COURSE SCHEMA OF BACHELOR OF ENGINEERING IN ELECTRICAL ENGINEERING
(Batch-XXX)

	S.NO	COURSE CODE	SUBJECT	Knowledge Area	PRE-REQ	CREDIT HOURS
SEMESTER-I	1	CSE-111	Introduction to Computing	Computing	--------	3 (2+1)
	2	ELE-111	Workshop Practice	EE Foundation	--------	1 (0+1)
	3	HUM-111	Functional English	Humanities	--------	3 (3+0)
	4	HUM-112	Pakistan Studies	Humanities	--------	2 (2+0)
	5	MTS-111	Calculus and Analytical Geometry	Natural Science	--------	3 (3+0)
	6	PHY-111	Applied Physics	Natural Science	--------	4 (3+1)
	TOTAL CREDIT HOURS					16(13+3)

	S.NO	COURSE CODE	SUBJECT	Knowledge Area	PRE-REQ	CREDIT HOURS
SEMESTER-II	1	HUM-121	Communication & Presentation Skills	Humanities	-------	3 (3+0)
	2	MTS-211	Linear Algebra & Differential Equations	Natural Science	--------	3 (3+0)
	3	HUM-122/3	Islamic Studies/ Ethics	Natural Science	--------	2 (2+0)
	4	ELE-121	Linear Circuit Analysis	EE Foundation	--------	4 (3+1)
	5	CSE-121	Programming for Engineers	Computing	--------	4 (3+1)
	6	CSE-122	Computer Aided Design	EE Foundation	--------	1 (0+1)
	TOTAL CREDIT HOURS					17(14+3)

	S.NO	COURSE CODE	SUBJECT	Knowledge Area	PRE-REQ	CREDIT HOURS
SEMESTER-III	1	MTS-211	Multivariable Calculus	Natural Science	MTS-111	3 (3+0)
	2	MCH-211	Applied Thermodynamics	IDEE-1	--------	3(3+0)
	3	ELE-211	Electrical Network Analysis	EE Foundation	ELE-121	4 (3+1)
	4	ESE-211	Digital Logic Design	EE Foundation	--------	4 (3+1)
	5	ESE-212	Electronic Devices and Circuits	EE Foundation	--------	4 (3+1)
	TOTAL CREDIT HOURS					18(15+3)

	S.NO	COURSE CODE	SUBJECT	Knowledge Area	PRE-REQ	CREDIT HOURS
SEMESTER-IV	1	MTS-221	Complex Variables & Transforms	Natural Science	MTS-111	3 (3+0)
	2	ESE-221	Intro to Embedded Systems	EE Foundation	ESE-211	4 (3+1)
	3	ELE-221	Electromagnetics Field Theory	Core (Breadth)	----------	3 (3+0)
	4	ESE-222	Electronic Circuit Design	Core (Breadth)	----------	4(3+1)
	5	CSE-221	Object Oriented Programing	Computing	----------	4 (3+1)
	TOTAL CREDIT HOURS					18 (15+3)

	S.NO	COURSE CODE	SUBJECT	Knowledge Area	PRE-REQ	CREDIT HOURS
SEMESTER-V	1	MTS-311	Probability & Statistics	EE Foundation	----------	3 (3+0)
	2	ELE-311	Electrical Machines	Core (Breadth)	ELE-122	4 (3+1)
	3	ESE-311	Instrumentation and Measurement	Elective (Depth)-I	----------	4 (3+1)

	4	ESE-312	Signals and Systems	EE Foundation	----------	4 (3+1)
	5	HUM-311	Organizational Behavior	Humanities	----------	3 (3+0)
	TOTAL CREDIT HOURS					18 (15+3)

	S.NO	COURSE CODE	SUBJECT	Knowledge Area	PRE-REQ	CREDIT HOURS
SEMESTER-VI	1	ESE-321	Power Electronics	Elective (Depth)-II	ESE-121	4 (3+1)
	2	ELE-321	Control Systems	Core (Breadth)	MTS-211	4 (3+1)
	3	TEL-321	Communication Systems	Core (Breadth)	----------	4 (3+1)
	4	MCH-321	Health Safety & Environment	IDEE-II	----------	3(3+0)
	5	MGT-321	Engineering Economics & Management	Management Science	----------	3 (3+0)
	TOTAL CREDIT HOURS					18(15+3)

	S.NO	COURSE CODE	SUBJECT	Knowledge Area	PRE-REQ	CREDIT HOURS
SEMESTER-VII	1	HUM-211	Technical Writing	Humanities	----------	2 (2+0)
	2	ELE-411	Elective-I	Core(Breadth-I)	----------	3 (3+x)
	3	ELE-412	Elective-II	Core(Breadth-II)	ELE-322	4 (3+1)
	4	ELE-322	Elective-III	Elective (Depth)-III	----------	4 (3+1)
	5	MGT-411	Engineering Entrepreneurship	Management Science	----------	3 (3+0)
	6	ELE-419	Final Year Project-I	FYP	----------	2 (0+2)
	TOTAL CREDIT HOURS					18(14+4)

	S.NO	COURSE CODE	SUBJECT	Knowledge Area	PRE-REQ	CREDIT HOURS
SEMESTER-VIII	1	ELE-421	Elective-IV	Elective (Depth)-IV	----------	4 (3+x)
	2	ELE-422	Elective-V	Elective (Depth)-V	----------	4 (3+x)
	3	MGT-421	Project Management	Management Science	----------	3 (3+0)
	4	ELE-429	Final Year Project-II	FYP	----------	4 (0+4)
	TOTAL CREDIT HOURS					15 (9+6)
	GRAND TOTAL CREDIT HOURS					138(106+28)

	S.NO	COURSE CODE	SUBJECT	CREDIT HOURS
ELECTIVES POWER SPECILIZATION	1	ELE-xxx	Power Distribution & Utilization	4(3+1)
	2	ELE-xxx	Power System Analysis	4(3+1)
	3	ELE-xxx	Power System Stability & Control	3 (3+0)
	4	ELE-xxx	Power Generation	4 (3+1)
	5	ELE-xxx	Power Transmission	4 (3+1)
	6	ELE-xxx	Advance Machine and Drives	3 (3+0)
	7	ELE-xxx	Power System Protection	4 (3+1)
	8	ELE-xxx	Renewable Energy Systems	3(3+0)
	9	ELE-xxx	High Voltage Engineering	3(3+0)
	10	ELE-xxx	Smart Grid	3(3+0)

	S.NO	COURSE CODE	SUBJECT	CREDIT HOURS
ELECTIVES ELECTRONICS SPECILIZATION	1	ELE-xxx	Digital System Design	4(3+1)
	2	ELE-xxx	Digital System Processing	4(3+1)
	3	ELE-xxx	Opto-Electronics	3 (3+0)
	4	ELE-xxx	Industrial Electronics	4 (3+1)
	5	ELE-xxx	Artificial Intelligence	3 (3+0)
	6	ELE-xxx	Nano Technology	3 (3+0)
	7	ELE-xxx	Introduction to Robotics	3(3+0)
	8	ELE-xxx	VLSI	3(3+0)
	9	ELE-xxx	Antenna and Wave Propagation	3(3+0)
	10	ELE-xxx	Adv. Embedded Systems	3(3+0)
	11	ELE-xxx	Neural Network and Fuzzy Logic	3(3+0)
	12	ELE-xxx	Microwave Engineering	4(3+1)

	S.NO	COURSE CODE	SUBJECT	CREDIT HOURS
ELECTIVES COMMUNICATIONS SPECILIZATION	1	ELE-xxx	Digital System Design	4(3+1)
	2	ELE-xxx	Digital System Processing	4(3+1)
	3	ELE-xxx	Mobile Wireless Communications	3 (3+0)
	4	ELE-xxx	Artificial Intelligence	3 (3+0)
	5	ELE-xxx	Antenna & Wave Propagation	3 (3+0)
	6	ELE-xxx	Satellite Communication	3(3+0)
	7	ELE-xxx	Antenna and Wave Propagation	3(3+0)
	8	ELE-xxx	Adv. Embedded Systems	3(3+0)
	9	ELE-xxx	Neural Network and Fuzzy Logic	3(3+0)
	10	ELE-xxx	Mobile & pervasive Computing	3(3+0)
	11	ELE-xxx	Microwave Engineering	3(3+0)
	12	ELE-xxx	Radar Systems	

	S.NO	COURSE CODE	SUBJECT	CREDIT HOURS
University Electives	1	UNI-xxx	Organizational Behavior	3(3+0)
	2	UNI-xxx	Engineering Entrepreneurship	3(3+0)
	3	UNI-xxx	Project Management	3 (3+0)
	4	UNI-xxx	Technical Writing	3 (3+0)
	5	UNI-xxx	Ethics	3 (3+0)

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Department of Electrical Engineering

Introduction to Computing

Programs & Class: BE-I (EE)	**Semester:** Fall 2019
Credit Hours: 2+1	**Course Instructor: Engr. Dr. Abdul Sattar Chan** **Support instructor: TBA**
Pre-requisite Courses: None	**Post-requisite Courses: None**
Co-requisite Courses: None	**e-mail: abdul.sattar@iba-suk.edu.pk**
Office Hours: 0900 hrs. – 1700 hrs.	**Consulting Hours: ---**
Office Location: 202, Academic Block-III	

ASSESSMENT/ EVALUATION

1.	Project Presentation	**10%**
2.	Assignments	**05%**
3.	Quizzes	**05%**
4.	First Term exam	**20%**
5.	Second Term exam	**20%**
6.	Final Examination	**40%**

RECOMMENDED BOOKS:

S. No	Book Name	Author/s Name	Publisher Name & Edition
1.	Understanding Computers: Today and Tomorrow	Charles S. Parker & Deborah Morley	Course Technology, 25 Thomson Place, Boston, Massachusetts 02210, USA
2.	Discovering Computers2017	Misty E. Vermaat	Shelly Cashman Series

COURSE DESCRIPTION:

This is an introductory course in ITC (Introduction to Computing) designed for beginners. Apart from leading the participants through an introduction to computers, the course also develop understanding for components of PC, Networking Basics, OS fundamentals, everyday Internet applications and computer ethics. A basic understanding of HTML will help the students develop

COURSE LEARNING OUTCOMES

The students will be able:

CLO1: **Identify** the components of a computer system, demonstrate basic proficiency in computer, commonly used computer applications (P)

CLO2: Explain the fundamentals of operating systems, computer networks, and cyber ethics and be able to purchase a computer as per requirements (C)

CLO3: Ability to understand programming logic and to **build**& present a webpage using basic HTML (C)

PROJECTS & ASSIGNMENTS DETAILS ALONGWITH PREDEFINED ASSESSMENT CRITERIA

Quizzes:

- Two quizzes clearly linked with the CLOs will be taken.

Assignments:

- Two assignments clearly linked with the CLOs will be taken.

Projects:

Students research computers or laptops as per university student requirements. Students must come up with 3 OR MORE options for a student to choose from. Then give them advice on which computer to buy.

CLOs	Related PLOs	Teaching Methods	CLO attainment checked in
CLO1	**Modern Tool Usage (5)**	Lab Activities, Lab tasks	First mid, Second mid, Final Exam, Quizzes, Assignments
CLO2	**Ethics (8)**	Lectures, Assignments	First Mid, Second Mid, Final Exam, assignments, Quizzes,
CLO3	**Modern Tool Usage (5)**	Lectures, Assignments	Final Exams, assignments, Quizzes

Lecture Plan

SESSION / WEEK WISE DETAILS:

Session No.	Topics	Assignments/ Quizzes / Digital Library work	Suggested Readings	CLO Covered
01-03	Introducing Today's Technologies: - Computers, Devices, and the Web		Ch:1 Discovering Computers 2017	
04-06	Computing Components: The Motherboard			

	The Control Unit The Arithmetic Logic Unit Machine Cycle Registers The System Clock Personal Computer and Mobile Device Processors Processor Cooling Memory		Ch:6 Discovering Computers 2017	
07-09	Binary Numbers & Logic Operations		**Handout # 1**	
10-12	Operating Systems Operating System Functions Types of Operating Systems Desktop Operating Systems	Quiz No.01	Ch:9 Discovering Computers 2017	
13-15	Digital Storage Storage Hard Drives Portable Flash Memory Storage Cloud Storage Optical Discs		Ch:7 Discovering Computers 2017	
MID-I Exams				
16-18	Communications & Networks Communications Software Network Communications Standards and Protocols Communications Lines		Ch:10 Discovering Computers 2017	
19-21	Communications Devices Home Networks Transmission Media. Physical Transmission Media Wireless Transmission Media		Ch:10 Discovering Computers 2017	
22-24	Introduction to Programming Fundamentals Flow Charts (FC) FC Examples Algorithms Programming Languages Pseudo code	Assignment No.02	Handout# 2	**CLO-III**
25-27	Levels of Programming Languages Non-structured vs Structured	Quiz No.02	Handout# 3	**CLO-III**
MID-II Exams				
29-30	Semester Project details How to Buy a computer		**Project Handout**	**CLO-II**
31-33	**Data bases, Data, and Information.**		Ch:11	

	The Hierarchy of Data **File Maintenance**		Discovering Computers 2017	
34-36	Data base Management Systems		Ch:11 Discovering Computers 2017	
37-40	Digital Security, Cybercrime **Internet and Network Attacks**		Ch:5 Discovering Computers 2017	**CLO-II**
41-43	Unauthorized Access and Use		Ch:5 Discovering Computers 2017	
43-46	Project presentations			
Final Exams				

Introduction to Computing Lab

Instructor: Dr. Abdul Sattar Chan

Week #	**Lab Experiments**
1	Inside the Personal Computer (PC)
2	Computing fundamentals and internet familiarization
3	Operating Systems (OS) fundamentals
4	Introduction to HTML
5 & 6	***MID-TERM I EXAM***
7	HTML Tags
8	Programming fundamental using scratch-I
9	Programming fundamental using scratch-II
10	Python Programming-I
11 & 12	***MID-TERM II EXAM***
13	Python Programming-II
14	Python Programming-III
15	Course Project Design
16	***FINAL EXAM***

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Department of Electrical Engineering

Workshop Practice

Programs & Class: BE-I (EE)	**Semester**: Fall 2019
Credit Hours: 00+01	**Course Organizer**: Dr. Muhammad Asim Ali **Course Instructor**: Dr. Muhammad Asim Ali
Pre-requisite Courses: None	**Post-requisite Courses**:
Co-requisite Courses:	**e-mail**: asim.samejo@iba-suk.edu.pk
Office Hours: 9:00 AM to 5:00 PM	**Consulting Hours**: TBA
Office Location: 105 Academic Block III	

Grading Policy (Lab) (50 Marks)

S No		Max Marks
1.	Lab Report	20
2.	Assignment	10
3.	First Term exam	05
4.	Second Term exam	05
5.	Final Examination	10

Recommended Software

S No.	Software	Publisher
1.	Sketchup 2016	Tremble Software
2.	Easy CAM	Denford
3.	Eagle CAM	Eagle CAM

Course Description:

This module is Work Shop course for Freshmen. The module introduces students to a variety of different skills and ettiquates of working in a Lab Environment. The students learn about the purpose and application of electrical measurement tools. The student have the opportunity to use contemporary computer aided design and manufacturing techniques. They have the opportunity to design objects in plastic and wood and electronic circuit boards. The students have to compile a comprehensive report of the processes and procedures.

