

**SCHEME**

**OF**

**STUDIES AND EXAMINATIONS**

**B.TECH. APPLIED ELECTRONICS AND  
INSTRUMENTATION ENGINEERING  
2012-13 ONWARDS**

**DEENBANDHU CHHOTU RAM UNIVERSITY OF SCIENCE & TECHNOLOGY, MURTHAL (SONEPAT)**  
**SCHEME OF STUDIES & EXAMINATIONS**  
**B.Tech. 1st YEAR (SEMESTER – I) (COMMON FOR ALL BRANCHES)**  
**Credit Based Scheme w.e.f. 2012-13**

S. No.	Course No.	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credit	Duration of Exam
			L	T	P		Theory	Practical			
1	HUM101B	COMMUNICATIVE ENGLISH	3	1	-	25	75	-	100	4	3
2	MATH101B	MATHEMATICS-I	3	1	-	25	75	-	100	4	3
3	PHY101B	ENGINEERING PHYSICS-I	3	1	-	25	75	-	100	4	3
4	ME101B	MANUFACTURING PROCESSES (Gr-A)	3	1	-	25	75	-	100	4	3
	CH101B	ENGINEERING CHEMISTRY (Gr-B)	3	1	-	25	75	-			
5	EE101B	PRINCIPLES OF ELECTRICAL ENGINEERING (Gr-A)	3	1	-	25	75	-	100	4	3
	CSE101B	INTRODUCTION TO COMPUTERS & PROGRAMMING (Gr-B)	3	1	-	25	75	-			
6	ME103B	ENGINEERING GRAPHICS & DRAWING (Gr-A)	1	-	4	40	-	60	100	3	3
	ME105B	ELEMENTS OF MECHANICAL ENGINEERING (Gr-B)	3	1	-	25	75	-			
7	PHY103B	PHYSICS LAB-I	-	-	2	20	-	30	50	1	3
8	ME107B	WORKSHOP PRACTICE (Gr-A)	-	-	4	40	-	60	100	2	3
	CH103B	CHEMISTRY LAB (Gr-B)	-	-	2	20	-	30			
9	EE103B	PRINCIPLES OF ELECTRICAL ENGINEERING LAB (Gr-A)	-	-	2	20	-	30	50	1	3
	CSE103B	COMPUTER PROGRAMMING LAB (Gr-B)	-	-	2	20	-	30			
10	ME109B	ELEMENTS OF MECHANICAL ENGINEERING LAB (Gr-B)	-	-	2	20	-	30	50	1	3
<b>Total</b>			<b>16</b>	<b>5</b>	<b>12</b>	<b>245</b>	<b>375</b>	<b>180</b>	<b>800</b>	<b>27</b>	
			<b>18</b>	<b>6</b>	<b>8</b>	<b>230</b>	<b>450</b>	<b>120</b>	<b>800</b>	<b>28</b>	

**Note:**

- 1 Every student has to participate in the sports activities. Minimum one hour is fixed for sports activities either in the morning or evening. Weightage of sports is given in General Proficiency Syllabus.
- 2 The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
- 3 Electronic gadgets including Cellular phones are not allowed in the examination.
- 4 All the branches are to be divided into group A and B as per the suitability of the institute/college, so that there is an equitable distribution of teaching load in odd and even semesters.

**DEENBANDHU CHHOTU RAM UNIVERSITY OF SCIENCE & TECHNOLOGY, MURTHAL (SONEPAT)**  
**SCHEME OF STUDIES & EXAMINATIONS**  
**B.Tech. 1st YEAR (SEMESTER – II) (COMMON FOR ALL BRANCHES)**  
**Credit Based Scheme w.e.f. 2012-13**

S. No.	Course No.	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credit	Duration of Exam
			L	T	P		Theory	Practical			
1.	MATH102B	MATHEMATICS-II	3	1	-	25	75	-	100	4	3
2	PHY102B	ENGINEERING PHYSICS-II	3	1	-	25	75	-	100	4	3
3	ME101B	MANUFACTURING PROCESSES (Gr-B)	3	1	-	25	75	-	100	4	3
	CH101B	ENGINEERING CHEMISTRY(Gr-A)	3	1	-	25	75	-			
4	EE101B	PRINCIPLES OF ELECTRICAL ENGINEERING (Gr-B)	3	1	-	25	75	-	100	4	3
	CSE101B	INTRODUCTION TO COMPUTERS & PROGRAMMING (Gr-A)	3	1	-	25	75	-			
5	ECE102B	BASICS OF ELECTRONICS ENGINEERING	3	1	-	25	75	-	100	4	3
	BT102B	BASICS OF BIO TECHNOLOGY									
	HUM102B	ORAL COMMUNICATION SKILLS									
	CE102B	BASICS OF CIVIL ENGINEERING									
6	ME103B	ENGINEERING GRAPHICS & DRAWING (Gr-B)	1	-	4	40	-	60	100	3	3
	ME105B	ELEMENTS OF MECHANICAL ENGINEERING (Gr-A)	3	1	-	25	75	-	100	4	
7	PHY104B	PHYSICS LAB-II	-	-	2	20	-	30	50	1	3
8	ME107B	WORKSHOP PRACTICE (Gr-B)	-	-	4	40	-	60	100	2	3
	CH103B	CHEMISTRY LAB (Gr-A)	-	-	2	20	-	30	50	1	
9	EE103B	PRINCIPLES OF ELECTRICAL ENGINEERING LAB (Gr-B)	-	-	2	20	-	30	50	1	3
	CSE103B	COMPUTER PROGRAMMING LAB (Gr-A)	-	-	2	20	-	30	50		
10	ME109B	ELEMENTS OF MECHANICAL ENGINEERING LAB (Gr-A)	-	-	2	20	-	30	50	1	3
11	GP102B	GENERAL PROFICIENCY & ETHICS	1	-	-	-	-	50	50	2	-
<b>Total</b>			<b>17</b>	<b>5</b>	<b>12</b>	<b>245</b>	<b>375</b>	<b>230</b>	<b>850</b>	<b>29</b>	
<b>Gr-B</b>			<b>19</b>	<b>6</b>	<b>8</b>	<b>230</b>	<b>450</b>	<b>170</b>	<b>850</b>	<b>30</b>	
<b>Gr-A</b>											

**Note:**

- Every student has to participate in the sports activities. Minimum one hour is fixed for sports activities either in the morning or evening. Weightage of Sports is given in General Proficiency Syllabus.
- Each student has to undergo a workshop of at least 4 weeks (80-100 hours) at the end of II semester during summer vacations. Out of the four weeks, two weeks would be dedicated to general skills and two weeks training for specialized discipline/ department. The evaluation of this training shall be carried out in the III semester.
- The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
- Electronic gadgets including Cellular phones are not allowed in the examination.
- The elective course HUM102B ORAL COMMUNICATION SKILLS is deleted with effect from session 2013-14.
- All the branches are to be divided into group A and B as per the suitability of the institute/college, so that there is an equitable distribution of teaching load in odd and even semesters.

Approved by UG BOS & FET

**DEENBANDHU CHHOTU RAM UNIVERSITY OF SCIENCE & TECHNOLOGY, MURTHAL (SONEPAT)**  
**SCHEME OF STUDIES AND EXAMINATION**  
**B. TECH. II YEAR (APPLIED ELECTRONICS AND INSTRUMENTATION ENGINEERING)**  
**SEMESTER III**  
**Credit Based Scheme w.e.f. 2013-2014**

Sr. No.	Course No.	Course Title	Teaching Schedule			Marks of Class Work	Exam. Marks		Total Marks	Credit	Duration of Exam
			L	T	P		Theory	Practical			
1	MGT201B	ENGINEERING ECONOMICS (Common for all branches Except BT & BME) (Gr-A)	4	-	-	25	75	-	100	4	3
	GES201B	OR ENVIRONMENTAL STUDIES(Common for all branches) (Gr-B)	3	-	-	-	75	-	75	-	3
2	ECE212B	FIELD AND WAVES (AEI, common with 4 <sup>th</sup> Sem. ECE)	3	1	-	25	75	-	100	4	3
3	EE201B	ELECTRICAL ENGINEERING MATERIALS (EE, EEE, IC, AEI)	3	-	-	25	75	-	100	3	3
4	EE211B	NETWORK ANALYSIS AND SYNTHESIS(ECE, AEI)	3	1	-	25	75	-	100	4	3
5	EE212B	ELECTROMECHANICAL ENERGY CONVERSION (AEI, common with 4 <sup>th</sup> Sem. EEE & IC)	3	1	-	25	75	-	100	4	3
6	CSE201B	DATA STRUCTURES (CSE, ECE, AEI)	3	1	-	25	75	-	100	4	3
7	EE241B	NETWORK ANALYSIS AND SYNTHESIS LAB(ECE, AEI)	-	-	2	20	-	30	50	1	3
8	CSE221B	DATA STRUCTURES LAB (CSE, ECE, AEI)	-	-	2	20	-	30	50	1	3
9	EE232B	ELECTROMECHANICAL ENERGY CONVERSION LAB(AEI, common with 4 <sup>th</sup> Sem. EEE & IC)	-	-	3	40	-	60	100	2	3
10	GES203B	ENVIRONMENTAL STUDIES FIELD WORK(Gr-B)	-	-	-	-	-	25	25	-	-
11	ME217B	WORKSHOP TRAINING (Common for all branches Except BT & AE)	-	-	2	50	-	-	50	2	-
<b>Total</b>			<b>17</b>	<b>4</b>	<b>9</b>	<b>255</b>	<b>375</b>	<b>120</b>	<b>750</b>	<b>25</b>	
			<b>19</b>	<b>4</b>	<b>9</b>	<b>280</b>	<b>450</b>	<b>120</b>	<b>850</b>	<b>29</b>	

**Note:**

1. Every student has to participate in the sports activities. Minimum one hour is fixed for sports activities either in the morning or evening. Weightage of Sports is given in General Proficiency Syllabus.
2. The students will be allowed to use non-Programmable Scientific Calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronic Gadgets including Cellular Phones are not allowed in the examination.
4. Assessment of Workshop Training (ME217B) will be based on seminar, viva-voce, report and certificate of professional training obtained by the student from in-house workshop.
5. All the branches are to be divided into group A and B as per the suitability of the institute/college, so that there is an equitable distribution of teaching load in odd and even semesters.

**DEENBANDHUCHHOTURAMUNIVERSITY OF SCIENCE & TECHNOLOGY, MURTHAL (SONEPAT)**  
**SCHEME OF STUDIES AND EXAMINATION**  
**B. TECH. II YEAR (APPLIED ELECTRONICS AND INSTRUMENTATION ENGINEERING)**  
**SEMESTER IV**  
**Credit Based Scheme w.e.f. 2013-2014**

Sr. No.	Course No.	Course Title	Teaching Schedule			Marks of Class Work	Exam. Marks		Total Marks	Credit	Duration of Exam
			L	T	P		Theory	Practical			
1	MGT201B	ENGINEERING ECONOMICS (Common for all branches Except BT& BME) (Gr-B)	4	-	-	25	75	-	100	4	3
	GES201B	ENVIRONMENTAL STUDIES(Common for all branches) (Gr-A)	3	-	-	-	75	-	75	-	3
2	MATH202B	NUMERICAL METHODS (CHE,AEI)	3	1	-	25	75	-	100	4	3
3	CSE204B	OBJECT ORIENTED PROGRAMMING(AEI,CSE, common with 5 <sup>th</sup> Sem. ECE)	3	1	-	25	75	-	100	4	3
4	ECE203B	ANALOG ELECTRONICS (AEI, common with 3 <sup>rd</sup> Sem. ECE,BME)	3	1	-	25	75	-	100	4	3
5	ECE201B	DIGITAL ELECTRONICS ( AEI,BME, common with 3 <sup>rd</sup> semester EE,ECE,CSE,IC,EEE)	3	1	-	25	75	-	100	4	3
6	EE204B	ELECTRICAL MEASUREMENTS & MEASURING INSTRUMENTS (AEI,EE, EEE, IC)	3	1	-	25	75	-	100	4	3
7	ECE223B	ANALOG ELECTRONICS LAB (AEI,common with 3 <sup>rd</sup> Sem. ECE,BME)	-	-	2	20	-	30	50	1	3
8	ECE221B	DIGITAL ELECTRONICS LAB ( AEI,BME, common with 3 <sup>rd</sup> semester EE,ECE,CSE,IC,EEE)	-	-	2	20	-	30	50	1	3
9	EE224B	ELECTRICAL MEASUREMENTS & MEASURING INSTRUMENTS LAB(AEI,EE, EEE, IC)	-	-	2	20	-	30	50	1	2
10	CSE224B	OBJECT ORIENTED PROGRAMMING LAB(AEI,CSE, common with 5 <sup>th</sup> Sem. ECE)	-	-	2	20	-	30	50	1	3
11	GES203B	ENVIRONMENTAL STUDIES FIELD WORK(Gr-A)	-	-	-	-	-	25	25	-	-
12	GPAEI202B	GENERAL PROFICIENCY & ETHICS	1	-	-	-	-	75	75	2	-
<b>Total</b>			<b>20</b>	<b>5</b>	<b>8</b>	<b>230</b>	<b>450</b>	<b>195</b>	<b>875</b>	<b>30</b>	
<b>Gr-B</b>			<b>18</b>	<b>5</b>	<b>8</b>	<b>205</b>	<b>375</b>	<b>195</b>	<b>775</b>	<b>26</b>	
<b>Gr-A</b>											

Note:

- Every student has to participate in the sports activities. Minimum one hour is fixed for sports activities either in the morning or evening. Weightage of Sports is given in General Proficiency Syllabus.
- The students will be allowed to use non-Programmable Scientific Calculator. However, sharing/exchange of calculator is prohibited in the examination.
- Electronic Gadgets including Cellular Phones are not allowed in the examination.
- At the end of 4<sup>th</sup> semester each student has to undergo four weeks Professional Training of 4 weeks in an Industry/ Institute/ Professional Organization/ Research Laboratory/ training centre etc. with the prior approval of the Training and Placement Officer of the University and submit in the department a typed report along with a certificate from the organization & its evaluation shall be carried out in the 5<sup>th</sup> Semester.
- The ENVIRONMENTAL STUDIES (GES201B) & ENVIRONMENTAL STUDIES FIELD WORK (GES203B) are compulsory & qualifying courses.
- All the branches are to be divided into group A and B as per the suitability of the institute/college, so that there is an equitable distribution of teaching load in odd and even semesters.

Approved by UG BOS & FET

**DEENBANDHU CHHOTU RAM UNIVERSITY OF SCIENCE & TECHNOLOGY, MURTHAL (SONEPAT)**  
**SCHEME OF STUDIES AND EXAMINATION**  
**B. TECH. III YEAR (APPLIED ELECTRONICS AND INSTRUMENTATION ENGINEERING)**  
**SEMESTER V**  
**Credit Based Scheme w.e.f. 2014-2015**

Sr. No.	Course No.	Course Title	Teaching Schedule			Marks of Class Work	Exam. Marks		Total Marks	Credit	Duration of Exam
			L	T	P		Theory	Practical			
1.	EE401B	SENSORS & TRANSDUCERS (AEI,common with 7 <sup>th</sup> Sem.EE, EEE, IC)	3	1	-	25	75	-	100	4	3
2	ECE303B	ELECTRONIC MEASUREMENT AND INSTRUMENTATION ( ECE, AEI & 6 <sup>th</sup> Sem. IC)	3	1	-	25	75	-	100	4	3
3	ECE206B	ANALOG ELECTRONIC CIRCUITS (AEI,common with 4 <sup>th</sup> Sem. BME,ECE)	3	1	-	25	75	-	100	4	3
4	CSE210B	COMPUTER ARCHITECTURE & ORGANIZATION(AEI, Common with 4 <sup>th</sup> Sem. CSE,ECE)	3	1	-	25	75	-	100	4	3
5	EE312B	CONTROL SYSTEM ENGINEERING(AEI,common with 6 <sup>th</sup> Sem. ECE,BME)	3	1	-	25	75	-	100	4	3
6	ECE309B	MICROPROCESSORS AND INTERFACING (BME,CSE ,ECE,AEI)	3	1	-	25	75	-	100	4	3
7	ECE323B	ELECTRONIC MEASUREMENT AND INSTRUMENTATION LAB (ECE, AEI,common with 6 <sup>th</sup> Sem. IC)	-	-	2	20	-	30	50	1	3
8	EE332B	CONTROL SYSTEM ENGINEERING LAB (AEI,common with 6 <sup>th</sup> Sem. ECE)	-	-	2	20	-	30	50	1	3
9	ECE226B	ANALOG ELECTRONIC CIRCUITS LAB(AEI,common with 4 <sup>th</sup> Sem. BME,ECE)	-	-	2	20	-	30	50	1	3
10	ECE329B	MICROPROCESSORS & INTERFACING LAB (BME,CSE ,ECE,AEI)	-	-	2	20	-	30	50	1	3
11	AEI335B	PROFESSIONAL TRAINING-I	-	-	2	50	-	-	50	2	-
Total			18	6	10	280	450	120	850	30	

**Note:**

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2. The students will be allowed to use non-Programmable Scientific Calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronic Gadgets including Cellular Phones are not allowed in the examination.
4. Assessment of Professional training. I (AEI335B) will be based on seminar, viva-voce, report and certificate of professional training obtained by the student from the industry / institute / research lab / training centre etc.

**DEENBANDHU CHHOTU RAM UNIVERSITY OF SCIENCE & TECHNOLOGY, MURTHAL(SONEPAT)**  
**SCHEME OF STUDIES AND EXAMINATION**  
**B. TECH. III YEAR (APPLIED ELECTRONICS AND INSTRUMENTATION ENGINEERING)**  
**SEMESTER VI**  
**Credit Based Scheme w.e.f. 2014-2015**

Sr. No.	Course No.	Course Title	Teaching Schedule			Marks of Class Work	Exam. Marks		Total Marks	Credit	Duration of Exam
			L	T	P		Theory	Practical			
1	HUM302B	REPORT WRITING SKILLS (common for all branches)	1	-	-	25	50	-	75	1	2
2	EE426B	COMPUTER BASED INSTRUMENTATION AND CONTROL	4	-	-	25	75	-	100	4	3
3	ECE210B	COMMUNICATION SYSTEMS (AEI, Common with 4 <sup>th</sup> Sem. ECE, 3 <sup>rd</sup> Sem. CSE)	3	1	-	25	75	-	100	4	3
4	ECE308B	MICROELECTRONICS (ECE, AEI)	3	1	-	25	75	-	100	4	3
5	ECE410B	BIOMEDICAL ELECTRONICS	4	-	-	25	75	-	100	4	3
6	ECE208B	POWER ELECTRONICS (AEI, common with 4 <sup>th</sup> sem. ECE)	3	1	-	25	75	-	100	4	3
7	ECE306B	HDL BASED SYSTEM DESIGN (ECE, AEI)	3	1	-	25	75	-	100	4	3
8	ECE326B	HDL BASED SYSTEM DESIGN LAB (ECE, AEI)	-	-	2	20	-	30	50	1	3
9	ECE230B	COMMUNICATION SYSTEMS LAB (AEI, Common with 4 <sup>th</sup> Sem. ECE)	-	-	2	20	-	30	50	1	3
10	ECE228B	POWER ELECTRONICS LAB (AEI, common with 4 <sup>th</sup> sem. ECE)	-	-	2	20	-	30	50	1	3
11	ECE333B	ELECTRONIC CIRCUIT SIMULATION LAB	-	-	2	20	-	30	50	1	3
12	GPAEI302B	GENERAL PROFICIENCY & ETHICS	1	-	-	-	-	75	75	2	-
13	HUM304B	ORAL PRESENTATION SKILLS (common for all branches)	-	-	2	20	-	30	50	1	2
Total			22	4	10	275	500	225	1000	32	

**Note:**

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2. The students will be allowed to use non-Programmable Scientific Calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronic Gadgets including Cellular Phones are not allowed in the examination.
4. At the end of 6<sup>th</sup> semester each student would undergo four weeks Professional Training in an Industry/ Institute/ Professional / Organization/ Research Laboratory / training centre etc. with the prior approval of the Training and Placement Officer of the University and submit in the department a typed report along with a certificate from the organization.

**DEENBANDHU CHHOTU RAM UNIVERSITY OF SCIENCE & TECHNOLOGY, MURTHAL (SONEPAT)**  
**SCHEME OF STUDIES AND EXAMINATION**  
**B. TECH. IV YEAR (APPLIED ELECTRONICS AND INSTRUMENTATION ENGINEERING)**  
**SEMESTER VII**  
**Credit Based Scheme w.e.f. 2015-2016**

Sr. No.	Course No.	Course Title	Teaching Schedule			Marks of Class Work	Exam. Marks		Total Marks	Credit	Duration of Exam
			L	T	P		Theory	Practical			
1	ECE401B	INDUSTRIAL PROCESS CONTROL AND INSTRUMENTATION (AEI,ECE)	3	1	-	25	75	-	100	4	3
2	ECE403B	DIGITAL SIGNAL PROCESSING ( ECE, AEI)	3	1	-	25	75	-	100	4	3
3	ECE407B	VLSI DESIGN(ECE, AEI,EEE)	3	1	-	25	75	-	100	4	3
4	ECE426B	EMBEDDED SYSTEM DESIGN	3	1	-	25	75	-	100	4	3
5		*OPEN ELECTIVE	4	-	-	25	75	-	100	4	3
6	ECE421B	PROGRAMMABLE LOGIC CONTROLLERS LAB(AEI,ECE)	-	-	2	20	-	30	50	1	3
7	ECE446B	EMBEDDED SYSTEM DESIGN LAB	-	-	2	20	-	30	50	1	3
8	ECE423B	DIGITAL SIGNAL PROCESSING LAB using MATLAB( ECE, AEI)	-	-	2	20	-	30	50	1	3
9	ECE427B	VLSI DESIGN LAB(ECE,AEI)	-	-	2	20	-	30	50	1	3
10	AEI431B	PROJECT	-	-	4	100	-	-	100	4	-
11	AEI435B	PROFESSIONAL TRAINING . II	-	-	2	50	-	-	50	2	-
Total			16	4	14	355	375	120	850	30	

**LIST OF OPEN ELECTIVES:**

1	MEI 623B	ENTREPRENEURSHIP	6	BT401B	BIOINFORMATICS
2	BME451B	MEDICAL INSTRUMENTATION	7	AE417B	MODERN VEHICLE TECHNOLOGY
3	ECE305B	CONSUMER ELECTRONICS	8	CE451B	POLLUTION & CONTROL
4	EE451B	ENERGY AUDIT	9	CSE411B	MANAGEMENT INFORMATION SYSTEM
5	EEE457B	ENERGY RESOURCES & TECHNOLOGY	10	IT413B	CYBER SECURITY

**Note:**

- Every student has to participate in the sports activities. Minimum one hour is fixed for sports activities either in the morning or evening. Weightage of Sports is given in General Proficiency Syllabus.
- Students will be permitted to opt for any one elective run by the other department. However, the department shall offer those elective for which they have expertise. The choice of the students for any elective shall not be binding for the department to offer, if the department does not have expertise. The minimum strength of the students should be 20 to run an elective course.
- Assessment of Professional Training-II, undergone at the end of VI semester, will be based on seminar, viva-voce, report and certificate of Professional Training obtained by the student from the industry, , institute, research lab, training center etc
- The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
- Assessment Electronics gadgets including Cellular phones are not allowed in the examination.



**DEENBANDHU CHHOTU RAM UNIVERSITY OF SCIENCE & TECHNOLOGY, MURTHAL (SONEPAT)**  
**SCHEME OF STUDIES AND EXAMINATION**  
**B. TECH. IV YEAR (APPLIED ELECTRONICS AND INSTRUMENTATION ENGINEERING)**  
**SEMESTER VIII**  
**Credit Based Scheme w.e.f. 2015-2016**

Sr. No.	Course No.	Course Title	Teaching Schedule			Marks of Class Work	Exam. Marks		Total Marks	Credit	Duration of Exam
			L	T	P		Theory	Practical			
1	IC302B	PROCESS DYNAMICS & CONTROL(AEI ,common with 6 <sup>th</sup> Sem. IC)	3	1	-	25	75	-	100	4	3
2	EE404B	COMPUTER APPLICATION TO POWER SYSTEM ANALYSIS (AEI,EE,EEE)	3	1	-	25	75	-	100	4	3
3		DEPT. ELECTIVE I	4	-	-	25	75	-	100	4	3
4		DEPT. ELECTIVE II	4	-	-	25	75	-	100	4	3
5	EE414B	COMPUTER APPLICATIONS TO POWER SYSTEM ANALYSIS LAB(AEI,EE,EEE)	-	-	2	20	-	30	50	1	2
6	AEI422B	SEMINAR	-	-	2	50	-	-	50	2	-
7	AEI431B	PROJECT	-	-	8	75	-	125	200	8	3
8	GPAEI402B	GENERAL FITNESS FOR THE PROFESSION	-	-	-	-	-	100	100	4	3
Total			14	2	12	245	300	255	800	31	

DEPT. ELECTIVE-I			DEPT. ELECTIVE-II		
S.NO	CODE	TITLE	S.NO	CODE	TITLE
1	IC452B	RANDOM PROCESSES IN ESTIMATION & CONTROL	1	IC464B	DYNAMIC BEHAVIOUR OF PROCESSES
2	EE446B	ARTIFICIAL INTELLIGENCE	2	ECE428B	POWER SYSTEM STABILITY AND FACTS
3	EE424B	FUZZY CONTROL SYSTEMS	3	ECE420B	TELECOMMUNICATION SWITCHING SYSTEMS
4	EE402B	ADVANCED CONTROL SYSTEMS	4	ECE422B	MECHATRONICS
5	EE434B	ADVANCED INSTRUMENTATION	5	ECE418B	RELIABILITY ENGINEERING

**Note:**

- Every student has to participate in the sports activities. Minimum one hour is fixed for sports activities either in the morning or evening. Weightage of Sports is given in General Proficiency Syllabus.
- The students will be allowed to use non-Programmable Scientific Calculator. However, sharing/exchange of calculator is prohibited in the examination.
- Electronic Gadgets including Cellular Phones are not allowed in the examination.
- Project coordinator will be assigned the project (AEI431B) load of, maximum of 2 hrs. per week including his own guiding load of one hr. However, the guiding teacher will be assigned maximum of one period of teaching load irrespective of number of students/groups under him/her. Project involving design, fabrication, testing, computer simulation, case studies etc., which has been commenced by students in VII semester will be completed in VIII semester.
- For the course AEI422B (Seminar), a student will select a topic from emerging areas of Engineering & Technology and study it independently. Student will give a seminar / talk on the topic.
- The evaluation of the student for his / her General Fitness for Profession shall be carried out by a team consisting of Dean Faculty of Engineering. & Technology, Chairperson of concerned department and external examiner appointed by University. The minimum strength of the students should be 20 to run an elective course.

Approved by UG BOS & FET

## HUM101B

## COMMUNICATIVE ENGLISH

B. Tech. Semester - I (Common for all Branches)

L	T	P	Credits
3	1	-	4

Class Work	:	25 Marks
Theory	:	75 Marks
Total	:	100 Marks
Duration of Exam.	:	3 Hrs.

### UNIT I

#### Communicative Grammar:

- A) Spotting the errors pertaining to tenses, conditional sentences, Concord – grammatical concord, notional concord and the principle of proximity b/w subject and verb
- B) Voice, Reported Speech.

### UNIT II

#### Language through Literature:

Linguistic Reading of the following texts:

- A) 'Kabuliwallah' by Rabindranath Tagore\*
- B) 'Am I Blue?' by Alice Walker\*
- C) 'If You are Wrong, Admit It' by Dale Carnegie\*
- D) 'Engine Trouble' by R.K. Narayan\*

The prescribed texts will be used as case studies for various components of the syllabus. \* the Source is given in the list of Texts Books given below.

### UNIT III

#### Group Communication:

- A) Communication: concept, Process and Barriers
- B) Communicating using Standard Pronunciation with the help of IPA
- C) Formal Speaking with peers ( e.g. discussion, talks on current issues in a class)
- D) Writing official letters on issues concerning students and social life
- E) Writing small reports on scientific issues, IT issues, University fests/programmes
- F) E-mail writing and writing for web

### UNIT IV

#### Communicative Creativity:

- A) Comprehension: Extracting, interpreting, summarizing, reviewing and analyzing the prescribed texts.
- B) Composition: Developing themes and situations through role play activities or dialogue writing.

#### Text Books:

1. Quirk, Randolph, Sidney Greenbaum, Geoffrey Leech & Jan Svartvik. A Comprehensive Grammar of the English Language. London: Longman, 1989
2. Communicative English for Engineers and Professionals by Nitin Bhatnagar & Mamta Bhatnagar New Delhi: Pearson / Longman
3. Crystal, David. Rediscover Grammar. London: Longman/Pearson, 1988.
4. \*Tagore, Rabinder. "Kabuliwallah" , Famous Indian Stories. Ed. M.G.Narsimha Murthy .Mumbai: Orient Blackswan, 2009. (Web source: [www.angelfire.com](http://www.angelfire.com))
5. \* Walker, Alice. "Am I Blue" , An Anthology of Short Stories . Ed. Usha Bande .New Delhi: OUP , 2004. (Web source- [www.old.li.sru.edu](http://www.old.li.sru.edu))
6. \*Narayanan .K.R. "Engine Trouble", Contemporary English Prose .Ed. K.P.K.Menon. New York: OUP,1976. ( Web Source- [www.scribd.com](http://www.scribd.com))
7. \*Carnegie, Dale. "If you are wrong admit it", An Anthology of Modern Prose. Ed Manmohan K.Bhatnagar.Delhi :Macmillan India Ltd,2006.

#### Suggested Reading:

1. Pink, M.A. and S.E. Thomas. *English Grammar, Composition and Correspondence*. Delhi: S. Chand and Sons McRae, John and Roy Boardman.
2. *Reading Between the Lines*. Delh: Foundation Books (Cambridge University Press)Sharma, Sangeeta and Binod Mishra.
3. *Communication Skills for Engineers and scientists*. Delhi: PHI, 2009
4. Fitikides, T.J. *Common Mistakes in English*. Essex: Pearson Education, 1936, 6<sup>th</sup> edition 2000.

## **SCHEME OF END SEMESTER EXAMINATION (MAJOR TEST)**

### **Theory**

1. The duration of the exam will be 3 hours.
2. The Question Paper for this theory course shall have seven questions in all covering all the units of the syllabus..
3. The student is required to attempt all the seven questions.
4. Questions No. 1 based on Unit I is of **15** marks. It may be in the form of 'Do as directed: trace the error, choose the correct alternative, supply the correct alternative/s, change the voice, convert the speech from direct to indirect or vice-versa'.
5. Question no 2 and 3 based on prescribed texts in Unit II. Question no 2 of **10** marks is to evaluate the comprehension of the text through short answer questions or a long answer question to assess the students' reading comprehension, interpretative and analytical abilities. Question no 3 of **15** marks will judge the linguistic aspect of the text such as using a particular word in its various syntactic forms like noun, adjective, verb etc.; matching the lists of words and their explanation; providing opposite/similar meanings and other grammar components prescribed in Unit I of the syllabus.
6. Question no 4 based on Unit III is of **10** marks. It may be in the form of transcription of words given, describe an event, classmate, discuss an issue etc.
7. Question no 5 based on Unit III is of **10** marks. It requires the student to frame either a small report on a topic given or write the given official letter, or e-mail a message.
8. Question no 6 based on unit IV is of **10** marks. It evaluates the Comprehension and Interpretation of the texts prescribed in Unit II. The vocabulary, general understanding and interpretation of the content may be evaluated in the form of question answer exercise, culling out important points, suggesting a suitable topic/title, summarising and interpreting.
9. Question No. 7 based on unit IV is of **5** marks. It requires the student to develop a hypothetical situation in a dialogue form, or to develop an outline, key expression, for role play activity.

## MATH101B

## MATHEMATICS - I

B. Tech. Semester - I (Common for all Branches)

L	T	P	Credits
3	1	-	4

Class Work	:	25 Marks
Theory	:	75 Marks
Total	:	100 Marks
Duration of Exam.	:	3 Hrs.

### UNIT I

#### Infinite series :

Convergence and divergence, Comparison, D' Alembert's ratio, Integral, Raabe's, Logarithmic and Cauchy root tests, Alternating series, Absolute and conditional convergence.

Applications of Differentiation : Taylor's and Maclaurin's series, Asymptotes, Curvature Asymptotes.

### UNIT-II

#### Partial Differentiation & its Applications :

Functions of two or more variables; partial derivatives, Total differential and differentiability, Derivatives of composite and implicit functions, Jacobians, Higher order partial derivatives.

