C++, function prototype, call & return by reference, inline function, Default & Const argument.

UNIT.2. Classes & Objects 4

Specifying class, defining member function, making an outside function inline, Nesting member function, private member function, Arrays within a class, memory allocation for objects, Array of objects, pointer to members.

UNIT.3. Constructors and Destructors 4

Constructors, parameterized and multiple, Constructors with default arguments, Dynamic initialization of objects (new, delete) copy constructor, dynamic constructors and destructors.

UNIT.4. Polymorphism & Inheritance 5

Function overloading, Unary & binary operator overloading, manipulation of strings using operators. Friend function & friend class. Single, multiple, multilevel, Hybrid, Hierarchical inheritance, virtual base classes, Abstract

classes.

UNIT.5. Pointers 5

Pointers to objects, this pointer, pointer to derived classes

UNIT.6. File Handling 4

Classes for file stream operations, opening and closing of files, file modes, file pointer & their manipulations, sequential I/O operations. Graphics: Introduction to graphics.

Text Books **:**

1. E Balgurusamy –'Object oriented programming with C++' -, IInd Edition- Tata Mc-Graw Hill Publication

Reference Books **:**

1. Herbert Schildt –'The Complete Reference C++' - IIIrd Edition - Tata McGraw Hill Publication

2. Ravichandran D.-'Programming with C++ '-IInd Edition- Tata McGraw Hill Publication

3. Robert Lafore –'C++ Programming' –. IV th Edition –Techmedia, New Delhi.

Class & Semester	:	**S. Y. B.Tech (Electronics and Communication Technology), Part II, Semester III**									
Course Title	:	**Programming Techniques Laboratory**						*Course Code*:	:	**EC 216 L**	
Teaching Scheme (Hours)	:	**2 hr /week= 2 x13= 26 hours**						*Credits*	:	**1**	
Evaluation Scheme	:	**IPE** **IOE**	: :	**Nil** **Nil**	**EPE** **EOE**	: :	**50** **Nil**	*Duration of Exam (in case*	:	**03 hours**	

(Marks)								*of External Evaluation)*		
Revision:	:	**Third**						*Month*	:	**December 2016**

Pre-requisites	**:**	Good knowledge of engineering mathematics, fundamentals of physics
Type of Course	**:**	Practical
Course Domain	**:**	Core
Skills Imbibed	**:**	Cognitive: Understand, Apply, Analyze, Evaluate, Create

Course Assessment Methods:

Practical Journal Assessment, External Practical Examination

Practical List **:**

Minimum 10 practical based on syllabus.

1. Classes & objects - 1

2. Constructors &Destructors - 1

3. Copy Constructor - 1

4. Unary operator overloading - 1

5. Binary operator overloading - 1

6. Function overloading - 1

7. Friend function - 1

8. Friend class - 1

9. Inheritance - 2

10. Pointers and virtual function - 1

11. File handling - 1

12. Graphics. – 1

Lab Manual **:**

- Institute's Laboratory Course Manual and equipment wise Standard Operating Procedure to follow.

Reference **:**

Books

1. Herbert Schildt –'The Complete Reference C++' - IIIrd Edition - Tata McGraw Hill

Publication

2. Ravichandran D.-'Programming with C++ '-IInd Edition- Tata McGraw Hill

Publication

3. Robert Lafore –'C++ Programming' –. IV th Edition –Techmedia, New Delhi.

Class & Semester	:	**S. Y. B.Tech (Electronics and Communication Technology) Part II, Semester III**						
Course Title	:	**Environmental Studies**				*Course Code*:	:	**HS211**
Teaching Scheme (Hours)	:	**Lectures 2 hours/weeks = 2 x 13 weeks= 26 hours** **Tutorial= 00 hour/week** **Practical= 00 hours/week**				*Total Credits*	:	**Nil**
Evaluation Scheme (Marks)	:	**CIE = 00 SEE = 70**	**IPE=30**	: :	**Grand Total=100**	*Duration of SEE*	:	**2 hours** (SEE at the yearend)
Revision:	:	**Third**				*Month*	:	**December 2016**

Pre-requisites	**:**	Engineering Chemistry
Type of Course	**:**	Theory and field work
Course Domain	**:**	Humanities and Applied Science
Skills Imbibed	**:**	Affective : Awareness, Respond, Value, Organize Psychomotor: Imitation, manipulation, articulation, naturalization

Course Assessment Methods:

1. Project / Field work
2. Semester End Examination.

Course Objectives:

1. To recall fundamental physical and biological principles those govern natural processes.
2. To understand the importance of ecological balance for sustainable development.
3. To Understanding the impacts of developmental activities and mitigation measures and to further understand the environmental policies and regulations.
4. To identify the complex relationships between scientific approaches to environmental issues and political, social, economic, and ethical perspectives on the environment.
5. To collect and interpret scientific data in both field and laboratory settings.
6. To integrate and apply perspectives from across the natural sciences, social sciences, and the humanities in the context of complex environmental problems.
7. To communicate scientific information to both professional and lay audiences.

Course Outcomes:

1. Develop an understanding of different natural resources including renewable resources.
2. Realize the importance of ecosystem and biodiversity for maintaining ecological balance.
3. Aware of important acts and laws in respect of environment.
4. Demonstrate critical thinking skills in relation to environmental affairs
5. Develop an understanding of environmental pollutions and hazards due to engineering/technological activities and general measures to control them.
6. Demonstrate knowledge and application of communication skills and the ability to write effectively in a variety of environmental contexts.
7. Demonstrate an ability to integrate the many disciplines and fields that intersect with environmental concerns.
8. Demonstrate an appreciation for need for sustainable development and role of science.

Curriculum Content **Hours**

UNIT I: Significance of environmental studies **04**

Multidisciplinary nature of environmental studies Need for public awareness.

a) Forest resources: Use and over-exploitation, deforestation, Timber extraction, mining, dams and their effects on forests and tribal people. b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. c) Mineral resources: Usage and exploitation, environmental effects of extracting and using mineral resources. d) Food resources: World food problem, changes caused by agriculture effects of modern agriculture, fertilizer-pesticide problems. e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. g) Role of an individual in conservation of natural resources. h) Equitable use of resources for sustainable lifestyle.

UNIT II: Ecosystems **04**

Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids. Introduction, types, characteristics features, structure and function of the following Ecosystem: - a) Forest ecosystem, b) Grassland ecosystem, c) Desert ecosystem,

d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

UNIT III: Biodiversity and its Conservation **04**

Introduction – Definition: genetic, species and ecosystem diversity, Biogeographical classification of India, Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.; Biodiversity at global, National and local levels.; India as a mega-diversity nation; Western Ghats as a bio-diversity region; Hot-spots of biodiversity; Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; Endangered and endemic species of India; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT IV: Environmental Pollution **04**

Definition: Causes, effects and control measures of:

a) Air pollution, b) Water pollution, c) Soil pollution, d) Marine pollution, e) Noise pollution, f) Thermal pollution, g) Nuclear hazards

- Solid waste Management: Causes, effects and control

measures of urban and industrial wastes.
• Role of an individual in prevention of pollution.• Pollution case studies• Disaster management: Floods, earthquake, cyclone and landslides. Tsunami

UNIT V: Social Issues and the Environment **05**

From Unsustainable to Sustainable development; Urban problems related to energy; Water conservation, rain water harvesting, watershed management; Resettlement and rehabilitation of people; its problems and concerns; Environmental ethics: Issue and possible solutions; Climate change, Global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust; Wasteland reclamation; Consumerism and waste products.