Course Learning Outcomes:

CLO 1: Demonstrates ability to design mechanical drawing using CAD software.

CLO 2: Demonstrate ability to use modern tools including 3D printer, CNC router and PCB milling machine.

CLO 3: Demonstrate the cognizance of ethics in utilization of lab facilities.

Important Policies:

- Class attendance will not be compromised and late coming is highly discouraged.
- Assessment of lab reports will be performed during mid-term lab examination sessions.
- Students are responsible for the content of assignments and lab reports. Cheating or plagiarism in any form will not be tolerated. Violations can result in F grade.

CLOs	Level of Learning	Related PLOs	Teaching Method	CLO Attainment Checklist
CLO 1	Cognitive 3	PLO 3	Lab Demonstration	Lab task
CLO 2	Cognitive 4	PLO 5	Lab Demonstration	Lab task
CLO 3	Cognitive 3	PLO 8	Lab Demonstration	Lab Conduct

Application based Lab Activity

Description:

The introductory labs touch open various Design and Fabrication capabilities available in FabLab. To impart students with hands on skill and technical comprehension of the modern manufacturing tools.

S No.	Lab Activity	Contact Hours
1	Health Safety Precautions / Hazard Perception	03
2	Electrical Measurement Tools	03
3	3D Design Using Sketch Up – Introduction	03
4	3D Design Using Sketch Up – Orthographic Project	03
5	3D Design Using Sketch Up – Plugins	03
6	Post Processing of Design using Cura Software	03
	Mid-term 1	
7	Woodwork using CNC Router (Mechanical Drawing)	03
8	Woodwork using CNC Router (Using Easy CAM software)	03
9	Woodwork using CNC Router (Manufacturing and Assembly)	03
10	Domestic Load Calculation Assignment	03
12	PV Load Calculation Assignment	03
	Mid-term 2	
13	PCB Design (Eagle CAM)	03
14	PCB Design (Post-processing and Fabrication)	03
15	Soldering of Electronic Circuit	03
16	Design of Line Following Robot	03

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Department of Electrical Engineering

Functional English

Programs & Class: BE-I (EE)	**Semester:** Fall -2019
Credit Hours:03	**Course Organizer:** Dr. Muhammad Yameen Sandhu **Instructor:** Bahawal Soomro
Pre-requisite Courses:	**Post-requisite Courses: None**
Co-requisite Courses: None	**e-mail: bahawal.soomro@iba-suk.edu.pk**
Office Hours: 09 am -5 pm	**Consulting Hours: Tuesday** **Otherwise please make an appointment**
Office Location: Academic Block One Faculty Office Room#4 .	

ASSESSMENT/ EVALUATION

1.	Class performance and behavior	**05%**
2.	Assignment	**05%**
3.	Presentations	**05%**
4.	Quizzes	**05%**
5.	First Term Exams	**20%**
6.	Second Term Exams	**20%**
7.	Final Examination	**40%**

REFERENCE BOOKS:

S. No	**Book Name**	**Author/s Name**	**Publisher Name & Edition**
1.	Oxford Progressive English.	Rachel Redford	OUP
2.	College Writing Skills	Jhon Languin	

RECOMMENDED BOOKS:

1.	Practical English Grammar	by A. J. Thomson and A. V. Martinet	Oxford University Press
2.	High School English Grammar& Composition	by Wren & Martin	
3.	Exploring the World of English	Saadat Ali Shah	Ilmi Kitab Khana

COURSE DESCRIPTION:

The course has been designed to acquaint students with the concepts and skills required for efficient and effective usage of productive and receptive skills of English language. The course offers a blend of reading and writing materials with essential elements of English composition from various practical resources like, (Books, Newspapers, and Magazines). The course focuses on developing among students an ability to read and write academic texts. On the whole, this course will cater to their needs of language proficiency with particular focus on reading and writing. The reading material is related with local and national traditions of Pakistan in order to create interest among students.

Ser	CLO	Domain	Taxonomy level	PLO	Attainment
1	Students will be able to read different types of reading material particularly their academic texts	Cognitive	A2	PLO-10	First Mid Term
2	Students will able to communicate in group discussion effectively.	Affective	A3	PLO-10	Group discussion
	Students will be able to write well organized and coherent paragraphs and essays	Cognitive	A2	PLO-10	Second Mid Term

PLO-10: Communication: Ability to communicate effectively, orally as well as in writing on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentations, make effective presentations, and give and receive clear instructions.

Quizzes& ASSIGNMENTS DETAILS ALONGWITH PREDEFINED ASSESSMENT CRITERIA

Quizzes:

- Three quizzes clearly linked with the CLOs will be taken at the end of 4th, 9th and 14th week of teaching.
- Best two out of three quizzes will be considered.

Presentations:

- Three presentations will be taken at the end of 5th and 10th, and 14thweek of teaching.
- Best two out of three quizzes will be considered

IMPORTANT POLICIES (subject to the course instructor)

- Class attendance is mandatory and late comers will not be allowed to attend the lecture.
- Late submission of coursework will not be accepted.

Session / Week wise Details:

Session No.	Date / Week	Topics	Assignments/ Quizzes / Digital Library work	Suggested Readings
01-02	Week 01	**CHAPTER/TOPIC HEADING** 1. An Introduction to reading & writing		From the text Book
03-04	Week 01	**Taking Risks** 1. Drama on Killer Mountain (Reading) **Structure of Paragraph** Parts of paragraph Writing as a skill	Related activities from the Handouts	*Oxford Progressive English * Handouts from teachers & Young World
05-06	Week 02	**Taking Risks (Reading)** **Picture Description** and Picture Stories	Related activities from the Handouts	*Oxford Progressive English *Handouts from teachers & Young World
07:08	Week 02	**Customs & Traditions** Kaleidoscopes on wheels (Reading) **Complete the stories** Teacher will share the worksheets of Half stories and students will be asked to complete	Related Activities from the text book	*Oxford Progressive English *Handouts from teachers & Young World
09-10	Week 03	**Writing Process** Pre-writing & its different techniques Writing first draft	Related Activities from the text book and Young World	*Oxford Progressive English *College Writing Skills
11-12	Week 03	**Writing Process** Revising & Editing the content Thesis statement Organize & Connect	Related Activities from the text book and Young World	*Oxford Progressive English *College Writing Skills

13-14	Week 04	**Storm in the desert** (Reading) **Writing Process** Common methods of Introduction	Related Activities from the text book and Young World	*Oxford Progressive English *College Writing Skills
15-16	Week 04	**Sahara** (Reading) **Writing Process** Common methods of conclusion	Related Activities from the text book and Young World	*Oxford Progressive English *College Writing Skills
17-18	Week 05	**Class presentation**	Demonstrate on the given topic	
FIRST TERM				
19-20	Week 05	**Picture Description** and Writing Prompts	Related Activities from the text book and Young World	*Oxford Progressive English *Handouts from teachers & Young World
21-22	Week 06	**The Culinary Delights of Lahore** (Reading) Picture Description and Writing Prompts	Related Activities from the text book and Young World	*Oxford Progressive English *Handouts from teachers & Young World
23-24	Week 06	Patterns of Essay Development Descriptive Essays		*Oxford Progressive English
25-26	Week 07	Writing Samples from students	Related Activities from Text Book	*Oxford Progressive English *College Writing Skills
27-28	Week 07	Patterns of Essay Development Narrative Essay Writing Samples from students	Related Activities from Text Book	*Oxford Progressive English *College Writing Skills
29-30	Week 08	**Special Teaching** (Reading) Patterns of Essay Development Argumentative Essay Writing Samples from students		*Oxford Progressive English *College Writing Skills
31-32	Week 08	Patterns of Essay Development Argumentative Essay Writing Samples from students	Related Activities from Text Book	*Oxford Progressive English *College Writing Skills

33-34	Week 09	Patterns of Essay Development Cause & Effect Writing Samples from students		*Oxford Progressive English *College Writing Skills
35-36	Week 09	Practice of Narrative Essays Reading Model Essay Practice Activity by a Prompt		*Oxford Progressive English *501 Writing prompts
37-38	Week 10	**Group discussion**	Demonstrate on the given topic	
SECOND TERM				
39-40	Week 10	A Beijing Childhood (Reading)		*Oxford Progressive English
41-42	Week 11	Practice of Argumentative Essays Reading Model Essay Practice Activity by a Prompt		*501 Writing prompts
43-44	Week 11	**Practice** of Descriptive Essays Reading Model Essay Practice Activity by a Prompt		501 Writing prompts
45-46	Week 12	**Climbing the Wisteria (Reading)**		*Oxford Progressive English
47-48	Week 12	**Practice** of Cause & Effect Essays Reading Model Essay Practice Activity by a Prompt		501 Writing prompts
49-50	Week 13	**Practice** of Cause & Effect Essays Reading Model Essay Practice Activity by a Prompt		501 Writing prompts
51-52	Week 13	**Amir Khan on His Career (Reading)**		*Oxford Progressive English
53-5	Week 14	**Practice** Reading & Writing Activities from Young World		
55-56	Week 14	**Class presentation**	Demonstrate on the given topic	
57-58	Week 15	**Practice** Reading & Writing Activities from Young World		
59-60	Week 15	**Group discussion**		
FINAL EXAM				

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Department of Electrical Engineering

Pakistan Studies

Programs & Class:BE-1	**Semester:** Fall 2019
Credit Hours: 1.5	**Course Organizer:** **Course Instructor: Yaseen Ali Shah** **Support instructor:**
Pre-requisite Courses: Pakistan Studies	**Post-requisite Courses:**
Co-requisite Courses:	**e-mail: yaseen.shah@iba.edu.pk**
Office Hours: 9:00 to 05:00 Pm	**Consulting Hours: After classes 3:00 Pm-05:00 Pm**
Office Location: knowledge center 2nd floor room 08	**Contact No: 03337155229**

ASSESSMENT/ EVALUATION

1.	Assignments plus presentation	**05**
2.	Quizzes	**05**
3.	First Term exam	**10**
4.	Second Term exam	**10**
5.	Final Examination	**20**

RECOMMENDED BOOKS:

S.No	Book Name	Author/s Name	Publisher Name & Edition
1.	1. Pakistan Studies An analytical approach to Pakistan studies	Pakistan Studies by Gul Shahzad	Rehbar Publisher
2.	1. Pakistan Studies/Pakistan Affairs	Ikram Rabbani.	Carvan series Book house

REFERENCE BOOKS:

1.	Pakistan foreign policy: An historical analysis.	BS.M burke and lawerence Ziring.	Oxford university press 1993
2.	1. Pakistan political roots & Development by	Mehmood Safdar:	1. Lahore 1994

COURSE DESCRIPTION:

This course aims to introduce students to the history of sub-continent comprising Pakistan, provide an overview of contending perspectives on the origins of the country, and examine its Government, Politics and constitutional development. Furthermore, it looks at some Contemporary developmental issues facing the country.

COURSE LEARNING OUTCOMES

Course learning outcomes (CLO)
CLO1: To appreciate socio-Economic Structure of Pakistan
CLO2: To analyze the impact the diminishing natural resources in the wake of geographical condition of Pakistan.

PROJECTS & ASSIGNMENTS DETAILS ALONGWITH PREDEFINED ASSESSMENT CRITERIA

Quizzes:

- 2 quizzes clearly linked with the CLOs will be taken at the end of 14th & 15th week of teaching.

Presentations:

- One presentation will be taken at the end of 15th week of teaching.
- One assignment will be taken at the end of 14th week of teaching

IMPORTANT POLICIES (subject to the course instructor)

- Class attendance is mandatory and late comers will not be allowed to attend the lecture.
- Late submission of coursework will not be accepted.

CLOs	Related PLOs	Cognitive levels	Teaching Methods	CLO attainment checked in
CLO1	PLO 06	C1	Quizzes, assignment lectures Notes & Discussions	Final exam and Assignment
CLO2	PLO 07	C3	Quizzes, Lectures, Notes & discussions	Final exam & Assignment

SESSION / WEEK WISE DETAILS:

Lecture No.	Topics	Assignments/ Quizzes /	Suggested Readings
01-02	**HISTORICAL PERSPECTIVE** Introduction to the course Arrival of Muslims in the Sub-Continent, foundation of Muslim rule (712-1857)	Quizzes	Pakistan Studies by Gul shahzad sarwar/Pakistan Affairs by Ikram Rabbani Notes and www.storyofpakistan.com Watch the documentaries from YouTube
03	Ideological rational with the special reference to Sir Syed Ahmed khan, Sir Muhammad Allama Iqbal and Quid-e-Azam Muhammad Ali Jinnah	Quizzes/Group discussion	
04-05-06	Factor leading to Muslim separation Religious difference Cultural difference Social difference Political difference (1867-1947)	Quizzes/Group discussion	
07-08	Indus valley civilization Moen-jo Daro & Harappa	Assignment Quizzes	
09	Study of Map of Pakistan with the reference to four provinces of Pakistan		Pakistan Studies by Gul shahzad sarwar/Pakistan Affairs by Ikram Rabbani Notes and www.storyofpakistan.com
10-11	Location and geo-physical features of Pakistan	Quizzes	
FIRST MID TERM EXAMS			
12-13	**GOVERNMENT & POLITICS IN PAKISTAN** 1947-58	Quizzes	Pakistan Studies by Gul shahzad sarwar/Pakistan Affairs by Ikram Rabbani

	The formative phase (democratic Government)		Notes and www.storyofpakistan.com Watch the documentaries from YouTube
14-15	1958-71 Martial law regime of Ayub khan and Yahya khan.	Quizzes	
16-17	1971-77 Government of Zulifiqar Ali Bhutto PPP	Quizzes	
18-19	1977-1988 Zia-ul-Haq's Martial law Rule	Quizzes	
20-21	1988-99 Period of democratic Government	Quizzes	
22-23	1999-2008 Pervaiz Mushraf Era & PML-N Government under Nawaz Sharif	Quizzes	
SECOND MID TERM EXAMS			
24-25	**CONTEMPORARY PAKISTAN** Society and culture of Pakistan Ethnicity and ethnic issues and national integration	Assignment	Pakistan Studies by Gul shahzad sarwar/Pakistan Affairs by Ikram Rabbani Notes and www.storyofpakistan.com CLO I & CLO II
26-27	Foreign policy of Pakistan Determinations of foreign policy of Pakistan Major challenges to foreign policy of Pakistan	Assignment/Quizzes	
28-29	Major problems and issues facing Pakistan today	Assignment	
30-31	Climate, Natural resources Global warning concern Diminishing energy resources	Quizzes/Assignment	
32	Other environmental issues.	Assignment	
FINAL EXAMS			

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Department of Electrical Engineering

Calculus and Analytical Geometry

Programs & Class: BE-I (EE)	**Semester:** Fall 2019
Credit Hours: 03	**Instructor:** Mr. Umair Khan
Pre-requisite Courses: None	**Post-requisite Courses:** None
Co-requisite Courses: None	**e-mail:** umairkhan@iba-suk.edu.pk
Office Hours: 09:00 AM to 5:00 PM	**Consulting Hours:**
Office Location: Room# 01, Academic Block-I	

ASSESSMENT/ EVALUATION

1.	Class performance and behavior	05%
2.	Semester Project	None
3.	Quizzes	10%
4.	Assignment	05%
5.	First Term Exam	20%
6.	Second Term Exam	20%
7.	Final Examination	40%

RECOMMENDED BOOKS:

S.No	Book Name	Author/s Name	Publisher Name & Edition
1.	Calculus	James Stewart	8th Edition
2.	Plane Analytic Geometry Calculus with Analytic Geometry	Maxime Bocher S. M. Yusuf and Muhammad Amin	New-York, Henry Holt & Company New edition

REFERENCE BOOKS:

1.	Calculus	James Stewart	8th Edition
2.	Calculus in Single Variable	Larson Hostetler Edwards	9th Edition

COURSE DESCRIPTION:

This course is design for the students of EE department. This course is helpful for students to understand the concept of differentiation and Integration and their use in engineering and science. The core contained of this subject is, Functions, limit of a function, derivatives of the

functions of one variable, applications of differentiation in engineering and science through optimization, and Euclidian geometry in 2-D.