Homogeneous functions, Euler's theorem, Taylor's series for functions of two variables (without proof), maxima-minima of function of two variables, Lagrange's method of undetermined multipliers, Differentiation under integral sign.

### UNIT-III

#### Applications of Single & Multiple Integration :

Applications of single integration to find volume of solids and surface area of solids of revolution. Double integral, change of order of integration, Double integral in polar coordinates, Applications of double integral to find area enclosed by plane curves and volume of solids of revolution.

Triple integral, volume of solids, change of variables, Beta and gamma functions and relationship between them.

### UNIT-IV

#### Vector Calculus :

Differentiation of vectors, scalar and vector point functions Gradient of a scalar field and directional derivative, divergence and curl of a vector field and their physical interpretations.

Integration of vectors, line integral, surface integral, volume integral, Green, Stoke's and Gauss theorems (without proof) and their simple applications.

#### Text Books :

1. Advanced Engineering Mathematics : F. Kreyszig.
2. Higher Engineering Mathematics : B.S. Grewal.

#### Reference Books :

1. Engineering Mathematics Part-I : S.S. Sastry.
2. Differential and Integral Calculus : Piskunov.
3. Advanced Engineering Mathematics : R.K. Jain and S.R.K. Iyengar
4. Advanced Engg. Mathematics : Michael D. Greenberg

#### Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

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## PHY101B

## ENGINEERING PHYSICS - I

B. Tech. Semester - I (Common for all Branches)

L T P Credits  
3 1 - 4

Class Work : 25 Marks  
Theory : 75 Marks  
Total : 100 Marks  
Duration of Exam. : 3 Hrs.

### UNIT I

#### PHYSICAL OPTICS:

**Interference:** Division of wave front-Fresnel's Biprism, Division of amplitude – Newton's rings, Michelson interferometer, applications.

**Diffraction :** Difference between Fraunhofer and Fresnel diffraction, Fraunhofer diffraction through a slit, Plane transmission diffraction grating and its spectra, dispersive and resolving powers.

**Polarization :** Polarised and unpolarized light, double refraction, Nicol prism, quarter and half wave plates, Plane, Elliptically & circularly polarised light, Polarimetry: Biquartz and Laurent's half-shade polarimeters.

### UNIT-II

#### LASER & FIBRE OPTICS:

Introduction, Spontaneous and stimulated emissions, Laser action, characteristics of laser beam, Ruby laser, He-Ne, Nd-Yag and semiconductor lasers, applications of laser.

Introduction, Propagation of light in fibres, Types of fiber (pulse & continuous), numerical aperture, Modes of propagation in optical fibre, application of optical fibre.

#### ACOUSTIC OF BUILDINGS:

Introduction, Reverberation, Sabine's formula for reverberation time, Absorption coefficient and its measurements, factors affecting the architectural acoustics and their remedy, Sound absorbing materials.

### UNIT-III

#### TRANSMISSION OF HEAT AND THERMAL RADIATION:

Modes of transmission of heat, Thermal conductivity, Rectilinear flow of heat through a rod, Radial flow of heat through a spherical shell, determination of Thermal conductivity of good and bad conductors.

Black body, Emissive and Absorptive Powers, Wein's Displacement Law, Kirchhoff's Law, Stefan's Law, Determination of Stefan's Constant.

### UNIT-IV

#### NUCLEAR & ELEMENTARY IDEA OF PARTICLE PHYSICS:

Outline of interaction of charged particles and of Gamma-rays with matter. Counters: Gas filled counters (Ionization Chamber, Proportional Counter and G M Counter). Detector: Scintillation detector, Semiconductor detectors (p-n junction detector), Biological effects of nuclear radiation.

Introduction to elementary particles, Interaction in particle physics: strong, electromagnetic, weak and gravitational. .

#### Text Books :

1. A text book of Optics – Brij Lal and Subramanyam
2. Perspectives of Modern Physics - Arthur Beiser (TMH)
3. Modern Engineering Physics – A.S. Vasudeva (S. Chand)
4. Engineering Physics by R.K. Gaur and S.L. Gupta
5. Engineering Physics by H.K Malik and A.K. Singh (Tata McGraw Hill).
7. Engineering Physics by S.P. Taneja (Chand Pub.)

#### Reference Books:

1. Physics Vol-I & II – Resnick & Halliday (Wiley Eastern)
2. Heat and Thermodynamics – M.N. Saha & B.N. Srivastava
3. Nuclear Physics Principles and Applications by John Lilley(Wiley-India).

#### Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

## ME101B

## MANUFACTURING PROCESSES

B. Tech. Semester – I/II (Common for all Branches)

L	T	P	Credits
3	1	-	4

Class Work	:	25 Marks
Theory	:	75 Marks
Total	:	100 Marks
Duration of Exam.	:	3 Hrs.

### UNIT I

#### Introduction:

Introduction to Manufacturing Processes and their Classification, automation in manufacturing, Industrial Safety; Introduction, Types of Accidents, Causes and Common Sources of Accidents, Methods of Safety, Electric Safety Measures, First Aid. Plant Layout, Principles of Plant Layout and Objectives of Layout, Types of Plant and shop layouts and their Advantages

### UNIT-II

#### Engineering Materials:

General Properties and Applications of Engineering Materials, Mild Steel, Medium Carbon Steel, High Carbon Steel, High Speed Steel and Cast Iron, Non-Ferrous Materials, Shop's Tools Materials, Super Alloys or High Temperature Materials

#### Foundry:

Introduction to Casting Processes, Basic Steps in Casting Process, Pattern, Types of Patterns, Pattern allowances, Risers, Runners, Gates, Molding Sand and its composition, Sand Preparation, Molding Methods, Core Sands and Core Making, Core Assembly, Mold Assembly, Melting ( Cupola) and Pouring, Fettling, Casting Defects and Remedies. Testing of Castings.

### UNIT-III

**Cold Working (Sheet Metal Work):** Sheet Metal Operations, Measuring, Layout Marking, Shearing, Punching, Blanking, Piercing, Forming, Bending and Joining - Advantages and Limitations. Hot Working Processes: Introduction to Hot Working, Principles of Hot Working Processes, Forging, Rolling, Extrusion, Wire Drawing.

**Introduction to Machine Tools:** Specifications and Uses of commonly used Machine Tools in a Workshop such as Lathe, Shaper, Planer, Milling, Drilling, Slotter, Introduction to Metal Cutting. Nomenclature of a Single Points Cutting Tool and Tool Wear, Mechanics of Chips Formation, Type of Chips, Use of Coolants in machining.

### UNIT-IV

**Welding:** Introduction to Welding, Classification of Welding Processes, Gas Welding: Oxy-Acetylene Welding, Resistance Welding; Spot and Seam Welding, Arc Welding: Metal Arc, TIG & MIG Welding, Welding Defects and Remedies, Soldering & Brazing, Comparisons among Welding, Brazing and Soldering  
Surface Finishing Processes, Introduction to Heat Treatment Processes, Estimating of Manufacturing Cost

#### Text Books:

1. Workshop Technology Vol. I & II - Hazra & Chaudhary, Asian Book Comp., New Delhi.
2. Process and Materials of Manufacture -- Lindberg, R.A. Prentice Hall of India, New Delhi.
3. Principles of Manufacturing Materials and Processes - Campbell, J.S.- McGraw- Hill.

#### Reference Books:

1. Manufacturing Science - Amitabha Ghosh & Ashok Kumar Malik, - East-West Press.
2. Manufacturing Process and Systems - Ostwald, Munoz, John Wiley.
3. Workshop Technology, Vol. 1, 2 & 3 – Chapman, WAJ, Edward Arnold.

#### Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

Approved by UG BOS & FET

**EE101B**

**PRINCIPLES OF ELECTRICAL ENGINEERING**

B. Tech. Semester – I/II (Common for all Branches)

L	T	P	Credits
3	1	-	4

Class Work	:	25 Marks
Theory	:	75 Marks
Total	:	100 Marks
Duration of Exam.	:	3 Hrs.

**UNIT I**

**D.C. Circuit Analysis:**

Basic concepts of electric circuits, Ohm's Law, Independent energy sources, Dependent energy sources, passive elements, circuit properties, Kirchoff's laws, applications of Kirchoff's laws, Nodal and Loop methods of Analysis, Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Reciprocity Theorem, Maximum Power Transfer Theorem, Millman's Theorem, Star-Delta or delta-star transformation, Applications of network theorems P-spice for DC circuit analysis.

**UNIT-II**

**A.C. Circuits:**

Sinusoidal signal, Phasors, polar & rectangular, exponential & trigonometric representations, Resistance, Inductance & Capacitance components, behavior of these components in A.C. circuits, Phasor relationship for circuit elements, Impedance & Admittance, instantaneous & peak values, average and RMS values, active power, reactive power, apparent power, power factor, complex power, behavior of AC series, parallel circuits, RL, RC & RLC A.C. circuits (series and parallel), Resonance-series and parallel R-L-C Circuits, Q-factor, cut-off frequencies & bandwidth.

**UNIT-III**

**Three Phase Circuits:**

Phase and line voltages and currents, balanced star and delta circuits, power equation, measurement of power by two wattmeter method.

**Measuring Instruments:**

Principle, Construction & working of moving coil type voltmeter & ammeter, moving iron type voltmeter & ammeter, Electrodynamic type wattmeter, single-phase induction type energy meter.

**UNIT-IV**

**Transformers:**

Ampere's law, Mutual Inductance, Construction, Working principle and phasor diagrams of Single-phase Transformer, Emf equation, Equivalent circuit, testing, efficiency and regulation of single-phase transformer, Auto transformer.

**Rotating Machines:**

Construction and working principle of dc motor and generator and its characteristics. Construction and working principle of 3-phase Induction machines & 3-phase synchronous machines, torque-speed characteristics.

**Text Books:**

1. Basic Electrical Engg (2nd Edition) : Kothari & Nagarath, TMH
2. Electrical Technology (Vol-I): B.L Theraja & A K Theraja, S.Chand
3. Fundamental of electrical Engineering, Rajendra Prasad, PHI, Edition 2005.
4. Basic Electrical Engineering, V.N Mittle & Arvind Mittal, TMH, Second Edition
5. Basic Electrical Engineering, S.N. Singh, PHI

**Reference Books:**

1. Electrical Engineering Fundamentals: Deltoro, PHI
2. Basic Electrical Engineering (TMH WBUT Series), Abhijit Chakrabarti & Sudipta Nath, TMH
3. Basic Electrical Engineering, T.K. Nagsarkar & M.S. Sukhija, Oxford
4. Introduction to Electrical Engineering, M.S. Naidu & S, Kamakshaiah, TMH
5. Basic Electrical Engineering, J.J. Cathey & S.A Nasar, TMH, Second Edition.

**Note:**

In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.

Approved by UG BOS & FET

## ME103B

## ENGINEERING GRAPHICS AND DRAWING

B. Tech. Semester – I/II (Common for all Branches)

L	T	P	Credits
1	-	4	3

Class Work	:	40 Marks
Theory	:	60 Marks
Total	:	100 Marks
Duration of Exam.	:	3 Hrs.

### UNIT I

#### Basics of Engineering Graphics and Drawing :

Drawing Papers, Minidrafter, Pencils. Drawing Paper Layout, Title Block, Types of Lines, Lettering, Dimensioning, types of Projections; First and Third Angle systems of Orthographic Projections. Projection of Points in different Quadrants.

#### Projections of Straight Lines:

Contained by both Reference Planes, Contained by one and inclined to other Reference Plane, Contained by one and Parallel to other Reference Plane, Parallel to both Reference Plane, Perpendicular to one of the Reference Planes, Inclined to one Plane but Parallel to the other Reference Planes, Inclined to both the Reference Planes, True Length of a Line and its Inclination with Reference Planes, Traces of a Line.

### UNIT-II

#### Projections of Planes:

Parallel to one Reference Plane, Inclined to one Plane but Perpendicular to the other, Inclined to both Reference Planes.

#### Projections of Polyhedral Solids and Solids of Revolution:

In simple positions with axis perpendicular to a Reference Plane, with axis parallel to both Reference Planes, with axis parallel to one Reference Plane and inclined to the other Reference Plane, Projections of sections of Prisms, Pyramids, Cylinders and Cones. True Shape of Sections of Solids.

### UNIT-III

#### Development :

of Surfaces of various Solids objects.

#### Free Hand Sketching :

Orthographic Views from Isometric, Views of Simple Machine Components such as Brackets, Bearing Blocks, Guiding Blocks and Simple Couplings and Pipe Joints.

### UNIT-IV

#### Isometric Projections :

Introduction, Isometric Scale, Isometric Views and Drawing of various Plane and Solids objects. Perspective drawing and oblique view.

#### Orthographic Drawings :

Threads, Bolts, Nuts and Washers, Bolted, Riveted and Welded Joints

#### Text Books:

1. Engineering Drawing: MB Shah and BC Rana, Pearsons
2. Engineering Graphics and Drafting: P.S. Gill, S.K. Kataria and Sons.

#### Reference Books:

1. A Text Book of Engineering Drawing: RK Dhawan, S Chand & Company
2. Engineering Drawing Plane and Solid Geometry : N.D. Bhatt, Charotar Publishing House.

#### Note:

1. For class work, the students shall be assigned to prepare at least ten drawing sheets covering all units and each topic of the syllabus.
2. For practical examination, the examiner will set a question paper containing total eight questions, two questions from each unit covering each topic of the syllabus; students are required to attempt five questions at least one from each unit.

Approved by UG BOS & FET



**PHY103B****PHYSICS LAB - I**

B. Tech. Semester – I (Common for all Branches)

L	T	P	Credits
-	-	2	1

Class Work	:	20 Marks
Practical	:	30 Marks
Total	:	50 Marks
Duration of Exam.	:	3 Hrs.

**LIST OF EXPERIMENTS:**

1. To find the wavelength of sodium light by using Newton's rings experimental setup.
2. To find the wavelength of sodium light by Fresnel's biprism experimental setup
3. To find the wavelength of various colours of white light with the help of a plane transmission diffraction grating.
4. To find the refractive index and Cauchy's constants of a prism by using spectrometer.
5. To find the wavelength of sodium light by using Michelson interferometer.
6. To find the resolving power of a telescope.
7. To find the pitch of a screw using He-Ne laser.
8. To find the specific rotation of sugar solution by using a polarimeter.
9. To compare the capacitances of two capacitors by De'sauty bridge.
10. To find the flashing and quenching potentials of Argon and also to find the capacitance of unknown capacitor.
11. To study the photo conducting cell and hence to verify the inverse square law.
12. To find the temperature co-efficient of resistance by using platinum resistance thermometer and Callender and Griffith bridge.
13. To find the frequency of A.C. mains by using sonometer.
14. To find the velocity of ultrasonic waves in non-conducting medium by piezo-electric method.
15. To determine the value of Stefan's constant.
16. To find the coefficient of thermal conductivity of a good conductor by Searle's method.
17. To determine the coefficient of thermal conductivity of a bad conductor by Lee and Charlton method.

**Recommended Books :**

1. Advanced Practical Physics – B.L. Worshnop and H.T. Flint (KPH)
2. Practical Physics – S.L. Gupta & V. Kumar (Pragati Prakashan).
3. Advanced Practical Physics Vol.I & II – Chauhan & Singh (Pragati Prakashan).

**Note:-**

- 1 Total ten experiments are to be performed in the semester.
- 2 At least seven experiments should be performed from the above list. Remaining three experiments should be performed as designed and set by the concerned institution as per the scope of the syllabus.

Approved by UG BOS &amp; FET

**ME107B****WORKSHOP PRACTICE**  
B. Tech. Semester – I/II (Common for all Branches)

L	T	P	Credits
-	-	4	2

Class Work	:	40 Marks
Practical	:	60 Marks
Total	:	100 Marks
Duration of Exam.	:	3 Hrs.

**LIST OF EXPERIMENTS/ JOBS:**

1. To study different types of measuring tools/instruments used in metrology and determine least counts of vernier calipers, micrometers and vernier height gauges.
2. To study different types of machine tools ( lathe, shaper, planer, slotter, milling, drilling machines).
3. To prepare a job on a lathe involving facing, outside turning, taper turning, step turning, radius making and parting-off.
4. To study different types of fitting tools and marking tools used in fitting practice.
5. To prepare lay out on a metal sheet by making and prepare rectangular tray, pipe shaped components e.g. funnel.
6. To prepare joints for welding suitable for butt welding and lap welding.
7. To study various types of carpentry tools and prepare simple types of at least two wooden joints.
8. To prepare simple engineering components/ shapes by forging.
9. To prepare mold and core assembly, to put metal in the mold and fettle the casting.
10. To prepare horizontal surface/ vertical surface/ curved surface/ slots or V-grooves on a shaper/ planner.
11. To prepare a job involving side and face milling on a milling machine.
12. To study of CNC lathe, CNC Milling and EDM Machines.

**Note:-**

1. At least ten experiments/ jobs are to be performed/ prepared by students in the semester.
2. At least 8 experiments/ jobs should be performed / prepared from the above list, remaining two may either be performed/ prepared from the above list or designed and set as per the scope of the syllabus of Manufacturing Processes.

Approved by UG BOS &amp; FET

**EE103B**

**PRINCIPLES OF ELECTRICAL ENGINEERING LAB**

B. Tech. Semester – I/II (Common for all Branches)

L	T	P	Credits
-	-	2	1

Class Work	:	20 Marks
Practical	:	30 Marks
Total	:	50 Marks
Duration of Exam.	:	3 Hrs.

**LIST OF EXPERIMENTS:**

1. To verify KCL and KVL.
2. To verify Thevenin's & Norton's Theorems.
3. To verify maximum power transfer theorem in D.C. Circuit.
4. To verify reciprocity theorem.
5. To verify Superposition theorem.
6. To study frequency response of a series R-L-C circuit and determine resonant frequency & Q- factor for various Values of R, L, C.
7. To study frequency response of a parallel R-L-C circuit and determine resonant frequency & Q -Factor for various values of R, L, C.
8. To perform direct load test of a transformer and plot efficiency Vs load characteristic.
9. To perform direct load test of a D.C. shunt generator and plot load voltage Vs load current curve.
10. To study various type of meters.
11. .Measurement of power by three voltmeters / three ammeters method.
12. Measurement of power in a three phase system by two watt meter method.

**Note:**

1. At least 10 experiments are to be performed by students in the semester.
2. At least 8 experiments should be performed from the above list; remaining two experiments may either be performed from the above list or designed and set by the Dept. as per the scope of the syllabus of EE101B.

Approved by UG BOS & FET

**MATH102B****MATHEMATICS - II**

B. Tech. Semester -II (Common for all Branches)

L	T	P	Credits
3	1	-	4

Class Work	:	25 Marks
Theory	:	75 Marks
Total	:	100 Marks
Duration of Exam.	:	3 Hrs.

**UNIT-I**

**ORDINARY DIFFERENTIAL EQUATIONS & ITS APPLICATIONS** : Exact differential equations. Equations reducible to exact differential equations. Applications of Differential equations of first order & first degree to simple electric circuits, Newton's law of cooling, heat flow and orthogonal trajectories.

**LINEAR DIFFERENTIAL EQUATIONS OF SECOND AND HIGHER ORDER**. Complete solution, complementary function and particular integral, method of variation of parameters to find particular Integral, Cauchy's and Legendre's linear equations, simultaneous linear equations with constant co-efficients.

**UNIT-II**

**LAPLACE TRANSFORMS AND ITS APPLICATIONS** : Laplace transforms of elementary functions, properties of Laplace transforms, existence conditions, transforms of derivatives, transforms of integrals, multiplication by  $t^n$ , division by  $t$ . Evaluation of integrals by Laplace transforms. Laplace transform of Unit step function, unit impulse function and periodic function. Inverse transforms, convolution theorem, application to linear differential equations and simultaneous linear differential equations with constant coefficients.

**UNIT-III**

**FUNCTIONS OF COMPLEX VARIABLE** : Definition, Exponential function, Trigonometric and Hyperbolic functions, Logarithmic functions. Limit and Continuity of a function, Differentiability and Analyticity. Cauchy-Riemann equations, necessary and sufficient conditions for a function to be analytic, polar form of the Cauchy-Riemann equations. Harmonic functions, application to flow problems. Integration of complex functions. Cauchy-Integral theorem and formula.

Power series, radius and circle of convergence, Taylor's Maclaurin's and Laurent's series. Zeros and singularities of complex functions, Residues

**UNIT-IV**

**FOURIER SERIES AND FOURIER TRANSFORMS** : Euler's formulae, conditions for a Fourier expansion, change of interval, Fourier expansion of odd and even functions, Fourier expansion of square wave, rectangular wave, saw-toothed wave, half and full rectified wave, half range sine and cosine series.

Fourier integrals, Fourier transforms, Shifting theorem (both on time and frequency axes), Fourier transforms of derivatives, Fourier transforms of integrals, Convolution theorem, Fourier transform of Dirac-delta function.

**TEXT BOOKS :**

1. Advanced Engg. Mathematics F Kreyszig
2. Higher Engg. Mathematics B.S. Grewal

**REFERENCE BOOKS:**

1. Differential Equations - H.T.H. Piaggio.
2. Elements of Partial Differential Equations - I.N. Sneddon.
3. Advanced Engineering Mathematics - R.K. Jain, S.R.K. Iyengar.
4. Advanced Engg. Mathematics - Michael D. Greenberg.

**Note:**

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

**PHY102B****ENGINEERING PHYSICS – II**  
B. Tech. Semester -II (Common for all Branches)

L	T	P	Credits
3	1	-	4

Class Work	:	25 Marks
Theory	:	75 Marks
Total	:	100 Marks
Duration of Exam.	:	3 Hrs.

**UNIT I****ELECTRODYNAMICS & QUANTUM PHYSICS :**

Introduction, Displacement current, Equation of continuity, Gauss's Law in dielectric, applications of Gauss's law, Maxwell's equations (both differential and integral form), plane e.m. wave equations in free space, dielectric and conducting medium; Poynting vector.

Difficulties with Classical physics, Introduction to quantum mechanics-simple concepts, Black Body radiations, Planck's Law of radiation and its limitations, Group velocity and phase velocity, Schrodinger wave equations, Application of Schrodinger Equations (Particle in a box).

**UNIT-II****CRYSTAL STRUCTURE:**

Space Lattice, unit cell and translation vectors, Miller indices, Bravis lattice structure in 3D, simple crystal structure (NaCl, ZnS and CsCl<sub>2</sub>), Elementary idea of reciprocal lattice, Ewald Construction, Experimental x-ray diffraction method, Laue method, powder Method.

**FREE ELECTION THEORY:**

Elements of classical free electron theory, Drude's Theory of Conduction and its limitations, quantum theory of free electrons, Fermi level, Density of states, Fermi-Dirac distribution function, Thermionic emission, Richardson's equation.

**UNIT-III****BAND THEORY OF SOLIDS :**

Origin of energy bands, Kronig, Penney Model (qualitative), E-K diagrams, Brillouin Zones, Concept of effective mass and holes, Classification of solids into metals, Semiconductors and insulators, Fermi energy and its variation with temperature, Conduction in Intrinsic and Extrinsic Semiconductors. Hall Effect and its Applications.

**UNIT-IV****SUPERCONDUCTIVITY & NANOSCIENCE:**

Introduction to superconductivity, Critical temperature, Meissner Effect, Types of Superconductor, London Equations, penetration depth and coherence length, BCS Theory(qualitative ideas), High temperature superconductors.

Concept of Nano-materials, Size dependence of band gap, Top-down and bottom-up approach for preparing nano-materials, MEMS & NEMS, Properties and applications of Fullerene, Graphene, CNT, Nanowires, Nano-composites, Quantum dots.

**Text Books :**

1. Solid State Physics – S.O.Pillai (6th Edition, New Age).
2. Quantum Mechanics – Ghatak & Loknathan.
3. Fundamentals of Solid State Physics – B.S.Saxena, R.C.Gupta & P.N.Saxena (Pragati Prakashan).
4. Solid State Physics by H. Ibach & H. Luth, Springer, Berlin.
5. Engineering Physics by H.K Malik and A.K. Singh (Tata McGraw Hill).
6. Engineering Physics by S.P. Taneja (Chand Pub.)

**Reference Books :**

1. Introduction to Solid State Physics (VII Ed.) - Charles Kittel (John Wiley).
2. Quantum Mechanics – Powell and Crasemann (Oxford & IBH)
3. Classical Electrodynamics by S.P. Puri (Narosa)
4. Nano-technology- Molecularly Designed Materials: G. M. Chow & K. E. Gonsalves (American Chemical society).

**Note:**

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus.
2. The students will be required to attempt only 5 questions selecting at least one question from each unit.

## CH101B

## ENGINEERING CHEMISTRY B. Tech. Semester – I/II (Common for all Branches)

L	T	P	Credits
3	1	-	4

Class Work	:	25 Marks
Theory	:	75 Marks
Total	:	100 Marks
Duration of Exam.	:	3 Hrs.

### UNIT I

#### Thermodynamics:

Second law, concept of entropy ,entropy change for ideal gas, free energy and work functions, free energy change,chemical potential, Gibb's Helmholtz equation, Clausius –Clapeyron equation. Related numerical problems with above topics.

#### Phase-rule:

Terminology, Derivation of Gibb's Phase Rule equation ,One component system(water system), Two components systems, system with Eutectic point (Pb-Ag), system with congruent melting point (Zn-Mg), system with incongruent melting point (Na-K), Applications of above systems. Elementary idea of Zone refining and Zone leveling.

### UNIT-II

#### Water and its treatment:

Hardness of water and its determination, units of hardness, alkalinity of water and its determination, related numerical problems ,water softening, Ion-exchange process, mixed bed demineralisation, desalination of water by using different methods.

#### Corrosion and its prevention:

Galvanic & concentration cell, dry and wet corrosion, Electrochemical theory of corrosion, Galvanic corrosion, Pitting corrosion , differential aeration corrosion, water line corrosion, stress corrosion, factor effecting corrosion, Preventing measures, electroless Plating of Ni and Cu.

### UNIT-III

#### Polymers and Polymerization:

Organic polymers, polymerisation, various types of polymerisation, effect of structure on properties of polymers, preparation properties and technical applications of thermoplastics (PE, PVC, PVA, Teflon), thermosets (PF, UF & MF) and elastomers (Synthetic Rubber including SBR, Buna-S, Buna-N, Thiokol & Polyurethanes) , Inorganic polymers (general properties) , Glass transition temperature, silicones

#### Composite Materials & their application:

optical fibres, Fullerenes ,organic electronic material ,composite materials & their classification, constituents of composites, role of interface in composite performance and durability, fiber –Reinforced composite, advantage and applications of composites.

### UNIT-IV

#### Lubricants and fuels:

Friction, mechanism of lubrication, classification and properties of lubricants and selection of Lubricants, Definition and classification of fuel, Calorific value and methods of its determination.

#### Analytical methods:

Thermal methods; Principle, method and application of TGA,DTA & DSC, interaction of E.M radiation with a molecule and origin of spectrum, Vibrational & electronic spectra (Experimental details are excluded), spectrophotometry, , conductometric titrations, elementary discussion on Flame-photometry.

#### Text / Reference Books:

1. Physical Chemistry, P.W. Atkins (ELBS, Oxford Press).
2. Physical Chemistry, W.J. Moore (Orient-Longman).
3. Instrumental methods of Chemical Analysis, MERITT & WILLARD (East-West Press).
4. Chemistry in Engineering & Tech., Vol.I& II, Rajaram, Kuriacose (TMH)
- 5.Engineering Chemistry ,ShashiChawla (DhanpatRai and co.)
6. Engineering Chemistry, P.C. Jain, Monica Jain (DhanpatRai& Co.).
- 7.Engeneering chemistry ,S.S Dara (S.chand&co.)

#### Note:

In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.

**CSE101B****INTRODUCTION TO COMPUTERS AND PROGRAMMING**

B. Tech. Semester – I/II (Common for all Branches)

L	T	P	Credits
3	1	-	4

Class Work	:	25 Marks
Theory	:	75 Marks
Total	:	100 Marks
Duration of Exam.	:	3 Hrs.

**UNIT I****An introduction of Computer System:**

Anatomy of a digital Computer, Different Units of Computer System, Classification of Computer Systems, Radix Number systems. Binary codes: BCD, Gray, EBCDIC, ASCII

**Operating System:**

Operating System Concepts, Operating System services, Types of Operating Systems.  
Introduction to PC Operating Systems: Unix/Linux, DOS, Windows.

**UNIT-II****Programming Languages and algorithms:**

Machine, Assembly and High Level Language; Assembler, Linker, Loader, Compiler, Interpreter, debuggers, Programming fundamentals: problem definition, algorithms, flowcharts and their symbols

**Computer Networks:**

Basic concepts of Computer Networks, Working of Internet and its Major features. Network Topologies: Bus, Star, Ring, Hybrid, Tree, Complete, Irregular; Types of Networks: LAN, MAN and WAN.  
Electronic Mail: advantages and disadvantages, e-mail addresses, message components, message composition, mailer features, E-mail inner workings, E-mail management, Newsgroups, mailing lists, chat rooms.

**UNIT-III****Basics of 'C' Language :**

C Fundamentals, Basic data types, local and external variables and scope, formatted input/ output, expressions, selection statements, loops and their applications; arrays, functions, recursive functions, pointers and arrays. Strings literals, arrays of strings; applications, Structures, Unions and Enumerations.

**UNIT-IV****Advanced Features of 'C' Language**

Preprocessor directives, macro definition, conditional compilation, storage classes, type's qualifiers, Low level programming (Bitwise operators, Bit fields in structures, other low level techniques), error handling, file operations(low level/high level).  
Ampere's law, Mutual Inductance, Construction, Working principle and phasor diagrams of Single-phase Transformer, Emf equation, Equivalent circuit, testing, efficiency and regulation of single-phase transformer, Auto transformer.

**Reference Books:**

1. The C Programming Language by Dennis M Ritchie, Brian W. Kernigham, 1988, PHI.
2. Fundamentals of Computing and C Programming, R. B. Patel, Khanna Publications, 2010, New Delhi.
3. Information technology, Dennis P. Curtin, Kim Foley, Kunal Sen, Cathleen Morin, 1998, TMH
4. Theory and problem of programming with C, Byron C Gottfried, TMH
5. Using Computers and Information by Jack B. Rochester, 1996, Que Education & Training.
6. C Programming – A modern approach by K.N. King, 1996, WW Norton & Co.

**Note:**

In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.

**ECE102B****BASICS OF ELECTRONICS ENGINEERING**

B. Tech. Semester – II (OPTIONAL- Common for all Branches)

L	T	P	Credits
3	1	-	4

Class Work	:	25 Marks
Theory	:	75 Marks
Total	:	100 Marks
Duration of Exam.	:	3 Hrs.

**UNIT I****Semiconductor Physics, Diodes and Applications:**

Basic concepts, intrinsic and extrinsic semiconductors, diffusion and drift currents, Hall effect and its applications-pn junction under open circuit, reverse bias and forward bias conditions, p-n junction in the breakdown region, ideal diode, types of diodes –zener diode, varactor diode, LED and photodiode. Rectifier (half wave and full wave).

**Amplifiers:**

Introduction of different types of BJT amplifiers & their characteristics.

**UNIT-II****Operational Amplifiers:**

OP-amps, its characteristics, inverting, non-inverting, summing, averaging, scaling, difference, integrator and differentiator amplifiers. **Power**

**Supplies:**

Introduction and working of switched mode power supply (SMPS), voltage regulator.

**UNIT-III****Digital Electronics:**

Binary, Octal and Hexadecimal number system and conversion, Boolean algebra, truth tables of logic gates AND, OR, NOT, EX-OR, EX-NOR, NAND, NOR AND their implementation using diodes transistors, switches and lamps, Universal gates.

**Electronic Instruments:**

Transducers, Role, importance and applications of general purpose test instruments viz. multi meter (digital and analog), cathode ray oscilloscope (CRO), function/ signal generator.

**UNIT-IV****Communication System:**

Modulation, need of modulation, Block diagram of basic communication system, overview of AM, FM and PM.

**Microprocessor:**

Basics of 8085 & its architecture. Instruction set, Interrupts, Addressing modes.

**Reference Books :**

1. Sedra A S and Smith K C. "Microelectronic Circuits" New York. Oxford University Press, New York
2. Tocci R J and widner N S "Digital Systems" – Principles and Applications", Pearson Education India, New Delhi.
3. Cooper and Helfric, "Modern Electronic Instrumentation and Measuring Techniques". Prentice Hall of India, New Delhi.
4. Boylestad and Nashelesky, "Electronic Devices and Circuit Theory", Pearson Education India, New Delhi
5. Millman and Grabel, "Microelectronics", Tata McGraw Hill
6. Millman and Halkias, "Electronics Devices and Circuits". Tata McGraw Hill
7. Kennedy and Davis, "Electronic Communication Systems", Tata McGraw Hill
8. Ramesh S. Gaonkar, "Microprocessor Architecture, Programming, and Applications with the 8085", Penram International Publishing.