UNIT VI: Environmental Protection **05**

Environment Protection Act.; Air (Prevention and Control of Pollution) Act.; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act; Population Growth and Human Health, Human Rights. ;Field Work--Visit to a local area to document environmental assets river/forest/grassland/hill/mountain or Visit to a local polluted site –urban/rural/Industrial/Agricultural or Study of common plants, insects, birds or Study of simple ecosystems-ponds, river, hill slopes, etc.

Text Books :

1. Agarwal, K. C. 2001, Environmental Biology, Nidi Publ. Ltd., Bikaner.
2. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad, 380013, India, Email:mapin@icenet.net (R)
3. Brunner R. C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p

Reference Books :

1. Clark R. S., Marine Pollution, Clanderson Press Oxford (TB) Pg No. 6
2. Cunningham, W. P. Cooper, T. H. Gorhani, E. & Hepworth, M. T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p
3. De A. K., Environmental Chemistry, Wiley Eastern Ltd.
4. Down to Earth, Centre for Science and Environment (R)
5. Gleick, H., 1993, Water in crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute. Oxford Univ. Press 473p
6. Hawkins R. e., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R)
7. Heywood, V. H. & Watson, R. T. 1995, Global Biodiversity Assessment, Cambridge Univ. Press 1140p.
8. Jadhav, H. & Bhosale, V. M. 1995, Environmental Protection and Laws, Himalaya Pub. House, Delhi 284p.
9. Mckinney, M. L. & Schocl. R. M. 1996, Environmental Science Systems & Solutions, Web enhanced edition
10. Mhskar A. K., Matter Hazardous, Techno-Science Publications (TB)
11. Miller T. G. Jr., Environmental Science, Wadsworth Publishing Co. (TB)

12. Odum, E. P. 1971, Fundamentals of Ecology, W. B. Saunders Co. USA, 574p.
13. Rao M. N. & Datta, A. K. 1987, Waste Water Treatment, Oxford & IBH Publ. Co. Pvt. Ltd.,
14. Sharma B. K., 2001, Environmental Chemistry, Goel Publ. House, Meerut
15. Survey of the Environment, The Hindu (M)
16. Townsend C., Harper, J. and Michael Begon, Essentials of Ecology, Blackwell Science (TB)
17. Trivedi R. K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I and II, Enviro Media (R)
18. Trivedi R. K. and P. K. Goel, Introduction to air pollution Techno-Science Publications (TB)
19. Wagner K. D., 1998, Environmental Management, W. B. Saunders Co. Philadelphia, USA.
(M) Magazine
(R) Reference
(TB) Textbook
20. Paryavaram Swhastra – Gholap T. N.
21. Paryavaram Shastra - Gharapure.
22. Paryavaran Vighyan - V. R. Ahirrao - Nirali Prakashan, Pune.
23. Paryavaram Shastra Parichay - Jay Kumar Magar Vidya Prakashan, Nagpur.
24. Desh Ka Paryavaran - Anupam Misra, Ganolai santi Pratisthan. New Delhi.

Class & Semester	:	**S. Y. B.Tech (Electronics & Communication Technology), Part II, Semester III**									
Course Title	:	**Introduction to Performing Arts**						*Course Code*:	:	**HS217**	
Teaching Scheme (Hours)	:	**2 hr /week= 2 x13= 26 hours**						*Credits*	:	**Nil**	
Evaluation Scheme (Marks)	:	**Assignments** **Viva voce**	: :	**50** **25**	**Written Test** **Grand Total**	: :	**25** **100**	*Duration of Exam*	:	**Not Applicable**	
Revision:	:	**Third**						*Month*	:	**December 2016**	

Pre-requisites **:** In order to conduct the course successfully, student's involvement and interest in the classroom is the pre- requisite.

Type of Course **:** Audit Course at institute level

Course Domain **:** Humanity and Fine Arts

Skills Imbibed **:** Cognitive: Understand, Apply
Affective : Awareness, Respond, Value, Organize
Psychomotor: Perceive, Imitate, Manipulate, Articulate, Adapt

Course Assessment Methods:

The students will be given five assignments each for 10 marks. At the end of the course, there will be a written test of 25 marks and a viva voce of 25 marks. There will be assessment for a total of 100 marks. Based on the marks obtained, they will be awarded with a grade similar to other credit courses. Though it is an audit course, obtaining passing grade is essential.

Course Objectives:

1. To understand the history of arts.
2. To cultivate and enhance the interest in Music and other performing arts.
3. To highlight that these arts are not only the medium of entertainment but also a medium for proper channelization of emotions as this plays a vital role in determining the quality of life.
4. To form and defend value judgments about music.
5. To acquire audience skills such as listening and viewing responsibly.
6. To understand & develop skills to become lifelong learners in the musical art, both as participants and as audience members.

Course Outcomes:

1. Students will be able to learn Fundamentals and types of Music and other allied arts.
2. Students will be able to analyze, appreciate, and interpret significant works of art.
3. Students will demonstrate critical thinking through analysis and evaluation of works of art.
4. Students will develop good listening and viewing skills.
5. Students will be able to understand the '*Gharana*' system in Music.
6. Students will understand the classification of Musical instruments.
7. Students will demonstrate mastery of their designated area of concentration.
8. Students will demonstrate comprehension of global perspectives in visual culture.

Topics covered **:**	**Hours**
Unit I: Introduction to Music, Dance & Drama, History of Indian Music, Various Forms of Vocal Music.	**04**
Unit II: History and introduction of Drama, Bharat muni natya shastra, street play, Sanskrit natya, Marathi sangit rangbhumi	**04**
Unit III: Dance, its type, greek and roman theatres,	**04**
Unit IV: Concept of *Raga*, Concept of *Taal*.	**04**
Unit V: Notation System, Study of *Gharana* system in Music,Classification of Indian Instruments, Instrumental Music.	**04**
Unit VI: Contribution of Great Musicians, Appreciation of	

Music. Performance of a Music Concert.

Reference :

Books

1. ‘‘*Sangeet Visharad”,* Vasant, *Sangeet* Karyalaya, Hatras Prakashan.
2. *“Sangeet Shastra Vigyan”,* Suchita Bidkar, Sanskar Prakashan.
3. “*Sangeet Kala Aani Shikshan”*, Sudhir Mainkar, Sanskar Prakashan.
4. *“Vadyavedh”,* Bhaskar Chandavarkar, Sanskar Prakashan.
5. “Tabla”, Arvind Mulgaonkar, Popular Prakashan.
6. “All about theatre-Off stage”, Chris Hogget.
7. “Understanding of Bharat Natyam”, Mrinalini Sarabhai.
8. “Minding the body and mending the mind”, Joan Borysenko.
9. “Ragadalli Antrang” V.K.Subbanna.

Class & Semester	:	**S. Y. B.Tech (Electronics & Communication Technology) Part II, Semester IV**					
Course Title	:	**Electronics Circuit Analysis and Design-II**				*Course Code*:	: EC 221
Teaching Scheme (Hours)	:	**Lectures 4 hours/weeks = 4 x 13 weeks= 52 hours minimum** **Tutorial= 00 hour/week** **Practical= 02 hours/week**				*Total Credits*	: **04+00 +01 =05**
Evaluation Scheme (Marks)	:	**CIE = 50** **SEE = 50**	**IPE=Nil** **IOE=Nil** **EPE= 50**	: : :	**Grand Total=150**	*Duration of SEE*	: **3 hours**
Revision:	:	**Third**				*Month*	: **December 2016**

Pre-requisites **:** Good knowledge of engineering mathematics, fundamentals of physics

Type of Course **:** Theory

Course Domain	:	Core
Skills Imbibed	:	Cognitive: Recall, Understand, Apply, Analyze, Synthesize, Evaluate

Course Assessment Methods:

1. Continuous Internal Evaluation: Unit Test I & Unit Test II, assignments
2. Semester End Examination.

Course Objectives:

1. Analyze and design wave shaping circuits.
2. Understand the working principle and design of multivibrators.
3. Understand the working principle and design of oscillators.
4. Analyze and design power amplifiers.
5. Study construction, characteristics of JFETs, MOSFETs.
6. Study the tuned amplifiers

Course Outcomes:

1. Understand the basic principles of electronics circuit design.
2. Study the working principle and characteristics of electronics circuit.
3. Design discrete wave shaping circuits
4. Analyze and design discrete sinusoidal and non- sinusoidal waveform generator circuits.
5. Understand construction and working principle of JFETs and MOSFETs.
6. Analyze and design power amplifier and tuned amplifier.