COURSE CONTENTS:

Introduction to Limits, Rates of Change and Limits, One-Sided Limits, Infinite Limits, Continuity, Continuity at a Point, Continuity on an interval, Differentiation: Definition and Examples, Relation between Differentiability and Continuity, Derivative as slope, as rate of change (graphical representation), The Chain Rule, Applications of Ordinary Derivatives, definite and Indefinite Integrals, Different Techniques for Integration, Riemann Sum, Fundamental Theorem of Calculus, Area under the Graph of a Nonnegative Function, Improper Integrals, Transcendental Functions: Inverse, Logarithmic and Exponential functions, Inverse Trigonometric Functions, Hyperbolic Functions and Inverse Hyperbolic Functions and some more Techniques of Integration, Linear models and rates of change, Slope of the line, Equations of line, Ratios and rates of change, Graphing linear models, Parallel and perpendicular lines, Distance between two points, Distance from a line to a point, Distance between two parallel lines, Internal and External division of a line by a point, Angle between two lines.

COURSE LEARNING OUTCOMES

The students will be able:

CLO1: Express the idea of coordinate and analytical geometry in two dimensions

CLO2: Express the ideas of limits, continuity, derivative and integration in two dimensions

CLO3: Apply derivation and integrals for solving problems arising in engineering science.

IMPORTANT POLICIES

- Class attendance is mandatory and late comers will be marked absent.

CLOs	Level of learning	Related PLOs	Teaching Methods	CLO attainment checked in
CLO1	**Cog-2**	**1**	Lectures	First mid, Final exam
CLO2	**Cog-2**	**1**	Lectures	First Mid, Final Exam
CLO3	**Cog-3**	**2**	Lectures	Second Mid, Final exam

SESSION / WEEK WISE DETAILS:

Sessions	Topics	CLO Mapping	Sessional	Suggested Readings
01-02	Introduction to Course and Functions			Chapter 1 Including Exercise 1.1-1.7 and 1.8 James Stewart
03-04	Mathematical Models, A Catalog of Essential Functions			
05-06	Transformation and Compositions of Functions			
07-08	Graphical Representations of The Functions	CLO1		
09-10	The Tangents and Velocity problems, The Limit of a Functions	CLO1		
11-12	Limit Laws, The Precise definition of a limit, Continuity, Other Rates of Changes	CLO2		
13-14	Derivatives and rate of Change, The Derivative as a Function and Differentiation Formulas,			Chapter 2 & 3 Including Exercise 2.1-2.8 Exercise 3.1-3.2 of James Stewart
	FIRST MID TERM EXAMS			
15-16	Derivative of Trigonometric Functions			
17-18	The Chain Rule, Implicit Differentiations, Higher Derivatives	CLO2		
19-20	Maximum and Minimum Values and Their Applications	CLO2		
21-22	The Mean value Theorem and Its Applications	CLO3		James Stewart Exercise # 3.9 Chapter 4, 6 & 7 Including Exercises 4.2-4.5. Exercise 6.8. Exercise 7.1, 7.2 and 7.4 James Stewart
23-24	Antiderivatives, Techniques of integrations			
25-26	Integration by parts			
27-28	Trigonometric integrals,	CLO2		
29-30	Integration of rational functions by partial fractions	CLO2		
31-32	Indefinite Integrals and The Net Change Theorem	CLO2		
	SECOND MID TERM EXAMS			
33-34	The substitution Rule of polynomials			
35-36	The Definite Integral and properties of a definite integrals	CLO2		
37-38	And the Fundamental Theorem of Calculus Part 1			

39-40	The Fundamental Theorem of Calculus Part 2			
41-42	Indeterminate Form and L' Hospital Rule	CLO2		Chapter 7 S. M. Yusuf and Mohammad Amin and also Maxime Bocher chapter 2, 3
43-44	Preliminaries, Distance between two points			
45-46	Straight Lines in R^3			
47-48	Direction Angles of a Vector			
49-50	Angle Between two straight lines	CLO2		
51-52	Distance of a point from a lines and equations for Planes			
53-54	Revision	CLO2		
55-56				
FINAL EXAMS				

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Department of Electrical Engineering

Applied Physics

Programs & Class: BE-I	**Semester:** Ist
Credit Hours: 04 (03+01)	**Instructor:** Dr Abdul Qadir
Office location: Block 03, Room 103, Ext 4053	**Post-requisite Courses:** Electronic devices and circuits
Consulting hours: Monday 12:00 to 1:00pm, Friday 10:00 to 12:00am	**e-mail: aqadir@iba-suk.edu.pk**

EVALUATION

1.	Quizzes	**20%**
2.	First Term	**20%**
3.	Second Term	**20%**
4.	Final Examination	**40%**

RECOMMENDED BOOKS:

S. No	Book Name	Author/s Name	Publisher Name & Edition
1.	Fundamentals of Physics	David Halliday, Robert Resnick, and Jearl Walker	10th Edition, John Wiley & Sons, ISBN: 0471465097.
2.	Electronic devices	Thomas L. Floyed	Ninth Edition, Pearson Education Instruction

REFERENCE BOOKS:

1.	Schaum's Outline of Applied Physics	Arthur Beiser	Fourth Edition, McGraw-Hill, ISBN: 0071426116

DIGITAL & WEB RESOURCES:

www.physicsclassroom.com
www.physicsforum.com

COURSE DESCRIPTION:

Applied Physics course is for students enrolled in first year engineering. This course has been designed for student who needs a broad understanding of physics and the ability to apply those principles in the electricity, magnetism and thermodynamics. It is a lab-based approach to the concepts of Charge, electric field, electric potentials, heat and work as they may apply in electrical, computer systems and energy systems.

COURSE LEARNING OUTCOMES:

After completion of the course, students should be able to:

CLO1: To **describe** the relationship between electrical charge, electrical field and electrical potential. Solve numerical problems involving topics covered

Curriculum Mapping

CLOs	Related PLOs	Teaching Methods	Mapped ABET SOs	CLOs attainment checked in	Cog level
1	**1**	Lectures, tutorials and numerical sheets	N/A	First mid, Second mid, Quiz, final exam	1

Mapped OBE Program Learning Outcomes (PLOs):

PLO1 Engineering Knowledge: An ability to gain and apply knowledge of mathematics, science, engineering fundamentals and engineering specialization to solve complex engineering problems.

Mapped ABET Student Outcomes (SOs):

N/A

IMPORTANT POLICIES

The student is expected to attend all of the scheduled classes if for some reason the student cannot make a class I should be contacted in advance, if possible, to arrange to turn in class work and to get assignments or related work, if any, for following class. The course will include homework problems, two midterm exams and a comprehensive final. The student is expected to turn in all work on time.

SESSION / WEEK WISE DETAILS:

Session No.	Week	Topics	Assignments/ Quizzes / Digital Library work	CLO Mapping	Suggested Readings
01-6	**03**	**Electrostatics:** Coulomb's law, first and second shell theorems, Charge in isolated conductors, conductor with a cavity, charge quantization, charge conservation and related numerical			Text book [1]
7-21	**05**	Electric field and potential, Ist & 2nd shell theorems, Field due to a point charge: electric field of Dipole, electric field due to several point charges. Electric field of continuous charge distribution e.g infinite	Quiz		Text book [1]

		line of charge, Ring of charge, disc of charge. Torque and energy of a dipole in uniform field. Application: Microwave oven, Electric flux: Gauss's law; and its application, field near a charged conducting sheet, Field of infinite line of charge, field of infinite sheet of charge. Solve numerical problems involving topics covered and related numerical		CLO-1	
22-28	**02**	Calculating the capacitance of parallel plate, cylindrical and spherical and isolated capacitor. Electric Current, energy transfer in an electric circuit. Calculating the current in a single loop, voltages at various elements of a loop. Use of Kirchhoff's Ist & 2nd law, capacitance, dielectrics. Growth and Decay of voltage in an RC circuit. Solve numerical problems involving topics covered and related numerical	Assignment	CLO-1	Text book [1]
29-34	02	**Electrodynamics:** Magnetic field and force, sources of magnetic field, Magnetic force on a charged particle, magnetic force on a current, Torque on a current loop. Faradays law of electromagnetic induction, Lenz's law, Magnetic dipole: Energy of magnetic dipole in field. Discuss quantitatively, Lorentz Force with its applications in CRO. RL circuit. Solve numerical problems involving topics covered and related numerical	Quiz	CLO-1	Text book [1]
35-40	**02**	Three laws of **thermo-dynamics**, Carnot theorem, Carnot engines. Heat engine. Refrigerators. Calculation of efficiency of heat engines. Coefficient of performance of refrigerators. Solve numerical problems involving topics covered and related numerical.	Assignment		Text book [1]
41-45	**03**	Basic crystal structure, free electron model, energy band in solid and energy gaps, doping, p-type, n-type semiconductor materials, p-n junction diode, its structure. Characteristics curve of a diode, half wave rectification, full wave rectification, peak inverse voltage in case of full wave rectifier, characteristics and application as rectifiers. Clipper and clamper circuits. Transistor, its basic structure and operation and related numerical			Text book [2]

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Department of Electrical Engineering

Communication & Presentation Skills

Programs & Class: BE-II	**Semester:** Fall -2019
Credit Hours: 3 Hours	**Course Organizer: Dr Muhmmad Yameen Sandhu Course Instructor: Rashid Hussain**
Pre-requisite Courses:	**Post-requisite Courses:**
Co-requisite Courses:	**e-mail: rashidhussain@iba-suk.edu.pk**

ASSESSMENT/ EVALUATION

1.	Group Discussion	**10**
2.	Presentations	**10**
3.	First Mid Term Examination	**20**
4.	Second Mid Term Examination	**20**
5.	Final Exams (Written)	**20**
6.	Final Speech	**20**
7.		

RECOMMENDED BOOKS:

S.No	Book Name	Author/s Name	Publisher Name & Edition
1.	The Art of Public Speaking	Stephen E Lucas	McGraw-Hill Companies Inc.
2	Presentation Skills Manual	International School of Communication	

REFERENCE BOOKS:

1.	Communicate!	Kathleen S. Verderber Rudolph S. Verderber	Wadsworth Publishing

COURSE DESCRIPTION:

This course is designed to equip the students with the skills that will enable them to communicate clearly and concisely in diverse situations and to prepare them to give effective presentations. The course emphasizes on determining objective and developing a logical argument before presenting the message in an appropriate and accurate manner. Through this course students will be able to

COURSE LEARNING OUTCOMES

The Students will be able to:

CLO1: Impart the basics of communication which will help them communicate more effectively and accurately.

CLO2: Demonstrate effective individual presentation skills, such as verbal and non-verbal cues.

CLO3: Participate in group communication effectively and ethically.

PROJECTS & ASSIGNMENTS DETAILS ALONGWITH PREDEFINED ASSESSMENT CRITERIA

and such other techniques which help them manage their anxiety about public speaking.

CLOs	Level of learning	Related PLOs	Teaching Methods	CLO attainment checked in
CLO1	Cognitive level 2	**10**	Lectures, Group Discussion	**Mid 1**
CLO2	Affective level 2	**10**	**Lectures Group Discussions**	**Presentations, Mid 2**
CLO3	Affective level 2	**9 and 8**	**Lectures Group Discussions**	**Group Discussion 1and 2**

IMPORTANT POLICIES

- You will be counted as tardy (late) if you are not in your seat by bell.
- Advance Reading of the chapter is mandatory, whenever we are going to start new chapter you are all supposed to be ready with its reading.
- Please show courtesy by being quiet during activities and class discussions.

LECTURE - Please keep the area around your desk **WISE DETAILS:** clean, and please do not write on the furniture.

- Please do not ask to leave the classroom at any cost.