**Note:**

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus.
2. The students will be required to attempt only 5 questions selecting at least one question from each unit.

Approved by UG BOS & FET



**BT102B**

**BASICS OF BIOTECHNOLOGY**

B. Tech. Semester – II (OPTIONAL- Common for all Branches)

L	T	P	Credits
3	1	-	4

Class Work	:	25 Marks
Theory	:	75 Marks
Total	:	100 Marks
Duration of Exam.	:	3 Hrs.

**UNIT I**

**Introduction:**

Nature and scope of Biotechnology.

**Cell Structure and Function:**

Prokaryotes and Eukaryotes- cell wall, cell membrane, nucleus, mitochondria, chloroplast, ribosome, vacuoles, bacteria and viruses: brief descriptions.

Biomolecules: A brief account of structure and functions of carbohydrates, lipids, proteins.

**UNIT– II**

**Cell Division:**

Mitosis and meiosis

**Genes and chromosomes:**

Classical- Mendel's laws and chromosomes, nature of genetic material, DNA and RNA as genetic material, concept of organization of genetic material into chromosomes.

DNA replication: DNA polymerases, replication mechanism.

**UNIT-III**

**Gene Expression:**

Central dogma, genetic code, gene expression-a brief account of transcription and translation, housekeeping genes, mutations and their molecular basis.

**Genetic Engineering:**

An introduction to genetic engineering: cloning (vectors, enzymes), DNA and genomic libraries, transgenics, DNA fingerprinting, genomics.

**UNIT – IV**

**Applications of Biotechnology :**

Bioprocess and fermentation technology, cell culture, enzyme technology, biological fuel generation, single cell protein, sewage treatment, environmental biotechnology, biotechnology and medicine, biotechnology in agriculture & forestry industry, food and beverage technology, production of biological inventions, safety in biotechnology.

**Text/ Reference Books:**

1. Biotechnology, Smith, Cambridge Press.
2. Modern Concepts of Biotechnology, H. D. Kumar, Vikas Publishing House (P) Ltd.
3. Elements of Biotechnology, P. K. Gupta, Rastogi Publications.

**Note:**

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

Approved by UG BOS & FET

## HUM102B

## ORAL COMMUNICATION SKILLS

B. Tech. Semester – II (OPTIONAL- Common for all Branches)

L	T	P	Credits
3	1	-	4

Class Work	:	25 Marks
Theory	:	75 Marks
Total	:	100 Marks
Duration of Exam.	:	3 Hrs.

### UNIT I

#### Essentials of Speaking Skills:

Familiarity with phonetic sound symbols; Transcription of simple words using International Phonetic Alphabet; Use of dictionary to cultivate standard pronunciation and develop phonetic discrimination.

### UNIT II

#### Speaking Skills:

Need and Significance of Effective Oral Communication; Practice of Conversation – Interpersonal and Telephonic Conversation; Formal Group Discussion.

### UNIT III

#### Non-Verbal Elements in Oral Communication Skills:

Reading Face, eyes, gesture and body posture, time, space and culture in communicative situations; practicing verbal and non-verbal communication (Body Language) to acquire effective Oral communication.

### UNIT IV

#### Listening Skills:

Essentials of Good Listening, Types of Listening, Barriers in Effective listening, Exercises in Listening to Talk Shows, Speech Reviews; Practice in English Sounds and Speech using RP/MRP.

#### RECOMMENDED READING:

1. Buck, Gary. *Assessing Listening*. Delhi: Foundation Books (Cambridge University Press), 200.
2. Balasubramanian, T. *A Textbook of English Phonetics for Indian Students*. Chennai: MacMillan, 1981 (rpt 2007).
3. Gangal, J.K. *A Practical Course in Spoken English*. New Delhi: PHI, 2011
4. Raman, Meenakshi and Sangeeta Sharma. *Communication Skills*. Delhi: OUP, 2011
5. Ribbens, Geoff and Richard Thompson. *Body Language*. New York: Hodder & Stoughton, 2007.

#### Note:

In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.

Approved by UG BOS & FET

**CE102B**

**BASICS OF CIVIL ENGINEERING**

B. Tech. Semester – II (OPTIONAL- Common for all Branches)

L T P Credits  
3 1 - 4

Class Work : 25 Marks  
Theory : 75 Marks  
Total : 100 Marks  
Duration of Exam. : 3 Hrs.

**UNIT I**

**Materials for Construction:**

Stones, Sands, Lime, Bricks, Timber, Steel their Classification and Properties. Different Types of Cement and their Properties, manufacturing of Cement, Concrete, and properties of Concrete, Ingredient of Concrete and Their Functions  
Component parts of a Building, Foundation, Masonry Works, Doors and Windows, Floors, Roofs, DPC, Building Services

**UNIT- II**

**Surveying , Introduction to Surveying:**

Definition, importance, classification of surveys, Principle, Leveling: definitions of terms used in leveling, different types of levels, Contours, Definition, representation of reliefs, horizontal equivalent, contour interval, characteristics of contours, methods of contouring, contour gradient, uses of contour maps, Introduction to GIS, GPS and Remote sensing.

**UNIT-III**

**Transportation:**

Various modes and means of transportation, Different types of transport systems, Importance of road transport, History of Road Development, Indian Road Congress. Main features of 20 years road development plans in India, PMGSY  
Sources of power, estimation of water power, water budget equation, necessity and importance of harnessing small hydro power plants, Dams, Types of Dams, Location and Impact assessment of a Dam project.

**UNIT – IV**

**Geotechnical Engineering:**

History and its applications, Soil Properties, Classification of Soil, Geotechnical and Geophysical investigation of Soil.  
Irrigation Engineering: Necessity, advantages, disadvantages, impact of irrigation on human environment, need and development of irrigation in India.

**Text Books:**

1. Basic Civil Engineering, Satheesh Gopi, Pearson.
2. Basic Civil Engineering, [Dr. B.C. Punmia](#), [Ashok Kumar Jain](#), [Arun Kr. Jain](#), Firewall Medi

**Reference Books:**

1. Surveying by Prof. N. Singh, Tata McGraw Hill, New Delhi
2. Basic Civil Engineering, Rakesh Beohar, Firewall Media
3. Highway Engg. by S. K. Khanna & C.e.G.Justo, Nem Chand & Bros,Roorkee
4. Water Resources Engineering by Linseley and Franzini
5. Basic Civil Engineering, [L.G. Kulkarni](#), [A. D. Pawar](#), [S. P. Nitsure](#), Technical Publications.

**Note:**

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

Approved by UG BOS & FET

## ME105B

## ELEMENTS OF MECHANICAL ENGINEERING

B. Tech. Semester – I/II (Common for all Branches)

L	T	P	Credits
3	1	-	4

Class Work	:	25 Marks
Theory	:	75 Marks
Total	:	100 Marks
Duration of Exam.	:	3 Hrs.

### UNIT I

#### Thermodynamics:

definitions in thermodynamics, fundamentals of first and 2nd law of thermodynamic- concept of internal energy, enthalpy and entropy, heat pump and refrigerator, elementary numerical problems.

#### Properties of Steam & Boilers:

properties of steam, use of steam tables and mollier diagram, measurement of dryness fraction of steam, Carnot and Rankin cycle, elementary numerical problems. Classification of boilers, Comparison of water and fire tube boilers mounting and accessories with their functions, Constructional and operational details of Cochran and Babcock and Wilcox boilers, elementary numerical problems.

#### Steam Turbines and Condensers:

Classification of turbines and their working principles, Types of condensers and their uses.

### UNIT-II

#### I.C. Engines and Gas Turbines:

Introduction, Classification, Constructional details and working of two-stroke and four-stroke diesel and petrol engines, Efficiency of Otto & Diesel cycles, Working principle of gas turbine, elementary numerical problems.

#### Refrigeration and air conditioning:

Rating of refrigeration machine, coefficient of performance, simple vapor compression cycle, fundamentals of air conditioning, use of Psychrometric charts.

### UNIT-III

**Water Turbines and Pumps :** Introduction, Classification, Construction details and working principle of Pelton, Francis and Kaplan turbines, Classification of water pumps and construction detail & working principle of centrifugal pump.

#### Measuring Instruments:

Principle, Construction & working of moving coil type voltmeter & ammeter, moving iron type voltmeter & ammeter, Electrodynamic type wattmeter, single-phase induction type energy meter.

### UNIT-IV

#### Introduction to Power transmission and Devices:

Belt drive, Rope drive, Chain drive, Types of gear and Gear train, Types and function of clutches, Types and function of brakes.

#### Stresses and Strains:

Introduction, Concept & types of Stresses and strains, Poisson's ratio, stresses and strains in simple and compound bars under axial loading, Stress-strain diagrams, Hooks law, Elastic constants & their relationships. Concept of shear force and bending moments in beams, elementary numerical problems.

#### Text Books:

1. Hydraulic and Fluid Mechanics – Modi and Seth, Pub. – Standard Book House, New Delhi
2. Engineering Thermodynamics – C.P. Arora, Pub. - TMH, New Delhi
3. Thermal Engineering – A.S. Sarad, Pub. - Satya Prakashan, New Delhi.
4. Engineering Mechanics – K.L. Kumar, Pub. - TMH, New Delhi.
5. Theory of Machines – S.S. Rattan, Pub. – TMH, New Delhi.

#### Reference Books:

1. Strength of Materials – Popov, Pub. - PHI, New Delhi.
2. Hydraulic Machines – Jagdish Lal, Pub.- Metropolitan, Allahbad.
3. Thermal Science and Engineering – D.S. Kumar, Pub. – Kateria & Sons, New Delhi.

#### Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed

**PHY104B****PHYSICS LAB. - II**  
B. Tech. Semester – II (Common for all Branches)

L	T	P	Credits
-	-	2	1

Class Work	:	20 Marks
Practical	:	30 Marks
Total	:	50 Marks
Duration of Exam.	:	3 Hrs.

**LIST OF EXPERIMENTS:**

1. To find the low resistance by Carey - Foster's bridge.
2. To find the resistance of a galvanometer by Thomson's constant deflection method using a post office box.
3. To find the value of high resistances by Substitution method.
4. To find the value of high resistances by Leakage method.
5. To study the characteristics of a solar cell and to find the fill factor.
6. To find the value of  $e/m$  for electrons by Helical method.
7. To find the ionisation potential of Argon/Mercury using a thyratron tube.
8. To study the variation of magnetic field with distance and to find the radius of coil by Stewart and Gee's apparatus.
9. To study the characteristics of (Cu-Fe, Cu-Constantan) thermo couple.
10. To find the value of Planck's constant by using a photoelectric cell.
11. To find the value of co-efficient of self-inductance by using a Rayleigh bridge.
12. To find the value of Hall Co-efficient of semi-conductor.
13. To study the V-I characteristics of a p-n diode.
14. To find the band gap of intrinsic semi-conductor using four probe method.
15. To calculate the hysteresis loss by tracing a B-H curve.
16. To verify the Truth Table of various Logic Gates.

**Recommended Books :**

1. Advanced Practical Physics – B.L. Worshnop and H.T. Flint (KPH)
2. Practical Physics – S.L.Gupta & V.Kumar (Pragati Prakashan).
3. Advanced Practical Physics Vol.I & II – Chauhan & Singh (Pragati Prakashan).

**Note:-**

- 1 Total ten experiments are to be performed in the semester.
- 2 At least seven experiments should be performed from the above list. Remaining three experiments should be performed as designed and set by the concerned institution as per the scope of the syllabus.

Approved by UG BOS &amp; FET

**CH103B****CHEMISTRY LAB**

B. Tech. Semester – I/II (Common for all Branches)

L T P Credits  
- - 2 1Class Work : 20 Marks  
Practical : 30 Marks  
Total : 50 Marks  
Duration of Exam. : 3 Hrs.**LIST OF EXPERIMENTS:**

1. Determination of Ca<sup>++</sup> and Mg<sup>++</sup> hardness of water sample using EDTA solution.
2. Determination of alkalinity of water sample.
3. Determination of dissolved oxygen (DO) in the given water sample.
4. To find the melting and eutectic point for a two component system by using method of cooling curve.
5. Determination of viscosity of lubricant by red wood viscometer(No. 1 & No. 2).
6. To determine Flash point & Fire point of an oil by Pensky-Marten's flash point apparatus and by Abel's closed cup apparatus..
7. To prepare Phenol-formaldehyde and urea- formaldehyde resin.
8. To find out saponification No. of an oil..
9. Determination of concentration of KMnO<sub>4</sub> solution spectrophotometrically.
10. Determination of strength of HCl solution by titrating it against NaOH solution conductometrically.
11. To determine amount of sodium and potassium in a given water sample by flame photometer
12. Estimation of total iron in an iron alloy.

**Recommended Books :**

1. A Text book on Experiments and Calculation –Engineering Chemistry by S.S.Dara, S.Chand & Company Ltd.
2. Essential of Experimental Engineering chemistry, Shashi Chawla, Dhanpat Rai Publishing Co.
3. Theory & Practice Applied Chemistry – O.P.Virmani, A.K. Narula( New Age).

**Note:-**

The student will be required to perform 10 experiments/exercises from the above list and any other two experiments designed by the department based on the theory course (course code CH101B Course Name Chemistry ).

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**CSE103B****COMPUTER PROGRAMMING LAB**  
B. Tech. Semester – I/II (Common for all Branches)

L	T	P	Credits
-	-	2	1

Class Work	:	20 Marks
Practical	:	30 Marks
Total	:	50 Marks
Duration of Exam.	:	3 Hrs.

**LIST OF EXPERIMENTS:**

1. Write a program to find the largest of three numbers. (if-then-else)
2. Write a program to find the largest number out of ten numbers (for-statement)
3. Write a program to find the average male height & average female heights in the class (input is in form of sex code, height).
4. Write a program to find roots of quadratic equation using functions and switch statements.
5. Write a program using arrays to find the largest and second largest no. out of given 50 nos.
6. Write a program to multiply two matrices.
7. Write a program to sort numbers using the Quicksort Algorithm.
8. Represent a deck of playing cards using arrays.
9. Write a program to check that the input string is a palindrome or not.
10. Write a program to read a string and write it in reverse order.
11. Write a program to concatenate two strings.
12. Write a program which manipulates structures (write, read, and update records).
13. Write a program which creates a file and writes into it supplied input.
14. Write a program which manipulates structures into files (write, read, and update records).

**Note:**

1. At least 10 experiments are to be performed by students in the semester.
2. At least 8 experiments should be performed from the above list; remaining two experiments may be given by the teacher concerned.
3. At least 5 to 10 more exercises to be given by the teacher concerned.

Approved by UG BOS & FET

**ME109B****ELEMENTS OF MECHANICAL ENGINEERING LAB**

B. Tech. Semester – I/II (Common for all Branches)

L	T	P	Credits
-	-	2	1

Class Work	:	20 Marks
Practical	:	30 Marks
Total	:	50 Marks
Duration of Exam.	:	3 Hrs.

**LIST OF EXPERIMENTS:**

1. To study Cochran & Babcock & Wilcox boilers.
2. To study the working & function of mountings & accessories in boilers.
3. To study 2-Stroke & 4-Stroke diesel engines.
4. To study 2-Stroke & 4-Stroke petrol engines.
5. To calculate the V.R., M.A. & efficiency of single, double & triple start worm & worm wheel.
6. To calculate the V.R., M.A. & efficiency of single & double purchase winch crabs.
7. To draw the SF & BM diagrams of a simply supported beam with concentrated loads.
8. To study the simple & compound screw jacks and find their MA, VR & efficiency.
9. To study the constructional features & working of Pelton Turbine.
10. To prepare stress-strain diagram for mild steel & cast iron specimens under tension and compression respectively on a Universal testing machine.

**Note:**

1. Total ten experiments are to be performed in the Semester.
2. At least eight experiments should be performed from the above list. Remaining three experiments should be performed as designed & set as per the scope of the syllabus of ME – 101: Elements of Mechanical Engineering.

Approved by UG BOS &amp; FET



**GP102B****GENERAL PROFICIENCY & ETHICS**  
B. Tech. Semester – II (Common for all Branches)

L	T	P	Credits
1	-	-	2

Examination	:	-
Practical	:	50 Marks
Total	:	50 Marks

The purpose of this course is to inculcate a sense of professionalism in a student along with personality development in terms of quality such as receiving, responding, temperament, attitude and outlook. The student efforts will be evaluated on the basis of his/ her performance / achievements in different walks of life.

A Faculty Counselor will be attached to a group of students which will remain associated with him /her during the entire period of the degree program in the University. Each faculty member will serve as a faculty counselor. They will act like a local guardian for the students associated with him / her and will help them in terms of career guidance, personal difficulties.

**A. The student will present a written report before the committee with following in view:**

The student will present before the committee his/her achievements during the current academic session in the form of a written report highlighting followings:

- |     |  |       |                   |
|-----|--|-------|-------------------|
| I.  | Academic Performance   | ----- |                   |
| II. | Extra Curricular Activities / Community Service, Hostel Activities |       | <b>(8 Marks)</b>  |
| III | Technical Activities / Industrial, Educational tour                |       | <b>(8 Marks)</b>  |
| IV  | Sports/games   |       | <b>(4 Marks)</b>  |
| V   | Moral values & Ethics  |       | <b>(10 Marks)</b> |

**NOTE:** Report submitted by the students should be typed on both sides of the paper.

**B.** A student will support his/her achievement and verbal & communicative skill through presentation before the committee. **(20 Marks)**

**C. Moral values & Ethics**

Syllabus - Introduction to Value Education. Understanding ethics, value system, happiness, prosperity

A minor test / Quiz will be conducted and It will be the duty of the concerned teacher assigned to teach Moral values & Ethics to submit the awards to respective chairman of the department / Director/Principal.

The evaluation of this course will be made by the following Committee.

**University Departments:**

1	Chairperson of the Department	Chairman
2	Senior Most Faculty Counselor	Member
3	Vice- Chancellor's Nominee	Member

**Affiliated Colleges:**

1	Director/Principal	Chairman
2	Head of the Department/Sr. Faculty	Member
3	External Examiner to be appointed by the University	Member

**Note:** Remuneration will be paid to the external examiner only (at par with the other practical examinations).

Approved by UG BOS & FET

**MGT201B****ENGINEERING ECONOMICS**

B. Tech. Semester – III (Common for all Branches Except BT&amp; BME)

L	T	P	Credits
4	-	-	4

Class Work	:	25 Marks
Theory	:	75 Marks
Total	:	100 Marks
Duration of Exam.	:	3 Hrs.

**UNIT I**

Definition of economics: Various definitions, nature of Economic problem, Micro and macro economics- their feature and scope, production possibility curve, Economic laws and their nature. Relation between Science, Engineering Technology and Economics. Concept and measurement of utility, Law of Diminishing Marginal Utility, Law of equi-marginal utility – its practical application and importance.

**UNIT II**

Meaning of Demand, Individual and Market demand schedule, Law of demand, shape of demand curve. Elasticity of demand, measurement of elasticity of demand, factors effecting elasticity of demand, practical importance & application of the concept of elasticity of demand. Various concepts of cost-Fixed cost, variable cost, average cost, marginal cost, money cost, real cost, opportunity cost. Shape of average cost, marginal cost, total cost etc. in short run and long run.

**UNIT III**

Meaning of production and factors of production; Law of variable proportions, Law of Return to Scale, Internal and External economics and diseconomies of scale. Meaning of Market, Type of Market– perfect Competition, Monopoly, Oligopoly, Monopolistic competition (Main features of these markers).

**UNIT IV**

Supply and Law of Supply, Role of Demand & Supply in Price Determination and effect of changes in demand and supply on prices . Nature and characteristics of Indian economy, privatization – meaning, merits and demerits. Globalisation of India economy – merits and demerits. Elementary Concept of WTO & TRIPS agreement, Monetary Policy & Fiscal Policy.

**Text Books:**

1. Ahuja H.L."Micro Economic Theory" S. Chand Publication, New Delhi
2. Dewett K.K "Modern Economic Theory" S. Chand Publication, New Delhi
3. Jain T.R, Grover M.L, Ohri V.K Khanna O.P,"Economics for engineers" V.K .Publication ,New Delhi

**Reference Books:**

1. Jhingan M.L"Micro Economic Theory" S.Chand Publication ,New Delhi
2. Chopra P.N "Principle of Economics" Kalyani Publishers, Delhi
3. Mishra S.K "Modern Micro Economics" Pragati Publication Mumbai.
4. Dwivedi D.N "Micro Economics " Pearson Education, New Delhi.

**NOTE:**

1. In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.
2. The students will be allowed to use non-Programmable Scientific Calculator. However, sharing/exchange of calculator are prohibited in the examination.

Approved by UG BOS &amp; FET

**ECE212B****FIELD AND WAVES**

B. Tech. Semester –III (AEI, common with 4th Sem. ECE)

L	T	P	Credits
3	1	-	4

Class Work	:	25 Marks
Theory	:	75 Marks
Total	:	100 Marks
Duration of Exam.	:	3 Hrs.

**UNIT I**

Coulomb's Law of Electrostatic Force, Electric Field Intensity, Electric Potential, Electric Charge Density, Field of A Finite Line Of Charge, Field Potential of an Infinite Line Of Charge, Electric Potential Difference, Electric Dipole, Electric Flux Density  
Gauss Law, Application of Gauss Law, Laplace Equation, Solution of Laplace Equation in Rectangular And Cartesian Coordinates, Uniqueness Theorem of Electrostatic Field Solutions, Methods of Electrostatic Images, Electrostatic Energy, Capacitance.

**UNIT II**

Introduction, Faraday Induction Law, Magnetic Effect on Current Carrying Conductor, Magnetic Flux, Magnetic Flux Density, Biot-Savart's Law, Ampere's Law of Force,  
Magnetic Field of A Solenoid, Magnetic Field In Vector Notations, Magnetic Field Intensity, Magnetic Flux Density outside and inside an Infinitely Long Cylinder Containing Uniform Current Density, Magnetic Vector Potential, Energy Stored In A Magnetic Field, Energy Density In A Magnetic Field.

**UNIT III**

Introduction, Displacement Current Mawell's Equations: In Free Space, Differential Form And Integra Form, Physical Interpretations Of Maxwell's Field Equations, Boundary Conditions  
Electromagnetic Wave In Homogeneous Medium, Wave Equation, Plane Wave And Uniform Plane Wave, Electromagnetic Wave Equations, Wave Propagation In Conducting Medium, Polarization

**UNIT IV**

Introduction, Basic Principles Of Transmission Lines, Equivalent Circuit Representation, General Transmission Line Equation, Wave Characteristics on Finite Transmission Lines, Transients on Transmission lines, Primary Constant, Voltage And Current Calculations, Characteristic Impedance, Open And Short Circuit Lines, Reflection Coefficient, VSWR, Smith's Chart And Its Applications.

**Text Books:**

1. Electro-magnetic Waves and Radiating System : Jordan & Balmain, PHI.
2. Antenna & Wave Propagation: K.D Prasad, Satya Prakashan.
3. Field and Wave Electromagnetics: David K.Cheng, Pearson, Second edition

**Reference Books:**

1. Engineering Electromagnetics: Umran S.Inan & Aziz S. Inan, Pearson
2. Engineering Electromagnetics : Hayt; TMH
3. Electro-Magnetics : Krauss J.DF; Mc Graw Hill.

**NOTE:**

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.

Approved by UG BOS &amp; FET

**EE201B**

**ELECTRICAL ENGINEERING MATERIALS**

B. Tech. Semester – III (EE, EEE, IC, AEI)

L	T	P	Credits
3	-	-	3

Class Work	:	25 Marks
Theory	:	75 Marks
Total	:	100 Marks
Duration of Exam.	:	3Hrs.

**UNIT I**

Atomic bonding, crystallinity, Miller Indices, X-ray crystallography, structural imperfections, crystal growth. Free electron theory of metals, factors affecting electric conductivity of metals, thermal conductivity of metals, heat developed in current Carrying conductors, thermoelectric effect, super conductivity.

**UNIT II**

Polarization mechanism and dielectric constant, behavior of polarization under impulse and frequency switching, dielectric loss, spontaneous polarization, piezoelectric effect. Origin of permanent magnetic dipoles in materials, classifications, diamagnetism, paramagnetism, ferromagnetism, Magnetic Anisotropy magnetostriction.

**UNIT III**

Energy band theory, classification of materials using energy band theory, Hall effect, drift and diffusion currents, continuity equation, P-N diode, volt-amp equation and its temperature dependence. Properties and applications of electrical conducting, semiconducting, insulating and magnetic materials.

**UNIT IV**

Special purpose materials, Nickel iron alloys, high frequency materials, permanent magnet materials, Feebly magnetic materials, Ageing of a permanent magnet, Effect of impurities, Losses in Magnetic materials.

**Text Books:**

1. Electrical Engineering Materials: A.J. Dekker; PHI.
2. Solid State Electronic Devices: StreetMan & Banerjee; Pearson

**Reference Books:**

1. Electrical Engineering Materials: S.P Seth & P.V Gupta; Dhanpat Rai.

**NOTE:**

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.

Approved by UG BOS & FET

**EE211B**

**NETWORK ANALYSIS & SYNTHESIS**

B. Tech. Semester –III (ECE, AEI)

L	T	P	Credits
3	1	-	4

Class Work	:	25 Marks
Theory	:	75 Marks
Total	:	100 Marks
Duration of Exam.	:	3 Hrs.

**UNIT I**

**TRANSIENT RESPONSE:**

Laplace Transform: Review of properties and applications of Laplace transform of complex waveform. Transient Response of RC, RL, RLC series, parallel, series-parallel circuits to various excitation signals such as step, ramp, impulse and sinusoidal excitations using Laplace transform.

**UNIT II**

**TWO-PORT NETWORKS:**

Characteristics and parameters of two port networks, Network Configurations, short-circuit Admittance parameters, open-circuit impedance parameters, Transmission parameters, hybrid parameters, condition for reciprocity & symmetry of two-port networks in different parameters representations. Inter-relationships between parameters of two-port network sets, Inter-connection of two port networks.

**UNIT III**

**FILTERS:**

Filter fundamentals, classification of Filter, Analysis & design of prototype high-pass, prototype low-pass, prototype band-pass, and prototype band-reject Filter, m-derived low-pass & high-pass filters.

**TOPOLOGY:** Principles of network topology, graph matrices, network analysis using graph theory

**UNIT IV**

**NETWORK SYNTHESIS:**

Network functions, concept of poles and zeros in Network functions, Time domain behavior from the pole-zero plot., Hurwitz polynomials, Positive real functions, procedure of testing of PR functions, concept and procedure of network synthesis, properties of expressions of driving point immittances of LC networks. LC Network synthesis: Foster's I & II Form, Cauer's I & II form.

**TEXT BOOKS:**

1. Network Theory Analysis & Synthesis: Smarajit Ghosh; PHI.
2. Network Analysis & Synthesis: F.F.Kuo; John Wiley & Sons Inc.

**REFERENCE BOOKS:**

1. Introduction to modern Network Synthesis: Van Valkenburg; John Wiley
2. Network Analysis: Van Valkenburg; PHI
3. Basic circuit theory:Dasoer Kuh; McGraw Hill.
4. A Course in Electrical Circuit Analysis by Soni & Gupta; Dhanpat Rai Publication.
5. Circuit Analysis: G.K. Mithal; Khanna Publication.
6. Networks and Systems: D.Roy Choudhury; New Age International
7. Engineering Circuit Analysis; Hayat & Kemmerley TMH.

**NOTE:**

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.

Approved by UG BOS & FET

**EE212B**

**ELECTROMECHANICAL ENERGY CONVERSION**  
B. Tech. Semester – III (AEI, common with 4th Sem. EEE & IC)

L	T	P	Credits
3	1	-	4

Class Work	:	25 Marks
Theory	:	75 Marks
Total	:	100 Marks
Duration of Exam.	:	3Hrs.

**UNIT I**

**MAGNETIC CIRCUITS AND PRINCIPLES OF ELECTROMECHANICAL ENERGY CONVERSION:**

Magnetic Circuits, static and dynamic emfs and force on current carrying conductor, AC operation of Magnetic Circuits, Hysteresis and Eddy current losses, Force and torque in magnetic field system, energy balance, energy and force in singly excited magnetic field system, concept of co-energy, forces and torques in system with permanent magnets, dynamic equation.

**UNIT II**

**TRANSFORMERS:**

Single Phase Transformer: Principle, construction, E.M.F equation, operation of transformer, phasor diagram, Equivalent parameter determination, Equivalent circuit, voltage regulation, losses, efficiency, open-circuit test, short circuit test, Sumpner's test, auto-transformer, Three Phase Transformer: Principle, construction, connection, operation, advantages, various types of connection of three phase transformer.

**UNIT III**

**DC MACHINES:**

**D.C Generator:**

Principle, Construction, E.M.F equation, types, characteristics, voltage buildup phenomenon in self-excited generator, applications

**D.C Motor:**

Principle, construction, torque equation, types, characteristics, starting and starters, speed control of DC motor.

**UNIT IV**

**AC MACHINES:**

**Poly-phase Induction Motor:**

Construction, double cage and deep bar motors, production of rotating magnetic field, Principle of operation, torque production, performance characteristics, speed control of induction motor, Introduction to single phase Induction motor, different types of single phase motors and their applications.

**Synchronous Machines:**

Construction and basic theory of synchronous generator & motor, emf equation, Phasor diagram, Regulation, V-curve.

**TEXT BOOKS:**

1. Electric Machines: I.J.Nagrath and D.P.Kothari, TMH, New Delhi.
2. Performance & Design of D.C. Machines: A.E. Clayton & N.N. Hancock; ELBS

**REFERENCE BOOKS:**

1. Electric Machinery, Fitzgerald & Kingsley, MGH.
2. Theory of alternating current machinery, A.S. Langsdorf, TMH.
3. Electrical Machines, P.S.Bhimbra, Khanna Publishers Delhi

**NOTE:**

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.

Approved by UG BOS & FET

## CSE201B

## DATA STRUCTURES

B. Tech. Semester –III (CSE, ECE, AEI)

L	T	P	Credits
3	1	-	4

Class Work	:	25 Marks
Theory	:	75 Marks
Total	:	100 Marks
Duration of Exam.	:	3 Hrs.

### UNIT I

**Basic Terminology:** Elementary Data Organization, Data Structure Operations.

**Arrays:** Array Definition and Analysis, Representation of Linear Arrays in Memory, Traversing of Linear Arrays, Insertion and Deletion, Single Dimensional Arrays, Two Dimensional Arrays, Multidimensional Arrays, Sparse Matrix.

**Stacks and Queues:** Operations on Stacks- Push, Pop, Peep, Representation of stacks. Application of stacks - polish expression and their compilation conversion of infix expression to prefix and postfix expression, Tower of Hanoi problem, Representation of Queues, Operations on queues: Create, Add, Delete, Priority Queues, Dequeues, Circular Queue.

### UNIT II

**Linked Lists:** Singly linked lists: Representation of linked lists in memory, Traversing, Searching, Insertion into, Deletion from linked list, Polynomial Addition, Header Linked List, Doubly linked list, generalized list.

### UNIT III

**Trees:** Basic Terminology, Binary Trees and their representation, expression evaluation, Complete Binary trees, Extended binary trees, Traversing binary trees, Searching, Insertion and Deletion in binary search trees(with and without recursion), AVL trees, Threaded trees, B trees.

**Graphs:** Terminology and Representations, Graphs &Multigraphs, Directed Graphs, Sequential representation of graphs, Adjacency matrices, Transversal Connected Component and Spanning trees, Shortest path

### UNIT IV

**Searching, Sorting methodologies:** Array- Bubble sort, Selection Sort, Insertion Sort, Linear Search, Binary Search. Stack -Quick Sort, Merge Sort. Two way Merge Sort. Queue- Radix Sort.Tree – Heap Sort.

#### Reference Books:

1. An introduction to data structures and application by Jean Paul Tremblay & Pal G. Sorenson (McGraw Hill)
2. R.L. Kruse, B.P. Leary, C.L. Tondo, Data structure and program design in C , PHI
3. R. B. Patel, Expert Data Structures With C, Khanna Publications, Delhi, India, 3<sup>rd</sup> Edition 2008.
4. Data Structures using C by A. M. Tenenbaum, Langsam, Moshe J. Augentem, PHI Pub.
5. Data Structures and Algorithms by A. V. Aho, J. E. Hopcroft and T. D. Ullman, Original edition, Addison-Wesley, 1999, Low Price Edition.
6. Fundamentals of Data Structure by Ellis Horowitz &SartajSahni, Pub, 1983. AW
7. Data Structure and Program design in C by Robert Kruse, PHI
8. Theory and Problems of Data Structures by Jr. SeymourLipschetz, Schaum's outline by TMH.
9. Introduction to Computer Science- An algorithms approach, Jean Paul Tremblay, Richard B. Bunt, 2002, TMH.
10. Data Structure and Standard Template Library- Willam J. Collins, 2003, T.M.H

#### NOTE:

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.