Curriculum Content

Hours

UNIT I. Wave Shaping Circuits — **8**

Low pass & high pass RC circuits (square & step response), High pass RC circuit as a differentiator, Low pass RC circuit as integrator. Clipping circuits: Classification, diode clippers transistor clippers, Transfer characteristics, Design & analysis of clipper circuits. Clamping circuits: Classification, clamping operations, Clamping circuit theorem, practical clamping circuits. Voltage multipliers: Doubbler, Trippler & Qudrappler circuits.

UNIT.2. Multivibrators — **8**

Transistor as a switch, different transistor switching parameters,

classification of multivibrators, Analysis and design of Astable, Monostable, Bistable multivibrator and Schmitt trigger using BJT. Design of triggering circuits for Multivibrators

UNIT.3. Oscillators **9**

Barkhausen's criteria , Frequency and amplitude stability, Classification, RC oscillators , RC phase shift & Wein bridge oscillator analysis & design using BJT & FET , LC oscillators, Colpit's & Hartely's oscillators analysis and design using BJT, Crystal oscillator.

UNIT.4. Power Amplifiers **9**

Need of Power amplifier, classification of power amplifier, Power considerations, Distortion in power amplifiers: Phase, Frequency, amplitude/ harmonic /nonlinear distortion, amplitude distortion using Three point method. Class A single ended transformer coupled amplifier& class A Push pull amplifiers analysis and design, Class B amplifier & class B push pull amplifier analysis & design, crossover distortion, class AB Push pull amplifiers analysis and design Complementary symmetry power amplifier, class C amplifier

UNIT.5. FET & MOSFET **9**

JFET types, construction, working, characteristics and comparative study. MOSFET types, construction, working, characteristics and comparative study, Handling precautions of MOS devices, ratings and specifications of MOS, CMOS inverter.

UNIT.6. Tuned Amplifiers **9**

Introduction, Classification, single tuned amplifiers, double tuned amplifiers, large signal tuned amplifiers, oscillations in tuned amplifiers, stagger tuned amplifiers

Text Books **:**

1. Allen Mottershed –'Electronic devices & circuits'-Prentice- Hall India

2. J. Millman & C.Halkias -'Electronic devices & circuits'-2nd Edition- Tata McGraw Hill Publication

3. N.C. Goyal & R.K. Khetan-' A Monograph on Electronics Design Principles'-5th Edition-Khanna Publishers

4. J.B.Gupta, 'Electronic Devices and circuits', Katson books

Reference Books :

1. David A. Bell –'Electronic devices & circuits'- 4th Edition- Prentice- Hall India

2. Robert L. Boylsted, Louis Nashelsky- 'Electronic devices & circuit theory'- 9th edition-Pearson Education

3. National Semiconductor Data Manual.

Note for question paper setter:

• Question paper shall consist of approximately 75% analysis & design based problems and approximately 25% theory should be covered.

Class & Semester	:	**S. Y. B.Tech (Electronics & Communication Technology), Part II, Semester IV**								
Course Title	:	**Electronics Circuit Analysis and Design-II Laboratory**						*Course Code*:	:	**EC 221L**
Teaching Scheme (Hours)	:	**2 hr /week= 2 x13= 26 hours**						*Credits*	:	**1**
Evaluation Scheme (Marks)	:	**IPE** **IOE**	: :	**Nil** **Nil**	**EPE** **EOE**	: :	**50** **Nil**	*Duration of Exam (in case of External Evaluation)*	:	**03 hours**
Revision:	:	**Third**						*Month*	:	**December 2016**

Pre-requisites : Electronic circuit analysis and design-I, Engineering Physics, Mathematics

Type of Course : Practical

Course Domain : Core

: Cognitive: Understand, Apply, Analyze, Evaluate, Create

Skills Imbibed

Course Assessment Methods:

Practical Journal Assessment, External Practical Examination

Course Objectives:

1. To introduce analysis and design of wave shaping circuits.
2. To understand the working and design of multivibrators.
3. To understand the working and design of oscillators.
4. To analyze and design power amplifiers.
5. To study construction, characteristics of JFETs, MOSFETs.
6. To study tuned amplifiers

Course Outcomes:

1. Understand the basic principles of electronics circuit design.
2. Design and experiment with wave shaping circuits.
3. Design and experiment with Multivibrators and oscillators.
4. Study the working principle and characteristics of electronics circuit.
5. Design and experiment with two stage RC coupled amplifier.
6. Experiment with electronic components.

Practical List :

Minimum 10 experiments based on syllabus. 8 experiments should be hardware based and 2 experiments should be simulation based.

1. Study of RC low pass filter as an integrator

b. Study of frequency response of low pass filter

2. Study of RC high pass filter as a differentiator

b. Study of frequency response of high pass filter

3. Design of different clipper circuits

4. Study of different clamper circuits: positive, negative & bias

5. Design of astable multivibrators

6. Design of monostable multivibrators

7. Design of bistable multivibrators

8. Design of Schmitt trigger

9. Design of Wein bridge oscillator using BJT.

10. Design of RC phase shift oscillators using BJT/ FET.

11. Design of Collpitt's oscillators using BJT

12. Design of Hartly oscillators using BJT

13. Study and design of power amplifiers

14. Study of characteristics of JFET and MOSFET

Lab Manual **:**

- Institute's Laboratory Course Manual and equipment wise Standard Operating Procedure to follow.

Reference Books **:**

1. David A. Bell –'Electronic devices & circuits'- 4th Edition- Prentice- Hall India

2. Robert L. Boylsted, Louis Nashelsky- 'Electronic devices & circuit theory'- 9th edition- Pearson Education

3. National Semiconductor Data Manual.

Class & Semester	:	**S. Y. B.Tech (Electronics & Communication Technology) Part II, Semester IV**						
Course Title	:	**Communication Technology**				*Course Code*:	:	**EC 222**
Teaching Scheme (Hours)	:	**Lectures 4 hours/week =4 x 13 weeks= 52 hours minimum** **Practical= 02 hours/week**				*Total Credits*	:	**04+00+01 =05**
Evaluation Scheme (Marks)	:	**CIE = 50**	**EPE= 50**	: : :	**Grand Total=150**	*Duration of SEE*	:	**3 hours**

		SEE = 50						
Revision:	:	**Third**				*Month*	:	**December 2016**

Pre-requisites	**:**	In order to complete the course studies successfully, it is important to have knowledge of Engineering Physics, Electronic devices & components
Type of Course	**:**	Theory & practical
Course Domain	**:**	Core
Skills Imbibed	**:**	Cognitive: Recall, Understand, Apply, Analyze, Synthesize, Evaluate

Course Assessment Methods:

1. Continuous Internal Evaluation: Unit Test I & Unit Test II
2. Semester End Examination.

Course Objectives:

1. To introduce and analyze techniques of generation, transmission and reception of amplitude modulation (AM) frequency modulation (FM) and phase modulation (PM) signals
2. To introduce the pulse modulation techniques.
3. To understand noise impact on communication system
4. To understand operation of transmitter.
5. To understand operation of TRF and super heterodyne receiver
6. To understand importance of sampling theorem and sampling types

Course Outcomes:

On completion of the course, student will be able to:

1. Understand and identify the fundamental concepts and various components of analog communication systems.
2. Understand, analyze and explain various analog modulation & demodulation schemes.
3. Explain signal to noise ratio, noise figure and noise temperature for single and cascaded stages in a communication system.
4. Develop the ability to compare and contrast the strengths and weaknesses of

various communication systems.
5. Understand operation of AM & FM receivers.