Session No.	Date / Week	Topics	Assignments/ Quizzes / Digital Library work	Suggested Readings
01-02	Week 01	• **Introduction to Course and Course policies** • **Part One: Speaking and Listening** Chapter 1: Speaking in Public		Text Book 'The Art of Public Speaking'
03-04	Week 01	Chapter 1: Speaking in Public Discussion		
05-06	Week 02	Chapter 2: Ethics and Public Speaking		
07:08	Week 02	Chapter 2: Ethics and Public Speaking Discussion		Text Book 'The Art of Public Speaking'
09-10	Week 03	Chapter 3: Listening		
11-12	Week 03	Chapter 3: Listening Discussion		Text Book 'The Art of Public Speaking'
13-14	Week 04	Chapter 4: Giving Your First Speech		
15-16	Week 04	Chapter 4: Giving Your First Speech		Text Book 'The Art of Public Speaking'
17-18	Week 05	**Part Two: Speech Preparation: Getting Started** Chapter 5: Selecting a Topic and a Purpose	First Presentation 1	
19-20	Week 05	Chapter 5: Selecting a Topic and a Purpose Discussion		
21-22	Week 06	Chapter 6: Analyzing the Audience		Text Book 'The Art of Public Speaking'
23-24	Week 06	Chapter 6: Analyzing the Audience Discussion		Text Book 'The Art of Public Speaking'
25-26	Week 07	Chapter 19: Speaking in Small Groups		Text Book 'The Art of Public Speaking'

27-28	Week 07	**Group Discussion** Assessment		
29-30	Week 08	Chapter 7: Gathering Materials	Group Discussion 1	Text Book 'The Art of Public Speaking'
31-32	Week 08	Chapter 7: Gathering Materials Discussion		
33-34	Week 09	Chapter 8: Supporting Your Ideas		Text Book 'The Art of Public Speaking'
35-36	Week 09	Chapter 8: Supporting Your Ideas Discussion		
37-38	Week 10	**Part Three: Speech Preparation: Organizing & Outlining** Chapter 9: Organizing the Body of the Speech	Presentation 2	Text Book 'The Art of Public Speaking'
39-40	Week 10	Chapter 9: Organizing the Body of the Speech Discussion		
		Second Mid		
41-42	Week 11	Chapter 10: Beginning and Ending the Speech	Group Discussion 2	Text Book 'The Art of Public Speaking'
43-44	Week 11	Chapter 10: Beginning and Ending the Speech Discussion		Text Book 'The Art of Public Speaking'
45-46	Week 12	Chapter 11: Outlining the Speech		Text Book 'The Art of Public Speaking'
47-48	Week 12	Chapter 11: Outlining the Speech Discussion		

49-50	Week 13	**Part Four: Presenting the Speech** Chapter 12: Using Language		Speaking'
51-52	Week 13	Chapter 12: Using Language Discussion		Text Book 'The Art of Public Speaking'
53-54	Week 14	Chapter 13: Delivery		
55-56	Week 14	Chapter 13: Delivery Discussion	Final Speech	Text Book 'The Art of Public Speaking'
57-58	Week 15	Chapter 14: Using Visual Aids		Text Book 'The Art of Public Speaking'
59-60	Week 15	• **Impromptu Speeches By the Students**		
61-62	Week 16	• **Impromptu Speeches By the Students**		
63-64	Week 16	• **Impromptu Speeches By the Students**		

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Department of Electrical Engineering

Linear Algebra & Differential Equations

Programs & Class: BE-II (EE)	**Semester:** Fall 2019
Credit Hours: 03	**Course Organizer:** Dr. Muhammad Asim Samejo **Instructor:** Miss Shumaila Ambreen **Support Instructor:** TBA
Pre-requisite Courses: None	**Post-requisite Courses: None**
Co-requisite Courses: None	**e-mail: pervez.ali@iba-suk.edu.pk**
Office Hours: 09 am -5 pm	**Consulting Hours: Monday 10am- 12pm Otherwise please make an appointment**
Office Location: Room# 203, Academic Block 02	

ASSESSMENT/ EVALUATION

1.	Class performance and behavior	**--**
2.	Semester Project	**--**
3.	Assignments	**10%**
4.	Quizzes (Best 02 out of total 03)	**10%**
5.	First Term Exams	**20%**
6.	Second Term Exams	**20%**
7.	Final Examination	**40%**

RECOMMENDED BOOKS:

S.No.	Book Name	Authors Name	Publisher/Edition
1	Linear Algebra	David C-Lay	4th Edition
2	Introduction to Linear Algebra	Gilbert Strang	5th Edition
3	Elementary linear algebra with applications	By: Howard Anton, Chris Rorres	9th Edition
4	Elementary Linear algebra	By: Ron Larson	8th Edition
5	Differential equations	By: branson	Schuam's outline series
6	Differential equations	By R. l shapely	3rd Edition
7	Differential equations for Engineers	WEI-CHAU XIE	Cambridge
8	A First Course in Differential Equations with Modeling Applications	Dennis G. Zill	10th Edition

COURSE DESCRIPTION:

The course of linear algebra introduced here to upgrade the ability of students to solve the tedious system of simultaneous equations. Using metrics, the transformation of axes and transformation of spaces can be studied easily using metrics. And this course will enable students to understand the transformation in computer graphics, image processing and various other fields of computer and science. While the course of differential equations will enable students to solve all those problems where the change happened due to other factors, the can solve the model of those problem in which one of the variable change due to other variables(parameters) here we will focus first to solve various problem (differential equations) of first order for applications.

COURSE CONTENTS:

Introduction to Matrices, Types of Matrices, Operations on Matrices, Symmetry in Matrices, System of Linear Equations**,** Solutions of L.E, Graphical Interpretation of System of Equations**,** Matrix Form of Equations, ERO-Elementary Row Operation, Echelon Form, Reduced Echelon Form, Solution of System of Equations, Using ERO-Technique, Gaussian Elimination, Gauss-Jordan Method, Analysis of Solutions, Inverse Of Matrices, Using ERO-Technique, Solution of System of Equations by Inverse Method, Determinant, Cramer's rule for Solution of system of Equations, Evaluation of determinates by elementary row operations, Co-factors and Minors, Determinant(in terms of Co-factors), Ad-joint of Matrix, Inverse of Matrix, Vectors , norm and inner product of vectors, Eigen values and Eigen vectors, Euclidian Space Transformations, Reflection, Projections, Matrix Special Operations, Orthogonal Matrix, Rotation Matrix, in 2-D and 3-D, Rotations and Reflections, Linear transformation properties and problems of linear transformations, Vector space and subspace, Linear combinations, linearly dependent Vectors, Linearly Independent Vectors, Bases, Differential equations classification as ordinary, partial linear non-linear ,differential equations, Solution of first order differential equations separable equations, Exact differential equations, Non-Exact differential equations, Homogeneous differential equations, Non-Homogeneous differential equations, Linear and Bernoulli differential equations, Second order homogeneous differential equations, nature of roots and their solutions, Homogeneous differential equations of higher order, Non-homogeneous differential equations , variation of parameters, Non-homogeneous differential equations , variation of parameters, Application of first order to population growth and vibrating spring problems

COURSE LEARNING OUTCOMES

The students will be able:

CLO1: Apply the knowledge of Linear Algebra to solve various engineering problems.

CLO2: Apply the concepts of ODE's to analyze the characteristics of RLC circuits.

PROJECTS & ASSIGNMENTS DETAILS ALONGWITH PREDEFINED ASSESSMENT CRITERIA

Quizzes:

- Three quizzes clearly linked with the CLOs will be taken at the end of 4^{th}, 9^{th} and 14^{th} week of teaching.
- Best two out of three quizzes will be considered.

Assignments:

- Two assignments will be given in 7^{th} and 11^{th} week.

IMPORTANT POLICIES (subject to the course instructor)

- Class attendance is mandatory and late comers will not be allowed to attend the lecture.
- Mobile-use is not allowed in any case.

CLOs	Level of learning	Related PLOs	Teaching Methods	CLO attainment checked in
CLO1	Cog-4	2	Lectures, tutorials	First Mid, Second Quiz, Final Exam
CLO2	Cog-3	4	Lectures, tutorials	2nd Assignment, Final exam, 3rd Quiz

SESSION / WEEK WISE DETAILS:

Lecture No.	Topics	CLO Mapping	Assignments/ Quizzes	Suggested Readings
01-02	• Introduction to Matrices ➢ Types of Matrices ➢ Operations on Matrices ➢ Symmetry in Matrices			Howard Anton + Any Book from aforementioned reference books
03-04	• System of Linear Equations ➢ Solutions of L.E ➢ Graphical Interpretation of System of Equations ➢ Matrix Form of Equations			
05-06	• ERO-Elementary Row Operation ➢ Augmented Matrix ➢ Echelon Form ➢ Reduced Echelon Form			
07-08	• Solution of System of Equations Using ERO-Technique ➢ Gaussian Elimination ➢ Gauss-Jordan Method ➢ Analysis of Solutions	CLO-1		
09-10	• Inverse of Matrices ➢ Using ERO-Technique ➢ Solution of System of Equations by Inverse Method			
11-12	• Determinant ➢ Cramer's rule for Solution of system of Equations ➢ Evaluation of determinants by elementary row operations			
13-14	• Co-factors and Minors ➢ Determinant (in terms of Co-factors) ➢ Ad-joint of Matrix ➢ Inverse of Matrix ➢ Rank of the Matrix			
15-16	• Vectors ➢ Norm ➢ inner product of vectors		Quiz-1	

17-18	• Eigen values and Eigen vectors ➢ Diagonalization ➢ Cayley-Hamilton Theorem	CLO1		
19-20	• Euclidian Space Transformations ➢ Projections • Current and Voltage Analysis of Electric Circuits	CLO1		
	FIRST MID TERM EXAMS			
21-22	• Matrix Special Operations ➢ Orthogonal Matrix ➢ Rotation Matrix, in 2-D and 3-D			
23-24	• Vector space and subspace	CLO1		
25-26	• Linear Combinations ➢ Bases ➢ linearly dependent Vectors ➢ Linearly Independent Vectors	CLO1		
27-28	• Linear transformation properties and problems of linear transformations	CLO1		
29-30	• Wronskian Test for Independence of functions		Assignment-1	
31-32	• Differential equations classification as ordinary, partial linear, non-linear, Solution vs. Function and Basic terminology			
33-34	• Solution of first order differential equations separable equations		Quiz-2	
35-36	• Exact and Non-exact differential equations,			
	SECOND MID TERM EXAMS			
37-38	• Homogeneous and Non-homogeneous differential equations			
39-40	• Linear and Bernoulli differential equations	CLO2		
41-42	• Second order homogeneous differential equations, nature of roots and their solutions	CLO2	Assignment-2	
43-44	• Homogeneous differential equations of higher order			
45-46	• Non-homogeneous differential equations, Un-determined Co-efficient Method and variation of parameters			
47-48	• RLC	CLO2		
49-50	• More Examples on Application of first and Second order Differential equations (RLC)	CLO2	Quiz3	
51-52	Review			
		FINAL EXAMS		

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Department of Electrical Engineering

Linear Circuit Analysis

Programs & Class: BE-II (EE)	**Semester:** Fall 2019
Credit Hours: 4 (3+1)	**Instructor:** Engr. Umar Abdul Majeed **Support Instructor:** TBA
Pre-requisite Courses: None	**Post-requisite Courses: Electrical Network Analysis**
Co-requisite Courses: None	**e-mail: umar.majeed@iba-suk.edu.pk**
Office Hours: 09 am -5 pm	**Consulting Hours: 2 pm- 4 pm (Mon-Tues)** **Otherwise please make an appointment**
Office Location: Room# 107, Academic Block 03	

ASSESSMENT/ EVALUATION

1.	Semester project/ assignments/ group activities etc	**10%**
2.	Quizzes (Best 02 out of total 03)	**10%**
3.	First Term Exams	**20%**
4.	Second Term Exams	**20%**
5.	Final Examination	**40%**

RECOMMENDED BOOKS:

S.No	Book Name	Author/s Name	Publisher Name & Edition
1.	Introductory Circuit Analysis	Robert L.Boylested	Prentice Hall, Latest Ed.
2.	Electrical technology	B.l Theraja and A.K. Theraja	S Chand and Company, latest edition

REFERENCE BOOKS:

1.	Electric Circuit Analysis	David E. Jhonson, Jhonny R. Jhonson	Jhon Wiley and sons, latest edition

COURSE DESCRIPTION:

This course is designed for the students to learn and practice the theory of electric, magnetic and electromagnetic fields. The course starts with the revision of essential vector calculus followed by static and dynamic electric and magnetic fields. Maxwell's equations and their mathematical formulation describing electromagnetic phenomenon are introduced.

COURSE LEARNING OUTCOMES

Students will be able to:

CLO1: To **apply** the knowledge of Network Theorems to solve complex linear circuits.

CLOs	Level of learning	Mapped OBE PLOs	Mapped ABET SOs	Teaching Methods	CLO attainment checked in
CLO1	**Cog-3**	**2**		Lectures, tutorials	First mid, Second mid, Quiz 1, Final exam, Problem Sheet
				Lectures, tutorials	Quiz 3, Final Exam, Problem Sheet
				Labs	Lab Exam
				Labs	Lab Exam

Mapped OBE Program Learning Outcomes (PLOs):

PLO2 Problem Analysis: An ability to identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.

Mapped ABET Student Outcomes (SOs):

Performance Indicator for SO1 are:

a. Identification of specific facts of mathematics, science and engineering for a given situation.
b. Convert real world situation into an appropriate model
c. Ability to solve engineering problems using relevant facts of mathematics, science and engineering

LECTURE WISE DETAILS:

Lecture No.	Topics	CLO Mapping	Assignments/ Quizzes	Suggested Readings
01-03	Introduction to linear elements (R, L & C) Basic Terminologies Definition of circuit, network, unilateral circuits and bilateral circuits, active networks, passive networks, distributed parameters, lumped parameters, node, branch, loop, meshes etc.		Quiz 1	Fundamental concepts of DC circuits
04-05	Ideal Independent voltage and current sources, Dependent Voltage and current sources	CLO1		
06-09	Solution of series and parallel circuits using VDR and CDR	CLO1	CLO 1 Quiz 2	Text Book / Reference Book
10-13	Solution of simple electric circuits using Kirchhoff's Laws	CLO1		
14-17	Nodal analysis & Mesh/Loop Analysis			
	FIRST MID TERM EXAMS			
18-19	Star-Delta Transformations		CLO 1 Quiz 2	Text Book / Reference Book
20-30	**Network Theorems with DC circuits:** Superposition Theorem Thevenin's Theorem Norton's Theorem Maximum power Transfer Theorem Reciprocity Theorem			
31-32	**AC fundamentals**, Instantaneous values, peak to peak values, periodic wave form, period, cycle, frequency, angular velocity			
33-34	RMS and Effective Values, average and maximum values of current and voltage of sinusoidal signal wave form, Form Factor, Peak Factor.		Quiz 3	Fundamental concepts of AC circuits
	SECOND MID TERM EXAMS			
35-38	Reactance, Inductive Reactance, Capacitive Reactance, Susceptance, Inductive Susceptance, Capacitive Susceptance, Impedance and Admittance			
39-48	**Network Theorems for AC circuits:** Superposition Theorem Thevenin's Theorem		Quiz 3	Fundamental concepts of AC circuits

	Norton's Theorem Maximum power Transfer Theorem Reciprocity Theorem			Text Book/ Reference Book
	FINAL EXAMS			

For Lab Courses, Insert list of lab experiments and proposed lab projects here:

Week	Objective	Mapped CLO
1	Verification of Voltage Divider & Current Divider Rule For Various Electric Circuits	
2	Verification of Kirchoff's Laws	
3	Verification Of mesh analysis for various electric circuits	
4	Verification of Nodal Analysis for various electric circuits	
5 & 6	**MIDTERM 1**	
7	Verification of Superpostition Theorem	
8	Verification of Thevenin's Theorem for various electric circuits	
9	Verification of Norton's theorem for various electric circuits	
10	Verification of maximum power transfer theorem	
11 & 12	**MIDTERM 2**	
13	Verification of Reciprocity theorem	
14	Phase shift measurement of RL, RC and RLC series circuits connected with sinusoidal AC voltage source using an Oscilloscope	
15	Open ended Lab	
16	Lab Project	
17	**FINALTERM**	

S. No	Project Title
1	Street light circuit
2	5V fixed Dc Power supply.
3	9V fixed Dc Power supply.
4	12V fixed Dc Power supply.
5	24V fixed Dc Power supply.
6	LED lamp circuit using USB port
7	Water level indicator
8	Rain Alarm circuit
9	Musical Bell
10	Security Alarm

Reviewed by ACC on _____

Review Comments:_____

_____

Approved by ACC on_____

Head of ACC Engineering

HoD, Electrical

Sukkur IBA University

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Department of Electrical Engineering

Islamic Studies/Ethics

Programs & Class: BE-II	**Semester:**Fall-2019
Credit Hours: 2	**Course Organizer :** **Instructor:** Manzoor Ali **Support Instructor :** Dr Hafiz Khalid Shafi
Pre-requisite Courses: None	**Post-requisite Courses: None**
Co-requisite Courses: None	**e-mail:** manzoor.ali@iba-suk.edu.pk
Office Hours: 09 am -5 pm	**Consulting Hours: 3 pm- 5 pm (Fri-Sat)** **Otherwise please make an appointment**
Office Location: Room# 15,Acadmic Block-1	

ASSESSMENT/ EVALUATION

1.	Class performance and behavior	--
2.	Semester Project	--
3.	Assignment	**05%**
4.	Quiz # 1	**05%**
5.	First Term Exams	**10%**
6.	Second Term Exams	**10%**
7.	Final Examination	**20%**

RECOMMENDED BOOKS:

S.No	Book Name	Author/s Name	Publisher Name & Edition
1.	Islam at a Glance .	Sadruddin Islahi	Islamic Publication, Lahore
2.	Islamiyat Compulsory	Prof. Mufti Munib-ur-Rehman	Maktab -e - Faridi, karachi

REFERENCE BOOKS

1.	Islam its meaning and message	Prof. Khurshid Ahmed	A.H publishers Lahore
2.	The general introduction to Islam	Baber Ali Zia	Islamic publications (Pvt) Ltd

3	Introduction to Islam	Hameed ullah Muhammad	

SESSION / WEEK WISE DETAILS:

Lecture No.	Topics	CLO Mapping	Assignments/ Quizzes	Suggested Readings
01-	OBE introduction, Course introduction			
02	Islamic Concept of Knowledge Comprehensive concept of Islam Beliefs, Prayers, Affairs, Ethics Two types of Divine Injunctions Islam and Man The Religion of Every Nation was Islam			Islam at a glance Page No: 1 – 7
03	**How does Islam deal with Universal Questions?** **Toheed**: Definition and Concept, The Entity and Attributes of ALLAH, Arguments about the existence of ALLAH, Kinds of Toheed, Impacts of Toheed on Human Life **Risalat:** Importance and Significance •Difference between Nabi and Rasool • Characteristics of Prophets •Status of a Prophet and its demands • Rational Proof of Prophet hood •Characteristics of Muhammad Relationship with the Holy Prophet Finality of Prophet Muhammad **Belief in the Hereafter Life (Akhrat)**: Meaning and concept of Akhirah in different religions • Different concepts of Akhirah • Qur'anic and rational arguments about Akhirah			Islam at a glance Page No: 11 – 42 Islamiyat (Compulsory)

	• Concept of reward and punishment • Effects of belief Akhirah on life.			
04	**Pillars of Islam Salat (Namaz**): Meaning and Concepts, Importance of Salat in the light of Quran and Hadith, Benefits of Salat **Zakat (Poor's Due):** Meaning and Concepts, Importance of Zakat in the light of Quran and Hadith, The Rate of Zakat, Expense of Zakat, Objectives of Zakat			
05	**Fasting (Saum)** Meaning and Concepts, Importance of Fasting in the light of Quran and Hadith, Objectives of Fasting **Hajj (Pilgrimage):** Meaning and Definition • Importance • Objectives			Islamiyat (Compulsory) Islam at a glance
	FIRST MID TERM EXAMS			
06-7	**Basic sources of Islam** Introduction to the Holy Quran (Surah Al Furqan 63 – 77, Surah Al Hujurat)			
8-9	**Hadith and Sunnat** 20 Selected Ahadith			Islam at a glance Islamiyat (Compulsory)
10	**Life of Holy prophet at Makkah & Madina** Important Events		Quiz	
11	**Comparative analysis of Islam with other Religions** • Hinduism • Buddhism • Judaism • Christianity			
	SECOND MID TERM EXAMS			
12	**Social System of Islam** Basic Concept of Social System in Islam • Elements of Family Ethical values of Islam			Islam at a glance
13	**Economic system of Islam** •Basic Concepts of Islamic Economic System • Means of Distribution of wealth in Islamic Economics • Islamic Concept of Riba			Islam at a glance
14	**Political system of Islam**			

	Basic Concepts of Islamic Political System • Islamic Concept of Sovereignty • Basic Institutions of Govt. in Islam			Islam at a glance
15	**Concept of Halal and Haram** in Islam & importance of lifelong learning in the light of Islam			
16	**Contemporary issues of Islamic world** Kashmir, Philistine and Rohinga Muslims of Burma etc. Issues of Pakistan		Assignment	Handouts
	FINAL EXAMS			

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Department of Electrical Engineering

Programming for Engineers

Programs & Class: BE-II (EE)	**Semester:** Fall 2019
Credit Hours: 03+01	**Instructor:** Engr. Muhammad Irfan Younas **Support Instructor:** TBA
Pre-requisite Courses: NA	**Post-requisite Courses:** CSE-222 Object Oriented Programming
Co-requisite Courses: None	**e-mail: irfan.younas@iba-suk.edu.pk**
Office Hours: 09 am -5 pm	**Consulting Hours: 9 am- 11 am (Mon-Tues) Otherwise please make an appointment through email**
Office Location: Room# 201, Academic Block 03	

ASSESSMENT/ EVALUATION

1.	Assignments (03)	**05%**
2.	Quizzes (03)	**05%**
3.	Programming Recitations	**05 %**
3.	First Term Exams	**20%**
4.	Second Term Exams	**20%**
5.	Final Examination	**40%**
6.	Semester project	**05%**

RECOMMENDED BOOKS:

S.No	Book Name	Author/s Name	Publisher Name & Edition
1.	C++ How to program	Deitel and Deitel	Eighth Edition

REFERENCE BOOKS:

1.	C++ Programming	D.S.Malik	Fifth Edition

ONLINE RESOURCES:

1	Online C++ Shell	http://cpp.sh/
2	C++ Tutorials in Animated Way	https://www.youtube.com/playlist?list=PLrKBFf87Cy9BVBAZ1Y-6Olzz0KTU4Qw6L
3	Contains lots of exercises about each topic of c++.	http://www.worldbestlearningcenter.com/index_files/cpp-tutorial-variables_datatypes_exercises.htm
4	C++ Programming Tutorial	http://www.cplusplus.com/doc/tutorial/

COURSE DESCRIPTION:

This is an introductory course to the C++ programming language which is intended for those who have no programming background. This course provides a conceptual and practical introduction to programming fundamentals. The focus is on program logic building rather than making them hardcore programmers, with general principles being brought out through the study of 'C++'. This course will equip students with tools and techniques to understand and implement a given intermediate level problem in C++ language. It aims to provide students with an understanding of the role computation can play in solving problems and to help students, regardless of their major, feel justifiably confident of
their ability to write small programs that allow them to accomplish useful goals.

COURSE LEARNING OUTCOMES

The students will be able:

CLO1: Describe and use the basic programming constructs and logic of a program in C/C++.

CLO2: Apply and manipulate the solution of low to intermediate engineering problems using loops, arrays, functions, pointers and structures.

CLOs	Level of learning	Mapped OBE PLOs	Mapped ABET SOs	Teaching Methods	CLO attainment checked in
CLO1	**Cog-3**	**1**	**NA**	Lectures, Quizzes, assignments & recitations	First mid, Second Mid, assignment 1&2, Quiz 1&2, Final Exam
CLO2	**Cog-3**	**3**	**NA**	Lectures, Quizzes, assignments & recitations	Second Mid, Final Exam, assignment 3, Quiz 3

Mapped OBE Program Learning Outcomes (PLOs):

PLO1 Engineering Knowledge: An ability to gain and apply knowledge of mathematics, science, engineering fundamentals and engineering specialization to solve complex engineering problems.

PLO3 Design/Development of Solutions: An ability to design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

SESSION / WEEK WISE DETAILS:

Lecture No.	Topics	CLO Mapping	Assignments / Quizzes	Suggested Readings
01-03	OBE & Course introduction What is programming Why programming is important C/C++ Develop a basic recipe for writing programs Variables & Data Types Basic Input/output			Lecture Notes & Recommended book
	Arithmetic Operators Precedence of Operators Equality & Relational Operators Compound assignment Logical operators			
04-06	Flow control & Decision Making if Selection Statement if…else Double-Selection Statement	CLO1		
	The Switch Statement The break statement The continue statement The goto statement			
	Algorithms Pseudo-code Flow Charts			
07-09	Iteration statements (loops)	CLO2	Assignment 1	
	For Loop			
	While & do While loop			
10-12	Quiz 1		Quiz 1	
13-15	Debugging & Exception Handling			Lecture Notes & Recommended book
	Input/output with files & streams			
	Revision			

MID-I				
16-18	Functions Structure of a Function Math Library Functions			
	Function Definitions with Multiple Parameters Function Prototypes and Argument Coercion C++ Standard Library Headers			
	Random Number Generation			
19-21	Scope of Identifiers Inline Functions	CLO2		
	Call by Value Call by Reference Default arguments			
	Function Overloading Function Templates			
22-24	Introduction to Recursion Recursion Concepts		Assignment 2	
	Factorial Iterative Factorial Recursive Factorial			
	The Fibonacci series using Recursion			
25-27	Quiz 2	CLO2	Quiz 2	
28-30	Program Efficiency			

	Big O Notation			
	Revision			
SECOND MID TERM EXAMS				
31-33	Arrays Initialization of Arrays Examples Using arrays Arrays Comparison Sorting Arrays			
34-36	Searching arrays Multidimensional Arrays Class Grade Book Using a Two- Dimensional array	CLO2		
37-39	String Handling String Manipulation Functions Character Handling Functions Sample Program String Functions	CLO2	Assignment 3	
40-42	Quiz 3	CLO2	Quiz 3	
43-45	Pointers in C++ Null Pointers Pointer Arithmetic Pointers vs Arrays Passing Pointers to Functions Return Pointer from Functions Null Pointers Pointer Arithmetic	CLO2		Lecture Notes & Recommended book
46-48	Defining a Structure Structures as Function Arguments Pointers to Structures The typedef Keyword Revision	CLO2		
FINAL EXAMS				

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Department of Electrical Engineering

Computer Aided Design

Programs & Class: BE-II (EE)	**Semester:** Fall 2019
Credit Hours: 03	**Instructor:** Engr. Mahnoor Mughal **Support Instructor:** Engr. Qasir Ali
Pre-requisite Courses: None	**Post-requisite Courses: None**
Co-requisite Courses: None	**e-mail:** mahnoor@iba-suk.edu.pk qasir.ali@iba-suk.edu.pk
Office Hours: 09 am -5 pm	**Consulting Hours: 2 pm- 5 pm (Mon-Wed)** **Otherwise please make an appointment**
Office Location: Room# 107, Academic Block 03	

ASSESSMENT/ EVALUATION

1.	Quizzes (Best 01 out of total 02)	**10%**
2.	First Term Exams	**20%**
3.	Second Term Exams	**20%**
4.	Final Examination	**40%**
5.	Semester project	**10%**

RECOMMENDED BOOKS:

S.No	Book Name	Author/s Name	Publisher Name & Edition
1.	AutoCAD® 2010 Essentials	Munir M. Hamad	Jones and Bartlett Publishers

REFERENCE BOOKS:

1.	Engineering Drawing, Plane and Solid Geometry	N.D. Bhatt and V.M. Panchal	Latest Edition
2.	Using AutoCAD 2010	Ralph Grabowski	Autodesk
3.	Mastering AutoCAD 2010 and AutoCAD LT 2010	George Omura	Autodesk
4	Introducing SolidWorks by Dassault Systemes (DS)	https://my.solidworks.com/solidworks/guide/SOLIDWORKS_Introduction_EN.pdf	

COURSE DESCRIPTION & OBJECTIVES:

This course is designed:

- To introduce the student to the basic tools of computer-aided design (CAD) and computer-aided manufacturing (CAM).
- To expose the student to contemporary computer design tools for Engineers.
- To prepare the student to be an effective user of a CAD system.
- Learn to sketch and take field dimensions.
- Learn to take data and transform it into graphic drawings.
- Learn basic AutoCAD, SolidWorks skills.
- Learn engineering drawing formats
- Prepare the student for real time 3D Printing.

COURSE LEARNING OUTCOMES

The students will be able:

CLO1: Student will be able to **design** 2D and 3D engineering drawings using AutoCAD/SolidWorks.

CLOs	Level of learning	Mapped OBE PLOs	Mapped ABET SOs	Teaching Methods	CLO attainment checked in
CLO1	**Psych-7**	**5**	N/A	Lectures, tutorials, Lab Exercises	First Mid, Second mid, Final Exam

Mapped OBE Program Learning Outcomes (PLOs):

PLO5 Modern Tool Usage: An ability to create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering activities, with an Understanding of the limitations.