Approved by UG BOS & FET

**EE241B**

**NETWORK ANALYSIS & SYNTHESIS LAB**

B. Tech. Semester –III (ECE, AEI)

L	T	P	Credits
-	-	2	1

Class Work	:	20 Marks
Practical	:	30 Marks
Total	:	50 Marks
Duration of Exam.	:	3 Hrs.

**LIST OF EXPERIMENTS:**

1. Transient response of RC circuit.
2. Transient response of RL circuit.
3. To find the resonance frequency and Band width of RLC series circuit.
4. To calculate and verify "Z" parameters of a two port network.
5. To calculate and verify "Y" parameters of a two port network.
6. To determine equivalent parameter of parallel connections of two port network.
7. To plot the frequency response of low pass filter and determine half-power frequency.
8. To plot the frequency response of high pass filter and determine the half-power frequency.
9. To plot the frequency response of band-pass filter and determine the band-width.
10. To calculate and verify "ABCD" parameters of a two port network.
11. To synthesize a network of a given network function and verify its response.
12. Introduction of P-Spice.

**Note:-**

- 1 Total ten experiments are to be performed in the semester.
- 2 At least seven experiments should be performed from the above list. Remaining three experiments should be performed as designed and set by the concerned institution as per the scope of the syllabus.

Approved by UG BOS & FET



**CSE221B**

**DATA STRUCTURES LAB**  
B. Tech. Semester –III (CSE, ECE, AEI)

L	T	P	Credits
-	-	2	1

Class Work	:	20 Marks
Practical	:	30 Marks
Total	:	50 Marks
Duration of Exam.	:	3 Hrs.

**LIST OF EXPERIMENTS:**

Experimental work will be based upon the course Data Structures (CSE201B).

**Note:-**

1 Total ten experiments are to be performed in the semester.

Approved by UG BOS & FET

**EE232B**

**ELECTROMECHANICAL ENERGY CONVERSION LAB**  
B. Tech. Semester –III (AEI, common with 4th Sem. EEE & IC)

L T P Credits  
- - 3 2

Class Work : 40 Marks  
Practical : 60 Marks  
Total : 100 Marks  
Duration of Exam. : 3 Hrs.

**LIST OF EXPERIMENTS:**

1. To find turns ratio and polarity of a single phase transformer.
2. To perform open and short circuit tests on a single phase transformer.
3. To perform Sumpner's back to back test on single phase transformers.
4. Parallel operation of two single phase transformers.
5. Study of construction of a DC machine.
6. To plot O.C.C of a DC shunt generator and find its Critical Resistance.
7. To perform direct load test of a DC motor.
8. Speed control of a DC motor by armature control and field control methods.
9. To perform open circuit and block rotor tests of an induction motor.
10. Star-delta starting of a three phase induction motor.
11. Plot O.C.C of a synchronous generator.
12. To plot V-curve of a synchronous motor.

**BOOKS:**

1. Experiments in basic Electrical Engineering – S.K.Bhattacharya & K.M.Rastogi (New Age International, Publishes).
2. Practicals in Electrical Engineering – N.K.Jain (Dhanpat Rai Publishing Company Pvt. Ltd.)

**Note:-**

- 1 Total ten experiments are to be performed in the semester.
- 2 At least seven experiments should be performed from the above list. Remaining three experiments should be performed as designed and set by the concerned institution as per the scope of the syllabus.

Approved by UG BOS & FET

**ME217B****WORKSHOP TRAINING**

B. Tech. Semester –III (Common for all branches except BT &amp; AE)

L	T	P	Credits	Class Work	:	50 Marks
-	-	-	2	Practical	:	-
				Total	:	50 Marks

Each student has to undergo a workshop atleast 4 weeks (80-100 hours ) at the end of II semester during summer vacations. **Out of the four weeks, two weeks would be dedicated to general skills and two weeks training for specialized discipline/department.** The evaluation of this training shall be carried out in the III semester

**LIST OF JOBS TO BE CARRIED OUT DURING THIS PERIOD**

1. To study and prepare different types of jobs on machine tools ( lathe, shaper, planer, slotter, milling, drilling machines).
2. To prepare lay out on a metal sheet by making and prepare rectangular tray, pipe shaped components e.g. funnel.
3. To prepare joints for welding suitable for butt welding and lap welding.
4. To study various types of carpentry tools and prepare simple types of wooden joints.
5. To prepare simple engineering components/ shapes by forging.
6. To prepare mold and core assembly, to put metal in the mold and fettle the casting.
7. To study of CNC lathe, CNC Milling and EDM Machines.
8. Any work assigned in electrical workshop, computer hardware/language lab, electronics workshop, biomedical hardware, automobile workshop etc.

**This student will prepare job(s)/project as an individual or in a group using workshop in house infrastructure.**

The student shall submit a typed report.

Training will be evaluated on the spot out of 20 marks.

The report will be evaluated in the III Semester by a Committee consisting of two teachers.

The student will interact with the committee through presentation to demonstrate his/her learning. The basis of evaluation will primarily be the knowledge and exposure of students on different kinds of Machines/instruments/tools/skills etc. The committee will evaluate out of 30 marks.

The committee shall submit the awards out of 50 marks.

## GES201B

## ENVIRONMENTAL STUDIES

B. Tech. Semester –III/IV (Common for all Branches)

L	T	P	Credits
3	-	-	-

Class Work	:	-
Theory	:	75 Marks
Total	:	75 Marks
Duration of Exam.	:	3 Hrs.

### UNIT – I

The Multidisciplinary nature of environmental studies, Definition, scope and importance. Need for Public awareness.

#### Natural Resources:

Renewable and non-renewable resources:

Natural resources and associated problems.

- Forest resources: Use and over-exploitation: deforestation, case studies, Timber exploitation, mining, dams and their effects and forests tribal people.
  - Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
  - Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
  - Food resources: World food problems, changes, caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
  - Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources; case studies.
  - Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. • Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

### UNIT- II

#### Ecosystems:

- 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, characteristic features, structure and function of the following eco-system: a) Forest ecosystem.
- b) Grassland ecosystem.
- c) Desert ecosystem.
- d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

#### Biodiversity and its conservations:

- Introduction – Definition: Genetic, species and ecosystem diversity.
- Biogeographically 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.
- Hot-spots of biodiversity.
- Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.
- Endangered and endemic species of India.

### UNIT – III

#### Environmental Pollution:

Definition, causes, effects and control, measures of:

- Air pollution
  - Water pollution
  - Soil pollution
  - Marine pollution
  - Noise pollution
  - Thermal Pollution
  - 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.

## UNIT – IV

### Social issues and the Environment:

- a) From unsustainable to sustainable development
- b) Urban problems related to energy
- c) Water conservation, rain water harvesting, watershed management
- d) Resettlement and rehabilitation of people; its problems and concerns, case studies
- e) Environmental ethics: Issues and possible solutions
- f) Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, Case studies
- g) Wasteland reclamation
- h) Consumerism and waste products
- i) Environment Protection Act
- j) Air (Prevention and Control of Pollution) Act
- k) Water (Prevention and Control of Pollution) Act
- l) Wildlife Protection Act
- m) Forest Conservation Act
- n) Issues involved in enforcement of environmental legislation
- o) Public awareness

### Human population and the Environment.

Population growth, variation among nations.

Population explosion – Family Welfare Programme.

Environment and human health.

Human Rights.

Value Education.

HIV/ AIDS.

Woman and Child Welfare.

Role of Information Technology in Environment and human health.

Case Studies.

### REFERENCES:

1. Agarwal, K.C. 2001, Environmental Biology, Nidi Pub. Ltd. Bikaner.
2. Bharucha, Franch, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad – 380013, India .
3. Brunner R.C. 1989, Hazardous Waste Incineration, Mc. Graw Hill Inc. 480p.
4. Clark R.S., Marine Pollution, Slanderson Press Oxford (TB).
5. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Pub. House, Mumbai. 1195p.
6. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
7. Down to Earth, Centre for Science and Environment @.
8. Gleick, H.P., 1993. Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security, Stockholm Env. Institute, Oxford Univ., Press 473p.
9. Hawkins R.E. Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R).
10. Heywood, V.H. & Watson, R.T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press 1140p.
11. Jadhav, H & Bhosale, V.M. 1995, Environmental Protection and Laws, Himalaya Pub. House, Helhi 284p.
12. Mckinney, M.L. & Schoch, RM 1996, Environmental Sciences Systems & Solutions, Web enhanced Edition 639p.
13. Mhaskar A.K., Mater Hazardous, Tekchno-Sciences Publications (TB).
14. Miller T.G. Jr. Environmental Science, Wadsoworth Publishing Co. (TB).
15. Odum, E.P. 1971, Fundamentals of Ecology, W.B. Saunders Co. USA, 574p.
16. Rao M.N. & Dutta, A.K. 1987, Waste Water Treatment. Oxford & IBH Publ. Co. Pvt. Ltd., 345p
17. Sharma, B.K., 2001, Environmental Chemistry, Goel Publ. House, Meerut.
18. Survey of the Environment, The Hindu (M).
19. Townsend C., Harper J., and Michael Begon, Essentials of Ecology, Blackwell Sciences (TB).
20. Trivedi, R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I and II Enviro Mdiea (R).
21. Trividi R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol I and II Enviro Media (R).
22. Trividi R.K. and P.K. Goel, Introduction to air pollution, Techno Sciences Pub. (TB).
23. Wagner K.D., 1998, Environmental Management, W.B. Saunders Co. Philadelophia, USA 499p.
24. A text bok environmental education G.V.S. Publishers by Dr. J.P. Yadav.

### (M) Magazine (R) Reference (TB) Textbook

### Note:

1. In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.
2. The awards of this paper shall not be counted in the award of the Degree/DMC.

## MATH202B

## NUMERICAL METHODS B. Tech. Semester –IV (CHE, AEI)

L	T	P	Credits
3	1	-	4

Class Work	:	25 Marks
Theory	:	75 Marks
Total	:	100 Marks
Duration of Exam.	:	3 Hrs.

### UNIT I

#### Interpolation and Curve Fitting:

Interpolation problem, Lagrangian polynomials, Divided differences, Interpolating with a cubic spline, Bezier curves and B-spline curves, Least Square Approximations.

Non-Linear Equations:

Bisection Method, Linear Interpolation methods, Newton's method, Muller's method, fixed point method.

### UNIT II

#### Simultaneous Linear Equations:

Elimination Method, Gauss and Gauss-Jordan method, Jacobi's method, Gauss-Seidal method, Relaxation Method.

Numerical Differentiation and Integration:

Derivatives from differences tables, Higher order derivatives, Extrapolation techniques, Newton-cotes integration formula, Trapezoidal rule, Simpson's rule, Boole's rule and Weddle's rule, Romberg's integration

### UNIT III

#### Numerical Solution of Ordinary Differential Equations:

Taylor series method, Euler and modified Euler method, Runge-Kutta method, Milne's method, Adams-Moulton method, Power method for Eigen values by integration.

### UNIT IV

#### Numerical Solution of Partial Differential Equations:

Finite difference approximations of partial derivatives, solution of Laplace equation (Standard 5-point formula only), one-dimensional heat equation (Schmidt method, Crank-Nicolson method, Dufort and Frankel method) and wave equation.

#### Text Books:

1. Applied Numerical Analysis: Curtis F. Gerald and Patrick G. Wheatley-Pearson, Education Ltd.
2. Numerical Method: E. Balaguruswamy T.M.H

#### Reference Books:

1. Numerical Methods for scientific and Engg. Computations: MK Jain, SRK Iyenger and RK John-Wiley Eastern Ltd.
2. Introductory Methods of Numerical Analysis S.S Sastry, PHI
3. Numerical Methods in Engineering and Science: BS Grewal

#### NOTE:

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.

Approved by UG BOS & FET

## CSE204B

## OBJECT ORIENTED PROGRAMMING

B. Tech Semester –IV (AEI, CSE, common with 5<sup>th</sup> Sem. EL)

L	T	P	Credits
3	1	-	4

Class Work	:	25 Marks
Theory	:	75 Marks
Total	:	100 Marks
Duration of Exam.	:	3 Hrs.

### UNIT I

C++ Standard Library, Preprocessor Directives, illustrative Simple C++ Programs.Header Files and Namespaces, library files.Concept of objects, Object Oriented Analysis & Object Modeling techniques.

**Object Oriented Concepts:** Introduction to Objects and Object Oriented Programming, Encapsulation (Information Hiding), Access Modifiers: Controlling access to a class, method, or variable (public, protected, private, package), Other Modifiers, Polymorphism: Overloading, Inheritance, Overriding, Abstract Classes, Reusability

**Classes and Data Abstraction:** Introduction, Structure Definitions, Accessing Members of Structures, Class Scope and Accessing Class Members, Controlling Access Function And Utility Functions, Initializing Class Objects: Constructors.

### UNIT II

**Using Destructors, Classes:** Const(Constant) Object And Const Member Functions, Object as Member of Classes, Friend Function and Friend Classes, Using This Pointer, Dynamic Memory Allocation with New and Delete, Static Class Members, Container Classes and iterators, Function overloading.

**Operator Overloading:** Introduction, Fundamentals of Operator Overloading, Restrictions On Operators Overloading, Operator Functions as Class Members vs. as Friend Functions, Overloading

### UNIT III

**Inheritance:** Introduction, Inheritance: Base Classes And Derived Classes, Protected Members, Casting Base Class Pointers to Derived-Class Pointers, Using Member Functions, Overriding Base -Class Members in a Derived Class, Public, Protected and Private Inheritance, Using Constructors and Destructors in derived Classes, Implicit Derived -Class Object To Base- Class Object Conversion, Composition Vs. Inheritance.

Introduction to Virtual Functions, Abstract ,Base Classes And Concrete Classes, Polymorphism, New Classes And Dynamic Binding, Virtual Destructors, Polymorphism, Dynamic Binding.

### UNIT IV

Files and I/O Streams and various operation on files. Stream Input/Output Classes and Objects, Stream Output, Stream Input, Unformatted I/O (with read and write), Stream Manipulators, StreamFormatStates, StreamErrorStates.

**Templates & Exception Handling:** Function Templates, Overloading Template Functions, Class Template, Class Templates and Non-Type Parameters, Templates and Inheritance, Templates and Friends.

**Templates and Static Members:** Introduction, Basics of C++ Exception Handling: Try Throw, Catch, Throwing an Exception;- Catching an Exception, Re-throwing an Exception, Exception specifications, Processing Unexpected Exceptions, Constructors, Destructors and Exception Handling, Exceptions and Inheritance.

#### Reference Books:

1. C++ How to Program by H M Deitel and P J Deitel, 1998, Prentice Hall
2. Object Oriented Programming in Turbo C++ by Robert Lafore ,1994, The WAITE Group Press.
3. Programming with C++ By D Ravichandran, 2003, T.M.H
4. Object oriented Programming with C++ by E Balagurusamy, 2001, Tata McGraw-Hill
5. Computing Concepts with C++ Essentials by Horstmann, 2003, John Wiley,
6. The Complete Reference in C++ By Herbert Schildt, 2002, TMH.

#### NOTE:

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.

Approved by UG BOS & FET

**ECE203B****ANALOG ELECTRONICS**

B. Tech. Semester –IV (AEI, common with 3rd Sem. EL, BME)

L	T	P	Credits
3	1	-	4

Class Work	:	25 Marks
Theory	:	75 Marks
Total	:	100 Marks
Duration of Exam.	:	3 Hrs.

**UNIT I****BASIC SEMICONDUCTOR AND PN-JUNCTION THEORY:**

Introduction, Atomic Structure, Covalent Bond, Metals, Insulators & Semiconductors, Effect of Temperature on Conduction, Drift Current, Donor & Acceptor Impurities in Semiconductor, Law Of Mass Action, Hall's Effect, Hall Coefficient & Mobility, Numerical.

**CHARACTERISTICS OF DIODE:**

PN-Junction, Construction Types, Unbiased Junction, Biased Junction, Space Charge Region, Diode Characteristics & Parameters, Diode Capacitance, Diode Resistance, DC And AC Load Lines, Diode Testing, Zener And Avalanche Breakdown Diodes, Tunnel Diode, Temperature Characteristics of Diode, Reverse Recovery Time, Switching Characteristics of Diode.

**UNIT II****DIODE APPLICATIONS:**

Half Wave, Full Wave Center Tapped, Full Wave Bridge(Rectification), Series Clipping Circuit, Shunt Clipping Circuit, Clamping Circuit, Bridge Voltage Doubler, Filtering Circuit Using Capacitor & Inductor.

**JUNCTION TRANSISTOR:**

Introduction, Construction Of Junction Transistor, Circuit Symbols, Transistor Operation, Unbiased Transistor, Operation Of Biased Transistor, Transistor Current Components, DC & AC Load Line, Operating Point, Transistor Configuration CB, CE, CC, Input/Output Characteristics, Early Effect(Base Width Modulation), Eber's-Moll-Model of Transistor, Maximum Rating of Transistor, Transistor Testing, Transistor as an Amplifier, Transistor as Oscillator.

**UNIT III****BJT BIASING:**

Bias Stability, Instability Due To  $\beta$ , Thermal Stability, Stability Factor, Fixed Biased Circuits, Effect of Emitter Resistor, Collector to Base Bias, Voltage Divide Biasing, Advantage & drawbacks of Biasing Techniques, Stability Factor calculation of Biasing Techniques, Bias Compensation by various device, Thermal Runway, Transistor Dissipation, Thermal Resistance, Condition of Thermal Stability

**SMALL SIGNAL CIRCUIT:**

Two Port Network, Hybrid(H-Parameter)Model, Typical Values of H-Parameter Model, Conversion of CE, CB, CC Configuration to Equivalent Hybrid Model, CB Circuit Analysis, CE circuit with & without  $R_E$  analysis, CC circuit analysis, Analysis of CE, CB & CC Configuration with approximate Hybrid Model, Miller's Theorem, Dual of Miller Theorem.

**UNIT IV****HIGH FREQUENCY ANALYSIS:**

Hybrid Pi Model, CE Short Circuit Gain, Frequency Response, Alpha Cut off Frequency, Gain Bandwidth Product, Emitter Follower at High Frequencies.

**FET:**

Introduction, The Junction FET, Basic Construction, Operation, P- Channel FET, N-Channel FET, High Frequency Model of FET, Low Frequency FET Amplifiers, Transfer Characteristics of FET, MOSFET, Enhancement Mode, Depletion Mode of FET, Circuit Symbol of MOSFET, V-MOSFET.

**Reference Books:**

- |                                  |                                       |
|----------------------------------|---------------------------------------|
| 1. Basic Electronics             | By Debashion DE. -- Pearson.          |
| 2. Electronics Device & Circuit, | By Robert Boylestad ,Louis Nashelsky. |
| 3. Electronics Device Circuit    | By David.A.Bell -- Oxford             |
| 4. Integrated Electronics        | By Millman Halkias -- TMH.            |
| 5. Electronics Device & Circuit  | By Dharam Raj Cheruku -- Pearson.     |

**NOTE:**

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.

Approved by UG BOS &amp; FET



**ECE201B****DIGITAL ELECTRONICS**

B. Tech. Semester –IV (AEI, BME, common with 3rd semester EE, EL, CSE, IC, EEE)

L	T	P	Credits
3	1	-	4

Class Work	:	25 Marks
Theory	:	75 Marks
Total	:	100 Marks
Duration of Exam.	:	3 Hrs.

**UNIT I****FUNDAMENTALS OF DIGITAL TECHNIQUES :**

Digital signal, logic gates: AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR, Boolean algebra. Review of Number systems. Binary codes: BCD, Excess-3, Gray, EBCDIC, ASCII, Error detection and correction codes.

**COMBINATIONAL DESIGN USING GATES:**

Design using gates, Simplifications of SOP and POS Boolean Expressions, Karnaugh map up to four variables.

**UNIT II****COMBINATIONAL DESIGN USING MSI DEVICES :**

Multiplexers and Demultiplexers and their use as logic elements, Decoders, Adders / Subtractors, BCD arithmetic circuits, Encoders, Code Converters, Decoders / Drivers for display devices.

**SEQUENTIAL CIRCUITS:**

Flip Flops : S-R, J-K, T, D, master-slave, edge triggered, shift registers, sequence generators, Counters, Asynchronous and Synchronous Ring counters and Johnson Counter, Design of Synchronous and Asynchronous sequential circuits.

**UNIT III****DIGITAL LOGIC FAMILIES:**

Switching mode operation of p-n junction, bipolar and MOS. devices. Bipolar logic families:RTL, DTL, DCTL, HTL, TTL, ECL, MOS, and CMOS logic families. Tristate logic, Interfacing of CMOS and TTL families.

**SEMICONDUCTORS MEMORY DEVICES:**

Memory organizations, Characteristics of memory devices, Classifications of semiconductors memories.

**UNIT IV****A/D AND D/A CONVERTERS:**

Sample and hold circuit, weighted resistor and R -2 R ladder D/A Converters, specifications for D/A converters.

A/D converters : Quantization, parallel -comparator, successive approximation, counting type, dual-slope ADC, specifications of ADCs.

**PROGRAMMABLE LOGIC DEVICES:**

PLA, PAL, FPGA and CPLDs.

**Text Books :**

1. Modern Digital Electronics(Edition III) : R. P. Jain; TMH
2. Digital Electronics :Green; Pearson

**Reference Books:**

1. Digital Integrated Electronics : Taub & Schilling; MGH
2. Digital Principles and Applications : Malvino & Leach; McGraw Hill.
3. Digital Design : Morris Mano; PHI.

**NOTE:**

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.

Approved by UG BOS & FET

**EE204B**

**ELECTRICAL MEASUREMENTS & MEASURING INSTRUMENTS**

B. Tech. Semester –IV (AEI, EE, EEE, IC)

L T P Credits  
3 1 - 4

Class Work : 25 Marks  
Theory : 75 Marks  
Total : 100 Marks  
Duration of Exam. : 3 Hrs.

**UNIT I**

**Fundamentals of Electrical & Electronics measurements:**

Standards, True Value, Errors (Gross, Systematic, Random); Static Characteristic of Instruments (Accuracy, Precision, Sensitivity, Resolution & threshold). Classification of Instruments (Absolute & Secondary Instruments; Indicating, Recording & Integrating instruments; Based upon Principle of operation), Generalized Instrument (Block diagram, description of blocks), Three forces in Electromechanical indicating instrument, Comparison between gravity & spring controls; Comparison of damping methods & their suitability, bearing supports, pivot-less supports (Simple & taut-band), Scale information.

**UNIT II**

**MEASURING INSTRUMENTS:**

Instrument cases (Covers). Construction, operating principle, Torque equation, Shape of scale, use as Ammeter or as Voltmeter (Extension of Range), Use on AC/DC or both, Advantages & disadvantages, Errors (Both on AC/DC) of PMMC types, Electrodynamic Type, Moving iron type (attraction, repulsion & combined types), Induction type.

**UNIT III**

**WATTMETERS & ENERGY METERS:**

Construction, operating principle, Torque equation, Shape of scale, Errors, Advantages & Disadvantages of Electrodynamic & Induction type Wattmeters; & single phase induction type Energy meter, Compensation & creep in energy meter.

**POWER FACTOR & FREQUENCY METERS:**

Construction, operation, principle, Torque equation, Advantages & disadvantages of Single phase power factor meters (Electrodynamic & Moving Iron types) & Frequency meters (Electrical Resonance Type, Ferrodynamic & Electrodynamic types).

**UNIT IV**

**LOW & HIGH RESISTANCE MEASUREMENTS:**

Limitations of Wheatstone bridge; Kelvin's double bridge method, Difficulties in high resistance measurements, Measurement of high resistance by direct deflection, loss of charge method, Megohm bridge.

**A.C. BRIDGES:**

General balance equation, Ckt. diagram, Phasor diagram, Advantages, disadvantages, applications of Maxwell's, inductance-capacitance, Hays, Owens, Schering & Wein's bridges, Shielding & earthing, Wagner's device, .

**Text Books :**

1. A Course in Elect. & Electronic Measurement & Instrumentation by A. K. Sawhney; Khanna Pub.

**Reference Books:**

1. Electrical Measurements by E.W. Golding
2. Electronic & Elect. Measurement & Instrumentation by J.B.Gupta; Kataria & Sons.
3. Electronic Instrumentation & Measurement Technique, W.D. Cooper & A.D. Helfrick.
4. Measuring Systems by E.O. Doebelin; TMH.

**NOTE:**

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.

Approved by UG BOS & FET

**ECE223B**

**ANALOG ELECTRONICS LAB**

B. Tech. Semester –IV (AEI, common with 3rd Sem. EL, BME)

L T P Credits  
- - 2 1

Class Work : 20 Marks  
Practical : 30 Marks  
Total : 50 Marks  
Duration of Exam. : 3 Hrs.

**LIST OF EXPERIMENTS:**

- 1 Study of half wave and full wave rectifiers
- 2 Study of power supply filter.
- 3 Study of diode as a clipper and clamper.
- 4 Study of zener diode as a voltage regulator.
- 5 Study of CE amplifier for voltage,current and Power gains input,output impedances.
- 6 Study of CC amplifier as a buffer.
- 7 To study the frequency response of RC coupled amplifier.
- 8 Study of transistor as a constant current source in CE configuration .
- 9 To study characteristics of FET.
- 10 Study of FET common source amplifier.
- 11 Study of FET common drain amplifier.
- 12 Graphical determination of small signal hybrid parameter of bipolar junction transistor.
- 13 Study and design of a DC voltage doubler.

**Note:-**

- 1 Total ten experiments are to be performed in the semester.
- 2 At least seven experiments should be performed from the above list. Remaining three experiments should be performed as designed and set by the concerned institution as per the scope of the syllabus.

Approved by UG BOS & FET

**ECE221B****DIGITAL ELECTRONICS LAB**

B. Tech. Semester –IV (AEI, BME, common with 3rd semester EE, EL, CSE, IC, EEE)

L	T	P	Credits
-	-	2	1

Class Work	:	20 Marks
Practical	:	30 Marks
Total	:	50 Marks
Duration of Exam.	:	3 Hrs.

**LIST OF EXPERIMENTS:**

- 1 Study of TTL gates –AND,OR,NOT,NAND,NOR,EX-OR,EX-NOR
- 2 To realize the universal property of NAND gate
- 3 To realize the universal property of NOR gate
- 4 Design & realize a given function using K-maps and verify its performance.
- 5 To verify the operation of Multiplexer & De-multiplexer.
- 6 To verify the operation of Comparators.
- 7 To perform Half adder and Full adder
- 8 To perform Half Subtractor and Full subtractor.
- 9 To verify the truth table of S-R,J-K,T & D Type flip flop .
- 10 To verify the operation of bi-directional shift register.
- 11 To study analog to digital and digital to analog converter
- 12 To design & verify the operation of 3 bit synchronous counter.
- 13 To design & verify the operation of synchronous UP/DOWN decade counter using JK flip flop & derive a seven segment display using the same.
- 14 To design & verify the operation of asynchronous UP/DOWN decade counter using JK flip flop & derive a seven segment display using the same.
- 15 Design a 4- bit shift register ,verify its operation and verify the operation of a ring counter and a Johnson counter.

**Note:-**

- 1 Total ten experiments are to be performed in the semester.
- 2 At least seven experiments should be performed from the above list. Remaining three experiments should be performed as designed and set by the concerned institution as per the scope of the syllabus.

Approved by UG BOS &amp; FET

**EE224B**

**ELECTRICAL MEASUREMENTS & MEASURING INSTRUMENTS LAB**

B. Tech Semester –IV (AEI, EE, EEE, IC)

L	T	P	Credits
-	-	2	1

Class Work	:	20 Marks
Practical	:	30 Marks
Total	:	50 Marks
Duration of Exam.	:	2 Hrs.

**LIST OF EXPERIMENTS:**

1. To identify the meters from the given lot.
2. To convert & calibrate a D'Arsonval type galvanometer into a voltmeter & into an ammeter.
3. To calibrate an energy meter with the help of a standard wattmeter & a stop watch.
4. To measure power & p.f. by 3-ammeter method.
5. To measure power & p.f. by 3-voltmeter method.
6. To measure power & p.f. in 3-phase circuit by 2-wattmeter method.
7. To measure capacitance by De-Sauty's bridge.
8. To measure inductance by Maxwell's bridge.
9. To measure frequency by Wien's bridge.
10. To measure the power with the help of C.T. & P.T.
11. To measure magnitude & phase angle of a voltage by rectangular type potentiometer.
12. To measure magnitude & phase angle of a voltage by polar type potentiometer.
13. To measure low resistance by Kelvin's double bridge.
14. To measure high resistance by loss of charge method

**Note:-**

- 1 Total ten experiments are to be performed in the semester.
- 2 At least seven experiments should be performed from the above list. Remaining three experiments should be performed as designed and set by the concerned institution as per the scope of the syllabus.

Approved by UG BOS & FET

**CSE224B****OBJECT ORIENTED PROGRAMMING LAB**B. Tech Semester –IV (AEI, CSE, common with 5<sup>th</sup> Sem. EL)

L	T	P	Credits
-	-	2	1

Class Work	:	20 Marks
Practical	:	30 Marks
Total	:	50 Marks
Duration of Exam.	:	3 Hrs.

**LIST OF EXPERIMENTS:**

- Raising a number  $n$  to a power  $p$  is the same as multiplying  $n$  by itself  $p$  times. Write a function called `power ( )` that takes a double value for  $n$  and an int value for  $p$ , and returns the result as double value Use a default argument of 2 for  $p$ . so that if this argument is omitted, the number will be squared. Write a main ( ) function that gets values from the user to test this function.
- A point on the two dimensional plane can be represented by two numbers: an X coordinate and a Y coordinate. For example, (4,5) represents a point 4 units to the right of the origin along the X axis and 5 units up the Y axis. The sum of two points can be defined as a new point whose X coordinate is the sum of the X coordinates of the points and whose Y coordinate is the sum of their Y coordinates  
Write a program that uses a structure called `point` to model a point Define three points, and have the user input values to two of them Then set the third point equal to the sum of the other two. and display the value of the new point Interaction with the program might look like this:  

```
Enter coordinates for P1 :      3      4
Enter coordinates for P2:      5      7
Coordinates of P1 + P2 are: 8    11
```
- Create the equivalent of a four function calculator. The program should request the user to enter a number, an operator, and another number. It should then carry out the specified arithmetical operation: adding, subtracting, multiplying, or dividing the two numbers. (It should use a switch statement to select the operation). Finally it should display the result.  
When it finishes the calculation, the program should ask if the user wants to do another calculation. The response can be 'Y' or 'N'. Some sample interaction with the program might look like this.  

```
Enter first number. Operator, second number: 10/3
Answer = 3.333333
Do another (Y|N)? Y
Enter first number. Operator, second number 12 + 100
Answer = 112
Do another (Y|N)? N
```
- Create two classes `DM` and `DB` which store the value of distances. `DM` stores distances in metres and centimeters and `DB` in feet and inches. Write a program that can read values for the class objects and add one object of `DM` with another object of `DB`.  
Use a friend function to carry out the addition operation. The object that stores the results maybe `DM` object or `DB` object. depending on the units in which the results are required. The display should be in the format of feet and inches or metres and centimetres depending on object on display.
- Create a class `rational` which represents a numerical value by two double values- `NUMERATOR` & `DENOMINATOR` Include the following public member Functions:
  - constructor with no arguments (default).
  - constructor with two arguments.
  - void `reduce( )` that reduces the rational number by eliminating the highest common factor between the numerator and denominator.
  - Overload `+` operator to add two rational number
  - Overload `>>` operator to enable input through `cin`
  - Overload `<<` operator to enable output through `cout`.
  - Write a main ( ) to test all the functions in the class.
- Create a program that creates a binary file by reading the data for the students from the terminal. The data of each student consist of roll no., name ( a string of 30 or lesser no. of characters) and marks.
- A hospital wants to create a database regarding its indoor patients. The information to store include  
Name of the patient  
Date of admission  
Disease  
Date of discharge  
Create a structure to store the date (year, month and date as its members). Create a base class to store the above information. The member function should include functions to enter information and display a list of all the patients in the database. Create a derived

class to store the age of the patients List the information about all the to store the age of the patients. List the information about pediatric patients (less than twelve years in age).