6. Compare AM, FM & PM.

Curriculum Content

Hours

UNIT.1. Introduction **(9 Hrs)**

Block schematic of communication system, Electromagnetic Spectrum, Necessity of modulation, Types of modulation – AM, FM, PM and Pulse Modulation. Noise types (Internal & External), Signal to Noise ratio, Noise factor, Noise figure, Noise Resistance, Noise Temperature, Noise factor of Amplifiers in Cascade(Numerical expected)

UNIT.2. Amplitude Modulation **(9 Hrs)**

Amplitude Modulation principle, AM envelope, frequency spectrum & BW, phase representation of AM wave, Modulation index, % modulation, Power relations in AM (Numerical expected) AM modulating circuits: Low level AM modulation, medium power AM modulation, AM transmitters: Block diagram of low level DSBFC, High level DSBFC, Trapezoidal patterns, SSB Principles, Balanced modulator, SSB Generation Methods: Filter system, phase shift & third method ,Independent sideband system (ISB),Vestigial sideband(VSB)

UNIT.3. Angle Modulation **(9 Hrs)**

Theory of frequency and phase modulation, mathematical analysis, FM and PM waveforms, frequency deviation and percentage modulation, deviation sensitivity, deviation ratio ,phase deviation and modulation index, frequency analysis of angle modulated wave-Bessel function, BW requirements, Narrow band & wide band FM, FM modulators(Direct & Indirect) , Noise and angle modulation, Pre-emphasis and de-emphasis.

UNIT.4. Pulse Modulation **(7 Hrs)**

Pulse amplitude modulation, Sampling theorem , types :Natural & flat top, PAM modulation Demodulation, TDM and FDM, Crosstalk in TDM, PWM modulator & demodulator, PPM modulators & demodulator.

UNIT.5. AM Receivers **(9 Hrs)**

Simplified block diagram of AM receiver, receiver parameters: Sensitivity, Selectivity, BW, dynamic range, fidelity, Types of AM receiver: TRF and superhetrodyne (block diagram), AM detection types: using diode, practical diode detector, distortion in diode detector. Negative peak clipping & diagonal clipping, Demodulation of SSB using: product demodulator & diode balanced modulator, Automatic Gain Control (AGC).

UNIT6.FM Receivers: **(9 Hrs)**

Block diagram, Double conversion FM receivers, FM demodulator, tuned circuit frequency discriminators, slope detectors, fosters seeley discriminator, ratio detectors, PLL-FM demodulators, FM noise suppression,

Class & Semester	:	**S. Y. B.Tech (Electronics & Communication Technology) Part II, Semester IV**									
Course Title	:	**Communication Technology Laboratory**						*Course Code*:	:	**EC 222L**	
Teaching Scheme (Hours)	:	**2 hr /week= 2 x13= 26 hours**						*Credits*	:	**1**	
Evaluation Scheme (Marks)	:	**IPE** **IOE**	: :	**Nil** **Nil**	**EPE** **EOE**	: :	**50** **Nil**	*Duration of Exam (in case of External Evaluation)*	:	**03 hours**	
Revision:	:	**Third**						*Month*	:	**December 2016**	

Pre-requisites	:	Laboratory work in Engineering Physics, Electronics Devices & Components
Type of Course	:	Practical
Course Domain	:	Core
Skills Imbibed	:	Cognitive: Understand, Apply, Analyze, Evaluate, Create

Course Assessment Methods:

Practical Journal Assessment & External Practical Examination

Practical List :

LIST OF EXPERIMENTS (minimum 10):

1. Study of Amplitude Modulation (A.M.)
2. Study of Frequency Modulation.(F.M.)
3. Study of AM Detection.
4. Study of SSB Modulation & Demodulation.
5. Study of DSB Modulation & Demodulation.
6. Study of FM Demodulation.
7. Sampling and Reconstruction.
8. Study of Pulse Amplitude Modulation & Demodulation.
9. Study of Pulse Width Modulation& Demodulation.
10. Study of Pulse Position Modulation & Demodulation.
11. Study of PAM-TDM.
12. Study of AM Receiver Characteristics.(Sensitivity, Selectivity & Fidelity)
13. Visit to radio station (AM/FM).

Note: Visit to radio station is compulsory. Student should attach report of visit to journal.

Lab Manual **:**

- Institute's Laboratory Course Manual and equipment wise Standard Operating Procedure to follow.

TEXT BOOKS:

1. George Kennedy, 'Electronics Communication System'--Tata McGraw Hill Publication.

2. Wayne Tomasi, 'Electronics Communication Systems Fundamentals through Advanced' - Pearson Education.

REFERENCE BOOKS:

1. Dennis Roddy, John Coolen, 'Electronics Communications '4th Edition-Pearson Education

2. Louis E. Frenzel, 'Principles of Electronic Communication Systems' -Tata McGraw Hill Publication.

3. R P Singh, S D Sapre 'Communication System-Analog & Digital' 2nd Edition –Tata Mc Graw Hill Publication

Class & Semester	:	**S. Y. B.Tech (Electronics & Communication Technology) Part II, Sem IV**			
Course Title	:	**Linear Integrated Circuits**	*Course Code*:	:	**EC 223**
Teaching Scheme (Hours)	:	4 hours/weeks=4x 13 weeks= 52 hrs minimum Tutorial= Nil /week Practical=2hrs/week	*Total Credits*	:	***04+00+01 =05***

Evaluation Scheme (Marks)	:	CIE = 50 SEE = 50	IPE IOE EPE	Nil Nil 50	= 150	*Duration of SEE*	*:*	3 hrs
Revision:	:	Third				*Month*	:	*December 2016*

Pre-requisites :

The prerequisite for this course is to possess the fundamental knowledge of electronic components and devices, their characteristics etc.

Type of Course **:** Theory

Course Domain **:** Core

Skills Imbibed **:** Cognitive: Recall, Understand, Apply, Analyze, Synthesize, Evaluate

Course Assessment Methods:

Student is evaluated during Continuous Internal Evaluation (Internal Test I & Internal Test II) and Semester End Examination.

Course Objectives:

1. Study OPAMP basics and characteristics
2. Study OPAMP configurations
3. Study OPAMP frequency response
4. Study OPAMP applications
5. Study OPAMP based filters
6. Study PLL and timer

Course Outcomes:

1. Define, describe and analyze the different differential amplifier configurations.

2. Define , explain and analyze the different op.amp configurations.

3. Sketch and analyze the op.amp frequency response.

4. Design different op.amp circuits for different applications.

5. Classify, design and explain active filters and signal generators.

6. Describe and design the different PLL and Timer application circuits.

Curriculum Content

Hours

Unit:I Op-Amp basics and Characteristics

Differential amplifier: common mode, differential mode, configurations, DC and AC analysis, constant current bias, current mirror circuit, cascade diff-amp stages, level shifter. Block Diagram of Op-Amp, Study of µA 741: Ideal & Practical Op-amp specifications, Transfer characteristics of Op amp, offset voltages and offset currents with compensation techniques, Input Bias current, slew rate, CMRR and methods to improve CMRR, PSRR, Thermal drift, open loop gain, closed loop gain, Comparative study of OP 07, LM 741, LM 311.