SESSION / WEEK WISE DETAILS:

Lecture No.	Topics	CLO Mapping	Assignments/ Quizzes	Suggested Readings
01-03	Introduction to Computer Aided Design Introduction to AutoCAD: ✓ To become familiar with AutoCAD 2010 environment. ✓ To understand the coordinate system in AutoCAD ✓ To work with Polar and Cartesian coordinate system ✓ To work with Relative and Absolute Coordinates			AutoCAD® 2010 Essentials/ Using AutoCAD 2010
04-06	AutoCAD Basic Drawing, ✓ Line ✓ Rectangle ✓ Polygon ✓ Circle ✓ Arc ✓ Donut ✓ Pline ✓ Ellipse	CLO1		

	Objects Modification Commands and Tools (I) ✓ move ✓ Rotate ✓ Mirror, offset. ✓ Fillet and chamfer commands.			
07-09	Objects Modification Commands and Tools (II) ✓ Erase ✓ Trim ✓ Extend ✓ Scale ✓ Explode ✓ Pedit Drawing with Precision in Autocad ✓ Grid ✓ Dsettings ✓ Snap ✓ Ortho ✓ Polar ✓ Osnap ✓ Otrack ✓ Ray and Xline ✓ Zoom ✓ Pan	CLO1		
10-12	Orthographic projections • Projections of a Point • Four quadrants of two planes Projection of points	CLO1		
13-15	Orthographic Projection of Lines ✓ Parallel to one or both the planes ✓ contained planes ✓ Perpendicular to one of the planes ✓ Inclined to one plane and parallel to the other ✓ inclined to both the planes	CLO1		Introducing SolidWorks by Dassault Systemes (DS)
16-18	Introduction to Solid works ✓ Part ✓ Assembly ✓ Drawing Part: • 2D and 3D Drawings • Exercises		Quiz 01	
19-20	SolidWorks Basics and the User Interface, • 2D Sketching • Stages in the Process Saving Files • Sketching:			

	✓ Sketch Entities Basic Sketching Rules ✓ Design Intent Sketch ✓ Relations Dimensions ✓ Extrude ✓ Sketching Guidelines			
FIRST MID TERM EXAMS				
21-23	SolidWorks Part Practice Exercises, Orthographic Projection Practice Tasks.	CLO1		
24-26	Basic Part Modeling ✓ Basic Modeling Terminology ✓ Choosing the Sketch Plane ✓ Details of the Part Sketching on a Planar Face ✓ Cut Feature View Options ✓ Filleting ✓ Detailing Basics Drawing Views ✓ Smart Dimensions Changing Parameters	CLO1		
27-29	Understand Assembly Modeling ✓ Differentiate between the Bottom-up Assembly Design Approach and the top- ✓ down Assembly design approach ✓ Use Bottom-up Assembly Design Approach to create an assembly ✓ Add Mates to assemblies ✓ Rotate individual Components ✓ Use Copying components with mates ✓ Use SolidWorks Toolbox Library		Quiz 2	
30-32	Feature-Based Parametric Modeling Two-Dimensional Sketch Apply/Modify Geometric Relations Dimensions Additional Parametric Features Geometric Relation Symbols ✓ Vertical ✓ Horizontal ✓ Dashed line ✓ Parallel			

	✓ Perpendicular ✓ Coincident ✓ Concentric ✓ Tangent			
33-36	3D Parametric Modeling with SolidWorks Exercises of Parametric Design			
SECOND MID TERM EXAMS				
37-39	Preparing a Solid 3D Models for Printing ✓ Mug ✓ Key Chain etc			
40-42	After completing this session student should be able to: ✓ Understand 3D printing ✓ Understand .STL file ✓ Understand G Code ✓ Use Cura 3D software			
43-45	A Visit to FAB Lab, Briefing and Introduction to Printers and 3D printers, Demonstration of 3D printing			
46-48	Designing and Printing of 3D objects by students			
49-52	Final Practice Lab with Exercises	CLO1		
		FINAL EXAMS		

For Lab Courses, Insert list of lab experiments and proposed lab projects here:

Week	**Objective**	**Mapped CLO**
1	Introduction to AutoCAD, AutoCAD Basic Drawing	
2	Objects Modification Commands and Tools, 2D and 3D Design in AutoCAD	
3	Orthographic Projections, Projection of points, Orthographic Projections, Projection of Line.	
4	Orthographic Projections, Projection of 3D Objects	
5 & 6	Introduction to SolidWorks.	
7	*MID-TERM I EXAM*	
8	Basic Part Modeling in SolidWorks Part -01	
9	Basic Part Modeling in SolidWorks Part -02 and Orthographic projection	
10	Basic Assembly in SolidWorks	
11 & 12	3D Parametric Modeling with SolidWorks	
13	A Visit to FAB Lab, Briefing and Introduction to Printers and 3D printers, Demonstration of 3D printing	
14	*MID-TERM II EXAM*	
15	Course Project Design	

S. No	**Project Title**
1	An assembly of a lamp and a table with customized table legs in SolidWorks
2	Light Bulb in SolidWorks
3	Cola Bottle in SolidWorks
4	Table lamp in SolidWorks
5	Helical bevel Gear in SolidWorks
6	Wind Turbine in SolidWorks
7	Motor Design in SolidWorks
8	Lock and Key in SolidWorks
9	Robotic arm in SolidWorks
10	Design and Assembly of Pipe Wrench in SolidWorks

16	Course Project Design	
17	Course Project Design	

Reviewed by ACC on _____

Review Comments: _____

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Approved by ACC on_____

Head of ACC
Engineering

HoD, Electrical

BE-III SEMESTER

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Department of Electrical Engineering

Multivariate Calculus

Programs: BEE (III)	**Semester:** Fall 2019
Credit Hours: 3 hours	**Course Organizer**: Abid Ali Memon **Course Instructor:** Abid Ali Memon
Pre-requisite Courses: Calculus with Analytic Geometry	**e-mail: abid.ali@iba-suk.edu.pk**
Office Location: Block-1, room (iv)	**Consulting Hours:**

ASSESSMENT/ EVALUATION

1.	Class performance and behavior	**5%**
2.	Semester Project	**----**
3.	Assignments	**10%**
4.	Quizzes	**5%**
5.	First Term exam	**20%**
6.	Second Term exam	**20%**
7.	Final Examination	**40%**

RECOMMENDED BOOKS:

S. No	Book Name	Author/s Name	Publisher Name & Edition
1.	Calculus by Larson, Hostetler Bruce H. Edwards	Larson, Hostetler	8th Edition
2.	Thomas' Calculus	Maurice D. Weir	13th Edition
3.	Calculus	James Stewart	Latest edition

Course Description: This is a first course in multivariable calculus. The focus will be on functions of two and three variables, and using calculus to analyze the geometry of curves and surfaces in three-dimensional space. The official description is as follows:

Parametric equations and polar coordinates. Vectors in 2- and 3-dimensional Euclidean spaces. Partial derivatives.

Multiple integrals. Vector Calculus. Theorems of Green, Gauss, and Stokes.

Course learning Outcomes

At the end of the course the students will be able to:

CLO1: Explain techniques of integration and interpretation of series expansion of function.

CLO2. Multiple integrals and its application in vector field and engineering sciences.

PROJECTS & ASSIGNMENTS DETAILS ALONGWITH PREDEFINED ASSESSMENT CRITERIA

Quizzes

- Three quizzes will be taken at the end of each mid-term exam completely related to CLOs
- Two out of three counted as best.

Assignment

- From the beginning of the semester a problem sheet will be given from the whole course.
- The problem sheet will be checked at the starting of each mid-term exam.
- In the last class of the semester the assignment will be collected and marked.

CLOs	Related PLOs	Level of learning	Teaching methods	CLO attainment checked in
CLO1	1	Cog-2	Lecture, tutorial Assignment	Quiz, Midterm,
CLO2	2	Cog-3	Lecture, tutorial Assignment	Quiz, Midterm, Final

Mapped OBE Program Learning Outcomes (PLOs):

PLO1 Engineering Knowledge: An ability to gain and apply knowledge of mathematics, science, engineering fundamentals and engineering specialization to solve complex engineering problems.

PLO2 Problem Analysis: An ability to identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.

Mapped ABET Student Outcomes (SOs):

SO1: An ability to understand the geometry of vectors in two and three dimensions, to work out the heterogeneous integrals in two-dimension or three-dimension coming about widely in engineering applications with the proper technical approach.

Performance Indicator for SO1 are:

a. Identifying and applying the various techniques of integration to solve the complex integrals.
b. Identification of specific facts of mathematics, science and engineering
c. Convert physical model to the mathematical model and solving them to interpreted the result in engineering context.

LECTURE WISE DETAILS:

Week No.	Book Chapter	Topics	Related CLOs
1	Integration	Review of basic integration rules,	
2	Principles of Integration evaluation	Fundamental theorem of calculus, Techniques of Integration	CLO 1
3	Infinite series	Taylor Series and Maclaurin series	
4	3-D Space; Vectors	Three-dimensional coordinate system, equation of line and plane in 3D.	
		Mid Term Exam 1	
7-11	Ch: 13, Partial derivativesCh: 14, Multiple integrals	Contour plots, Level curves and level Surfaces, Limits and Continuity, Partial derivatives, Chain rule, Directional derivatives and Gradient of a function, Extrema of function of two variables, Lagrange multiplier, Double integrals, Triple integrals.	CLO 2
12		**Mid Term Exam 2**	
13-17	Ch: 15, Topics in Vector Calculus	Vector fields, div, grad, curl, Line integrals Green's theorem, Surface integrals of vector fields, Surface integrals of scalar fields, divergence theorem, Stokes' theorem	CLO 2

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Department of Electrical Engineering

Applied Thermodynamics

Programs & Class: BE-III (EE)	**Semester:** Fall 2019
Credit Hours: 03	**Instructor:** Dr. Fareed Hussain Mangi **Support Instructor:** N/A
Pre-requisite Courses: N/A	**Post-requisite Courses: None**
Co-requisite Courses: None	**e-mail: fareed.mangi@iba-suk.edu.pk**
Office Hours: 09 am -5 pm	**Consulting Hours: 11PM- 01 PM (Mon-Tues)** **Otherwise please make an appointment**
Office Location: Room# 201, Academic Block 03	

ASSESSMENT/ EVALUATION

1.	Assignment (Best 1 of 3)	**10%**
2.	Quizzes (Best 01 out of total 03)	**10%**
3.	First Term Exams	**20%**
4.	Second Term Exams	**20%**
5.	Final Examination	**40%**

RECOMMENDED BOOKS:

1.	Fundamentals of Thermodynamics, 8th Edition	Borgnakke and Sonntag	John Wiley & Sons, 2013
2.	Fundamentals of Engineering Thermodynamic, 4th Edition	M.J Moran and H.N Shapiro	Wiley, New York, 2000

COURSE DESCRIPTION:

This course focuses on the Thermodynamic Principles, open and closed systems representative of engineering problems. The course starts with the basics of Zeroth, first and second laws of thermodynamics with applications to engineering systems and design.

COURSE LEARNING OUTCOMES

The students will be able:

CLO1: Able to identify the characteristics of pure substances on phase diagrams by applying basic laws of thermodynamics.

CLO1: Able to investigate real engineering systems such as heat exchangers, boiler and turbine by data acquisition through the experiments conducted in the lab.

CLOs	Level of learning	Mapped OBE PLOs	Mapped ABET SOs	Teaching Methods	CLO attainment checked in
CLO1	**Cog-4**	**1**		Lectures,	1st mid, Quiz 1,2, 2nd Mid and Final Exam
CLO2	**Psy-4**	**4**	**6**	Lectures/Labs	

Mapped OBE Program Learning Outcomes (PLOs):

PLO1 Engineering Knowledge: An ability to gain and apply knowledge of mathematics, science, engineering fundamentals and engineering specialization to solve complex engineering problems.

PLO 4

Mapped ABET Student Outcomes (SOs):

SO6:

SESSION / WEEK WISE DETAILS:

Week	Topics	CLO Mapping	Assignments/Quiz	Suggested Readings
01	Introduction, Scope and the applications of thermodynamics in different fields such as Power Plants, Jet Engines, Refrigerators, IC Engines etc.			Fundamentals of Thermodynamics, 8th Edition by Borgnakke and Sonntag. John Wiley & Sons, 2013
02	Basic concepts of thermodynamics such as temperature, pressure, systems, properties, process, states, cycles and equilibrium, Zeroth Law of thermodynamics			
03	Pure Substance, Properties of pure substances, phase diagrams.			
04	Quality, Saturation temperature and pressure, Critical and Triple Points. State Postulate, Compressibility Factor.			
05	First Law of Thermodynamics for control mass, Work and Heat, Polytropic Process, Specific heat capacities, enthalpy. Modes of heat transfer			
06	First law of thermodynamics for control volume, types of processes for control volume, Types of thermodynamic cycles,			
07	Rate form of energy equation, steady and unsteady problems.			

08	Second law of thermodynamics for control mass, Heat Engine, Heat Pump, Refrigerators, Thermal Reservoirs, Reversible and irreversible Processes. Steady State devices.			
09	Carnot Cycle, Carnot propositions, Carnot heat engine and Carnot Refrigerator,			
10	Concept of Entropy, T-s diagram, h-s diagram,			
11	Thermodynamic Property relations, Entropy generation, Isentropic process, Real Process.			
12	Second law of thermodynamics for control volume, derivation of second law of thermodynamics for control volume,			
13	Steady and unsteady problems, Rankine Cycle for ideal and real processes.			
14	Turbine efficiency, Pump efficiency, nozzle efficiency, cyclic efficiency of a power plant, Isentropic efficiency.			
15	Revision of the course			

For Lab Courses, Insert list of lab experiments here:

Week	Objective	Mapped CLO
01	Heat Transfer Rate, Temperature Difference, Surface Heat Transfer Coefficient, Duct Air Velocity, Reynolds Number and Nusselt Number in a **Single Tube Cross Flow Heat Exchanger**.	
02	Boiling Process at Different Pressures, Nexus Between the Steam Pressure and Temperature in a Closed Vessel, To Compare the Actual Results with Theoretical, Connexion Amongst Temperature and Pressure for Saturated Steam in a **Marcet Boiler**	CLO-2
03	Global Energy Balance in the Exchanger by Computing the Heat Transferred by the Hot Fluid, gained by the Cold Fluid, Subsequent Heat Losses, Log Mean Temperature Difference and the Overall Heat Transfer Coefficient in **Concentric Tube Heat Exchanger**	
04	Investigation of Torque/Speed and Power/Speed Characteristics of a **Single Stage Impulse Turbine.**	
05&06	**Mid Term 1**	
07	Computing Heat Transfer Rate, Temperature Difference, Surface Heat Transfer Coefficient, Duct Air Velocity, Reynolds Number and Nusselt Number in the 1st, 2nd, 3rd, 4th, and 5th Rows of a **Multi Tube Cross Flow Heat Exchanger.**	
08	The Influence of Hot Water Flow in Exchanger Heat Transfer. Computing the Log Mean Temperature Difference, the Overall Heat Transfer Coefficient, Velocity for Hot and Cold Fluid, Reynold Number for Hot and Cold Fluid in a **Concentric Tube Heat Exchanger**	CLO-2
09	Comparison of Specific Air Consumption when the Output of a Constant Speed **Single Stage Impulse Turbine** is Controlled by Throttling or by Varying the Number of Nozzles.	
10	Open Ended Lab	
11&12	**Mid Term 2**	
13	Computing Heat Transfer Rate, Temperature Difference, Surface Heat Transfer Coefficient, Duct Air Velocity, Reynolds Number and Nusselt Number in one to six rows for a **Multi Tube Cross Flow Heat Exchanger.**	
14	Determination of mean temperature difference and heat transfer characteristics of **Shell and Tube Heat Exchanger**	CLO-2
15	Demonstration and Computing; of Liquid Heating Accompanied by Vapour Formation within a Tube, Heat Transfer Rate, Heat Flux, Temperature Difference and Surface Heat Transfer Coefficient by Using **Flow Boiling Demonstration Unit.**	
16	Open ended Lab	
17&18	**Final Term**	

Reviewed by ACC on _____

Review Comments:_____

Approved by ACC on_____

Head of ACC **HoD, Electrical Engineering**

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Department of Electrical Engineering

Electrical Network Analysis

Programs & Class: B.E III	**Semester: Spring 2019**
Credit Hours: 4 (3+1)	**Course Organizer: Dr. Saeed Ahmed khan Abro** **Course Instructor: Engr. Aizaz Ali Larik**
Pre-requisite Courses: Linear Circuit Analysis	**Post-requisite Courses:**
Co-requisite Courses:	**e-mail: aizaz.ali@iba-suk.edu.pk**
Office Hours: 9 AM to 5 PM	**Consulting Hours: Tuesday 10 AM to 1 PM** **Wednesday 10 AM to 1 PM**
Office Location: Room No 107 Ground Floor AB 3	

ASSESSMENT/ EVALUATION

1.	Lab Project Report	5%
2.	Assignments	5 %
3.	Quizzes	10 %
4.	First Term exam	20 %
5.	Second Term exam	20 %
6.	Final Examination	40 %

RECOMMENDED BOOKS:

S.No	Book Name	Author/s Name	Publisher Name & Edition
1.	Fundamentals of Electric circuits	Alexander	McGraw-Hill , 5th Ed.