8. Make a class Employee with a name and salary. Make a class Manager inherit from Employee. Add an instance variable, named department, of type string. Supply a method to String that prints the manager's name, department and salary. Make a class Executive inherit from Manager Supply a method to String that prints the string Executive followed by the information stored in the Manager superclass object. Supply a test program that tests these classes and methods.
9. Imagine a tollbooth with a class called toll Booth. The two data items of a type unsigned int to hold the total number of cars, and a type double to hold the total amount of money collected. A constructor initializes both these to 0. A member function called payingCar ( ) increments the car total and adds 0.50 to the cash total. Another function, called nopayCar ( ). increments the car total but adds nothing to the cash total. Finally, a member function called displays the two totals.

**Note:-**

At least seven experiments should be performed from the above list. Remaining three experiments should be performed as designed and set by the concerned institution as per the scope of the syllabus.

Approved by UG BOS & FET

**GES203B**

**ENVIRONMENTAL STUDIES FIELD WORK**  
B. Tech. Semester –III/IV (Common for all Branches)

L	T	P	Credits
-	-	-	-

Class Work	:	-
Practical	:	25 Marks
Total	:	25 Marks
Duration of Exam.	:	-

**FIELD WORK:**

- Visit to a local area to document environmental assets – river/ forest/ grassland/ hill/ mountain.
- Visit to a local polluted site-Urban/ Rural/ Industrial/ Agricultural.
- Study of common plants, insects, birds.
- Study of simple ecosystems – pond, river, hill slopes, etc. (Field work equal to 5 lectures hours).

**Note:**

The awards of this paper shall not be counted in the award of the Degree/DMC

Approved by UG BOS & FET



**GP AEI202B****GENERAL PROFICIENCY & ETHICS**  
B. Tech. Semester – IV (Common for all Branches)

L	T	P	Credits
1	-	-	2

Examination	:	-
Practical	:	75 Marks
Total	:	75 Marks

The purpose of this course is to inculcate a sense of professionalism in a student along with personality development in terms of quality such as receiving, responding, temperament, attitude and outlook. The student efforts will be evaluated on the basis of his/ her performance / achievements in different walks of life.

A Faculty Counselor will be attached to a group of students which will remain associated with him /her during the entire period of the degree program in the University. Each faculty member will serve as a faculty counselor. They will act like a local guardian for the students associated with him / her and will help them in terms of career guidance, personal difficulties.

A. The student will present a written report before the committee with following in view:  
The student will present before the committee his/her achievements during the current academic session in the form of a written report highlighting followings:

I.	Academic Performance	-----
II.	Extra Curricular Activities / Community Service, Hostel Activities	(8 Marks)
III	Technical Activities / Industrial, Educational tour	(8 Marks)
IV	Sports/games	(14 Marks)
V	Moral values & Ethics	(15 Marks)

NOTE: Report submitted by the students should be typed on both sides of the paper.

B.. A student will support his/her achievement and verbal & communicative skill through presentation before the committee.  
(30 Marks)

**C. Moral values & Ethics**

Syllabus - Process for Value Education, self-evaluation concept and process.

A minor test will be conducted during the semester and It will be the duty of the concerned teacher assigned to teach Moral values & Ethics to submit the awards to respective chairman of the department / Director/Principal.

The evaluation of this course will be made by the following Committee.

**University Departments:**

1	Chairperson of the Department	Chairman
2	Senior Most Faculty Counselor	Member
3	Vice- Chancellor's Nominee	Member

**Affiliated Colleges:**

1	Director/Principal	Chairman
2	Head of the Department/Sr. Faculty	Member
3	External Examiner to be appointed by the University	Member

Note: Remuneration will be paid to the external examiner only (at par with the other practical examinations).

Approved by UG BOS & FET

**EE401B****SENSORS AND TRANSDUCERS**

B. Tech Semester –V (AEI, common with 7th Sem.EE, EEE, IC)

L	T	P	Credits
3	1	-	4

Class Work	:	25 Marks
Theory	:	75 Marks
Total	:	100 Marks
Duration of Exam.	:	3 Hrs.

**UNIT I**

Basic concepts of sensors and transducers and their classification, characteristics and choice of transducers, factors influencing the choice of transducers. Resistive transducers, potentiometers, loading effect, construction of potentiometers, materials used for potentiometers. Strain gauges, theory of strain gauges, types of strain gauges, semiconductor strain gauges, Rossetts, Load cells. Thermistors, thermometers, thermocouples and their applications.

**UNIT II**

Variable inductance transducers, Linear Variable Differential Transformer(LVDT), Rotary Variable Differential Transformer(RVDT), Synchros, control type synchro systems, synchros as torque transmitters. Capacitive transducers, transducers using change in area of plates, transducers using change in distance between plates, differential arrangement, variation of dielectric constant for measurement of displacement and liquid level, frequency response of capacitive transducers. Piezoelectric transducers, modes of operation of piezoelectric crystals, properties of piezoelectric crystals, equivalent circuit of piezoelectric transducers, loading effects and frequency response, impulse response of piezoelectric crystals.

**UNIT III**

Hall Effect transducers, photovoltaic cells, photoconductive cells, semiconductor photodiode, phototransistors. Measurement of angular velocity, Electrical tachometers, Electromagnetic tachometer generators, Digital methods, Photoelectric tachometers, stroboscope and stroboscopic methods, Measurement of low pressure using various methods, Measurement of acceleration, flow liquid level and humidity employing different transducers.

**UNIT IV**

Chemical sensors, measurement of pH values, measurement of thermal conductivity. Data acquisition in instrumentation systems, various types of data acquisition systems, method of data transmission, general telemetry system, types of telemetry systems, Landline telemetry and Radio Frequency( R.F.) telemetry. Recent trends in sensor technology, smart sensors, basic building blocks of smart sensors, application of smart sensors.

**Text Books :**

1. A.K.Sawhney, "A Course in Electrical and Electronics Measurement and Instrumentation," Dhanpat Rai & Co.
2. D.V.S.Murti, " Transducers and Instrumentation," PHI.
3. D.Patranabis, " Principles of Electronic Instrumentation," PHI

**Reference Books:**

1. D. Patranabis, "Sensors and Transducers," PHI.
2. D.A.Bell, "Electronic Instrumentation and Measurements," PHI.
3. Rangan, Sharma and Mani, "Instrumentation Devices and Systems," TMH.

**NOTE:**

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.

Approved by UG BOS &amp; FET

**ECE303B**

**ELECTRONICS MEASUREMENT AND INSTRUMENTATION**

B. Tech Semester –V (EL, AEI & 6th Sem. IC)

L	T	P	Credits
3	1	-	4

Class Work	:	25 Marks
Theory	:	75 Marks
Total	:	100 Marks
Duration of Exam.	:	3 Hrs.

**UNIT I**

**Oscilloscope:**

Block diagram, study of various stages in brief, high frequency CRO considerations, Sampling and storage oscilloscope, Measurements of Phase and Frequency (Lissajous Patterns)

**Electronic Instruments:**

DC and AC voltage measurements, DC and AC current measurements, Multimeter, Ohmmeter, Bolometer, Calorimeter, Power meter, Introduction to digital meters

**UNIT II**

**Generation and Analysis of waveforms:**

Block Diagram of pulse generators, signal generators, function generators, wave analyzers, distortion analyzers, spectrum analyzer, Harmonic analyzer, introduction to power analyzer.

**Frequency and Time Measurements:**

Study of Decade Counting Assembly(DCA), frequency measurements, period measurements, universal counters, Introduction to digital meters

**UNIT III**

**Display Devices:**

Nixie Tubes, LED's, LCD's, Discharge Devices

**Recorders:**

Strip charts recorder, single point recorder, UV recorder, Magnetic tape recorder.

**UNIT IV**

**Transducers:**

Classification, Transducers of types: RLC Photocell, thermocouple, etc., Basic schemes of measurements of displacement, velocity, acceleration, strain, pressure, liquid level & temperature.

**Introduction to signal conditioning:**

DC signal conditioning systems, AC signal conditioning systems, Data acquisition and conversion system, characteristics of modern digital data acquisition system, Filter, Settling time, Amplifier Characteristics.

**Text Books :**

1. A course in Electrical and Electronics Measurements and Instrumentation by A.K.Sawhney; Dhanpat Rai & sons

**Reference Books:**

1. Electronics Measurements and Instrumentation Techniques By H. Cooper; PHI
2. Electronics Instrumentation by Kalsi; TMH

**NOTE:**

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.

Approved by UG BOS & FET

**ECE206B****ANALOG ELECTRONICS CIRCUITS**

B. Tech. Semester –V (AEI, common with 4th Sem. BME, EL)

L	T	P	Credits
3	1	-	4

Class Work	:	25 Marks
Theory	:	75 Marks
Total	:	100 Marks
Duration of Exam.	:	3 Hrs.

**UNIT I****MULTISTAGE AMPLIFIER:**

RC Coupled Transistor Amplifier, Lower & Upper Cut off Frequency, Frequency Response curve & Bandwidth, Transformer Coupled Amplifier, Direct Coupled Amplifier, Cascode Amplifier, Darlington Pair Amplifier, Distortion In Amplifiers.

**FEEDBACK AMPLIFIERS:**

Feedback concept , Transfer Gain with Feedback, General Characteristics of Negative Feedback, Advantages & disadvantages, Input And Output Resistance, Voltage Series Feedback topology, Voltage Shunt, Current Series & Current Shunt topology ,Equivalent circuit for each topology, Effects of Negative Feedback.

**UNIT II****OSILLATORS:**

Introduction, Barkhausen Criterion, Oscillator with RC Feedback circuit (RC Phase Shift, Wien Bridge), Tuned Collector, Tuned Base Oscillator, LC Feedback circuits (Hartley, Colpitts), Condition for Sustained Oscillations & Frequency of Oscillations, Crystal Oscillator.

**POWER AMPLIFIER:**

Definition, Application & Types of Power Amplifiers, Amplifier Classes of Efficiency (Class - A, B, AB, C), Push Pull Amplifiers, Distortion in Simple & Push Pull Amplifier, Complementary Push Pull Amplifier, Integrated Circuit Power Amplifier , Introduction to MOSFET & CLASS D Power Amplifier.

**UNIT III****VOLTAGE REGULATORS:**

Voltage Regulation, Basic Series Regulators, Basic Shunt Regulators, Power Supply Parameters, Basic Switching Regulators, Step up Configuration, Step down Configuration, IC Voltage Regulator, SMPS.

**SWITCHING CIRCUIT:**

Switching action & Characteristics of a Transistor, Switching Times in Transistor, Multivibrators, Astable Multivibrator, Monostable Multivibrator, Bistable Multivibrator, 555 Timer, Monostable & Astable Operation with 555 Timer.

**UNIT IV****A/D CONVERTERS:**

Basic Principle of DAC & ADC, Types of DAC Circuits: Resistor Divider, R/2R Ladder network, Types of ADC circuits: Parallel Comparator, Counter type, Successive approximation & Dual Slope, Specifications.

**SPECIAL SEMICONDUCTOR DEVICES:**

Optoelectronic Devices, Photoconductors, Photo Diode, Photo Transistor, Photo Voltaic Sensor, Photo Emission, LED, LCD, Laser Diode, Schottky Diode, SCR, TRIAC, DIAC, UJT, Single Electron Transistor. Infrared LEDs, IGBT, Opto Coupler.

**Reference Books:**

- |    |                              |   |
|----|------------------------------|---|
| 1. | Electronics Device & Circuit | By David.A. Bell - Oxford University Press.                       |
| 2. | Electronics Device & Circuit | By Theodore F. Bogart, Jeffrey.S.Bealey,Guillermo Rico - Pearson. |
| 3. | Electronics Device & Circuit | By Robert Boylestad ,Louis Nashelsky.                             |
| 4. | Electronics Device           | By Floyd , Pearson.   |
| 5. | Integrated Electronics       | By Millman Halkias - TMH.   |
| 6. | Electronics Device & Circuit | By Sanjeev Gupta.   |
| 7. | Electronics Device & Circuit | By I. J. Nagrath - PHI  |
| 8. | Electronic Principles        | By Albert Malvino.  |

**NOTE:**

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.

Approved by UG BOS &amp; FET

## CSE210B

## COMPUTER ARCHITECTURE & ORGANIZATION

B. Tech. Semester – V (AEI, common with 4<sup>TH</sup> Sem. CSE, EL)

L T P Credits  
3 1 - 4

Class Work : 25 Marks  
Theory : 75 Marks  
Total : 100 Marks  
Duration of Exam. : 3 Hrs.

### UNIT I

#### General System Architecture:

Classification of computers ( Based on Computation methodology(Analog, digital, hybrid), based on generations, based on size & capability, based on Flynn's criteria); Multilevel viewpoint of a machine: digital logic, micro architecture, ISA, operating systems, high level language ; Register Transfer language; Computer Buses ( basic design using multiplexers), Bus width, Bus clocking( synchronous , asynchronous), bus arbitration, Bus examples( ISA bus, PCI bus, Universal serial bus) ; Computer Arithmetic ,Addition , subtraction ( signed magnitude , signed 2's complement , Multiplication ( Booth's algorithm).

### UNIT II

#### CPU Organization:

CPU Architecture types (accumulator, register, stack, memory/ register) Instruction cycle (Fetch-Decode-Execute); Instruction set based classification of processors (RISC, CISC, and their comparison); Addressing modes(register, immediate, direct, indirect, indexed); Operations in the instruction set; Arithmetic and Logical, Data Transfer, Control Flow; Instruction set formats (fixed, variable, hybrid) .

### UNIT III

#### Input /Output & Control Unit:

Input Output Interface , Asynchronous data transfer ( Strobe control, handshaking , serial transfer); Serial Vs parallel data transmission;Modes of data transfer( Programmed I/O, Interrupt driven, Direct Memory access ( DMA)).

Control Unit design:- Control unit design methods ( hardwired & microprogrammed ) Control Memory, Address Sequencing, Micro instructions.

### UNIT IV

#### Memory Organization:

Memory device characteristics(access/ cycle time, cost per bit, volatility , storage density) ;Memory hierarchy ;Main memory Design (Semiconductor RAM & ROM organization, memory expansion, Static & dynamic memory types , their comparison); Associative memory Design ,Match logic ,Locality of reference principle( Temporal & Spatial),Cache mapping( Direct , associative , set associative ); Cache writing policies ( Copy-Back , Write-through); Virtual Memory( Address space , memory space , Address mapping using pages , Page replacement).

#### Text Books:

1. Computer System Architecture by M. Mano, Prentice-Hall.
2. Structured Computer Organisation by A.S. Tanenbaum, 6th edition, Prentice-Hall of India, Eastern Economic Edition

#### Reference Books:

1. Computer Organization, 5th Edi, by Carl Hamacher, Zvonko Vranesic,2002, SafwatZaky.
2. Computer Organization and Design, 2nd Ed., by David A. Patterson and John L. Hennessy, Morgan 1997, Kauffmann.
3. Computer Architecture and Organization, 3rd Edi, by John P. Hayes, 1998, TMH
4. Computer Organisation& Architecture: Designing for performance by W. Stallings, 4th edition, 1996, Prentice-Hall International edition.

#### Note:

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.

Approved by UG BOS & FET

**EE312B**

**CONTROL SYSTEM ENGINEERING**

B.Tech. Semester-V (AEI, common with 6th Sem. EL, BME)

L	T	P	Credits
3	1	-	4

Class Work	:	25Marks
Theory	:	75Marks
Total	:	100Marks
Duration of Exam.	:	3 Hrs.

**UNIT1**

**INPUT / OUTPUT RELATIONSHIP:**

System / Plant model, illustrative examples of plants & their inputs and outputs, open loop & closed loop control system & their illustrative examples, Mathematical modeling and representation of physical systems, Concept of transfer function, relationship between transfer function and impulse response, order of a system, block diagram algebra, signal flow graphs: Mason's gain formula & its application, characteristic equation, derivation of transfer functions of electrical and electromechanical systems.

**UNIT 2**

**TIME DOMAIN ANALYSIS:**

Typical test signals, time response of first order systems to various standard inputs, time response of 2nd order system to step input, time domain specifications, steady state error and error constants, concept of stability, pole-zero configuration and stability, necessary and sufficient conditions for stability, Hurwitz stability criterion, Routh stability criterion and relative stability. Root locus concept, development of root loci for various systems, stability considerations.

**UNIT3**

**FREQUENCY DOMAIN ANALYSIS:**

Relationship between frequency response and time-response for 2nd order system, polar, Nyquist, Bode plots, stability, Gain-margin and Phase Margin, relative stability, frequency response specifications.

**UNIT4**

**COMPENSATION:**

Necessity of compensation, compensation networks, application of lag and lead compensation, basic modes of feedback control, proportional, integral and derivative controllers.

**CONTROL COMPONENTS:**

Synchros, servomotors, stepper motors, magnetic amplifier.

**TEXT BOOK:**

1. Control System Engineering: I.J. Nagrath & M. Gopal; New Age Publishers.

**REFERENCE BOOKS:**

1. Automatic Control Systems: B.C. Kuo, PHI. Publishers.
2. Modern Control Engg: K. Ogata; PHI. Publishers.
3. Control Systems - Principles & Design: Madan Gopal; Tata Mc Graw Hill. Publishers.
4. Modern Control Engineering, R.C. Dorf & Bishop; Addison-Wesley Publishers.

**NOTE:**

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.

Approved by UG BOS & FET

**ECE309B****MICROPROCESSOR AND INTERFACING**

B. Tech Semester –V (BME, CSE, EL, AEI)

L	T	P	Credits
3	1	-	4

Class Work	:	25 Marks
Theory	:	75 Marks
Total	:	100 Marks
Duration of Exam.	:	3 Hrs.

**UNIT I****THE 8086 MICROPROCESSOR ARCHITECTURE:**

Architecture, block diagram of 8086, details of sub-blocks such as EU, BIU; memory segmentation and physical address computations, program relocation, addressing modes, instruction formats, pin diagram and description of various signals.

**INSTRUCTION SET OF 8086 & PROGRAMMING:**

Instruction execution timing, assembler instruction format, data transfer instructions, arithmetic instructions, branch instructions, looping instructions, NOP and HLT instructions, flag manipulation instructions, logical instructions, shift and rotate instructions, directives and operators, programming examples.

**UNIT II****THE X86 FAMILY (80186, 80286, 80386, 80486) MICROPROCESSOR ARCHITECTURE AND PROGRAMMING:**

Architecture, block diagram, details of sub-blocks, hardware features and description of various signals, interrupts, multitasking, addressing modes, instruction set and programming example.

**THE PENTIUM PROCESSOR AND OTHER ADVANCED PROCESSORS:**

Enhanced features of Pentium, Pentium Pro, Pentium-II, Pentium-III, Pentium-IV, Multi-core Technology, Mobile Processor.

**UNIT III****INTERFACING DEVICE:**

The 8255 PPI chip: Architecture, control words, modes and examples..

**PERIPHERAL DEVICES:**

Introduction to DMA process, 8237 DMA controller, 8259 Programmable interrupt controller, Programmable interval timer chips.

**UNIT IV****COMMUNICATION INTERFACE:**

Parallel interface, serial interface, PCI interface, PCMCIA, USB interface.

**PERSONAL COMPUTER:**

Modern PC, motherboard, chipset, expansion buses, memory-SIMM and DIMM.

**Reference Books:**

1. "The Intel Microprocessors 8086- Pentium Processor", Brey, 4<sup>th</sup> Edition, 2005.
2. "Microprocessors and interfacing", D. V. Hall, Tata McGraw-Hill, 2<sup>nd</sup> Edition, 2006.
3. "Microcomputer Systems: The 8086/8088 Family: Architecture, Programming and Design", Liu Yu-Chang and Gibson Glenn A., Prentice Hall of India, 2003.
4. "Advanced Microprocessors and Peripherals Architectures, Programming and Interfacing", Ray A. K. and Burchandi, Tata McGraw Hill, 2002.
5. "Microprocessor based System Design UBS", Rafiquzzman, Wiley-Interscience, 5<sup>th</sup> Edition, 2005.
6. "The X86 PC: Assembly Language, Design and interfacing", M. A. Mazidi, J. P. Maizidi and Danny Causey, Pearson, 5<sup>th</sup> Edition, 2011.
7. "The X86 Microprocessor (Architecture, Programming and Interfacing)", L. B. Das, Pearson, 2010.
8. "Advanced Microprocessor", Daniel Tabak, Tata McGraw-Hill, 2<sup>nd</sup> Edition, 2012.
9. "Fundamentals of Microprocessor and Microcomputers", B. Ram, Dhanpat Rai Publications, 5<sup>th</sup> edition, 2008.
10. "Microprocessor & Interfacing", Singh & Singh, Satya Parakashan.

**NOTE:**

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.

Approved by UG BOS &amp; FET

**ECE323B**

**ELECTRONICS MEASUREMENT AND INSTRUMENTATION LAB**

B. Tech Semester –V (EL, AEI, common with 6th Sem. IC)

L	T	P	Credits
-	-	2	1

Class Work	:	20 Marks
Practical	:	30 Marks
Total	:	50 Marks
Duration of Exam.	:	3 Hrs.

**LIST OF EXPERIMENTS:**

1. Speed measurement of DC Motor with the help of Magnetic Pick-up.
2. To measure temperature using thermocouple.
3. To measure temperature using Thermister
4. To measure temperature using RTD
5. To measure displacement using LDR.
6. To measure displacement using L.V.D
7. To measure Pressure using Pressure Transducer.
8. To measure Frequency & Time period of given wave form using frequency Meter
9. To study the operation of Spectrum Analyzer.
10. To measure phase & frequency of a given wave-form using Lissajous patterns
11. To measure weight using Strain Gauge
12. To measure displacement using Inductive and Capacitive Pick-up.

**Note:-**

- 1 Total ten experiments are to be performed in the semester.
- 2 At least seven experiments should be performed from the above list. Remaining three experiments should be performed as designed and set by the concerned institution as per the scope of the syllabus.

Approved by UG BOS & FET



**EE332B**

**CONTROL SYSTEM ENGINEERING LAB**  
B.Tech. Semester-V (AEI, common with 6th Sem. EL)

L T P Credits  
- - 2 1

Class Work : 20Marks  
Practical : 30Marks  
Total : 50Marks  
Duration of Exam. : 3 Hrs.

**LIST OF EXPERIMENTS:**

1. To study A.C. servo motor and to plot its torque-speed characteristics.
2. To study D.C. servo motor and to plot its torque speed characteristics.
3. To study the magnetic amplifier and to plot its load current v/s control current characteristics for:  
(a) series connected mode  
(b) parallel connected mode.
4. To plot the load current v/s control current characteristics for self excited mode of the magnetic amplifier.
5. To study the synchro & to:  
(a) Use the synchro pair (synchro transmitter & control transformer) as an error detector.  
(b) Plot stator voltage v/s rotor angle for synchro transmitter i.e. to use the synchro transmitter as position transducer.
6. To use the synchro pair (synchro transmitter & synchro motor) as a torque transmitter.
7. (a) To demonstrate simple motor-driven closed-loop position control system.  
(b) To study and demonstrate simple closed-loop speed control system.
8. To study the lead, lag, lead-lag compensators and to draw their magnitude and phase plots.
9. To study a stepper motor & to execute microprocessor or computer-based control of the same by changing number of steps, direction of rotation & speed.
10. To implement a PID controller for level control of a pilot plant.
11. To implement a PID controller for temperature control of a pilot plant.
12. To study the MATLAB package for simulation of control system design.

**Note:-**

- 1 Total ten experiments are to be performed in the semester.
- 2 At least seven experiments should be performed from the above list. Remaining three experiments should be performed as designed and set by the concerned institution as per the scope of the syllabus.

Approved by UG BOS & FET

**ECE226B**

**ANALOG ELECTRONICS CIRCUITS LAB**  
B. Tech. Semester –V (AEI, common with 4th Sem. BME, EL)

L	T	P	Credits
-	-	2	1

Class Work	:	20 Marks
Practical	:	30 Marks
Total	:	50 Marks
Duration of Exam.	:	3 Hrs.

**LIST OF EXPERIMENTS:**

- 1 To Study frequency response of RC coupled amplifier.
- 2 To Study different types of feedback topology.
- 3 To Study RC phase shift oscillator.
- 4 To study wein bridge oscillator.
- 5 To Study three terminal IC voltage regulator.
- 6 To draw characteristics of a transistor.
- 7 To study CE amplifier and calculate its gain.
- 8 To study 555 timer as a square wave generator.
- 9 To study SMPS power supply.
- 10 To study characteristics of SCR.
- 11 To study characteristics of DIAC.
- 12 To study UJT as a relaxation oscillator.

**Note:-**

- 1 Total ten experiments are to be performed in the semester.
- 2 At least seven experiments should be performed from the above list. Remaining three experiments should be performed as designed and set by the concerned institution as per the scope of the syllabus.

Approved by UG BOS & FET

**ECE329B**

**MICROPROCESSOR AND INTERFACING LAB**

B. Tech Semester –V (BME, CSE, EL, AEI)

L	T	P	Credits
-	-	2	1

Class Work	:	20 Marks
Practical	:	30 Marks
Total	:	50 Marks
Duration of Exam.	:	3 Hrs.

**LIST OF EXPERIMENTS:**

1. To study the architecture of 8086 microprocessor and 8086 microprocessor kit
2. Write a program to add the contents of the memory location 3000:0400 H to the content of 4000:0700 H and store the result in 6000:0900 H
3. Write a program to add 16 bit number using 8086 instruction set.
4. Write a multiplication of two 16 bit number using 8086 instruction set.
5. Write a program for division of two 16 bit numbers using 8086 instruction set.
6. Write a program factorial of a number.
7. Write a Program to transfer a block of data without overlap.
8. Write a Program to transfer a block of data with overlap.
9. Write a program to find the average of two numbers.
10. Write a Program to check whether data byte is odd or even
11. Write a program to find maximum number in the array of 10 numbers.
12. Write a program to find the sum of the first 'n' integers.
13. Write a program to generate a square wave.
14. Write a program to generate a rectangular wave.
15. Write a program to generate a triangular wave.

**Note:-**

- 1 Total ten experiments are to be performed in the semester.
- 2 At least seven experiments should be performed from the above list. Remaining three experiments should be performed as designed and set by the concerned institution as per the scope of the syllabus.

Approved by UG BOS & FET

**AEI335B**

**PROFESSIONAL TRAINING-I**

B. Tech Semester –V

L	T	P	Credits
-	-	2	2

Class Work	:	50Marks
Practical	:	-
Total	:	50Marks
Duration of Exam.	:	-

At the end of 4th semester each student would undergo four weeks Professional Training in an Industry/ Institute/ Professional Organization/ Research Laboratory etc. with the prior approval of the Training and Placement Officer of the University and submit in the department a typed report along with a certificate from the organization.

The typed report should be in a prescribed format.

The report will be evaluated in the V Semester by a Committee consisting of three teachers from different specialization to be constituted by the Chairperson of the department. The basis of evaluation will primarily be the knowledge and exposure of the student towards different processes and the functioning of the organization.

The student will interact with the committee through presentation to demonstrate his/her learning.

Teachers associated with evaluation work will be assigned 2 periods per week load.

**HUM302B**

**REPORT WRITING SKILLS**  
B. Tech. Semester – VI (Common for all branches)

L	T	P	Credits
1	-	-	1

Class Work	:	25 Marks
Theory	:	50 Marks
Total	:	75 Marks
Duration of Exam.	:	2Hrs.

**UNIT I**

**Report Writing:**

Reports: meaning, their importance and types, Structure of reports, Formats of reports, Use of illustrations

**UNIT II**

**Writing of Business and Technical Reports:**

Preliminary steps and procedure of writing report, writing various types of reports on technical, business related topics.

**Recommended Reading:**

1. Borowick, Jerome. N. Technical Communication and its Applications. New Delhi: PHI, 2000.
2. Guffey, Mary Ellen. Business Communication: Process & Product. USA: South western College Publishing, 2000.
3. Kumar, Sanjay and Pushp Lata. Communication Skills. Delhi: OUP, 2011.

**SCHEME OF END-TERM EXAMINATION (MAJOR TEST) AND INSTRUCTIONS FOR EXAMINER**

**Theory**

1. The duration of the exam will 2 hours.
2. The Question Paper for this theory course shall have three questions in all covering both the units. All will be compulsory with internal choice.
3. Question no. 1 will be of 10 marks. The question may have two/three parts with enough internal choice, covering various components of both the Units.
4. Question no 2 with internal choice will be of 10 marks covering contents of the Unit I. It will be theoretical in nature.
5. Question no 3 will have two parts of 15 marks each. The student will be asked to write reports on business and technical subject/ issue covering contents of Unit II. The emphasis would be on testing the actual report writing on a given business and technical situation/ subject in letter format.

**EE426B**

**COMPUTER BASED INSTRUMENTATION AND CONTROL**

B. Tech. Semester –VI

L	T	P	Credits
4	-	-	4

Class Work	:	25 Marks
Theory	:	75 Marks
Total	:	100 Marks
Duration of Exam.	:	3 Hrs.

**UNIT I**

**INTRODUCTION:**

Necessity and functions of computers. Level of automation and economy of computer control, Centralized computer control Vs distributed computer control.

**COMPUTER ARCHITECTURE:**

Micro and mini computer, functional models of I.O. system.

**UNIT II**

**INTERFACING:**

Sampling; Multiplexing; A/D and D/A converters, interfacing with different types of transducers - Analog / Digital, Electrical and non electrical selection of sensors; Micro computer interfacing standard buses Serial buses; Serial data communication protocols.

**UNIT III**

**STRUCTURAL STUDY OF AUTOMATIC PROCESS CONTROL:**

Fundamental of automatic process control, building block of automatic system, direct and distributed digital control system. Programmable controllers.

**UNIT IV**

**PERSONAL COMPUTER IN REAL LIFE ENVIRONMENT:**

Introduction, personal computer: system and facility, PC bus and signals, interrupts, interfacing PC with outer world, PC in RTE, Real time application of IBM PC, PC based distributed control system.

**PROGRAMMING AND APPLICATION:**

Modeling and simulation for plant automation, PLC Architecture and programming of PLC, industrial control application: cement plant, thermal power plant , water treatment plant, steel plant.

**Text Books :**

1. Computer based industrial control: Krishan Kant,; PHI

**NOTE:**

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.

Approved by UG BOS & FET

## ECE210B

## COMMUNICATION SYSTEMS

B. Tech. Semester –VI (AEI, Common with 4th Sem. EL, 3rd Sem. CSE)

L	T	P	Credits
3	1	-	4

Class Work	:	25 Marks
Theory	:	75 Marks
Total	:	100 Marks
Duration of Exam.	:	3 Hrs.

### UNIT I

#### INTRODUCTION TO COMMUNICATION SYSTEM:

Modulation, Demodulation, Radio Frequency Spectrum, Signals & their classification, Limitations & Advantages of a Communication System, Comparison of Analog & Digital Communication Systems, Historical Perspective, Modes & Medias of Communication.

#### NOISE:

Sources of Noise, External & Internal Noise, Noise Calculations, Noise Figure, Noise Figure Calculation, Noise Temperature, Noise in Communication Systems, Band Pass Noise Model, Cascaded Stages & its Noise Figure Calculation, Signal in presence of Noise, Pre-Emphasis & De-Emphasis, Noise Quieting Effect, Capture Effect, Noise in Modulation Systems.

### UNIT II

#### LINEAR MODULATION:

(AM) Basic definition & derivation for Modulation & Modulation Index, Modulation & Demodulation of AM, Suppressed Carrier Modulation, Quadrature Amplitude Modulation, SSB-SC, DSB-SC, VSB Modulation & Demodulation, Comparison of various AM Systems, Generation of AM waves.

#### ANGLE MODULATION:

Basic definition & derivation for Modulation & Modulation Index, Generation of FM waves, Comparison between PM & FM, Frequency Spectrum of FM, B.W. & required spectra, Types of FM, vector representation of FM, Universal Curve, Multiple FM, Demodulation of FM waves, Demodulation of PM waves, Comparison between AM & FM.

### UNIT III

#### TRANSMITTERS & RECEIVERS:

Classification of Radio Transmitters, Basic Block Diagram of Radio Transmitter, Effect of Feedback on operation of Transmitter, Radio Telephone Transmitters, Privacy Device in Radio Telephony, FM Transmitter using Reactance Modulator, Armstrong FM Transmitter, Radio Receivers, Classification, TRF Receiver, Super Heterodyne Receiver, Image Rejection & Double Spotting, Choice of IF, Tracking & Alignment of Receivers, AGC.

#### PROBABILITY THEORY & RANDOM PROCESSES:

Probability, Properties, Conditional Probability, Random Variables, CDF, PDF, Uniform Distribution, Random or Stochastic Process, Ergodic Process, PSD, Properties of PSD, Correlation Function.