Unit:II Op-Amp Configurations

Open Loop & Closed Loop Inverting, Non inverting and Differential amplifier with analysis of parameters like Av, Ri, Ro, Bandwidth and output offset voltage. AC & DC amplifiers with all configurations

Unit:III Op-Amp frequency response

Open loop and closed loop frequency response, unity gain BW, need for compensation, Internal and external compensated op amps and frequency response, effect of slew rate, slew rate analysis, selection of op amp for different applications.

4 hrs X 13 Weeks= 52 hrs

Unit:IV Op-Amp Applications

Summing amplifier, Subtractor, Integrator, Differentiator, Instrumentation Amplifier, I to V and V to I converters. Comparators, Zero Crossing Detector, Window detector, Schmitt trigger, peak detector, log and antilog amplifier, precision rectifier, sample and hold circuit, clippers and clampers.

Unit :V Op-Amp Active Filters and signal generators

First & Second Order Butterworth Low Pass, High Pass, Band Pass, Band Reject, & All Pass Filters, KS filter. *Signal generators:* RC phase Shift, Wein Bridge, Hartely, Colpitts oscillators, opamp as multivibrators and triangular wave generators, Case study of IC 8038 Waveform generator.

Unit : VI PLL and Timer

Introduction, Operating principle, Study of Block Diagram of PLL with

detail explanation, transfer characteristics of IC 565 PLL, lock range and capture range with applications like Frequency modulator, demodulator, frequency synthesizer. ***Timer IC:*** IC555 block diagram, IC 555 as astable, monostable, bistable multivibrators, VCO.

Text Books :

1. Ramakant. A.Gayakwad " Op-Amps & Linear Integrated Circuits" , 3rd Edition, PHI.

2. Sergio Franco "Design with op-amp & Analog Integrated Circuits" , 3rd Edition, Tata McGraw Hill.

3. S.Salivahanan & Bhaaskaran "Linear Integrated Circuits" , 1st Edition, Tata McGraw Hill.

Reference Books :

1. National Analog & Interface products Data book—National Semiconductors

2. T.R Ganesh Babu, "Linear Integrated Circuits" 3rd Edition, Scitech Publication.

3. David. A. John & Ken Martin "Analog Integrated Circuit Design", Student Edition, Wiley.

4. Rashid "Microelectronics Circuits Analysis & Design" 1st Edition, Cengage Learning.

5. J. Michael. Jacob "Application & Design with Analog Integrated Circuits" 2nd Edition, PHI.

6. Roy Choudhury & Shail. B. Jain "Linear Integrated Circuits," 2nd Edition, New Age Publishers.

Reference Codes **:**

(If applicable as any other source of studies)

1.

Class & Semester	:	**S. Y. B.Tech (Electronics & Communication Technology) Part II, Sem IV**								
Course Title	:	**Linear Integrated Circuits Laboratory**						*Course Code*:	:	**EC 223L**
Teaching Scheme (Hours)	:	2 hr /week=2x13= 26 hrs						*Credits*	:	**1**
Evaluation Scheme (Marks)	:	IPE IOE	: :	Nil Nil	EPE EOE	: :	Nil 50 =50	*Duration of Exam (in case of External Evaluation)*	:	
Revision:	:	Third						*Month*	:	*December 2016*

Pre-requisites **:**

The prerequisite for this course is to possess the fundamental knowledge of electronic components and devices, their characteristics etc.

Type of Course **:** Practical

Course Domain **:** Core

Skills Imbibed **:** Cognitive: Recall, Understand, Apply, Analyze, Synthesize, Evaluate

Course Assessment Methods:

Student is evaluated during External Practical Examination

Practical covered :

Minimum 10 experiments based on syllabus.

1. Study of Inverting amplifier for DC & AC inputs using opamp
2. Study of Non-Inverting amplifier for DC & AC inputs using opamp
3. Frequency Response of Inverting & Non-Inverting amplifier using opamp
4. Study of op-amp as Summing, Scaling, & Averaging amplifier in Inverting & Non-Inverting modes
5. Study of Instrumentation Amplifier using LM 324
6. Study of V-I & I-V Converter
7. Study of Schmitt Trigger using opamp & Window detector using opamp
8. Study of Comparator & Zero Crossing Detector using opamp
9. Study of Precision Rectifier using opamp
10. Study of Butterworth Filter using opamp
11. Study of Triangular & square wave generator using opamp
12. Design of IC 555 Timer as Astable & Monostable Multivibrator
13. Study of IC NE 565 PLL
14. Study of Weins Bridge Oscillator using opamp
15. Study of Function Generator using IC 8038.

<table>
<tr><td>Class & Semester</td><td>:</td><td colspan="4">S. Y. B.Tech (Electronics & Communication Technology) Part II, Sem IV</td></tr>
<tr><td colspan="6"></td></tr>
<tr><td>Course Title</td><td>:</td><td>Measurement Techniques</td><td>Course Code:</td><td>:</td><td>EC 224</td></tr>
<tr><td rowspan="3">Teaching Scheme (Hours)</td><td rowspan="3">:</td><td>3 hours/weeks=3x 13 weeks= 39 hrs minimum</td><td rowspan="3">Total Credits</td><td rowspan="3">:</td><td rowspan="3">03+00+01 =04</td></tr>
<tr><td>Tutorial= Nil /week</td></tr>
<tr><td>Practical=2hrs/week</td></tr>
</table>

Evaluation Scheme (Marks)	:	CIE = 50 SEE = 50	IPE IOE EPE EOE	50 Nil Nil Nil	= 150	*Duration of SEE*	*:*	3 hrs
Revision:	:	Third				*Month*	:	*December 2016*

Pre-requisites **:**

The prerequisite for this course is to possess the fundamental knowledge of Electronic measuring instruments, their principles etc.

Type of Course **:** Theory

Course Domain **:** Core

Skills Imbibed **:** Cognitive: Recall, Understand, Apply, Analyze, Synthesize, Evaluate

Course Assessment Methods:

Student is evaluated during Continuous Internal Evaluation (Internal Test I & Internal Test II) and Semester End Examination.

Course Objectives:

1. Acquire fundamental knowledge of measuring systems.
2. Study transducers.
3. Study AC and DC bridges
4. Study oscilloscope and display devices
5. Study signal generators and analyzers
6. Study data acquisition systems

Course Outcomes:

1. Define , describe the generalized measurement system and its elements.

2. Describe and sketch different transducers and explain their operation.

3. Sketch , explain and design different dc and ac bridges.

4. Sketch , explain and describe different oscilloscopes and display devices.

5. Sketch and describe signal generators and analyzers.

6. Define, describe Data acquisition systems and conversion.

Curriculum Content

Hours

Unit:I Introduction to Measurements Systems and Measuring Instruments

Measurements, significance of measurements, methods of measurements-Direct & indirect method, elements of generalized measurement system, measurement system performance, Performance characteristics- static and dynamic characteristic, Errors- Types & source of error. Digital voltmeters- Introduction, Dual Slope Integrating type DVM, Integrating type DVM & successive approximation principles, general specifications of DVM, digital multimeter, clamp meter, digital measurements of time, digital frequency meter, stroboscope, Q meter, phase measurement.

Unit:II Transducers

Definition, classification, transducer selection, different types of transducers, strain gauges, RTD, thermistor, thermocouple, semiconductor diode temperature sensor, LVDT, capacitive transducers, piezoelectric transducer, photovoltaic cell, LDR, Elastic pressure transducer – bellows, bourdon tubes, diaphragm, speed measurement using magnetic and photoelectric pickup, ultrasonic transducers – level measurement, vibrations transducers – piezoelectric transducers

3hrsX13 weeks6=39hrs.