REFERENCE BOOKS:

c1.	Engineering Circuit Analysis	William H. Hayt, Jack Kemmerly and Steven M. Durbin	McGraw-Hill, 8th Ed.

COURSE DESCRIPTION:

Course is based on transient and forced analysis of 1st and 2nd order DC circuits, steady state analysis of 1st and 2nd order AC circuits and analysis of 3 phase circuits.

Students will be able to:

CLO1: To apply differentiation and integration to illustrate behavior of Inductors and Capacitors in DC and AC electric circuits.

CLO2: To analyze the responses (Transient, steady-state and Step response) of first and second order DC and AC electric circuits.

CLO3: To construct AC and DC circuits proficiently as per diagram and measure their responses using suitable equipment

CLO4: Design & troubleshoot RLC circuits with compliance & proficiency to achieve their desired output using modern engineering tools i.e. Multisim and PSpice.

PROJECTS & ASSIGNMENTS DETAILS ALONGWITH PREDEFINED ASSESSMENT CRITERIA

- Three quizzes will be taken on 4^{th}, 10^{th} and 14^{th} week. Best of two will be considered.
- Two assignments will be given on 5^{th} and 9^{th} week.

IMPORTANT POLICIES (subject to the course instructor)

- Class attendance is mandatory and late comers will not be allowed to attend the lecture.
- Late submission of coursework will not be accepted.

CLOs	Levels of Learning	Related PLOs	Teaching Methods	CLO attainment checked in
CLO1	**Cog 4**	**1**	Lectures, tutorials, problem sheets	1^{st} Mid-Term Exam, Quiz 1, Final Exam
CLO2	**Cog 4**	**2**	Lectures, tutorials, problem sheets	2^{nd} Mid Term Exam, Final Exam, Quiz 2
CLO3	**Psycomotor 4**	**4**	Lectures, Instruction Labs	Lab Exams
CLO4	**Psycomotor 4**	**5**	Instruction, Labs	Lab Reports

LECTURE WISE DETAILS:

Lecture No.	Topics	Suggested Readings	Assessment Instruments
01-03	Introduction, Revision of the basic circuit laws, Capacitor and ideal capacitor model, Integral voltage current relationship, Energy storage	Capacitor basics	
04-06	Inductor and ideal inductor model, Integral voltage current relationship, Energy storage	Inductor basics	
07-10	Linearity and non-linearity of RLC circuits, Duality, Source free RC circuit and its response	1st order DE (Homogeneous)	**CLO 1**
11-13	Source free RL circuit and its response, Step response of RC Circuit (Natural and forced response)	1st order DE (Non-homogeneous)	**CLO 2**
14-15	Step response of RL circuits (Natural and forced response)	1st order DE (Homogeneous)	
1st Mid Term Exam			
16-19	Source free parallel RLC circuits (Under damped, Critically damped & over damped)	2nd order DE (Homogeneous)	
20-22	Source free series RLC circuits (Under damped, Critically damped & over dsamped)		**CLO 2**
23-30	Complete response of RLC circuits (Under damped, Critically damped & over damped)	2nd order DE (Non-homogeneous)	
31-34	Introduction to sinusoids, Forced response of sinusoidal functions in RC & RL	AC source basics	
2nd Mid Term Exam			
35-38	Introduction to phasors, Phasor relationships of R, L, C circuits, Impedance, Admittance, Series RLC Circuit,		
38-42	Basic Power terminologies, Introduction to Complex power, Comparison of power terminologies	Average, instantaneous and effective values	
43-46	Power Traingle, Power factor, Importance of p.f in ac supply system	Power transmission basics	
47-54	Introduction to Poly phase systems, Generation of three phase EMF Balanced Star connection Balanced Delta connection		
Final Exam			

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Department of Electrical Engineering

Digital Logic Design

Programs & Class: BE-III (EE)	**Semester:** Fall 2019
Credit Hours: 03	**Instructor:** Dr. Gulsher Ali **Support Instructor:** TBA
Pre-requisite Courses:	**Post-requisite Courses: None**
Co-requisite Courses: None	**e-mail: gulsher@iba-suk.edu.pk**
Office Hours: 09 am -5 pm	**Consulting Hours: 2 pm- 4 pm (Mon-Tues)** **Otherwise please make an appointment**
Office Location: Room# 104, Academic Block 03	

ASSESSMENT/ EVALUATION

1.	Presentations (Best 02 out of total 03)	**10%**
2.	Quizzes (Best 02 out of total 03)	**10%**
3.	First Term Exams	**20%**
4.	Second Term Exams	**20%**
5.	Final Examination	**40%**
6.	Semester project/ assignments/ group activities etc	

Recommended Books:

S. No	Book Name	Author/s Name	Publisher Name & Edition
1.	Digital Fundamentals	Floyd Thomas	Prentice Hall, USA. ISBN = 0130464112,

Reference Books:

1.	Digital Systems: Principles & Applications	R. C. Tocci	Prentice Hall, USA
2.	Digital Electronics: Principles & Applications	R. Tokheim	McGraw Hill.
3.	Introduction to Digital Electronics,	Crowe John and Hayes-Gill Barrie	Newnes Books, UK. ISBN = 0340645709,
4.	Digital Design	M. Moris Mano	Pearson, Prentice Hall.

COURSE DESCRIPTION:

To understand the basics of digital logic, design and implementation and covering fundamentals of combinational and sequential circuits.

CLO #	Description	Taxonomy Level	Mapped PLO	Assessment
1	Develop a desirable solution in an efficient way as per given requirements and constraints	C6	3	Final hardware demonstration/ Simulation results/ Computer program
2	Contribute strongly as a team member	A3	9	Record of 3 meetings with project supervisor- Evidence of individual tasks allocated vs completed and role in a team.
3	Compose high quality project report and confidently demonstrate presentation skills	C5	10	Project report and final presentation
4	Define the realistic milestones, and continuously evaluate the progress	C5	11	Record of 3 meetings with project supervisor- Evidence of outcomes set vs achieved
5	Relate the solution with the societal needs. Identify possible extension or application area of the developed solution	C3, C5	7, 12	Final presentation Q/A

SESSION / WEEK WISE DETAILS:

Week	Session No	Lecture Topics	Suggested Readings
1	**1-2**	Introduction to the Class & Subject, Introductory Analog and Digital Concepts, • Binary digits • Binary digits • Logic levels • Digital waveform (periodic and non- periodic) Basic logic operations	Digital Fundamentals by Thomas L. Floyd
	3-4	Basic Logic Operations, Digital ICs, Classifications of ICs, Number Systems	Digital Fundamentals by Thomas L. Floyd
2	**5-6**	Number Conversion-I: Binary to Decimal and vice versa Number Conversion-II: Binary to Hexadecimal and vice	Digital Fundamentals by Thomas L. Floyd

		versa	
	7-9	Number Conversion-III: Binary to Octal and vice versa Gates & Truth Tables	Digital Fundamentals by Thomas L. Floyd
3	**10-12**	Boolean Algebra • Apply the basic laws and rules of Boolean Algebra to simplify Boolean expressions Apply DE Morgan's theorems to simplify Boolean Expressions **Quiz-1**	Digital Fundamentals by Thomas L. Floyd Section. 4.1 Section. 4.2 Section. 4.3 Section. 4.4 Section. 4.5
	13-15	Standard forms of Boolean Expressions	Digital Fundamentals by Thomas L. Floyd
		• Identify the Sum-of-Product (SOP) and the Product-of-Sum (POS) expressions • Converting any SOP and POS expression to a Standard Form • Converting Standard SOP to Standard POS and vice versa • Binary representation of standard Product and Sum term • Converting a Boolean expression to a truth table and vice versa	Section. 4.6 Section. 4.7
4	**15-18**	The Karnaugh Map	Digital Fundamentals by Thomas L. Floyd
		• Use Karnaugh Map method to simplify three and four variable Boolean Expressions • Use Karnaugh Map method to simplify truth tables • Quine McCuskey Method	Section. 4.8 Section. 4.9
	19-20	The Karnaugh Map Examples	Digital Fundamentals by Thomas L. Floyd Section. 4.8,4.9

5	**21-24**	Combinational Logic Analysis	Digital Fundamentals by Thomas L. Floyd
		• Analyze and Apply AND-OR, AND-OR- Invert, Exclusive-OR, and Exclusive-NOR logic • Write Boolean output expression for any combinational logic circuit • Develop truth table from the output expression for any combinational logic circuit • Implement a logic circuit from a Boolean expression	Section. 5.1 Section. 5.2 Section.5.3 Section. 5.5
6	**25-26**	Basic Adders • Describe the function of Half-Adder using Boolean expression and truth table • Draw a half adder logic diagram and logic symbol	Digital Fundamentals by Thomas L. Floyd
			Section. 5.1 Section. 5.2
7	**27-28**	Basic Adders	Digital Fundamentals by Thomas L. Floyd
		• Describe the function of the full adder using Boolean expression and truth table • Draw the full adder logic diagram using half- adders Implement full-adder using AND-OR logic	Section. 5.3 Section. 5.4 Section. 5.5

8	**29-30**	Parallel Binary Adders • Use Full-Adders to design 4-bit parallel binary adder • Cascade 4-bit Parallel Adder ICs (*74LS283*) to perform 8-bit and 16-bit addition • Explain drawback of ripple carry adder • Working principle and advantage of Carry- Look ahead adder (CLA) • Develop Boolean expression for CLA Carry out	Digital Fundamentals by Thomas L. Floyd Section. 6.1 Section. 6.2 Section. 6.3
9	**31-32**	**Quiz-2- Review of Course**	
10	**33-34**	Comparator • Use Exclusive-NOR to design basic comparator with equality output and expand the design for n-bit comparison • Analyze internal logic of magnitude comparator with both equality and inequality operators • Design 2-bit comparator *Assignment*: • Design 4-bit comparator • Design multi-bit comparator using 4-bit magnitude comparator ICs (*74LS85*)	Digital Fundamentals by Thomas L. Floyd Section. 6.4
11	35-36	Decoders/Encoders • Design basic Decoder • Design basic Encoder • Design basic Multiplexer • Design basic Demultiplexer	Digital Fundamentals by Thomas L. Floyd Section. 6.5 Section. 6.6 Section. 6.8 Section. 6.9 Section. 6.10

12	36-37	Latch/Flip Flop
		• Use basic gates to construct basic latches
		  ○ S-R Latch
		  ○ Gated S-R Latch
		  ○ Gated D-Latch
		  ○ T Flip Flop
		• Explain the difference between S-R Latch and D-Latch
		• Recognize the difference between a latch and flip-flop
			Digital Fundamentals by Thomas L. Floyd
			
			Chapter. 7

13	38-39	Flip Flop
		• S-R Flip Flop
		• J-K Flip Flop
		• J-K Flip Flop with Preset and Clear inputs
		• D-Flip Flop
		• T-Flip Flop
		• Flip Flop Operating characteristics
		• Interconversion of Flip Flops
		• Apply flip-flops in basic applications
		  ○ Parallel data storage
		  ○ Frequency Division
		  ○ Counting
		Quiz-3
			Digital Fundamentals by Thomas L. Floyd
			
			Chapter. 7

14	40-41	Finite State Machines
		Asynchronous Counters
		• Explain difference between Asynchronous and Synchronous counters
		• Working principle Asynchronous counters
		  ○ 2-Bit, 3-Bit and 4-Bit Asynchronous counters
		  ○ Up counter
		  ○ Down Counter
		  ○ Asynchronous decade counters
			Digital Fundamentals by Thomas L. Floyd
			
			Chapter. 8

15	42-43	Synchronous Counters
		• Working principle Synchronous counters
		  ○ 2-Bit, 3-Bit and 4-Bit Synchronous counters
		  ○ Synchronous decade counters
		• Design of Synchronous Counter
			Digital Fundamentals by Thomas L. Floyd
			
			Chapter. 8

16	44-45	Shift Registers 1. Basic Shift register functions 2. serial In/ serial Out shift registers 3. serial In/ Parallel Out shift registers 4. paralle In/ Serial Out shift registers 5. parallel In/ Parallel Out shift registers 6. Shift Registers Counters 7. Shift Registers Applications	Digital Fundamentals by Thomas L. Floyd Chapter 9
17	46-47	Review Classes and discussions	

For Lab Courses, Insert list of lab experiments and proposed lab projects here:

Week	Objective
1	NOT, AND, OR Gate
2	Logic Gates Explored and Boolean Algebra
3	Binary Conversion and Adders
4	Karnaugh Maps
5 & 6	**MIDTERM 1**
7	Encoders and Decoders
8	Multiplexers Demultiplexer
9	Flip Flops
10	Counters
11 & 12	**MIDTERM 2**
13	Shift Registers
14	Open ended Lab
15	Lab Project Finalization
16	Lab Project Demonstration
17	**FINALTERM**

S. No	Project Title
1	Obstacle Detector
2	Automatic Street Light
3	Digital Object Counter
4	Fire Alarm System
5	Stop Watch

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Department of Electrical Engineering