### UNIT IV

#### PULSE ANALOG MODULATION:

Sampling theory, TDM, FDM, PAM, PWM, PPM, Modulation & Demodulation techniques of above all.

#### PULSE DIGITAL MODULATION:

Elements of Pulse Code Modulation, Noise in PCM Systems, Bandwidth of PCM Systems, Measure of Information, Channel Capacity, Channel Capacity of PCM System, Differential Pulse Code Modulation (DPCM). Delta Modulation (DM)

#### Reference Books:

- |                                      |                                      |
|--------------------------------------|--------------------------------------|
| 1. Communication Systems,            | By Manoj Duhan – I. K. International |
| 2. Electronic Communication Systems, | By Kennedy – TMH                     |
| 3. Communication Systems,            | By Singh & Sapre – TMH               |
| 4. Electronic Communication,         | By Roody Coolen – Pearson            |
| 5. Analog Communication,             | By P. Chakarbarti – DR & Co.         |
| 6. Communication Systems,            | By Simon Haykins – Wiley             |

#### NOTE:

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.

Approved by UG BOS & FET

## ECE308B

## MICROELECTRONICS B. Tech Semester –VI (EL, AEI)

L T P Credits  
3 1 - 4

Class Work : 25 Marks  
Theory : 75 Marks  
Total : 100 Marks  
Duration of Exam. : 3 Hrs.

### UNIT I

#### CRYSTAL GROWTH AND WAFER PREPARATION:

Clean room concept, safety requirements, crystal growth techniques: czochralski and gradient freeze techniques, physics involved in CZ growth, Energy flow balance, pull rate- considerations, problems and solutions , defects involved in CZ method, effects due to carbon and oxygen impurities, modeling of dopant incorporation, float zone growth for high purity silicon, liquid encapsulated growth for GaAs, material characterization- wafer shaping, crystal characterization, wafer cleaning.

#### CURRENT ELEMENT CHARACTERISTICS:

Growth mechanism and kinetic oxidation, thin oxides, oxidation techniques and systems, oxide properties, characterization of oxide films, growth and properties of dry and wet oxidation, charge distribution during oxidation, oxide characterization, anomalies with thin oxide regime.

### UNIT II

#### DIFFUSION:

The nature of diffusion, diffusion mechanisms – interstitial, substitution, interstitial-substitution combined, interstitialcy and grain boundary, Fick's law of diffusion, limited and constant source diffusion, models of diffusion in solid, diffusion equation, atomic diffusion mechanisms, diffusion system for silicon and gallium arsenide. Measurement techniques, experimental analysis of diffused profiles.

#### ION IMPLANTATION:

Introduction, physics of implantation, range theory, projected range, ion stopping mechanisms- channeling, nuclear stopping, electronic stopping, implantation damage, implantation equipment, annealing, shallow junction, application to silicon and gallium arsenide, RTA mechanism.

### UNIT III

#### LITHOGRAPHY:

Pattern generation and mask making, exposure sources, photolithography, photoresists, optical lithography, electron lithography, X-ray lithography, ion lithography, mask defects, atomic force microscopy based lithography system, dip pen lithography system.

#### DEPOSITION:

Need for film deposition, film deposition methods- physical and chemical, deposition processes, CVD techniques for deposition of polysilicon, silicon dioxide, silicon nitride and metal films, sputter deposition, sputter unit, Epitaxy –types, techniques, advantages, vapor phase epitaxy, molecular beam epitaxy.

### UNIT IV

#### ETCHING:

Directionality and selectivity issues, wet chemical etching, wet etchants, dry physical etching, dry etchants, plasma etching, advantages and disadvantages, issues involved, dry etching systems, dry chemical etching, reactive ion etching, etching induced damage, cleaning.

#### METALLIZATION:

Introduction, metallization applications, metallization choices, physical vapor deposition, patterning, metallization problems.

#### Text Books :

1. S.M.Sze, "VLSI Technology" TMH
2. S.K.Gandhi, "VLSI Fabrication Principles"

#### Reference Books:

1. S.M.Sze, "Semiconductor Devices Physics and Technology"
2. K.R.Botkar, "Integrated Circuits".

#### NOTE:

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks



**ECE410B**

**BIOMEDICAL ELECTRONICS**  
B. Tech Semester –VI

L T P Credits  
4 - - 4

Class Work : 25 Marks  
Theory : 75 Marks  
Total : 100 Marks  
Duration of Exam. : 3 Hrs.

**UNIT I**

**Electrodes, Sensors and Transducers:**

Signal Acquisition, Transduction, Active v/s Passive sensors, Sensor error sources, sensor terminology, signal processing, electrodes for biophysical sensing, medical surface electrodes, microelectrodes, different types of transducers.

**Electrocardiography:**

Generation of electric currents in heart, ECG waveform, standard lead system, ECG preamplifier, ECG readout devices, ECG machines, ECG machine maintenance, faults and troubleshooting.

**UNIT II**

**Cardio vascular measurements and Devices:**

Physiological pressure measurements, B.P. measurements, Oscillometric and Ultrasonic non-invasive pressure measurements, pressure transducers, pressure amplifiers, calibrations methods, detector circuits, dilution methods, blood flow measurements. Introduction to plethysmography, phonocardiograph, defibrillators, pacemakers, heart lung machine.

**Respiratory system measurements and Devices:**

Human respiratory system, gas laws, internal respiration, external respiration, mechanics of breathing, parameters and regulations of respiration, respiratory transducers, medical gases, introduction to spirometer and artificial ventilators.

**UNIT III**

**Nervous system measurements and Devices:**

Organization of Human nervous system, cerebral angiography, cranial X-rays, brain scans, system preamplifier and specifications of EEG, EEG electrodes, EEG telemetry system, typical EEG system artifacts, faults, trouble shooting and maintenance.

**ICUs, CCUs and Operating Rooms (Ors):**

ICU/CCU equipments, Bedside monitors, central monitoring consoles, ECG and physiological telemetry, types of surgery, OR personal, sterilization, OR equipments.

**UNIT IV**

**Medical Laboratory Instrumentation:**

Blood tests, Colorimeter, flame photometer, spectrophotometer, blood cell counters, pH and blood gas analyzers, auto analyzer, dialysis machine, Electrical safety precautions, typical faults.

**Medical Imaging Equipments:**

Basic Principles and working of various medical imaging modality: X-ray, CT Scan, MRI, PET Scan, Ultrasonography, color Doppler, Echocardiography, nuclear medical imaging.

**Reference Books:**

1. Introduction to Biomedical Equipments Technology by Carr & Brown, Pearson Education.
2. Biomedical Instrumentation and measurements by Cromwell et al, Pearson Education.
3. Handbook of Biomedical Instrumentation by Khandpur, Tata McGraw Hill.

**NOTE:**

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.

Approved by UG BOS & FET

**ECE208B****POWER ELECTRONICS**B. Tech. Semester –VI (AEI, common with 4<sup>TH</sup> Sem. EL)

L	T	P	Credits
3	1	-	4

Class Work	:	25 Marks
Theory	:	75 Marks
Total	:	100 Marks
Duration of Exam.	:	3 Hrs.

**UNIT I****Power Semiconductor Diodes and Transistors:**

Characteristics of Power Diodes, Types of Power Diodes, Power Transistors, Power MOSFET, Insulated Gate Bipolar Transistors (IGBT), MOS Controlled Thyristors.

**Thyristors:**

Terminal Characteristics of Thyristors, Thyristor Turn ON Methods, Switching Characteristics of Thyristors, Thyristors Gate Characteristics, Two Transistor Model of a Thyristor, Thyristor Ratings, Thyristors Protection, Heating Cooling and Mounting of Thyristors, Series and Parallel Operation of Thyristors, Programmable Unijunction Transistors(PUT), Silicon Unilateral Switch(SUS), Silicon Controlled Switch(SCS), Light Activated Thyristors, Static Induction Thyristors, Diac, Triac, Asymmetric Thyristors, Reverse Conducting Thyristors, Firing Circuits for Thyristors, Pulse Transformer in Firing Circuits, Triac Firing Circuit

**UNIT II****Thyristors Commutation Techniques:**

Class A Commutation (Load Commutation), Class B Commutation (Resonant Pulse Commutation), Class C Commutation (Complementary Commutation), Class D Commutation (Impulse Commutation), Class E Commutation (External Pulse Commutation), Class F Commutation (Line Commutation)

**Phase Controlled Rectifier:**

Principle of Phase Control, Full Wave Controlled Converters, Single Phase Full Wave Converter, Single Phase Two Pulse Converter with Discontinuous Load Current, Three Phase Converter Systems Using Diodes, Three Phase Thyristor Converter Circuits, Effect of Source Impedance on Performance of Converter, Dual Converters.

**UNIT III****Choppers:**

Principle of Chopper Operation, Control Strategies, Step Up Choppers, Types of Chopper Circuits, Steady State Time Domain Analysis of Type A Chopper, Thyristor Chopper Circuits, Multiphase Choppers.

**Inverters:**

Single Phase Voltage Source Inverter: Operating Principle, Force Commutated Thyristor Inverters, Three Phase Bridge Inverter, Voltage Control in Single Phase Inverter, Pulse Width Modulated Inverter, Reduction of Harmonics in the Inverter Output Voltage, Current Source Inverters, Series Inverters, Single Phase Parallel Inverter.

**UNIT IV****AC Voltage Controller and Cycloconverters:**

Types of AC Voltage Controller, Integral Cycle Control, Single Phase Voltage Controllers, Sequence Control of AC Voltage Controller. Principle of Cycloconverter Operation, Three Phase Half Wave Cycloconverter, Output Voltage Equation for Cycloconverter, Load Commutated Cycloconverter.

**Applications:**

Switched Mode Power Supply(SMPS), Uninterruptible Power Supplies, High Voltage DC Transmission, Static Switches, Static Circuit Breakers, Solid State Relays.

**Text Books:**

1. P.S Bimbhra : Power Electronics, Khanna Publisher
2. Muhamed H.Rashid : Power Electronics Circuits, Devices and Applications, PHI.
3. Singh And Kanchandani : Power Electronics, TMH.1.

**Reference Books:**

1. Sen : Power Electronics, TMH .
2. Dubey : Thyristorised Power Controllers, Wiley Eastern .
3. Vithayathil : Power Electronics – Principles And Applications, McGraw-Hill.
4. Lander : Power Electronics, McGraw-Hill.

**NOTE:**

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.

Approved by UG BOS & FET

## ECE306B

## HDL BASED SYSTEM DESIGN B. Tech Semester –VI (EL, AEI)

L T P Credits  
3 1 - 4

Class Work : 25 Marks  
Theory : 75 Marks  
Total : 100 Marks  
Duration of Exam. : 3 Hrs.

### UNIT I

#### INTRODUCTION:

System: definition, introduction to digital system, design issues of digital system, computer-aided design tools for designing of digital systems, hardware description languages, simulation and synthesis.

#### HARDWARE FOR DIGITAL SYSTEM DESIGN:

PLA, PAL, ROM, CPLDs and FPGA.

### UNIT II

#### VHDL BASICS:

Introduction to VHDL, entity and architecture declaration, data objects, classes and data types, operators, overloading, logical operators, types of delays, behavioural, dataflow and structural models.

#### VHDL STATEMENTS:

Assignment statements; sequential statements and process; conditional statements; Generate statement; case statement, array and loops, resolution functions, concurrent statements.

### UNIT III

#### ADVANCE VHDL TOPICS:

Packages and libraries; subprograms: application of functions and procedures, structural modelling, component declaration, structural layout and generics, configuration statement, Test Benches, ALIAS, Generate statement.

#### COMBINATIONAL CIRCUIT DESIGN:

VHDL models and simulation of combinational circuits such as multiplexers, demultiplexers, encoders, decoders, code converters, comparators, implementation of boolean functions etc.

### UNIT IV

#### SEQUENTIAL CIRCUITS DESIGN:

VHDL models and simulation of sequential circuits flip flops, shift registers, counters etc., introduction to FSM, VHDL models and simulation of FSM.

#### DESIGN OF DIGITAL SYSTEM:

Basic components of a computer, specifications, architecture of a simple computer system, design of ALU, memory unit, design implementation using CPLDs and FPGAs.

#### Reference Books:

1. "IEEE Standard VHDL Language Reference Manual (1993)".
2. "Digital design", Ashenden, Elsevier.
3. "Digital Design and Modelling with VHDL and Synthesis", K. C. Chang; IEEE Computer Society Press.
4. "A VHDL Primer", J. Bhasker, Prentice Hall 1995.
5. "Digital System Design using VHDL", Charles. H. Roth, PWS (1998).
6. "VHDL-Analysis & Modelling of Digital Systems", Z. Navabi, McGraw Hill.
7. "VHDL", Perry, TMH (2002).
8. "Introduction to Digital Systems", Ercegovac. Lang & Moreno, John Wiley (1999).
9. "Fundamentals of Digital Logic with VHDL", Brown and Vranesic; TMH (2000)
10. "Modern Digital Electronics", R. P. Jain, TMH (2003).
11. "Digital system Design using FPGA & CPLD'S", Grout, Elsevier.
12. "VHDL SHORT", Pearson.
13. "VHDL", Kaur, Pearson.

#### NOTE:

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.

**ECE326B**

**HDL BASED SYSTEM DESIGN LAB**  
B. Tech Semester –VI (EL, AEI)

L T P Credits  
- - 2 1

Class Work : 20 Marks  
Practical : 30 Marks  
Total : 50 Marks  
Duration of Exam. : 3 Hrs.

**LIST OF EXPERIMENTS:**

1. Design all Basic gates using HDL.
2. Design Universal gates using HDL.
3. Write VHDL programs for half adder and full adder circuits, check the wave forms and the hardware generated.
4. Write VHDL programs for multiplexer & demultiplexer circuits, check the wave forms and the hardware generated.
5. Write VHDL programs for the following circuits, check the wave forms and the hardware generated
  - a. decoder
  - b. encode
6. Write a VHDL program for a comparator and check the wave forms and the hardware generated
7. Write a VHDL program for a code converter and check the wave forms and the hardware generated
8. Write a VHDL program for a FLIP-FLOP and check the wave forms and the hardware generated
9. Write a VHDL program for a counter and check the wave forms and the hardware generated
10. Write VHDL programs for the following circuits, check the wave forms and the hardware generated
  - (a) Register
  - (b) Shift register
11. Implement any three (given above) on FPGA kit.
12. Implement any three (given above) on CPLD kit.

**Note:-**

- 1 Total ten experiments are to be performed in the semester.
- 2 At least seven experiments should be performed from the above list. Remaining three experiments should be performed as designed and set by the concerned institution as per the scope of the syllabus.

Approved by UG BOS & FET

**ECE230B**

**COMMUNICATION SYSTEMS LAB**  
B. Tech. Semester –VI (AEI, Common with 4<sup>th</sup> Sem. EL)

L T P Credits  
- - 2 1

Class Work : 20Marks  
Practical : 30Marks  
Total : 50Marks  
Duration of Exam. : 3 Hrs.

**LIST OF EXPERIMENTS:**

1. To study and waveform analysis of amplitude modulation and determine the modulation index of amplitude modulation.
2. To study and waveform analysis of amplitude demodulation by any method.
3. To study and waveform analysis of frequency modulation and determine the modulation index of frequency modulation.
4. To study and waveform analysis of frequency demodulation by any method.
5. To study Amplitude Shift Keying (ASK) modulation.
6. To study Frequency Shift Keying (FSK) modulation.
7. To study Phase Shift Keying (PSK) modulation.
8. To study and waveform analysis of phase modulation.
9. To study Phase demodulation.
10. To study Pulse code modulation.
11. To study Pulse amplitude modulation and demodulation.
12. To study Pulse width modulation.
13. To study Pulse position modulation.
14. To study delta modulation.
15. To deliver a seminar by each student on ADVANCE COMMUNICATION SYSTEM.

**Note:-**

- 1 Total ten experiments are to be performed in the semester
- 2 At least seven experiments should be performed from the above list. Remaining three experiments should be performed as designed and set by the concerned institution as per the scope of the syllabus.

Approved by UG BOS & FET

**ECE228B**

**POWER ELECTRONICS LAB**

B. Tech. Semester –VI (AEI, common with 4<sup>th</sup> Sem. EL)

L	T	P	Credits
-	-	2	1

Class Work	:	20 Marks
Practical	:	30 Marks
Total	:	50 Marks
Duration of Exam.	:	3 Hrs.

**LIST OF EXPERIMENTS:**

1. To study Steady-state characteristics of SCR by plotting graph between voltage and current of Thyristers.
2. To Study R and RC Triggering Circuit for SCR.
3. To study UJT as Relaxation Oscillator.
4. To study SCR Half Wave and Full Wave Bridge Controlled Rectifier-Output characteristics.
5. To study 1-Phase Full Wave Bridge Controlled Rectifier using SCR and UJT with R and R-L Load and observe its input/output characteristics with and without free wheeling (commutating ) diode.
6. To study three Phase Full-Wave Uncontrolled Rectifier Operation with R and R-L Load and bserve its input/output Characteristics.
7. To study To study single Phase Cycloconvener output characteristics.
8. To study Series operation of SCR's.
9. To study Parallel operation of SCR's.
10. To study Speed Control of DC motor using SCR's.
11. To study Lamp-Dimmer Using Diac & Triac With Lamp Load.

**Note:-**

- 1 Total ten experiments are to be performed in the semester.
- 2 At least seven experiments should be performed from the above list. Remaining three experiments should be performed as designed and set by the concerned institution as per the scope of the syllabus.

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**ECE333B**

**ELECTRONIC CIRCUIT SIMULATION LAB**

B. Tech. Semester –VI

L	T	P	Credits
-	-	2	1

Class Work	:	20 Marks
Practical	:	30 Marks
Total	:	50 Marks
Duration of Exam.	:	3 Hrs.

**LIST OF EXPERIMENTS:**

1. Simulate and study half-wave, full-wave, and bridge-rectifier using PSPICE windows
2. Simulate and study diode clipper and clamper circuits using PSPICE windows
3. Simulate and study emitter bias and fixed bias BJT and JFET circuits using PSPICE windows, and determine quiescent conditions.
4. Simulate a common emitter amplifier using self-biasing and study the effect of variation in emitter resistor on voltage gain , input and output impedance using PSPICE windows .
5. Determine the frequency response of  $V_o/V_s$  for CE BJT amplifier using PSPICE windows. Study the effect of cascading of two stages on band width.
6. Simulate and study Darlington pair amplifier circuit using PSPICE windows and determine dc bias and output ac voltage .
7. Study an operational amplifier using PSPICE windows and find out: CMMR, gain band width product, slew rate, 3-db frequency, and input offset voltage.
8. Simulate and study active low pass, high pass, and band pass filters using PSPICE windows.
9. Simulate and study class A, B, C, and AB amplifier using PSPICE windows.
10. Study the operation of 555 timer oscillator using PSPICE.
11. Simulate logic expression.....and determine its truth table.
12. Simulate logic expression of full adder circuit and determine its truth table.
13. Simulate a synchronous 4-bit counter and determine its count sequence.
14. Simulate a master-slave flip-flop using NAND gates and study its operation. Study the operation of asynchronous preset and clear .

**Note:-**

- 1 Total ten experiments are to be performed in the semester.
- 2 At least seven experiments should be performed from the above list. Remaining three experiments should be performed as designed and set by the concerned institution as per the scope of the syllabus.

Approved by UG BOS & FET

**GP AEI302B****GENERAL PROFICIENCY & ETHICS**  
B. Tech. Semester – VI (Common for all Branches)

L	T	P	Credits
1	-	-	2

Examination	:	-
Practical	:	75Marks
Total	:	75Marks

The purpose of this course is to inculcate a sense of professionalism in a student along with personality development in terms of quality such as receiving, responding, temperament, attitude and outlook. The student efforts will be evaluated on the basis of his/ her performance / achievements in different walks of life.

A Faculty Counselor will be attached to a group of students which will remain associated with him /her during the entire period of the degree program in the University. Each faculty member will serve as a faculty counselor. They will act like a local guardian for the students associated with him / her and will help them in terms of career guidance, personal difficulties.

**A. The student will present a written report before the committee with following in view:**

The student will present before the committee his/her achievements during the current academic session in the form of a written report highlighting followings:

- |      |  |                   |
|------|--|-------------------|
| I.   | Academic Performance   | -----             |
| II.  | Extra Curricular Activities / Community Service, Hostel Activities | <b>(8 Marks)</b>  |
| III. | Technical Activities / Industrial, Educational tour                | <b>(8 Marks)</b>  |
| IV.  | Sports/games   | <b>(14 Marks)</b> |
| V.   | Moral values & Ethics  | <b>(15 Marks)</b> |

**NOTE:** Report submitted by the students should be typed on both sides of the paper.

- B.** A student will support his/her achievement and verbal & communicative skill through presentation before the committee.  
**(30 Marks)**

**C. Moral values & Ethics**

Syllabus - A few topics from the below mentioned books

1. R.R.Gaur, R. Sangal and G.P. Bagaria, " Bagaria, " A foundation course in Human Values and Professional Ethics", Pub: Excel Books, New Delhi-110028.
2. M. Govindrajan, S Natrajan & V.S. Senthil Kumar, " Engineering Ethics (including Human Values )" Eastern Economy Edition, Prentics Hall of India Ltd.

A minor test/Quiz will be conducted during the semester and It will be the duty of the concerned teacher assigned to teach Moral values & Ethics to submit the awards to respective chairman of the department / Director/Principal.

The evaluation of this course will be made by the following Committee.

**University Departments:**

1	Chairperson of the Department	Chairman
2	Senior Most Faculty Counselor	Member
3	Vice- Chancellor's Nominee	Member

**Affiliated Colleges:**

1	Director/Principal	Chairman
2	Head of the Department/Sr. Faculty	Member
3	External Examiner to be appointed by the University	Member

**Note:** Remuneration will be paid to the external examiner only (at par with the other practical examinations).

Approved by UG BOS & FET



**HUM304B**

**ORAL PRESENTATION SKILLS**  
B. Tech. Semester – VI (Common for all branches)

L	T	P	Credits
1	-	-	1

Class Work	:	20 Marks
Theory	:	30 Marks
Total	:	50 Marks
Duration of Exam.	:	2Hrs.

**Oral Presentations:**

Group Discussion; Mock interviews

**Note for the Teacher:**

The teacher concerned, by devising her/his method, must preview and review the student's spoken proficiency at the beginning and end of the semester respectively to find the efficacy of the course and degree of improvement in the student.

**Recommended Reading:**

1. Konar, Nira. English Language Laboratories: A Comprehensive Manual. Delhi: PHI, 2011.
2. Kumar, Sanjay and Pushp Lata. Communication Skills. Delhi: OUP, 2011

**SCHEME OF END SEMESTER EXAMINATION (Practical)**

An external Practical exam of 25 marks of 2 hour duration for the course will be conducted by an external examiner appointed by the university's Controller of Exams.

**NOTE:**

Students will be tested for their oral communication competence making them participate in Group discussion, mock situations for interview. Students may also be evaluated through a viva conducted by an external examiner.

Approved by UG BOS & FET

ECE401B

## INDUSTRIAL PROCESS CONTROL AND INSTRUMENTATION

B. Tech Semester –VII (AEI, EL)

L	T	P	Credits
3	1	-	4

Class Work	:	25Marks
Theory	:	75Marks
Total	:	100Marks
Duration of Exam.	:	3 Hrs.

### UNIT I

**Introduction:**

Instruments for measurements of voltage, current and other circuit parameters, digital meters.

**Pressure measurements:**

Introduction, Basic Terms, Pressure measurements, Pressure Formulas, Measuring Instruments, Application considerations.

### UNIT II

**Level Measurements:**

Introduction, Level Formulas, Level sensing devices, Application considerations.

**Flow Measurements:**

Introduction, Basic Terms, Flow Formulas, Flow measurement Instruments, Application considerations.

### UNIT III

**Temperature and Heat Measurements:**

Introduction, Basic Terms, Temperature and Heat Formulas, Temperature measuring devices, Application considerations.

**Humidity, Density and Specific Gravity Measurements:**

Viscosity and pH measurements: Basic Terms, Measuring devices, application considerations.

### UNIT IV

**Actuators and control:**

Pressure controllers, Flow control actuators, power controls

**Automatic Process Control Systems and Controllers:**

Introduction, automatic controllers, classification of controllers, introduction to computer aided measurement and control system, Introduction to programmable logic controllers.

**Text Books :**

1. Principles of Industrial Instrumentation by D. Patranabis TMH
2. Industrial Instrumentation and Control by S.K.Singh TMH

**Reference Books:**

1. Elements of Electronic Instrumentation and Measurement by Joseph c. Carr Pearson

**NOTE:**

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.

Approved by UG BOS & FET

## ECE403B

## DIGITAL SIGNAL PROCESSING B. Tech Semester –VII (EL, AEI)

L T P Credits  
3 1 - 4

Class Work : 25 Marks  
Theory : 75 Marks  
Total : 100 Marks  
Duration of Exam. : 3 Hrs.

### UNIT I

#### **Discrete Fourier Transform (DFT):**

Frequency Domain Sampling and Reconstruction of Discrete –Time signals, Discrete Fourier Transform, DFT as a Linear Transformation, Relationship of the DFT to other transforms, Properties of DFT, Use of DFT in Linear filtering methods: linear filtering, Filtering of long data sequences.

#### **Fast Fourier Transform (FFT):**

Efficient computation of the DFT: Fast Fourier Transform Algorithms, Radix-2 FFT Algorithms, Applications of FFT Algorithms: Efficient Computation of the DFT of Two Real Sequences, Efficient Computation of the DFT of a  $2N$  –Point Real Sequence, Quantization effects in the computation of the DFT.

### UNIT II

#### **Structures for FIR Systems:**

Direct –Form Structures, Cascade –Form Structures, Frequency Sampling Structures, Lattice Structure.

#### **Structures for IIR Systems:**

Direct –Form Structures, Signal Flow graphs & Transposed Structures, Cascade –Form Structures, Parallel –Form Structures; Lattice & Lattice-Ladder Structures for IIR Systems. Comparison of Different structures.

### UNIT III

#### **Frequency Domain Characterization of LTI Systems:**

Response to Complex Exponential & Sinusoidal Signals, Steady –state and Transient response with Input as a sinusoidal signal, Steady state response to periodic input signals, response to Aperiodic Input Signals, magnitude and phase response from pole & zeros, measuring the impulse response of an unknown system by correlation.

#### **Frequency Selective Filters**

Ideal Filters: lowpass, Highpass, Bandpass, Digital Resonators, Notch, Comb, All-pass filters, Digital Sinusoidal Oscillators pole –zero pattern for lowpass and highpass filters, lowpass to highpass filter transformation, Invertibility of systems & Deconvolution: LTI systems invertibility, maximum, minimum phase, and mixed phase systems; System identification through Crosscorrelation, Spectrum.

### UNIT IV

#### **Considerations for Practical Realization, Comparison of FIR & IIR, FIR Filter Design :**

Testing the Frequency response for practical realization: Paley –Wiener Theorem, characteristics of Practical Frequency –selective filters, FIR and IIR filters properties, Design of FIR filters: importance of Linear Phase response, Zero locations for a linear phase FIR filter, Design of linear phase FIR filters using Windows, Desirable Window function properties for FIR filter design, Frequency Sampling method for Linear Phase FIR Filter Design.

#### **IIR Filter Design**

Design steps for IIR Filter design, Design of IIR lowpass analog filters: Butterworth, Chebyshev, Elliptic; Conversion of analog system to digital system by: Approximation of Derivatives, Impulse Invariance, Bilinear Transformation, Analog Domain Frequency Transformations, Digital Domain Frequency Transformations.

#### **Text Books :**

1. J. G. Proakis, D. G. Manolakis, "Digital Signal Processing, Principles, Algorithms, & Applications", Prentice –Hall India.

#### **Reference Books:**

1. L. R. Rabiner & B. Gold, "Theory and Application of Digital Signal Processing", Prentice –Hall India.
2. A. V. Oppenheim, R. W. Schaffer, J. R. Buck, "Discrete –Time Signal Processing", Prentice –Hall India.
3. A. V. Oppenheim, R. W. Schaffer, "Digital Signal Processing", Prentice –Hall India.

#### **NOTE:**

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.

## ECE407B

## VLSI DESIGN B. Tech Semester –VII (EL, AEI, EEE)

L	T	P	Credits
3	1	-	4

Class Work	:	25 Marks
Theory	:	75 Marks
Total	:	100 Marks
Duration of Exam.	:	3 Hrs.

### UNIT I

#### INTRODUCTION:

Evolution of VLSI, Moore's Law, MOS transistor theory – MOS structure, enhancement & depletion transistor, Threshold voltage, MOS device design equations, Body Effect, Channel length modulation, Mos Transistor Trans conductance and output conductance.

#### MOS FABRICATION:

Crystal Growth, wafer preparation, epitaxy, oxidation, lithography, etching, diffusion, deposition, ion-implantation, metallization, Fabrication Process: nMOS, CMOS (n-well, p-well, twin-tub, silicon on insulator, 3-D CMOS, MOS capacitance dynamic behavior, sub-micron MOS transistors- related effects.

### UNIT II

#### MOS INVERTER:

Introduction, nMOS inverter: resistive load, enhancement load, depletion load, determination of pull-up to pull-down ratio for an nMOS inverter driven by another nMOS inverter. CMOS inverter: DC characteristics, circuit model, latch up.

#### CMOS DESIGN:

Gate Logic: inverter, nand gate, nor gate. Ratioed logic, pseudo NMOS logic, DCVSL Logic, Switch Logic: pass transistor and transmission gate, dynamic logic, charge sharing logic, domino logic. Combination logic: Parity generator, multiplexer. Sequential logic: two phase clocking, memory-latches and registers, setup and hold time violations, causes ,effects and remedies.

### UNIT III

#### MOS circuit Design :

MOS layer, stick diagram: nMOS Design style, CMOS design style, design rules and layout: lambda based design rule, layer representation, contact cuts, double metal MOS process rules, CMOS lambda based design rules.

#### SCALING OF MOS CIRCUITS:

Scaling models and scaling factors for device parameters, limitations of scaling: substrate doping, limits of miniaturization, limit of interconnect and contact resistance.

### UNIT IV

#### CIRCUIT CHARACTERIZATION AND PERFORMANCE ESTIMATION:

Sheet resistance, resistance estimation, capacitance estimation, inductance, switching characteristic, propagation delays, CMOS gate transistor sizing, power dissipation: static and dynamics.

#### SUB-DESIGN PROCESS:

Design of an ALU subsystem: 4-bit shifter, barrel shifters, logarithmic shifters. Adders – ripple carry, Manchester carry, carry bypass, carry select linear, carry select square root, carry look ahead, tree and domino adder .Multiplier – binary , array, carry save, Wallace tree, Programmable logic array, random access memory, binary counter.

#### Text Books :

1. D.A.Pucknell and K. Eshraghian, "Basic VLSI Design"
2. Weste and Eshraghian, "Principle of CMOS VLSI Design" Pearson Education, 2001

#### Reference Books:

1. S. M. Kang, Y. Leblebici, "CMOS digital integrated circuits analysis & design" TMH, 3<sup>rd</sup> Edition.
2. Rabaey, "Introduction of digital integration circuit".

#### NOTE:

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.

Approved by UG BOS & FET

**ECE426B**

**EMBEDDED SYSTEMS DESIGN**

B. Tech Semester –VII

L T P Credits  
4 - - 4

Class Work : 25 Marks  
Theory : 75 Marks  
Total : 100 Marks  
Duration of Exam. : 3 Hrs.

**UNIT I**

**INTRODUCTION OF EMBEDDED SYSTEMS DESIGN:**

Embedded Systems Design: Definition, Issues, Challenges and Trends, Current events and emerging technologies.

**AVR MICROCONTROLLER:**

Introduction to AVR microcontroller, features of AVR family microcontrollers, different types of AVR microcontroller, architecture, memory access and instruction execution, pipelining, program memory considerations, addressing modes, CPU registers, Instruction set, and simple operations.

**UNIT II**

**FEATURES OF AVR MICROCONTROLLER:**

Timer: Control Word, mode of timers, simple programming, generation of square wave, Interrupts: Introduction, Control word Simple Programming, generation of waveforms using interrupt, serial interface using interrupt.

**SPECIAL FEATURES OF AVR MICROCONTROLLER:**

Watch-dog timer, Power-down modes of AVR microcontroller, UART, SRAM.

**UNIT III**

**APPLICATIONS BASED ON AVR MICROCONTROLLER:**

Applications based on RF Card, Graphical LCD, Color LCD, Zigbee, DTMF, GSM, GPS, Smart Card, RF ID, Touch Screen, Bluetooth.