Unit:III AC and DC Bridges

DC bridges: Introduction, wheatstone's bridge, Kelvin bridge, guarded Wheatstone bridge, AC bridges: Condition for bridge balance .Maxwell bridge, Hay bridge, Schering bridge, wein bridge, Wagner ground connection (Numericals are expected), Bolometer & RF power measurement.

Unit:IV Oscillosope & Display Devices

Preview of CRO, Basic principle, CRT, horizontal and vertical deflection system (analytical treatment expected), delay line & types, Types of CRO: Dual Bean, Dual Trace, sampling, Digital

storage, digital readout, measurement of phase and frequency using Lissajous pattern, CRO probes: active, passive, current, attenuators: uncompensated & compensated type Display devices: Digital display system, classification of display, display devices & principle: LED,LCD,Dot matrix printer.

Unit :V Signal Generators and Analyzers

Signal generators: Function generators, Sweep,pulse and square wave generator. Wave Analyzers: Introduction, basic wave analyzer, heterodyne harmonic distortion analyzer, spectrum analyzer, Digital Fourier analyzer, logic analyzer, Wobbluscope.

Unit : VI Data Acquisition System and Conversion

Introduction ,Objective of DAS, Signal Conditioning of inputs ,Single channel & Multichannel DAS data conversion, Sample and hold, digital transducers. DAC concepts: Binary weighted DAC, R-2R ladder circuit DAC ADC concept: flash, single slope, dual slope, stair case Ramp ADC, successive approximation ADC, Data Loggers.

Text Books :

1. H .S. Kalsi 'Elecronic Instrumentation' – 2nd edition --Tata McGraw Hill Publication

2. A. D. Helfrick , W. D. Cooper ' Modern Electronic Instrumentation and Measurement Techniques'-- Pearson Education

Reference Books :

1. . A.K.Sawhney 'A Course in Electrical & Electronics Measurement & Instrumentation.' –11th Edition, 1996 --Dhanpat Rai & sons
2. C.S. Rangan ,G.R. Sharma , V.S.V. Mani 'Instrumentation devices and system' 2nd edition --Tata McGraw Hill Publication
3. B.C.Nakra, K.K.Choudhary 'Instrumentation, Measurement and Analysis', 2nd edition -- Tata McGraw Hill Publication
4. E.O.Doebeline.'Measurement systems application and design 'Tata McGraw Hill Publication

5. Oliver Cage 'Electronic measurement and instrumentation 'Tata McGraw Hill PublicationPublishers.

Class & Semester	:	**S. Y. B.Tech (Electronics & Communication Technology) Part II, Sem IV**

***Reference Codes* :**

(If applicable as any other source of studies)

2.

Course Title	:	Measurement Techniques Lab						*Course Code*:	:	**EC 224L**
Teaching Scheme (Hours)	:	2 hr /week=2x13= 26 hrs						*Credits*	:	**1**
Evaluation Scheme (Marks)	:	IPE IOE	: :	50	EPE EOE	: :	Nil	*Duration of Exam (in case of External Evaluation)*	:	**3 Hours**
Revision:	:	Third						*Month*	:	*December 2016*

Pre-requisites :

The prerequisite for this course is to possess the fundamental knowledge of Electronic measuring instruments, their principles etc.

Type of Course **:** Practical

Course Domain **:** Core

Skills Imbibed **:** Cognitive: Recall, Understand, Apply, Analyze, Synthesize, Evaluate

Course Assessment Methods:

Student is evaluated during Internal Oral Examination

Practical covered :

Minimum 10 experiments based on syllabus

1. Study of temperature transducers: (Any two)
   a) RTD
   b) Thermocouple
   c) Thermistor
2. 2. Study of displacement transducers: (Any two)
   a) Inductive
   b) Capacitive
   c) Resistive
3. Study of weight measurement using strain gauge:
4. Study of speed measurement using : (Any one)
   a) Magnetic pick up
   b) Photoelectric pick up

5. Study of AC and DC bridges: (Any two)
   a) Wheastones' bridge
   b) Maxwell's bridge
   c) Wein bridge
6. Measurement of frequency and phase using Lissageous patterns
7. Study of digital storage oscilloscope
8. Study of spectrum analyzer
9. Study of pressure measurement using bourdan tube
10. Study of DAC using R-2R ladder network

Class & Semester	:	**S. Y. B.Tech (Electronics and Communication Technology) Part II, Semester IV**					
Course Title	:	**Industrial Organization and Management**			*Course Code*:	:	**EC 225**
Teaching Scheme (Hours)	:	**Lectures 2 hours/weeks=2 x 13 weeks= 26 hours minimum** **Tutorial= 01 hour/week** **Practical= Nil**			*Total Credits*	:	**02+01 =03**
Evaluation Scheme (Marks)	:	**CIE = 50** **SEE = 50**	**IPE=Nil** **IOE=50** **EPE= Nil**	: : :	**Grand Total=150**	*Duration of SEE*	*:*	**3 hours**
Revision:	:	**Third**				*Month*	:	**December 2016**

Pre-requisites **:** Professional Communication

Type of Course **:** Theory

Course Domain **:** Social Science

Skills Imbibed **:** Cognitive: Recall, Understand, Apply, Evaluate
Affective : Awareness, Respond, Value, Organize
Psychomotor: Imitation, manipulation, articulation, naturalization

Course Assessment Methods:

1. Continuous Internal Evaluation: Unit Test I & Unit Test II, Tutorials (Assignments+Survey).
2. Semester End Examination.

Course Objectives:

1. To introduces the basic concepts of management and organization structure of an industry.
2. To teach and improve concept of Entrepreneurship.
3. To teach Material management and cost analysis.
4. To introduce engineering economics and encourage for doing project management.

Course Outcomes:

1. Demonstrate the concepts of Management and organizational structure.
2. Understand the values of human and industrial relation.
3. Understand industrial environment.
4. Apply the project management tools in effective.
5. Use ethical and professional practices.
6. Develop leadership quality.

Curriculum Content	**Hours**
Unit.I. Organization and Management Organization: Concept, Important, Characteristics, Elements, Structure and process of an industrial organization, Types of Organization, Functions of different departments. Relationship between individual departments. Management, Administration, Principals, process, functions and Characteristics of management, Objectives of management.	**04**
Unit.II. Human and Industrial Relations Human relations and performance in organization, Understand self and others for effective behavior, Behaviour modification techniques, Industrial relations and disputes, Relations with subordinates, peers and superiors, Characteristics of group behaviour and trade unionism, Mob psycholog, Grievance, handling of grievances, Agitations, strikes, lockouts, picketting and gherao, Labour welfare, Workers' participation in management. Functions of HRD manager: Introduction, Staff development and career development, Training strategies and methods.	**06**
Unit.III. Industrial Psychology and Leadership Industrial Psychology and personal management, aim, objective and scope. Individual and group, difference in behavior, moral, Motivation: Factors determining motivation, Characteristics of motivation, Methods for improving motivation, Incentives, pay, promotion,	**04**

rewards, Job satisfaction and job enrichment. Leadership: Need for leadership, Functions of a leader, Factors for accomplishing effective, leadership, Manager as a leader.

Unit.IV. Materials and Financial Management **04**

Material management, procurement, buying techniques, purchase procedure, accounting, physical verification. Financial Management: Types of capital, sources of capital, book keeping, assets, capital gearing, return of investment.

Unit.VI. Professional and business ethics **03**

Concept, ethics and moral, business and professional ethics, importance and need of ethics , ethical dilemmas, ethical problem in business.

Text Books **:**

1. Industrial Engineering and Management by OP Khanna, Dhanpat Rai Publications, Delhi.

Reference Books **:**

1. "Industrial Engineering and Management by TR Banga.

Class & Semester	:	**S. Y. B.Tech (Electronics and Communication Technology) Part II, Semester IV**						
Course Title	:	**Industrial Organization and Management Tutorial**				*Course Code*:	:	**EC 225L**
Teaching Scheme (Hours)	:	**Lectures 2 hours/weeks=2 x 13 weeks= 26 hours minimum**				*Total Credits*	:	**02+01 =03**
		Tutorial= 01 hour/week						
		Practical= NA						
Evaluation Scheme (Marks)	:	**CIE = 50 SEE**	**IPE=NA IOE=50 EPE= Nil**	: : :	**Grand Total=150**	*Duration of SEE*	:	**3 hours**

		= 50						
Revision:	:	**Third**				*Month*	:	**December 2016**

Pre-requisites **:** Professional Communication

Type of Course **:** Tutorial

Course Domain **:** Social Science

Skills Imbibed **:** Cognitive: Understand, Apply, Analyze, Evaluate, Create
Affective : Awareness, Respond, Value, Organize
Psychomotor: Perception, Imitation, manipulation, articulation

Course Assessment Methods:

Tutorials, Internal Oral Examination, Survey reports and presentation.

Tutorial Work **:**

- The tutorial work includes six assignments based on theory curriculum and
- The tutorial work is also consisting of the industrial survey and report writing. Students have to follow the guidelines given below. Evaluation of the students will be done on completion of the report and presentation.

1. Form the group of students not exceeds than five.
2. Select the appropriate product or service based industry in the nearby region.
3. Take permission of industry for the visit.
4. Visit the industry and make the survey with respect to organization structure, various departments and their functions, processing of raw material to form final product, administration, vision, mission, goals, growth etc.
5. Go for multiple visits if required.
6. Prepare the Industrial Survey report in detail and submit at the end of semester.
7. Prepare and make presentation on the industrial survey.

Text Books **:**

1. Industrial Engineering and Management by OP Khanna, Dhanpat Rai Publications, Delhi.

Reference Books **:**

1. "Industrial Engineering and Management by TR Banga.

Class & Semester	:	**S. Y. B.Tech (Electronics and Communication Technology) Part II, Semester IV**					
Course Title	:	**Data Structures**			*Course Code*:	:	**EC 226**
Teaching Scheme (Hours)	:	**Lectures 2 hours/weeks=2 x 13 weeks= 26 hours minimum** **Tutorial= Nil** **Practical= 02 hour/week**			*Total Credits*	:	**02+01 = 03**
Evaluation Scheme (Marks)	:	**CIE=NA** **SEE=Nil**	**IPE= Nil** **IOE= 50** **EPE= Nil**	: : :	**Grand Total=50**	*Duration of SEE*	:	**NA**
Revision:	:	**First**			*Month*	:	**December 2016**

Pre-requisites **:** Fundamentals of Programming Languages like c and C++.

Type of Course **:** Theory

Course Domain **:** Core

Skills Imbibed **:** Cognitive: Recall, Understand, Apply, Analyze.
Affective : Awareness, Respond, Value, Organize
Psychomotor: Imitation, manipulation, articulation, naturalization

Course Assessment Methods:

1. Continuous Internal Evaluation: Laboratory.

Course Objectives:

1. To teach efficient storage mechanisms of data for an easy access.
2. To design and implementation of various basic and advanced data

structures.

3. To introduce various techniques for representation of the data in the real world.
4. To develop application using data structures.
5. To teach the concept of protection and management of data.
6. To improve the logical ability

Course Outcomes:

Student will be able to

1. Choose appropriate data structure as applied to specified problem definition.
2. Handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.
3. Apply concepts learned in various domains like DBMS, compiler construction etc.
4. Use linear and non-linear data structures like stacks, queues , linked list etc
5. Understand The Concept of Hash Function.
6. Understand Logic to Design an algorithm form Operation on data Structure.

CURRICULUM CONTENT

Hours

UNIT I: Introduction to Data Structures **03**

Types of Data Structure, Arrays, Strings, Recursion, ADT (Abstract Data type),Concept of Files,Operations with files, types of files

UNIT II: Linked List **05**

Linked List as an ADT, Linked List Vs. Arrays, and Memory Allocation & De-allocation for a Linked List, Linked List operations, Types of Linked List, Implementation of Linked List, Application of Linked Listpolynomial, sparse matrix.

UNIT III: Stacks and Queus **05**

Stacks: The Stack as an ADT, Stack operation, Array Representation of Stack, Link Representation of Stack, Application of stack – Recursion, Polish Notation *queues*: The Queue as an ADT, Queue operation, Array Representation of Queue, Linked Representation of Queue, Circular Queue, Priority Queue, & Dequeue, Application of Queues – Johnsons Algorithm, Simulation

Unit IV: Trees **05**

Basic trees concept, Binary tree representation,Binary tree operation, Binary tree traversal, Binary search tree implementation, Thread Binary tree, The Huffman Algorithm, Expression tree, Introduction to Multiway search tree and its creation(AVL, B-tree, B+ tree)

UNIT V:Graphs **03**

Basic concepts, Graph Representation, Graph traversal

(DFS & BFS)

UNIT VI: Sorting and Searching **05**

Sorting : Sort Concept, Shell Sort, Radix sort, Insertion Sort, Quick Sort, Merge Sort,Heap Sort,

*Searching :*List Search,Linear Index Search, Index Sequential Search Hashed List Search, Hashing Methods , Collision Resolution

Text Books **:**

1. R. Gilberg, B. Forouzan, "Data Structures: A pseudo code approach with C", Cenage Learning.

2. E. Horowitz, S.Sahani, S.Anderson-Freed "Fundamentals of Data Structures in C", Silicon Press.

Reference Books **:**

1. A. Aho, J. Hopcroft, J. Ulman, "Data Structures and Algorithms", Pearson Education.

2. Y. Langsam, M. Augenstin and A. Tannenbaum, "Data Structures using C and C++", PHI.

3. J. Tremblay, P. Soresan, "An introduction to data structures with Applications", 2nd edition, TMH International Editions.

4. Data Structures using C, Reema Thareja, Oxford University press.

Class & Semester	:	**S. Y. B.Tech (Electronics and Communication Technology) Part II, Semester IV**

Course Title	:	**Data Structures Tutorials**				*Course Code*:	: **EC 226L**
Teaching Scheme (Hours)	:	**Lectures 2 hours/weeks=2 x 13 weeks= 26 hours minimum** **Tutorial= 01** **Practical= Nil hour/week**				*Total Credits*	: **02+01 = 03**
Evaluation Scheme (Marks)	:	**CIE=Nil** **SEE=Nil**	**IPE= Nil** **IOE= 50** **EPE= Nil**	: : :	**Grand Total=50**	*Duration of SEE*	: **Nil**
Revision:	:	**First**				*Month*	: **December 2016**

Pre-requisites **:** Fundamentals of Programming Languages like c and C++.

Type of Course **:** Tutorial

Course Domain **:** Core

Skills Imbibed **:** Cognitive: Understand, Apply, Analyze, Evaluate, Create

Course Assessment Methods:

Tutorial Assessment, Internal Oral Examination.

Course Objectives:

1. To teach efficient storage mechanisms of data for an easy access.
2. To design and implementation of various basic and advanced data structures.
3. To introduce various techniques for representation of the data in the real world.
4. To develop application using data structures.
5. To teach the concept of protection and management of data.
6. To improve the logical ability.

Course Outcomes:

Student will be able to

1. Choose appropriate data structure as applied to specified problem definition.

2. Handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.
3. Apply concepts learned in various domains like DBMS, compiler construction etc.
4. Use linear and non-linear data structures like stacks, queues , linked list etc
5. Understand The Concept of Hash Function.
6. Understand Logic to Design an algorithm form Operation on data Structure.