**COMMUNICATION INTERFACE WITH AVR MICROCONTROLLER:**

RS-232, RS-485, SPI, IIC, ISA, CAN.

**UNIT IV**

**SOFTWARE REQUIREMENTS FOR EMBEDDED SYSTEMS DESIGN:**

Assemblers, Compilers, Linkers, Loaders, Debuggers, Profilers and Test Coverage Tools Utilities like make, ranlib, obj copy and obj dump, Configuring and Building GNU Cross-Tool chain Building RTOS / EOS Image for Target Hardware.

**OPERATING SYSTEM FOR EMBEDDED SYSTEM:**

Embedded Operating Systems, Real Time Operating System (RTOS), Writing Time and Space Sensitive Programs, Writing Device Drivers, Interrupt Handling in C, Combining C with Assembly.

**Text Books :**

1. Programming & Customizing the AVR Microcontroller, Dhananjay V. Gadre, Tata McGraw-Hill Pub. Co. Ltd., New Delhi.

**NOTE:**

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.

Approved by UG BOS & FET

**ECE421B**

**PROGRAMMABLE LOGIC CONTROLLERS LAB**  
B. Tech Semester –VII (EL, AEI)

L T P Credits  
- - 2 1

Class Work : 20 Marks  
Practical : 30 Marks  
Total : 50 Marks  
Duration of Exam. : 3 Hrs.

**LIST OF EXPERIMENTS:**

1. To study of PLC based Process control systems in a semi-automatic Bottling plant.
2. To study of PLC based Process control systems in a fully-automatic Bottling plant.
3. To Study of PLC based car parking.
4. To study of PLC based tank level control (high level,medium level,low level,empty level)
5. To study of PLC based step sequence.(use of time at different time interval)
6. How to create delay in PLC system.( off delays,pulse,extended pulse)
7. To study of PLC based light intensity variation.(intensity variation with help of digital processing)
8. To study of PLC based motor control (stepper motor clockwise,anticlockwise dectional control)
9. To study of PLC based digital electronic design (combinational,sequentional and control logic ckt.)
10. To study of PLC based traffic light interface.

**Note:-**

- 1 Total ten experiments are to be performed in the semester
- 2 At least seven experiments should be performed from the above list. Remaining three experiments should be performed as designed and set by the concerned institution as per the scope of the syllabus.

Approved by UG BOS & FET

**ECE446B**

**EMBEDDED SYSTEM DESIGN LAB**  
B. Tech Semester –VII (AEI, IC)

L T P Credits  
- - 2 1

Class Work : 20 Marks  
Practical : 30 Marks  
Total : 50 Marks  
Duration of Exam. : 3 Hrs.

**LIST OF EXPERIMENTS:**

**8051 Micro Controller**

1. Write an Assembly language Programme (ALP) to generate 10kHz square wave.
2. Write an ALP to generate 10 kHz frequency using interrupts.
3. Write an ALP to interface one Microcontroller with other using serial/parallel communication.
4. Write an ALP for temperature & pressure measurement & to display on intelligent LCD display

**PIC Microcontroller**

5. Write an ALP for PWM based speed control of motor .
6. Write an ALP for PWM based regulator of voltage.
7. Write an ALP to send/receive the data from an computer to MC through serial communication

**General**

8. Study of Development tools/environment for Microcontroller Programme.
9. Develop an embedded system for traffic light controller using Micro controller
10. Develop an embedded system for the automatic motion of a car (Model of car) & Subsequent display on LCD using Microcontroller..

**Note:-**

- 1 Total ten experiments are to be performed in the semester
- 2 At least seven experiments should be performed from the above list. Remaining three experiments should be performed as designed and set by the concerned institution as per the scope of the syllabus.

Approved by UG BOS & FET

**ECE423B**

**DIGITAL SIGNAL PROCESSING LAB USING MATLAB**  
B. Tech Semester –VII (EL, AEI)

L T P Credits  
- - 2 1

Class Work : 20Marks  
Practical : 30Marks  
Total : 50Marks  
Duration of Exam. : 3 Hrs.

**LIST OF EXPERIMENTS:**

1. Introduction to MatLab.
2. Matrix operations :- Addition,Subtraction,Multiplication,Transepose,Inverse.
3. Solution of a Linear Equation.
4. To find Eigen value of matrix.
5. To find statistical properties :- Mean, Median, Standard Deviation and energy of a set of signals.
  - Plotting.
  - Single signal in a single graph.
  - Multiple signal in single graph.
  - Multiple signal in multiple graphs but in single window.
6. To sort a matrix.
  - Row wise – in reference to a particular row.
  - Column wise – in reference to a particular column.
7. To practice different kind of loop and conditional statement and to make a program using the same.
8. To save workspace variables in a file.
9. To make a simulink model of feedback system using second order transfer function and utility feedback.
10. To find the convolution of two number.
11. To represent basic signals (Unit step, unit impulse, ramp, exponential, sine and cosine).
12. To develop program for discrete convolution & discrete correlation.
13. To understand stability test.
14. To develop program for computing FFT & IDFT.
15. To design analog filter (low-pass, high pass, band-pass, band-stop).
16. To design digital IIR filters (low-pass, high pass, band-pass, band-stop).
17. To design FIR filters using windows technique.
18. To design a program to compare direct realization values of IIR digital filter
19. To develop a program for computing parallel realization values of IIR digital filter.
20. To develop a program for computing cascade realization values of IIR digital filter
21. To develop a program for computing inverse Z-transform of a rational transfer function.
22. To design equiripple FIR filter for given specifications and plot its magnitude & Phase Response.
23. To plot pole zero diagram for given FIR and IIR system.

**Note:-**

- 1 Total fifteen experiments are to be performed in the semester
- 2 At least Ten experiments should be performed from the above list. Remaining Five experiments should be performed as designed and set by the concerned institution as per the scope of the syllabus.
- 3 All above experiments should be performed using MATLAB.

Approved by UG BOS & FET



**ECE427B**

**VLSI DESIGN LAB**  
B. Tech Semester –VII (EL, AEI)

L T P Credits  
- - 2 1

Class Work : 20 Marks  
Practical : 30 Marks  
Total : 50 Marks  
Duration of Exam. : 3 Hrs.

**LIST OF EXPERIMENTS:**

1. Design the schematic for CMOS inverter .
2. Design the schematic for CMOS nand gate
3. Design the schematic for CMOS nor gate .
4. Design the schematic for a d- latch with clk time period =6ns using nand gates
5. Design the schematic for a half adder using nand gates .
6. Design a full adder using half adder designed above.
7. Design the layout for PMOS in layout editor.
8. Design the layout for NMOS in layout editor.
9. Design the layout for CMOS inverter with equal rise and fall time in layout editor.
10. Design the layout for 2-Input and 3-Input NAND gate.
11. Design the layout for 2-Input and 3-Input NOR gate.
12. Design the layout for clocked S-R flip-flop.

**Note:-**

- 1 Total ten experiments are to be performed in the semester
- 2 At least seven experiments should be performed from the above list. Remaining three experiments should be performed as designed and set by the concerned institution as per the scope of the syllabus.

Approved by UG BOS & FET

**AEI431B**

**PROJECT**  
**B. Tech Semester –VII**

L T P Credits  
- - 4 4

Class Work : 100Marks  
Practical : -  
Total : 100Marks  
Duration of Exam. : 3 Hrs.

The primary objective of this course is to develop in students the professional quality of synthesis employing technical knowledge obtained in the field of Engineering & Technology through a project work involving design, analysis augmented with creativity, innovation and ingenuity.

Project involving design/ fabrication/ testing/ computer simulation/ case studies etc. which commences in the VII Semester will be completed in VIII Semester and will be evaluated through a panel of examiners consisting of the following:

Head/Chairperson of Department : Chairperson  
Project coordinator : Member  
External examiner : To be appointed by the University

The student will be required to submit two copies of his/her project report to the department for record (one copy each for the department and participating teacher).

Project coordinator will be assigned the project load of, maximum of 2 hrs. per week including his own guiding load of one hr. However, the guiding teacher will be assigned maximum of one period of teaching load irrespective of number of students/groups under him/her.

The format of the cover page and the organization of the body of the report for all the B.Tech. will be finalized and circulated by the Dean, Faculty of Engineering and Technology.

**AEI435B**

**PROFESSIONAL TRAINING – II**  
**B. Tech Semester –VII**

L	T	P	Credits
-	-	2	2

Class Work	:	50 Marks
Practical	:	-
Total	:	50Marks
Duration of Exam.	:	-

At the end of 6th semester each student would undergo four weeks Professional Training in an Industry/ Institute/ Professional / Organization/ Research Laboratory etc. with the prior approval of the Training and Placement Officer of the University and submit in the department a typed report along with a certificate from the organization.

The typed report should be in a prescribed format.

The report will be evaluated in the VII Semester by a Committee consisting of three teachers from different specialization to be constituted by the Chairperson of the department. The basis of evaluation will primarily be the knowledge and exposure of the student towards different processes and the functioning of the organization.

The student will interact with the committee through presentation to demonstrate his/her learning.

Teachers associated with evaluation work will be assigned 2 periods per week load.

**MEI623B**

**ENTREPRENEURSHIP**  
**B. Tech Semester –VII (Open Elective)**

L T P Credits  
4 - - 4

Class Work : 25 Marks  
Theory : 75 Marks  
Total : 100 Marks  
Duration of Exam. : 3 Hrs.

**UNIT I**

**ENTREPRENEURIAL DEVELOPMENT PERSPECTIVE:** Concepts of Entrepreneurship Development, Evolution of the concept of Entrepreneur, Entrepreneur Vs. Intrapreneur, Entrepreneur Vs. Entrepreneurship, Entrepreneur Vs. Manager, Attributes and Characteristics of a successful Entrepreneur, Role of Entrepreneur in Indian economy and developing economies with reference to Self-Employment Development, Entrepreneurial Culture.

**UNIT II**

**CREATING ENTREPRENEURIAL VENTURE:** Business Planning Process, Environmental Analysis - Search and Scanning, Identifying problems and opportunities, Defining Business Idea, Basic Government Procedures to be complied with.

**UNIT III**

**ENTREPRENEURSHIP DEVELOPMENT AND GOVERNMENT:** Role of Central Government and State Government in promoting Entrepreneurship - Introduction to various incentives, subsidies and grants - Export Oriented Units - Fiscal and Tax concessions available; Role of Central/State agencies in the Entrepreneurship Development - District Industries Centers (DIC), Small Industries Service Institute (SISI), Entrepreneurship Development Institute of India (EDII), National Institute of Entrepreneurship & Small Business Development (NIESBUD), National Entrepreneurship Development Board (NEDB).

**UNIT IV**

**PROJECT MANAGEMENT AND CASE STUDIES:** Technical, Financial, Marketing, Personnel and Management Feasibility, Estimating and Financing funds requirement - Schemes offered by various commercial banks and financial institutions like IDBI, ICICI, SIDBI, SFCs, Venture Capital Funding, Why do Entrepreneurs fail - The Four Entrepreneurial Pitfalls (Peter Drucker), Case studies of Successful Entrepreneurial Ventures, Failed Entrepreneurial Ventures and Turnaround Ventures.

**Text & Reference Books:**

1. Entrepreneurship - Hisrich Peters.
2. Entrepreneurship: New Venture Creation - David H. Holt.
3. The Culture of Entrepreneurship - Brigitte Berger.
4. Project Management - K. Nagarajan.
5. Dynamics of Entrepreneurship Development - Vasant Desai.
6. Entrepreneurship Development - Dr. P.C. Shejwalkar.
7. Thought Leaders - Shrinivas Pandit.
8. Entrepreneurship, 3rd Ed. - Steven Brandt.
9. Business Gurus Speak - S.N. Char.
10. The Entrepreneurial Connection - Gurmit Narula.

**NOTE:**

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.

Approved by UG BOS & FET

**BME451B****MEDICAL INSTRUMENTATION**  
B. Tech Semester –VII (Open Elective)

L	T	P	Credits
4	-	-	4

Class Work	:	25 Marks
Theory	:	75 Marks
Total	:	100 Marks
Duration of Exam.	:	3 Hrs.

**UNIT I**

**PHYSIOLOGY AND TRANSDUCERS:** Cell and its structure – Action and resting – Potential propagation of action potential – Sodium pump – Nervous system – CNS – PNS – Nerve cell – Synapse – Cardio pulmonary system – Physiology of heart and lungs – Circulation and respiration – Transducers – Different types – Piezo-electric, ultrasonic, resistive, capacitive, inductive transducers – Selection criteria.

**UNIT II**

**ELECTRO – PHYSIOLOGICAL AND NON-ELECTRICAL PARAMETER MEASUREMENTS:** Basic components of a biomedical system – Electrodes – Micro, needle and surface electrodes – Amplifiers – Preamplifiers, differential amplifiers, chopper amplifiers – Isolation amplifier. ECG – EEG – EMG – ERG – Lead systems and recording methods – Typical waveforms. Measurement of blood pressure – Cardiac output – Cardiac rate – Heart sound – Respiratory rate – Gas volume – Flow rate of CO<sub>2</sub>, O<sub>2</sub> in exhaust air - PH of blood, ESR, GSR measurements – Plethysmography.

**UNIT III**

**MEDICAL IMAGING AND PATIENT MONITORING SYSTEMS:** X-ray machine - Radio graphic and fluoroscopic techniques – Computer tomography – MRI – Ultrasonography – Endoscopy – Thermography – Different types of biotelemetry systems and patient monitoring – Electrical safety. Biological effects of X-rays and precautions.

**UNIT IV**

**ASSISTING AND THERAPEUTIC EQUIPMENTS:** Pacemakers – Defibrillators – Ventilators – Nerve and muscle stimulators – Diathermy – Heart – Lung machine – Audio meters – Dialyzers. Respiratory Instrumentation - Mechanism of respiration, Spirometry, Pneuotachograph Ventilators.

**Text Books:**

1. Biomedical Instrumentation and Measurements – Leslie Cromwell and F.J. Weibell, E.A. Pfeiffer, PHI, 2nd Ed, 1980.
2. Medical Instrumentation, Application and Design – John G. Webster, John Wiley, 3rd Ed., 1998.

**Reference Books:**

1. Principles of Applied Biomedical Instrumentation – L.A. Geoddes and L.E. Baker, John Wiley, 1975.
2. Hand-book of Biomedical Instrumentation – R.S. Khandpur, TMH, 2nd Ed., 2003.
3. Biomedical Telemetry – Mackay, Stuart R., John Wiley, 1

**NOTE:**

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.

Approved by UG BOS & FET

ECE305B

**CONSUMER ELECTRONICS**  
B. Tech Semester –VII (Open Elective)

L T P Credits  
3 1 - 4

Class Work : 25 Marks  
Theory : 75 Marks  
Total : 100 Marks  
Duration of Exam. : 3 Hrs.

**UNIT I**

**MONOCHROME TV (INTRODUCTION):**Elements of a TV System,Picture transmission,Sound transmission,Picture reception,Sound reception,Synchronization,Receiver control,Image continuity, Scanning Process, Aspect Ratio, Flicker, Composite Video Signal, Picture Elements,Kell factor, Vertical Resolution,Horizontal Resolution,Video bandwidth,Interlacing, 625 Line System,Bandwidths for TV Transmission,Vertical and horizontal synch detail,Vestigial Side Band transmission(Advantages and Disadvantages)

**Monochrome TV (Picture and Camera Tubes):**Monochrome picture tube,beam reflection,Beam focussing,Screen Phosphor,Face plate,Picture tube characteristics,picture tube circuit controls,Monochrome Camera Tubes:Basic principle,Image Orthicon, Vidicon,Plumbicon

**UNIT II**

**Colour TV Essentials:**Compatibility , Colour perception,Three Colour theory,Luminance,Hue and Saturation, Dispersion and Recombination of light,Primary and secondary colours,luminance signal,Chrominance Signal, Colour picture tube,colour TV Camera,Colour TV display Tubes,colour Signal Transmission,Bandwidth for colour signal transmission,Colour TV controls. Cable TV,Block Diagram and principle of working of cable TV.

**Plasma and LCD:**Introduction,liquid crystals,types of LCD's,TN,STN,TFT,Power requirements,LCD working,Principle of operation of TN display,Construction of TN display,Behaviour of TN liquid crystals,Viewing angle,colour balance, colour TN display, limitatons, advantages, disadvantages, applications.

**UNIT III**

**LED and DMD:**Introduction to LED Television , comparison with LCD and Plasma TV's, schematic of DMD, introduction to Digital MicroMirror device, Diagram of DMD, principle of working, emerging applications of DMD.

**Microwave Ovens and Air Conditioners:**Microwaves,Transit Time,Magnetron,Waveguides,Microwave Oven,Microwave Cooking. Air conditioning,Components of air conditioning systems,all water Air conditioning systems,all air air conditioning Systems,Split air conditioner.

**UNIT IV**

**Microphones:**Introduction, characteristics of microphones,types of microphone:carbon,moving coil,wireless,crystal,introduction to tape recorder.

**Loudspeaker:**Introduction to ideal and basic loudspeaker,loudspeaker construction types of loudspeaker: Dynamic and permanent magnet,woofers,tweeters,brief introduction to baffles,equalisers.

**Text Books:**

1. Consumer Electronics by S. P. Bali(Pearson Education)
2. Complete Satellite and Cable T.V by R.R Gulati(New Age International Publishers)

**Reference Books:**

1. Monochrome and Colour Television by R. R. Gulati

**NOTE:**

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.

Approved by UG BOS & FET

**EE451B**

**ENERGY AUDIT**  
B. Tech Semester –VII (Open Elective)

L T P Credits  
4 - - 4

Class Work : 25 Marks  
Theory : 75 Marks  
Total : 100 Marks  
Duration of Exam. : 3 Hrs.

**UNIT I**

**INTRODUCTION TO THE POWER DISTRIBUTION SYSTEM:** Description of the power distribution system- voltage levels, Components of the distribution system- Substation, Transformer, feeders, distribution system planning, operation & maintenance objectives, activities involved in O&M, grid management, load scheduling & dispatch, load balancing, 66-33/11 KV substation equipment, 11/0.4 KV substation equipment, Distribution transformers- reasons for DT failures.

**UNIT II**

**ENERGY ACCOUNTING & ENERGY AUDIT:** Need for energy accounting, objectives & functions of energy accounting, Energy flow diagram in power distribution system, energy accounting procedure- Energy measurement, and problems in energy accounting & overcoming these problems in energy accounting, Definition, need and types of energy audit, energy audit instruments, procedure for conducting an energy audit.

**UNIT III**

**AT&C LOSS REDUCTION & EFFICIENCY IMPROVEMENT:** Concepts and principles of distribution losses- transmission & distribution losses, AT&C losses in power distribution network, factors contributing to high technical & commercial losses. Technical loss reduction- Short term measures for technical loss reduction, long term plans for technical loss reduction, Commercial loss reduction- reasons for commercial losses, measures for commercial loss reduction.

**UNIT IV**

**DEMAND SIDE MANAGEMENT:** An introduction, Why DSM?, Benefits of DSM, DSM in power systems: load management, DSM techniques and emerging trends, EC Act 2001, DSM on consumer side – the industrial sector, the agricultural sector, the domestic & commercial sectors, ESCO-a route for DSM.

**Text Books:**

1. Handbook of Energy Engineering, The Fairmont Press, INC.-Albert Thumann & Paul Mehta.
2. Energy Management Supply & Conservation, Butterworth Heinemann, 2002-dr. Clive Beggs.

**Reference Books:**

1. Handbook on energy audit & environment management by ISBN 81-1993.0920 TERI.

**NOTE:**

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.

Approved by UG BOS & FET

EEE457B

## ENERGY RESOURCES & TECHNOLOGY

B. Tech Semester –VII (Open Elective)

L	T	P	Credits
4	-	-	4

Class Work	:	25 Marks
Theory	:	75 Marks
Total	:	100 Marks
Duration of Exam.	:	3 Hrs.

### UNIT I

**ENERGY SOURCES & AVAILABILITY:** World energy situation. Indian energy scenario. Comparative study of thermal, hydro, nuclear and gas power plants. Impact of thermal, gas, hydro and nuclear power stations on environment, air and water pollution, green house effect (global warming), Plasma confinement - magnetic confinement and inertial confinement, geothermal, hydrogen energy, fuel cells, Alkaline fuel cells (AFC), Solid oxide fuel cell (SOFC), Molten carbonate fuel cells (MCFC), thermo-electric power, MHD power generation OTEC & tidal waves.

### UNIT II

**SOLAR ENERGY:** Solar constant, solar radiation geometry, local solar time, day length, solar radiation measurement, radiation on inclined surface, solar radiation data & solar charts. Flat plate collectors, liquid and air type. Theory of flat plate collectors, advanced collectors, optical design of concentrators, selective coatings, solar water heating, solar dryers, solar stills, solar cooling and refrigeration. Thermal storage. Conversion of heat into mechanical energy. Active and passive heating of buildings. Solar cells.

### UNIT III

**WIND ENERGY:** Wind as a Source of Energy, Characteristics of wind, wind data. Horizontal & Vertical axis wind Mills, Wind Energy: Wind energy potential measurement, general theories of wind machines, basic laws and concepts of aerodynamics, wind mill and wind electric generator. Basic electric generation schemes- constant speed constant frequency, variable speed constant frequency and variable speed variable frequency schemes. Applications of wind energy.

### UNIT IV

**BIOMASS ENERGY:** Introduction to biomass, biofuels & their heat content, biomass conversion technologies. Aerobic & anaerobic digester, Factors affecting biogas production, biogas plants - types & description. Utilisation of biogas - Gasifiers, direct thermal application of Gasifiers. Advantages & problems in development of Gasifiers, use in I.C. engines, Energy plantation. Pyrolysis scheme. Alternative liquid fuels –ethanol and methanol. Ethanol production.

#### Text Books:

1. Electric Power Generation, B.R. Gupta.
2. Power Generation, Operation and Control, Wood and Wollenberg, John Wiley & Sons, 1984.
3. Power Plant Engg: G.D. Rai.

#### Reference Books:

1. Renewable Energy Resources: John Twidell and Tony Weir.
2. Renewable Energy Resources Conventional & Non- Conventional: M.V.R Koteswara Rao.
3. Science & Technology of Photovoltaics: Jayarama Reddy P.

#### NOTE:

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.

Approved by UG BOS & FET



**BT401B**

**BIOINFORMATICS**  
B. Tech Semester –VII (Open Elective)

L T P Credits  
4 - - 4

Class Work : 25 Marks  
Theory : 75 Marks  
Total : 100 Marks  
Duration of Exam. : 3 Hrs.

**UNIT I**

**INTRODUCTION:** Internet, intranet and extranet, networking, protocols, genomic data, organization, representation, data base management systems.

**SEQUENCING DATA BANK:** Introduction, collecting and storing sequence in laboratory, Nucleic acid data bank – Gen Bank, EMBL, AIDS and RNA, protein data bank (PDB), Cambridge Structural Database CSD, genome data bank, hybridoma data bank structure and others.

**UNIT II**

**SEQUENCE ANALYSIS:** Analysis tools for sequence data banks, Pair wise alignment: NEEDLEMAN and WUNSCH algorithms, Smith Waterman, Multiple alignment – CLUSTAL-W, BLAST, FASTA, sequence patterns and motifs and profiles.

**PREDICTIONS:** Secondary and tertiary structure: algorithms Chao-Fasman algorithm, hidden Markov model, neural networking, protein classification, fold libraries, fold recognition (threading), homology detection, SRS-access to biological data banks.

**UNIT III**

**PHYLOGENETIC ANALYSIS:** Basic concepts in systematics, taxonomy and phylogeny, phylogenetic trees- various types and their construction, tree building methods, distance methods, multiple alignment character based method, phylogenetic software.

**MANAGING SCIENTIFIC DATA:** Introduction, challenges faced in integration of biological information, SRS, Kleisli Query System TAMBIS, P/FDM mediator for a bioinformatics database, federation, discovery link and data management.

**UNIT IV**

**GENOMICS & PROTEOMICS:** Genome mapping, assembly and comparison, functional genomics: sequence based approaches & microarray based approaches, proteomics: technology of protein expression analysis & posttranslational modifications, protein sorting, protein-protein interaction.

**Text & Reference Books:**

1. Developing Bioinformatics Computer Skill, ed. Gibes & Jombeck, Shroff Publication.
2. Bioinformatics, ed. David W. Mount

**NOTE:**

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.

Approved by UG BOS & FET

**AE417B**

**MODERN VEHICLE TECHNOLOGY**  
B. Tech Semester –VII (Open Elective)

L T P Credits  
4 - - 4

Class Work : 25 Marks  
Theory : 75 Marks  
Total : 100 Marks  
Duration of Exam. : 3 Hrs.

**UNIT I**

**TRENDS IN POWER PLANTS:** Hybrid vehicles – stratified charged / lean burn engines – Hydrogen engines – battery vehicles – Electric propulsion with cables – magnetic track vehicles.

**UNIT II**

**SUSPENSION BRAKES AND SAFETY:** Air suspension – Closed loop suspension – antiskid braking system, Retarders, Regenerative braking safety cage – air bags – crash resistance – passenger comfort.

**UNIT III**

**NOISE & POLLUTION:** Reduction of noise – Internal & external pollution control through alternate fuels / power plants – Catalytic converters and filters for particulate emission.

**UNIT IV**

**VEHICLE OPERATION AND CONTROL:** Computer control for pollution and noise control and for fuel economy – Transducers and actuators – Information technology for receiving proper information and operation of the vehicle like optimum speed and direction.

**VEHICLE AUTOMATED TRACKS:** Preparation and maintenance of proper road network – National highway network with automated roads and vehicles – Satellite control of vehicle operation for safe and fast travel.

**Text Books:**

1. Heinz Heisler, "Advanced Vehicle Technology" - Arnold Publication.

**Reference Books:**

1. Beranek.L.L., Noise reduction, McGraw Hill Book Co., Inc., Newyork, 1993.
2. Bosch Hand Book, 3rd Edition, SAE, 1993.

**NOTE:**

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.

Approved by UG BOS & FET

**CE451B**

**POLLUTION & CONTROL**  
B. Tech Semester –VII (Open Elective)

L T P Credits  
4 - - 4

Class Work : 25 Marks  
Theory : 75 Marks  
Total : 100 Marks  
Duration of Exam. : 3 Hrs.

**UNIT I**

**WATER POLLUTION:** Classification of water pollutants, water characteristics, effluent standards, primary treatment, secondary treatment – aerobic (activated sludge, aerated lagoons, trickling filter, roughing filter, rotating biological contactor) anaerobic (contact process, UASB).

**UNIT II**

**AIR POLLUTION:** Classification of air pollutants, Particulates: Physical characteristics, mode of formation, settling properties, Control measures.

**HYDROCARBONS:** Nature; sources, control, Carbon Monoxide: Source, harmful effects on human health, control measures. Oxides of Sulphur and Nitrogen Sources, effects on human health and plants. Control measure.

**UNIT III**

**SOLID WASTE:** Types, sources and properties of solid waste, methods of solid waste treatment and disposal.

**SOLID WASTE MANAGEMENT:** Generation, Collection and techniques for ultimate disposal, Elementary discussion on resource and energy recovery.

**UNIT IV**

Elementary treatment of nuclear pollution, metal pollution, noise pollution their effects & control.

**TRACE ELEMENT:** Mechanism of distribution, essential and non essential elements, trace of element in marine environment, its ecological effects and biological effects.

**Text & Reference Books:**

1. Environmental Engg.: by Howard s. Peavy & Others, MGH International.
2. Metacaf – EDDY – Waste-water engineering revised by George Teholonobus (TMH)
3. Environmental Chemistry by B.K. Sharma, Goel Publishing, Meerut.
4. Environmental Chemistry, A.K.DE, Wiley Eastern.
5. Air Pollution: H.C. Perking – Mc Graw Hill.

**NOTE:**

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.

Approved by UG BOS & FET

**CSE411B**

**MANAGEMENT INFORMATION SYSTEM**

B. Tech Semester –VII (Open Elective)

L T P Credits  
4 - - 4

Class Work : 25 Marks  
Theory : 75 Marks  
Total : 100 Marks  
Duration of Exam. : 3 Hrs.

**UNIT I**

**INFORMATION SYSTEM:** Introduction to Information System and MIS, Decision support and decision making systems, systems approach, the systems view of business, Managing the digital firm, Electronic Commerce and Electronic business, DBMS, RDBMS, introduction to Telecommunication and Networks.

**I.T.INFRASTRUCTURE:** Managing Hardware Assets, Managing Software Assets, Managing Data Resources. Internet and New I.T. Infrastructure.

**UNIT II**

**CREATING ENTREPRENEURIAL VENTURE:** Business Planning Process, Environmental Analysis - Search and Scanning, Identifying problems and opportunities, Defining Business Idea, Basic Government Procedures to be complied with.

**UNIT III**

**DETAILED SYSTEM DESIGN:** Inform and involve the organization, aim of detailed design, project management of MIS detailed design, identify dominant and trade of criteria, define the sub systems, sketch the detailed operating sub systems and information flow, determine the degree of automation of each operation, inform and involve the organization again, inputs outputs and processing, early system testing, software, hardware and tools propose an organization to operate the system, documentation of detailed design.

**UNIT IV**

**IMPLEMENTATION, EVALUATION AND MAINTENANCE OF THE MIS:** Plan the implementation, acquire floor space and plan space layouts, organize for implementation, develop procedures for implementation, train the operating personnel, computer related acquisitions, develop forms for data collection and information dissemination, develop the files test the system, cut-over, document the system, evaluate the MIS control and maintain the system. Pitfalls in MIS development, Redesigning the organization with Information systems, Managing Knowledge Work.

**Text Books:**

1. Management Information System by W. S. Jawadekar, 2002, Tata McGraw Hill.
2. Management Information System by K.C. Laudon & J.P. Laudon 7th Edition 2003 Pearson Education Publishers Indian Reprint.
3. Information System for Modern Management (3rd edition)- Robert G. Murdick, Loel E. Ross & James R. Claggett. PHI.

**Reference Books:**

1. Management Information System; O Brian; TMH
2. Management Information System by Davis Olson Mac Graw Hill
3. Management Information System by Stallings,(Maxwell Mc Millman Publishers)

**NOTE:**

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.

Approved by UG BOS & FET

**IT413B**

**CYBER SECURITY**  
B. Tech Semester –VII (Open Elective)

L T P Credits  
4 - - 4

Class Work : 25 Marks  
Theory : 75 Marks  
Total : 100 Marks  
Duration of Exam. : 3 Hrs.

**UNIT I**

**INTRODUCTION TO CYBERCRIME:** Cybercrime and Information Security, Classifications of Cybercrimes, The need for Cyberlaws, The Indian IT Act Challenges to Indian Law and Cybercrime Scenario in India, Weakness in Information Technology Act and its consequences, Digital Signatures and the Indian IT Act, Cybercrime and Punishment; Technology, Students and Cyberlaw; Survival tactics for the Netizens, Cyber-offenses: Cyberstalking, Cybercafe and Cybercrimes, Botnets, Attack Vector, Cloud Computing.

**TOOLS AND METHODS USED IN CYBERCRIME:** Proxy Servers and Anonymizers, Phishing and identity theft, Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow; Cybercrime: Mobile and Wireless Devices: Trends in Mobility, Attacks on Wireless Networks, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges, Registry Settings for Mobile Devices, Authentication Service Security, Attacks on Mobile/Cell Phones.

**UNIT II**

**UNDERSTANDING COMPUTER FORENSICS:** The Need for Computer Forensics, Cyberforensics and Digital Evidence, Forensics Analysis of E-Mail, Digital Forensics Life Cycle, Chain of Custody Concept, Network Forensics, Computer Forensics and Steganography, Relevance of the OSI 7 Layer Model to Computer Forensics, Forensics and Social Networking Sites: The Security/Privacy Threats, Challenges in Computer Forensics, Forensics Auditing, Antiforensics.

**UNIT III**

**ENTREPRENEURSHIP DEVELOPMENT AND GOVERNMENT:** Role of Central Government and State Government in promoting Entrepreneurship - Introduction to various incentives, subsidies and grants - Export Oriented Units - Fiscal and Tax concessions available; Role of Central/State agencies in the Entrepreneurship Development - District Industries Centers (DIC), Small Industries Service Institute (SISI), Entrepreneurship Development Institute of India (EDII), National Institute of Entrepreneurship & Small Business Development (NIESBUD), National Entrepreneurship Development Board (NEDB).

**UNIT IV**

**CYBERSECURITY: ORGANIZATIONAL IMPLICATIONS:** Cost of Cybercrimes and IPR Issues, Web Threats for Organizations, Security and Privacy Implications from Cloud Computing, Social Media Marketing, Social Computing and the Associated Challenges for Organizations, Protecting People's Privacy in the Organization, Organizational Guidelines for Internet Usage, Safe Computing Guidelines and Computer Usage Policy, Incident Handling, Forensics Best Practices, Media and Asset Protection, Importance of Endpoint Security in Organizations.