Tutorials:

List of Tutorial work Based on Data Structures
(Minimum 10 tutorials based on syllabus)

1. Write a program to perform Set operations - Union, Intersection, Difference,
Symmetric Difference etc.
2. Write a program to perform various string operations such as Copy, Length, Reversing, Palindrome, Concatenation and to find occurrence substring etc with
and without using library functions.
3. Write a program to perform operations on matrices like addition, multiplication,
saddle point, magic square ,inverse & transpose etc using functions &
pointers.[Minimum 4 operations]
4. Write a program to perform following operations on any database: Add, Delete, Modify, Display, Search & Sort etc.
5. Implement Sorting Methods using functions- Bubble Sort, Selection Sort, Insertion Sort, and Shell Sort.
6. Implement Sorting Methods using recursion- Quick Sort and Merge Sort.
7. Implement Searching Methods-Sequential Search, Binary Search, Fibonacci Search and Index Sequential Search.[Minimum 3 searching methods]
8. Represent polynomial using structures and write a menu driven program to perform Addition, Multiplication and Evaluation.
9. Represent Sparse Matrix using array and perform Matrix Addition, Simple and Fast Transpose.
10. Write a menu driven program to perform following operations on SLL/CDLL :
Create, Insert – Start, end, between, Search & delete, Reverse ,Display etc.
11. Create two Singly Linked lists, sort one after creation and one while creation using Pointer manipulation. Merge these two lists into one list without creating a
new node or swapping of the data.
12. Represent a polynomial using Circular Linked List and write a menu driven program to perform Addition, Multiplication and Evaluation.
13. Implement Stack as an ADT using Array. Use this ADT to perform expression

conversion and evaluation (infix to postfix, infix to prefix, prefix to infix, prefix to
postfix, postfix to infix and postfix to prefix).
14. Represent Circular Queue using Linked List and write a program to perform operations like Insert, Delete, Finding front and rear element.
15. 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

Text Books **:**

1 R. Gilberg, B. Forouzan, "Data Structures: A pseudo code approach with C", Cenage Learning.

Reference Books **:**

1. E. Horowitz, S.Sahani, S.Anderson-Freed "Fundamentals of Data Structures in C", Silicon Press.

Class & Semester	:	**S. Y. B.Tech (Electronics & Communication Technology), Part II, Semester IV**									
Course Title	:	**Soft Skills Development**						*Course Code*:	:	**EC 227**	
Teaching Scheme (Hours)	:	**2 hr /week= 2 x13= 26 hours**						*Credits*	:	**Nil**	
Evaluation Scheme (Marks)	:	**Assignments** **Viva voce**	: :	**50** **25**	**Written Test** **Grand Total**	: :	**25** **100**	*Duration of Exam*	:	**Not Applicable**	
Revision:	:	**Third**						*Month*	:	**December 2016**	

Pre-requisites	:	H.S.C level English Language Competency
Type of Course	:	Audit Course at institute level
Course Domain	:	Humanity and Arts
Skills Imbibed	:	Cognitive: Understand, Predicting Situation, Comprehend, Affective : Receive, Listen, Respond, Showing self reliance, Organize Psychomotor: Imitation, adaptation, articulation, origination

Course Assessment Methods:

The students will be given five assignments each for 10 marks. At the end of the course, there will be a written test of 25 marks and a viva voce of 25 marks. There will be assessment for a total of 100 marks. Based on the marks obtained, they will be awarded with a grade similar to other credit courses. Though it is an audit course, obtaining passing grade is essential.

Course Objectives:

1. To develop effective communication skills (spoken and written).
2. To develop effective presentation skills.
3. To compete successfully in the business environment.
4. To generate ability in the learners to put their domain knowledge into effective practice.
5. To make the students self-confident individuals by mastering inter-personal skills, team management skills, and leadership skills..
6. To prepare the learners to take part effectively in various selection procedures adopted by the recruiters and to increase employment opportunities

Course Outcomes:

1. Students are able to expertise in self development, effective communication skills and interview skills
2. Understand how to handle situation and take decision
3. Equip to any sort of interviews particularly job interviews
4. Acquaintance with documentation skills
5. Become self reliant and responsible
6. Team build up, its development and management

Curriculum Content	**Hours**
Unit I : Self Development	**02**
Self analysis, creativity, attitude, motivation, goal setting. Importance of career visioning and planning.	**06**
Unit II : Effective Communication Skills	
Importance of communication, Communication process, Elements of communication, Communication Types-verbal and	**08**

nonverbal, objectives of communication. Business Communication, current English usage, debates, language games, situational dialogues, precise writing, essay writing, presentations.

Unit III : Behavioral Skills

Psychological Tests: Aptitude and personality assessment, suggestions for improvement, **Team Skills:** Team building and leadership, evolution of groups into teams, group dynamics, emergence of leadership, intra-group dynamics, inter-group dynamics, conflict management, inter dependency, assessment of team-based projects, **Time Management:** Pareto's Principle, Parkinson's Laws, Murphy's Laws, Law of Clutter, prioritization, goal setting, effective time management, **Interpersonal Skills:** Negotiations, listening skills, social skills, assertive skills, cross-cultural communications, **Leadership Skills:** Concepts of leadership, leadership styles, insights from great leaders. **03** **04** **03**

Unit II : Documentation

Report writing-Formal report, study tour report, project report, Writing proposal-solicited proposals and unsolicited proposals.

Unit III: Emotional Intelligence

Emotional Brain, Nature of emotional intelligence, emotional intelligence applied windows of opportunity, emotional literacy.

Unit VI: Interview Skills

Importance of Interview Skills, Resume Building, Group discussion and personal interview, Psychometric Test, actual career planning.

Text Book :

1. Soft Skills, 2015, Career Development Centre, Green Pearl Publications.

Reference Books :

1. "*Seven Habits of Highly Effective Teens"*, Covey Sean, , New York, Fireside Publishers, 1998.
2. "*How to win Friends and Influence People"*, Carnegie Dale, New York: Simon & Schuster, 1998.
3. "*I am ok, You are ok "*,Thomas A Harris, New York-Harper and Row, 1972
4. "*Emotional Intelligence"*, Daniel Goleman, Bantam Book, 2006
5. "Effective communication skill", MTD training & Ventus

publishing ApS ISBN 978-87-7681-598-1.

Class & Semester	:	**S. Y. B.Tech (Electronics & Communication Technology) Part I, Semester IV**								
Course Title	:	**Environmental Studies Project Work**						*Course Code*:	:	**HS221**
Teaching Scheme (Hours)	:	**2 hr /week= 2 x12= 24 hours**						*Credits*	:	**Nil**
Evaluation Scheme (Marks)	:	**IPE** **IOE**	: :	**30** **Nil**	**EPE** **EOE**	: :	**Nil** **Nil**	*Duration of SEE for Theory part*	:	**2 hours** (SEE at the yearend)
Revision	:	**Third**						*Month*	:	**December 2016**

Pre-requisites : Fundamentals of Physics and Chemistry

Type of Course : Filed work with necessary laboratory experimentation

Course Domain : Humanities and Applied Science

Skills Imbibed : Cognitive: Understand, Apply, Analyze, Evaluate, Create
Psychomotor: Imitation, manipulation, articulation, naturalization

Course Assessment Methods:

Students Project/ field work assessment. However, their overall response during entire semester is also considered for evaluation.

Practical List :

Field work under the supervision of course coordinator.

Lab Manual :

Institute's Laboratory Course Manual and equipment wise Standard Operating Procedure to follow in case of use of related apparatus, equipment.