**Text Books:**

1. "Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", Nina Godbole, Sunit Belapur, Wiley India Publications, April, 2011.

**NOTE:**

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.

Approved by UG BOS & FET

IC302B

**PROCESS DYNAMICS & CONTROL**  
B. Tech Semester –VIII (AEI, common with 6th Sem. IC)

L	T	P	Credits
3	1	-	4

Class Work	:	25 Marks
Theory	:	75 Marks
Total	:	100 Marks
Duration of Exam.	:	3 Hrs.

**UNIT I**

**Introduction to Process Control:**

Dynamics and stability of controlled systems. Dynamic behavior of linear and non-linear first and second-order systems. The development of mathematical models to describe process dynamic behavior.

**The Dynamics and Control of Heat Exchangers:**

Basic control strategies, dynamics of the heat exchangers, response to changes in steam temperature, measurement lag and control schemes

**UNIT II**

**The Dynamics and Control of Boilers:**

Boiler basic controls (safety interlocks, single element, two and three element level control, shrink, swell effect, inverse response, feed forward control of feed water, dynamic compensation, fuel-air ratio, stoichiometric calculations, steam temperature and pressure control) Boiler dynamics, burner management system, boiler optimization

**UNIT III**

**The Stability and Control of Chemical Reactors:**

Types of reactions and reactors (overview), factors governing the conduct of reaction, stability of reactors, time constant, effects of lag, flow control, temperature control, pH control, end point detection of continuous and batch reactors. Sequential & logic control in batch process, batch production management

**UNIT IV**

**Dynamic Behavior and Control of Distillation Column:**

Mass and Energy balance, column feed control, column pressure control, control of overhead and bottom composition, distillate reflux flow control. Frequency response, lag in liquid and vapor flow, concentration lag, predicting the behavior of control system.

Dynamic behavior and controls required in pumps and compressors, Design aspects and control scheme development for Waste-Water Treatment plant

**Text Books :**

1. Peter Harriott, "Process Control", TMH
2. F. G. Shinskey, "Process Control Systems" TMH
3. George Stephanopolous, "Chemical Process Control" , PHI
4. Krishna Kant, "Computer based Industrial Control", PHI
5. B. Wayne Bequette, "Process Control: Modeling, Design and Simulation", PHI

**Reference Books**

1. David Lindsley, "Boiler Control Systems : , Mc GRAW-HILL
2. S. K Singh, "Process Control : Concepts , Dynamics and Application," PHI
3. D. Patranabis, "Principles of Industrial Instrumentation" , TMH.
4. Dale E. Seborg, "Process Dynamics and Control", Wiley.

**NOTE:**

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.

Approved by UG BOS & FET

**EE404B**

**COMPUTER APPLICATION TO POWER SYSTEM ANALYSIS**

B. Tech Semester –VIII (AEI, EE, EEE)

L T P Credits  
3 1 - 4

Class Work : 25 Marks  
Theory : 75 Marks  
Total : 100 Marks  
Duration of Exam. : 3 Hrs.

**UNIT I**

**INTRODUCTION:**

Necessity and functions of computers. Level of automation and economy of computer control, Centralized computer control Vs distributed computer control.

**COMPUTER ARCHITECTURE:**

Micro and minicomputer, functional models of I.O. system.

**UNIT II**

**INTERFACING:**

Sampling; Multiplexing; A/D and D/A converters, interfacing with different types of transducers - Analog / Digital, Electrical and non-electrical selection of sensors; Micro computer interfacing of standard buses, Serial buses; Serial data communication protocols.

**STRUCTURAL STUDY OF AUTOMATIC PROCESS CONTROL:**

Fundamental of automatic process control, building blocks of automatic system direct and distributed digital control system. Programmable controllers.

**PERSONAL COMPUTER IN REAL LIFE ENVIRONMENT:**

Introduction, personal computer: system and facility, PC bus and signals, interrupts, interfacing PC with outer world, PC in RTE, Real time application of IBM PC, PC-based distributed control system

**UNIT III**

**Switching:**

Circuit Switched Networks-Three Phases, Efficiency Delay, Datagram Networks-Routing table, Efficiency delay, Virtual Circuit Networks-Addressing, Three Phases, Efficiency, Delay in Virtual Circuit Networks

**Data Link Control**

Framing-Fixed Size Framing, Variable Sized framing, Flow and Error Control-Flow Control, error control, Protocols; Noiseless Channels-Simplest protocol, stop and Wait Protocol, Noisy Channels-Stop and Wait Automatic Repeat Request, Go Back n Automatic Repeat request, Selective Repeat Automatic Repeat request, PiggyBacking

**UNIT IV**

**PROGRAMMING AND APPLICATION:**

Modeling and simulation for plant automation, PLC Architecture and programming of PLC, industrial control application: cement plant, thermal power plant, water treatment plant, steel plant.

**Text Books :**

1. Computer based industrial control: Krishan Kant; PHI

**NOTE:**

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.

Approved by UG BOS & FET

**EE414B**

**COMPUTER APPLICATIONS TO POWER SYSTEM ANALYSIS LAB**

B. Tech Semester –VIII (AEI, EE, EEE)

L T P Credits  
- - 2 1

Class Work : 20 Marks  
Practical : 30 Marks  
Total : 50 Marks  
Duration of Exam. : 2 Hrs.

**LIST OF EXPERIMENTS:**

1. Draw the flow chart and develop the computer program for the formation of the Y Bus of a generalized network.
2. Draw the flow chart and develop the computer program for the formation of the Z Bus of a generalized network.
3. To plot the swing curve and observe the stability.
4. To perform load flow study using Gauss-Siedel method.
5. Perform short circuit study for any type of fault.
6. To observe transmission losses and efficiency with variations in power for the given example.
7. Design of distribution system
8. To study the features of EMTP
9. To study the MATLAB Power System block set features.

**Note:-**

- 1 Total ten experiments are to be performed in the semester
- 2 At least seven experiments should be performed from the above list. Remaining three experiments should be performed as designed and set by the concerned institution as per the scope of the syllabus.

Approved by UG BOS & FET



**AEI422B**

**SEMINAR**  
**B. Tech Semester –VIII**

L T P Credits  
- - 2 2

Class Work : 50Marks  
Practical : -  
Total : 50Marks  
Duration of Exam. : -

The objectives of the course remains

- To learn how to carryout literature search
- To learn the art of technical report writing
- To learn the art of verbal communication with the help of modern presentation techniques

A student will select a topic in emerging areas of Engineering & Technology and will carry out the task under the observation of a teacher assigned by the department.

He/ She will give a seminar talk on the same before a committee constituted by the chairperson the department. The committee should comprise of three faculty members from different specializations. The teacher associated in the committee will be assigned 2 hours teaching load per week.

However, guiding students' seminar will not be considered towards teaching load.

The format of the cover page and the organization of the body of the seminar report for all the undergraduate programs will be finalized and circulated by the Dean, Faculty of Engineering and Technology.

**AEI431B**

**PROJECT**  
**B. Tech Semester –VIII**

L T P Credits  
- - 8 8

Class Work : 75 Marks  
Practical : 125 Marks  
Total : 200 Marks  
Duration of Exam. : 3 Hrs.

The project started in VII Semester will be completed in VIII Semester and will be evaluated through a panel of examiners consisting of the following:

Head/ Chairperson of Department : Chairperson  
Project coordinator : Member  
External examiner : To be appointed by the University

The student will be required to submit two copies of his/her project report to the department for record (one copy each for the department and participating teacher).

Project coordinator will be assigned the project load of, maximum of 2 hrs. per week including his own guiding load of one hr. However, the guiding teacher will be assigned maximum of one period of teaching load irrespective of number of students/groups under him/her.

The format of the cover page and the organization of the body of the report for all the B.Tech. will be finalized and circulated by the Dean, Faculty of Engineering and Technology.

Approved by UG BOS & FET

**GP AEI402B****GENERAL FITNESS FOR THE PROFESSION**

B. Tech Semester –VIII

L	T	P	Credits
-	-	-	4

Examination	:	-
Practical	:	100 Marks
Total	:	100 Marks
Duration of Exam.	:	3 Hrs.

The purpose of this course is to inculcate a sense of professionalism in a student along with personality development in terms of quality such as receiving, responding, temperament, attitude and outlook. The student efforts will be evaluated on the basis of his/ her performance / achievements in different walks of life.

The evaluation will be made by the committee of examiners constituted as under:

- |    |  |   |                             |
|----|--|---|-----------------------------|
| 1. | Dean, Faculty of Engineering & Technology/ Director /Principal of affiliated college | : | Chairperson                 |
| 2. | Chairperson of the department  | : | Member                      |
| 3. | External expert  | : | Appointed by the university |

**A. The student will present a written report before the committee with following in view:**

The student will present before the committee his/her achievements during the current academic session in the form of a written report highlighting followings:

- |      |  |                   |
|------|--|-------------------|
| I.   | Academic Performance   | -----             |
| II.  | Extra Curricular Activities / Community Service, Hostel Activities | <b>(12 Marks)</b> |
| III. | Technical Activities / Industrial, Educational tour                | <b>(12 Marks)</b> |
| IV.  | Sports/games   | <b>(16Marks)</b>  |

**Note:** Report submitted by the students should be typed on both sides of the paper.

- B.** A student will support his/her achievement and verbal & communicative skill through presentation before the examiners. **(40 Marks)**

- C.** Faculty Counselor Assignment **(20 Marks)**

It will be the duty of the student to get evaluated by respective faculty counselor and to submit the counselor assessment marks in a sealed envelope to the committee.

A counselor will assess the student which reflects his/her learning graph including followings:

1. Discipline throughout the year
2. Sincerity towards study
3. How quickly the student assimilates professional value system etc.
4. Moral values & Ethics- Syllabus (one lecture/week on the topics of Human values/Ethics is to be delivered)

IC452B

## RANDOM PROCESSES IN ESTIMATION & CONTROL

B. Tech Semester –VIII (Elective I)

L	T	P	Credits
4	-	-	4

Class Work	:	25 Marks
Theory	:	75 Marks
Total	:	100 Marks
Duration of Exam.	:	3 Hrs.

### UNIT I

**Probability Theory:** Axioms of Probability theory, Probability spaces, Joint and conditional probabilities, Independent events.

**Random variables:** Definitions, Densities and distributors, Examples, Properties of distribution and density function, Joint distributions and densities. Conditional probability distribution and density functions, Independent random variables.

### UNIT II

**Function Of Random Variables:** Distribution & density functions, conditional distributions, Total probability & Baye's theorem. Mean & variance, moments, characteristic functions of two random variables, moments & conditional statistics, partial characterization of a discrete time stochastic process.

**Sequences of Random Variables:** Statistical averages, Characteristic function, Inequalities of chebyshev and schwantz, Convergence concept and the central limit theorem

### UNIT III

**Random Processes:** Definitions, Basic concepts and examples, Stationarity and ergodicity, Second order processes, Weakly stationary and ergodicity, Second order processes, Weakly stationary processes, cyclostationary process, Covariance functions and their properties, Spectral representation Weiner - Kinchine theorem.

### UNIT IV

**Linear Prediction:** forward linear prediction, Backward linear prediction, Levinson-Durbin algorithm, Mean Square Estimation (Kalman filtering for discrete time systems), Minimum variance control, Spectrum estimation, Weiners theory of optimization.

#### Text Books:

1. Papoulis: Probability, Random Variables and stochastic processes 3rd Edition, McGrawHill, 1995.

#### Reference Books:

1. Davenport: Probability and Random processes for Scientists and Engineers, McGrawHill.
2. E. Wang: Introduction to Random Process, Springer Verlag Publication.
3. H. Stark and J. Woods: probability, Random Processes and estimation theory forEngineers, Prentice Hall.

#### NOTE:

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.

Approved by UG BOS & FET

**EE446B**

**ARTIFICIAL INTELLIGENCE**  
**B. Tech Semester –VIII (Elective I)**

L T P Credits  
4 - - 4

Class Work : 25 Marks  
Theory : 75 Marks  
Total : 100 Marks  
Duration of Exam. : 3 Hrs.

**UNIT I**

**FOUNDATIONAL ISSUES IN ARTIFICIAL INTELLIGENCE:**

Foundation and history of AI, AI problems and techniques, AI programming languages, introduction to LISP and PROLOG, problem spaces and searches, blind search strategies, Breadth first- Depth first - heuristic search techniques, Hill climbing, best first - A\* algorithm, AO\* algorithm- game tree, Min max algorithms, game playing- alpha beta pruning.

**UNIT II**

**KNOWLEDGE REPRESENTATION:**

Issues, predicate logic, logic programming, semantic nets, frames and inheritance, constraint propagation, representing knowledge using rules, rules based deduction systems.

**APPROXIMATE REASONING:**

Reasoning under uncertainty, review of probability, Baye's probabilistic inferences and Dempster Shafer theory, Heuristic methods, symbolic reasoning under uncertainty, Statistical reasoning, Fuzzy reasoning, Temporal reasoning, Non-monotonic reasoning.

**UNIT III**

**PLANNING & LEARNING:**

Planning in situational calculus, Representation for planning, Partial order planning algorithm, Learning from examples, Discovery as learning, Learning by analogy, Explanation based learning, Introductory remarks on learning by Neural Networks and Genetic Algorithms.

**UNIT IV**

**APPLICATIONS:**

Rule based systems architecture, Expert systems, Knowledge acquisition concepts, AI application to robotics, and current trends in intelligent systems.

**Text Books:**

1. Artificial Intelligence: A Modern Approach,. Russell & Norvig. Prentice Hall, 1995.

**Reference books:**

1. Elain Rich and Kevin Knight, "Artificial Intelligence", TMH, 1991.
2. Staurt Russel and Peter Norvig, "Artificial Intelligence - A modern approach", PHI, 1998.
3. Patrick Henry Winston, "Artificial intelligence", 3<sup>rd</sup> Ed., Addition Wesley, 1992.
4. Dan W. Patterson, "Artificial Intelligence", PHI, 1990

**NOTE:**

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.

Approved by UG BOS & FET

**EE424B**

**FUZZY CONTROL SYSTEMS**  
B. Tech Semester –VIII (Elective I)

L T P Credits  
4 - - 4

Class Work : 25 Marks  
Theory : 75 Marks  
Total : 100 Marks  
Duration of Exam. : 3 Hrs.

**UNIT I**

**FUZZY CONTROL & ITS MATHEMATICS :**

Fuzzy control from an industrial perspective, knowledge representation in KBC's, Vagueness, fuzzy logic versus probability theory, fuzzy sets; their properties & operations on fuzzy sets, fuzzy relations & operations on fuzzy relations, the Extension Principle, Fuzzy propositions, The Compositional Rule of Inference, Different implications, Representing a set of rules.

**UNIT II**

**FKBC DESIGN PARAMETERS:**

The FKBC architecture, choice of variables & content of rules, Derivation of rules, choice of membership functions, choice of scaling factors, choice of fuzzification procedure, choice of defuzzification procedure, comparison and evaluation of defuzzification methods.

**UNIT III**

**NONLINEAR & ADAPTIVE FUZZY CONTROL:**

The Control Problem, The FKBC as a Non-Linear Transfer Element, Types of FKBC such as PID-like FKBC, Sliding Mode FKBC, Sugeno FKBC, Adaptation mechanism for FKBC Design & Performance Evaluation, Approaches to Design such as membership function tuning using gradient descent, membership function tuning using performance criteria, the self-organizing controller, model based controller.

**UNIT IV**

**STABILITY OF FKBC & INTRODUCTION TO NEURO FUZZY CONTROLLERS:**

The State space approach, Stability and robustness indices, input-output stability, circle criterion, Application of the Circle Criterion to Design, Conicity criterion, Neural networks based Fuzzy controllers & their applications.

**Text Book:**

1. An Introduction to Fuzzy Control: D.,Driankov, H.Hellendoorn and M.Reinfrank.; Narosa Publications.
2. Klir, G.J. & Yuan,B.,' Fuzzy sets and Fuzzy logic, theory and applications', Prentice Hall India Private Limited.

**Reference Books:**

1. Fuzzy Control Systems by Abraham Kandel and Gideon Imngholz; Narosa Publications.
2. Bart Kosko, 'Neural Network & Fuzzy System', PHI

**NOTE:**

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.

Approved by UG BOS & FET

**EE402B**

**ADVANCED CONTROL SYSTEMS**  
B. Tech Semester –VIII (Elective I)

L	T	P	Credits
3	1	-	4

Class Work	:	25 Marks
Theory	:	75 Marks
Total	:	100 Marks
Duration of Exam.	:	3 Hrs.

**UNIT I**

**STATE VARIABLE TECHNIQUES:**

State variable representation of systems by various methods. Solution of state equations-state transition matrix. Transfer function from state variable model. Controllability & Observability of state variable model, Observer system

**UNIT II**

**SECOND ORDER SYSTEMS & STATE PLANE:**

Phase portrait of linear second order systems. Method of isoclines, phase portrait of second order system with non-linearities, limit cycle, singular points, stability of nonlinear system.

**UNIT III**

**DESCRIBING FUNCTION ANALYSIS:**

Definition, limitations, use of describing function for stability analysis, describing function of ideal relay, relay with hysteresis & dead zone, saturation/coulomb friction & backlash, Liapunov's 2<sup>nd</sup> method, Construction of Liapunov Function.

**UNIT IV**

**OPTIMAL CONTROL SYSTEM:**

Variation calculus: fundamental concepts, Functionals of a single function, fixed end point problems-euler-lagrange equation, variable end point problem and the transversality conditions, Limitations of calculus of variation. Pontryagin's minimum principle.

**Text Book:**

3. Digital Control & State Variable Methods: M.Gopal ; TMH.
4. Control Systems Engineering: Nagrath & Gopal, New Age Inter. Publisher.

**Reference Books:**

1. Modern Control Theory: M.Gopal; Wiley International.
2. Applied non-linear control: J.E.Slotine & W.P.Li; Prentice Hall, USA,
3. Nonlinear Control Systems: Isidori; Springer-Verlag.
4. Optimal Control Theory: An Introduction: Donald E. Krik; PHI.

**NOTE:**

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks

Approved by UG BOS & FET

**EE434B**

**ADVANCED INSTRUMENTATION**  
B. Tech Semester –VIII (Elective I)

L T P Credits  
4 - - 4

Class Work : 25 Marks  
Theory : 75 Marks  
Total : 100 Marks  
Duration of Exam. : 3 Hrs.

**UNIT I**

**Introduction:**

Functional block diagram of generalized Instrumentation system. Input-output configuration, specifications under steady and transient state & their performance characteristics.

**UNIT II**

**Review of Sensors and Transducers:**

Temperature, pressure, displacement, velocity, acceleration, strain and torque type.

**UNIT III**

**Signal Conditioning:**

Current & voltage sensitive bridges, Blumlein Bridges, Shielding & grounding, Instrumentation Amplifier & its Characteristics, Linearizing circuits, Wave form and frequency conversion, Active filters, A/D & D/A converters; Balanced modulators & demodulators.

**UNIT IV**

**Microcontroller Based Instrumentation System:**

Interfacing of 8051 Microcontroller with (a) ADC and DAC, (b) Alphanumeric Devices (Sixteen-segment Display, Dot Matrix Displays, LCD Display).

**Reference Books:**

1. E.O. Doebelin, Measurement System – Application & Design. TMH
2. A.K. Sawhney, A Course in Electrical & Electronics Measurement & Instrumentation. Pub.: Dhanpat Rai & Sons.
3. C.S. Rangan, G.R. Sarma, V.S.V. Mani, Instrumentation Devices & Systems. New Delhi: Tata McGraw-Hill Pub. Co. Ltd.
4. Oliver & CAGE, Electronic Measurement & Instrumentation.
5. Raj Kamal, Microcontrollers: Architecture, Programming, Interfacing and System Design. Delhi: Pearson Education (Singapore) Pte. Ltd., Indian Branch.
6. Kenneth. J. Ayala, The 8051 Microcontrollers – Architecture, Programming & Applications. Mumbai: Penram International Publishing (India) Pvt. Ltd..
7. Scott Mackenzie, The 8051 Microcontrollers. Englewood Cliffs: Prentice Hall Pub. Co.

**NOTE:**

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.

Approved by UG BOS & FET



**IC464B**

## **DYNAMIC BEHAVIOUR OF PROCESSES**

B. Tech Semester –VIII (Elective II)

L	T	P	Credits
4	-	-	4

Class Work	:	25 Marks
Theory	:	75 Marks
Total	:	100 Marks
Duration of Exam.	:	3 Hrs.

### **UNIT I**

#### **FUNDAMENTALS:**

Introduction to Process Control, Control Objectives and benefits, Models: introduction to Differential and State Space Equations, Models in different Physical fields: Electrical processes, Mechanical processes, Hydraulic processes, Thermal processes, Mass Flow, Compartment models (pharmacy kinetics), Development of mathematical models, Modeling consideration for control purposes, Regulation: Static Feedback loop, Dynamic Feedback loop.

### **UNIT II**

#### **DYNAMIC BEHAVIOR OF PROCESS CONTROL SYSTEMS:**

Dynamic behavior of first and second order system, series and parallel structures of simple system, recycle structures, staged processes, multiple input and multiple output systems, linear control theory, application of laplace transform and frequency domain to the analysis of open-loop and closed loop dynamics, stability analysis and gain/phase margins.

### **UNIT III**

#### **PROCESS CONTROL DESIGN AND MEASUREMENT:**

Process control design: definition and decisions, managing the design procedure, final control elements, measuring devices for flow, pressure and level.

### **UNIT IV**

#### **SIMULATION & EMPIRICAL MODEL IDENTIFICATION:**

Use of system simulation, tools for modeling & simulation, Simulation models types of system simulation. Analog & digital simulation techniques, process simulation, control system simulation, formulation of model for dynamic system & simulation on analog computer. Empirical model building procedure, process reaction curve, statistical model Identification.

#### **Text Book:**

1. Stephanopoulos, G. (1984). "Chemical process control: an introduction to theory and practice," Prentice-Hall, New Delhi.
2. Seborg, D.E., Edgar, T.F. and Mellichamp, D.A. (2003). "Process dynamics and control," Wiley, New York.
3. Smith, C.A. and Corripio, A.B. (1997). "Principles and practice of automatic process control," Wiley, New York.
4. Johnson, C.D. (2006). "Process control instrumentation technology," Prentice-Hall, New Delhi.

#### **Reference Books:**

1. Process control - Thomas E. Marlin, Mc Graw Hill Publication.
2. Chemical process control - Geoye stephanppolous, PHI private Limited.
3. Introduction to simulation – James Payne (MH)
4. Simulation modeling & analysis – Law Kelton (MH)

#### **NOTE:**

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.

Approved by UG BOS & FET

**ECE428B**

**POWER SYSTEM STABILITY AND FACTS**

B. Tech Semester –VIII (Elective II)

L T P Credits  
4 - - 4

Class Work : 25 Marks  
Theory : 75 Marks  
Total : 100 Marks  
Duration of Exam. : 3 Hrs.

**UNIT I**

**POWER SYSTEM STABILITY PROBLEM:**

Rotor angle stability, voltage stability, short term and long term stabilities, swing equation and its solution techniques.

**SYNCHRONOUS MACHINES AND ITS MODELLING:**

Power transformation, flux linkage equations, voltage equation, formulation using state-space equations, normalizing voltage and torque eqns., equivalent circuit of synchronous m/c, the flux linkage state-space model. Linearization of the flux linkage model, Simplified linear model block diagram, state-space representation of simplified model.

**UNIT II**

**DYNAMIC STABILITY:**

State-space representation, stability of a dynamic system, analysis of stability, Eigen properties of the state matrix, Small signal stability of a single m/c infinite bus system, Effect of excitation systems, power system stabilizer, system state matrix with armature winding.

**TRANSIENT STABILITY:**

An elementary view of transient stability, numerical integration methods, simulation of power system dynamic response.

**UNIT III**

**VOLTAGE STABILITY:**

Basic concept related to voltage stability, voltage collapse, voltage stability analysis, prevention of voltage collapse.

**FLEXIBLE AC TRANSMISSION SYSTEM:**

FACTS definitions, review of FACTS devices, series compensation in transmission systems, cascade connection of components-shunt and series compensation.

**UNIT IV**

**SUB-SYNCHRONOUS OSCILLATORS:**

Turbine generator torsional characteristics, characteristics of series capacitor compensated transmission system, Self excitation, torsional interaction, counter measure to SSR problems, ferro resonance.

**FACTS DEVICES:**

Series connected controllers- inter line power flow controller(IPFC), thyristor controlled series capacitor(TSSC), thyristor controlled series reactor(TCSR), thyristor switch series reactor(TSSR). Shunt connected controllers- static synchronous compensator(STATCOM), static synchronous generator(SSG), battery energy storage system(BESS), super conducting magnetic energy storage(SMES), static VAR compensator(SVC), thyristor controlled reactor(TCR), thyristor switched reactor(TSR), thyristor switched capacitor(TSC), static VAR generator or absorber, static VAR system(SVS), thyristor controlled braking resistor(TCBR), Combined series-shunt connected controllers- unified power flow controllers(UPFC), thyristor controlled phase shifting transformer(TCPST), interphase power controller(IPC), Combined series-series controllers.

**Text Books:**

1. Power System Stability and Control by Prabha Kumar: MGH
2. Power System Control and Stability by Anderson and Fouad: Galgotia Publications

**Reference Books:**

1. Extra high voltage AC Transmission Engg. By Rokosh Das Begamudre
2. Electrical energy theory: An Introduction by O.I. Elgerd: TMH

**NOTE:**

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, atleast one from each unit. All questions carry equal marks.

Approved by UG BOS & FET

**ECE420B****TELECOMMUNICATION SWITCHING SYSTEM****B. Tech Semester –VIII (Elective II)**

L T P Credits  
4 - - 4

Class Work : 25 Marks  
Theory : 75 Marks  
Total : 100 Marks  
Duration of Exam. : 3 Hrs.

**UNIT I****EVOLUTION OF SWITCHING SYSTEM:**

What is Switching, Types of Switching, Block Diagram of Telecommunication Network, Switching System Fundamentals, Classification of Switching System, Elements of a Switching System, Basic Function of Switching System, Basic Telephone Communication, Function of a Manual Switching System, Magneto or Local Battery Switchboard, Common Battery Switchboard, Limitations of Manual Switching System, Introduction to strowger switching system.

**CROSSBAR SWITCHING SYSTEM:**

Introduction, Principle of Common Control, Touch Tone Dial Telephone, Crossbar Switch Mechanism, Principle of Crossbar Switching, Crossbar Switch Configurations, Organisation of a Crossbar Telephone Switch, A General Trunking, Electronic Switching, Classification Crosspoint Technology

**UNIT II****SPACE DIVISION SWITCHING:**

Stored Program control, Centralised SPC, Distributed SPC, Software Architecture, Application software, Enhanced Services, Two Stage Networks, n-Stage Networks.

**TIME DIVISION SWITCHING:**

Introduction, Analog Time Division Switching, Digital Time Division Switching, A Digital Memory Switch, Time Stages in General, Two-Dimensional Switching, Multiple Stage Time and Space Switching

**UNIT III****PACKET SWITCHING:**

Statistical Multiplexing, Local area & wide area networks, Large Scale Networks, Broadband Networks

**TELETRAFFIC ENGINEERING:**

Introduction, Network Traffic Load, CCITT Recommended Busy Hours, Traffic Terminology, The Unit of Traffic, Congestion, Grade of Service, Blocking Probability, Traffic Measurements, Modelling Switching System, Markov processes representing traffic. Calculation of blocking probability, stationary probability measures for Ergodic Markov processes. Combinatorial interpretation, calculation of blocking probability.

**UNIT IV****CONTROL OF SWITCHING SYSTEMS:**

Call Processing functions, common control, Reliability, Availability & Security.

**SIGNALLING:**

Customer Line Signalling, Audio frequency junctions & trunk circuits, FDM carrier Systems, PCM signalling, Inter – register signalling, Common channel Signalling Principles.

**Text Books:**

1. Thiagarajan Viswanathan, "Telecommunication Switching Systems and Networks", PHI
2. Syed Riffat Ali, "Digital switching Systems, system reliability and analysis", Tata MC Graw, 2002.

**Reference Books:**

1. Keshav S, "An Engineering Approach to Computer Network Networking", Addison Wesley, 1998.
2. Martin, "Telecommunication & Computer 3e", PHI

**NOTE:**

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**ECE422B**

**MECHATRONICS**  
B. Tech Semester –VIII (Elective II)

L T P Credits  
4 - - 4

Class Work : 25 Marks  
Theory : 75 Marks  
Total : 100 Marks  
Duration of Exam. : 3 Hrs.

**UNIT I**

**CHARACTERISTIC OF TRANSDUCER AND SENSORS:**

Introduction, general characteristics of transducers and sensors including sensitivity, resolution, accuracy, repeatability, range, response time and hysteresis, linearity etc. Transducers applications and selections.

**UNIT II**

**HYDRAULIC AND PNEUMATIC ACTUATION SYSTEM:**

Mechanical, hydraulic and pneumatic actuation systems, operational characteristics and performance of hydraulic and pneumatic based actuation systems including linear devices, rotary devices, flow control valves, pressure control valves, direction control valves, ancillary devices (accumulators, amplifiers, etc.) Synthesis of systems with respect to fluid pressure, direction and flow control.

**UNIT III**

**ACTUATION SYSTEMS:**

Electrical Actuation Systems: operational characteristics and applications of electrical actuation components for applications like. AC/DC motors, Stepper motors, hydraulic motors, relays, push buttons, switches, etc. MECHATRONIC SYSTEMS: Identification of control systems and their inter relationship, behavior of mechatronic systems (First and Second order response).

**UNIT IV**

**PROGRAMMABLE LOGIC CONTROLLERS:**

Programmable logic controllers and applications: PLC structures, PLC languages, Programming of PLC, Interfacing PLC with actuators, open loop and closed loop control using PLC.

**Reference Books:**

1. Mechatronics – Electronic control in mechanical & electrical engineering by W.Bolton, Longman Indian Edn. 1999.
2. Mechatronic system design, by D.Shetty and R.A. Kolk – Mechatronic system design, PWS Publ. Co., Boston, 1997.
3. Mechatronics and Measurement Systems by D.G.Alcitore and M.B. Histan, TMH Publ. 2nd Edn. 2003.

**NOTE:**

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**ECE418B**

**RELIABILITY ENGINEERING**  
B. Tech Semester -VIII (Elective II)

L T P Credits  
4 - - 4

Class Work : 25 Marks  
Theory : 75 Marks  
Total : 100 Marks  
Duration of Exam. : 3 Hrs.

**UNIT I**

**Introduction:**

Definition for Reliability, Need for reliability engineering, Causes of failures, catastrophic failures and degradation failures. Characteristic types of failures, useful life of components, Exponential case of chance failures, Reliability measures, Derivation for exponential distribution function, other kinds of distributions, Binomial, Poisson uniform, Rayleigh, Weibull, Gamma distributions, Markov chains, failures data analysis.

**Reliability in Systems:**

Reliability Block Diagrams, series systems, parallel systems, K-out of - M systems, Open and short circuit failures, standby systems. Reliability Analysis of Non-series Parallel system, Boolean Algebra Method, Cut-set approach, delta star method, logical signal relation method, Bayes Theorem Method

**UNIT II**

**Reliability Prediction:**

Objective of reliability Prediction, Classification, information sources for failure rate data, prediction methodologies, general requirement, role and limitations of reliability prediction.

**Reliability Allocation:**

Subsystems reliability improvement, Apportionment for new units, criticality.

**UNIT III**

**Redundancy Techniques for reliability:**

Forms of maintenance, measures of maintainability and availability, maintainability function, availability function, two unit parallel system with repair, Markov model for two unit systems, preventive maintenance, provisioning of spares.

**Reliability Testing:**

Kinds of testing, component reliability measurements parametric methods, confidence limits, accelerate testing, equipment acceptance testing.

**UNIT IV**

**Economics of Reliability Engineering:**

Reliability cost, effect of reliability on cost. Reliability achievement cost models, reliability utility cost models, replacement policies.

**Integrated performance measures for communication systems:**

Integration of reliability and capacity, Delay related reliability.

**Text Books:**

1. KK Aggarwal, "Reliability Engineering", Kluwer Academic Netherlands.
2. B Singh, "Quality Control and Reliability Analysis", Khanna Publishers.

**Reference Books:**

1. KB Mishra: Reliability Prediction & Analysis: A Methodology oriented treatment, Elsevier, Netherlands
2. Ebeling, "Introduction to Reliability & Maintainability", TMH

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