Electronic Devices & Circuits

Programs & Class: BE-III (EE)	**Semester:** Fall 2019
Credit Hours: 4(3+1)	**Instructor:** Dr. Saeed Ahmed Khan/Engr. Aizaz Ali **Support Instructor:** NA
Pre-requisite Courses: Nil	**Post-requisite Courses: None**
Co-requisite Courses: None	**e-mail: saeed.abro@iba-suk.edu.pk/aizaz.ali@iba-suk.edu.pk**
Office Hours: 09 am - to- 5 pm	**Consulting Hours: 10 am- 12 pm (Wed-Thu)** **Otherwise please make an appointment**
Office Location: Room# 104, Academic Block 03	

ASSESSMENT/ EVALUATION

1.	Assignment	**10%**
2.	Quizzes	**10%**
3.	First Term Exams	**20%**
4.	Second Term Exams	**20%**
5.	Final Examination	**40%**

RECOMMENDED BOOKS:

S. No	Book Name	Author/s Name	Publisher Name & Edition
1.	Principles of Electronics	V K Mehta	S Chand

REFERENCE BOOKS:

1.	Electronic Devices and Circuit Theory	Robert Boylestad and Louis Nashelsky	Prentice Hall, Latest Edition, ISBN: 0131189050
2	Electronic Devices	Floyd	9th Edition
2.	Introductory Electronic Devices and Circuits: Electron Flow Version	Robert Paynter	Latest Edition, Prentice Hall, ISBN: 0131716395

COURSE DESCRIPTION:

This course is designed for the students to learn and practice;

Introduction to electronics: diodes:
pn junction diode, forward and reverse characteristics of a diode, ideal diode, practical diode, equivalent circuit of a diode, current equation of a diode, diode as a switch.
Types of diodes:
Schottky diode, Zener diode, varactor diode, LED.
Applications of diode:
Half-and full-wave rectifiers, clipper and clamper circuits, voltage multipliers.
Bipolar junction transistor:
Operation, *npn*and *pnp* transistors, unbiased transistors, DC biasing of a transistor, static characteristics, DC circuit analysis, load line, operating point and bias stabilization, Transistor as an amplifier.
Transistor biasing configurations:
Common emitter, common base, common collector. Field-effect transistor.
FET biasing techniques:
Common drain, common source and common gate, fixed bias and self-bias configurations, voltage divider biasing, universal JFET bias curve, MOSFET and its types.

SESSION / WEEK WISE DETAILS:

Lecture No.	Topics	CLO Mapping	Assignments/ Quizzes	Suggested Readings
01-02	**Introduction** OBE introduction, Course introduction, Electronics, Atomic Structure, Structure of Elements, The Electron, Energy of an Electron, Valence Electrons, Free Electrons			Principles of Electronics by V K Mehta
03-04	**Atomic Structure & Semiconductor Physics** Bohr's Atomic Model, Energy Levels, Energy Bands, Important Energy Bands in Solids, Classification of Solids and Energy Bands, Atomic Structure of Silicon, Semiconductor, Bonds in Semiconductors, Crystals, Commonly Used Semiconductors, Energy Band Description of Semiconductors			
05-06	Effect of Temperature on Semiconductors, Hole Current, Intrinsic Semiconductor, Extrinsic Semiconductor, *n*-type Semiconductor, *p*-type Semiconductor, Charge on *n*-type and *p*-type Semiconductors,			

07-08	Majority and Minority Carriers, *pn* Junction, Properties of *pn*-Junction, Applying D.C. Voltage across *pn*- Junction or Biasing a *pn*- Junction, Current Flow in a Forward Biased *pn*-Junction, Important Terms, Limitations in the Operating Conditions of *pn*-Junction			
09-12	**Semiconductor Diode** Semiconductor Diode, Resistance of Crystal Diode, Crystal Diode Equivalent Circuits, Crystal Diode Rectifiers, Half-Wave Rect ifier, Output Frequency of Half-Wave Rectifier, Full-Wave Rectifier			Principles of Electronics by V K Mehta
11-12	Full-Wave Bridge Rectifier, Efficiency of Full-Wave Rectifier, Nature of Rectifier Output, Comparison of Rectifiers			
13-14	**Filters & Special-Purpose Diodes** Types of Filter Circuits, Zener Diode, Zener Diode as Voltage Stabilizer, Clippers and Clamper Circuits		Quiz1	
15	Light-Emitting Diode (LED), Advantages of LED, Multicolor LEDs, Applications of LEDs, Varactor Diode, Application of Varactor Diode, Shockley Diode			
6th Week	**FIRST MID TERM EXAMS**			
16-17	**Transistors** Transistor, Some Facts about the Transistor, Transistor Symbols, Transistor Connections			Principles of Electronics by V K Mehta
18-19	Characteristics of Common Base Connection			
20-21	Common Emitter Connect ion, Measurement of Leakage Current			
22-23	Common Collector Connection, Commonly Used Transistor, Connection, Transistor Load Line Analysis			

24-25	Operating Point, Practical Way of Drawing CE Circuit, Performance of Transistor, Amplifier, Power Rating of Transistor, Transistor Testing			
26-27	**Transistor Biasing** Faithful Amplification, Transistor Biasing, Inherent Variations of Transistor Parameters, Stabilization, Essentials of a Transistor, Biasing Circuit, Stability Factor		Quiz2	
28-29	Methods of Transistor Biasing, Base Resistor Method, Emitter Bias Circuit, Circuit Analysis of Emitter Bias, Biasing with Collector Feedback Resistor			
30	Voltage Divider Bias Method, Mid-Point Biasing			
12th Week	**SECOND MID TERM EXAMS**			
31-32	Silicon Versus Germanium, Summary of Transistor Bias Circuits			Principles of Electronics by V K Mehta
33-34	**Field Effect Transistors** Types of Field Effect Transistors, Principle and Working of JFET, Importance of JFET, Salient Features of JFET			
35, 36, 37	Expression for Drain Current (*ID*), Parameters of JFET, Variation of Transconductance (*gm* or *gfs*) of JFET, JFET Biasing by Bias Battery Self-Biasing, JFET with Voltage-Divider Bias			
38-39	Practical JFET Amplifier, Voltage Gain of JFET Amplifier, (With Source Resistance Rs)			
40, 41-42	Metal Oxide Semiconductor, FET (MOSFET), Symbols for D-MOSFET, D-MOSFET Transfer Characteristic			
43-44	D-MOSFET Biasing, D-MOSFETs Versus JFETs			
45-46	E-MOSFET Biasing Circuits, D-MOSFETs Versus E-MOSFETs			
47-48	Review Lectures			
19th Week	**FINAL EXAMS**			

Mapped ABET Student Outcomes (SOs):

SO1: *An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions*

Performance Indicator for SO1 are:

a) Able to develop appropriate setup and acquire data
b) Analyze and interpret data
c) Draw valid conclusions using engineering principles

Lab Outline:

The emphasis is first on understanding the characteristics of basic circuits that use resistors, capacitors, diode, bipolar junction transistors and field-effect transistors. The students then use this understanding to design and construct more complex circuits such as rectifiers, amplifiers and power supplies.

For Lab Courses, Insert list of lab experiments and proposed lab projects here:

Week	Objective	Mapped CLO
1	**IV Characteristics of Junction Diode**	**1**
2	Half Wave Rectification of Diode	1
3	Full Wave Rectification of Diode	1
4	Filter Circuit	1
5	Zener Diode Characteristics	1
6 & 7	**MIDTERM 1**	
8	Characteristics of Clipper and Clamping Circuits	1
9	Output Characteristics of BJT Transistors	1
10	Transistor as a Switch	1
11	BJT Biasing	1
12 & 13	**MIDTERM 2**	
14	Configurations of BJT Amplifier	1
15	BJT as an Amplifiers	1
16	FET Characteristics	1
17	MOSFET I-V CHARACTERISTICS	1
18	**FINALTERM**	

Reviewed by ACC on _____

Review Comments:

_____

Approved by ACC on_____

Head of ACC **HoD, Electrical Engineering**

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Discrete Structure

Programs & Class: BE-III(CS)	**Semester:** Fall 2019
Credit Hours: 3+0	**Course Organizer: Muhammad Irfan Younas** **Instructor: Muhammad Irfan Younas**
Pre-requisite Courses: None	**Post-requisite Courses: None**
Co-requisite Courses: None	**e-mail: Irfan.younas@iba-suk.edu.pk**
Office Hours: 09 am -5 pm	**Consulting Hours: 10 am- 11am (Mon-Tues)** **Otherwise please make an appointment**
Office Location: Room 201, Block-III	

ASSESSMENT/ EVALUATION

1.	Assignments	**10%**
2.	Quizzes	**10%**
3.	First Term	**20%**
4.	Second Term	**20%**
5.	Final Examination	**40%**

RECOMMENDED BOOK/S:

S.No	Book Name	Author/s Name	Publisher Name & Edition
1	Discrete Mathematics with Applications	Susanna S. Epp	Fourth Edition or any latest

REFERENCE BOOK/S:

1	Logic and Discrete Mathematics: A Computer Science Perspective	Winifred Grassman	First Edition

ONLINE RESOURCES:

1	Truth table practice	https://www.ixl.com/math/geometry/truth-tables https://www.math.psu.edu/treluga/311w/3.1practiceD.html
2	Venn diagram maker	https://creately.com/Draw-Venn-Diagrams-Online
3	Graph Creator	https://www.nctm.org/Classroom-Resources/Illuminations/Interactives/Graph-Creator/
4	Online learning	http://mathworld.wolfram.com/topics/DiscreteMathematics.html

COURSE DESCRIPTION:

This subject offers an introduction to discrete mathematics oriented toward computer science and engineering. The subject coverage divides roughly into thirds:

1. Fundamental concepts of mathematics: Definitions, proofs, sets, functions, relations.
2. Discrete structures: graphs, state machines, modular arithmetic, counting.
3. Discrete probability theory.

Please feel free to give me feedback as to whether the class is going too fast or too slow

COURSE OBJECTIVES:

- To provide a solid background understanding of the pertinent computer science, mathematical, and engineering concepts that make up the foundation of the discipline of computer science and engineering, and its closely associated fields
- To develop logical thinking and its application to computer science, mathematics & engineering
- To emphasize the importance of proving statements correctly and de-emphasize the hand-waving approach towards correctness of an argument

COURSE LEARNING OUTCOMES

The students will be able:

CLO1 (Cog-2): Describe the key concepts of Discrete Structures such as Sets, Permutations, Relations, Graphs, and Trees etc.

CLO2 (Cog-3): Apply formal logic proofs and/or informal, logical reasoning to real problems, such as predicting the behavior of software or solving problems such as puzzles.

CLO3 (Cog-4): Differentiate various discrete structures and their relevance within the context of computer science, in the areas of data structures and algorithms, in particular.

QUIZZES & ASSIGNMENTS DETAILS ALONGWITH PREDEFINED ASSESSMENT CRITERIA

Quizzes:

- There will be three quizzes (best two out of three will be considered). All quizzes will be closed-book. Appearing in all quizzes is mandatory if any quiz is missed without proper justification (which will defiantly involve administration) then missed quiz will be considered even if other two quizzes have better scores.

- **No makeup quiz allowed for any reason whatsoever.**

Assignments:

- There will be three assignments (best two out of three will be considered). All assignments will be handwritten and program output snapshots will be attached.
- Assignments will be submitted individually but can be solved in groups.
- Submitting all assignments are mandatory if any assignment is missed without proper justification (which will defiantly involve administration) then missed assignment will be considered even if other two have better scores.
- **No late/resubmissions allowed for any reason whatsoever.**

IMPORTANT POLICIES (subject to the course instructor)

- Class attendance is mandatory and late comers will be marked "absent"

CLOs	Level of learning	Related PLOs	Teaching Method	CLO attainment in
CLO1	**Cog-2**	**1** (Engg Knowledge)	Lectures, Quizzes, assignments & recitations	First mid, assignment 1, Quiz 1, Final Exam
CLO2	**Cog-3**	**2** (Problem Analysis)	Lectures, Quizzes, assignments & recitations	Second Mid, Final Exam, assignment 2, Quiz 2
CLO3	**Cog-4**	**4** (Investigation)	Lectures, Quizzes, assignments & recitations	Final Exam, assignment 3, Quiz 3

Lecture Plan

SESSION / WEEK WISE DETAILS:

Session No.	Topics	Assignments/ Quizzes / Digital Library work	Suggested Readings	CLO Covered
01-03	Logic, Truth Tables, Laws of Logic		C++ How to program	CLO-1
04-06	Bi-Conditional, Argument, Application of Logic			
07-09	Set Theory, Venn Diagram, Set Identities,	**Assignment # 1**		CLO-1
10-12	Applications of Venn Diagram, Relations Types of Relations,			
13-15	Matrix Representation of Relations, Inverse of Relations, Functions	Quiz No.01		
MID-I Exams				

16-18	Types of Functions, Inverse Function, Composition of Functions			
19-21	Sequence, Series, Recursion			**CLO-II**
22-24	Recursion, Mathematical Induction, Mathematical Induction for Divisibility	Assignment No.02	C++ How to program	**CLO-II**
25-27	Methods of Proof, Proof by Contradiction, Algorithm	Quiz No.02		
MID-II Exams				
29-30	Division Algorithm, Combinatorics, Permutations	**Project Brief**		
31-33	Combinations, K-Combinations, Tree Diagram			**CLO-III**
34-36	Inclusion-Exclusion Principle, Probability, Laws of Probability	**Assignment 3**		
37-40	Conditional Probability, Random Variable, Introduction to graphs,			**CLO-III**
41-43	Paths and Circuits, Matrix Representation of Graphs, Isomorphism of Graphs	**Quiz 3**		**CLO-III**
43-46	Planar Graphs, Trees, Spanning Trees			
Final Exams				

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Object Oriented Programming

Programs & Class: BE-III	**Semester:** Fall 2019
Credit Hours: 04(3+)	**Instructor:** Irfan Latif Memon **Support Instructor :**
Pre-requisite Courses: No	**Post-requisite Courses: None**
Co-requisite Courses: None	**e-mail: irfan_memon@iba-suk.edu.pk**
Office Hours: 09 am -5 pm	**Consulting Hours: 2 pm- 4 pm (Mon-Tues)** **Otherwise please make an appointment**
Office Location: Room# 107, Academic Block 03	

ASSESSMENT/ EVALUATION

1.	Quizzes (Best 02 out of total 03)	**20%**
2.	First Term Exams	**20%**
3.	Second Term Exams	**20%**
4.	Final Examination	**40%**
6.	Semester project/ assignments/ group activities etc	

RECOMMENDED BOOKS:

S.No	Book Name	Author/s Name	Publisher Name & Edition
1.	The Complete Reference JAVA	Herbert Schildt	Latest edition
2.			

REFERENCE BOOKS:

1.	Java How to Program	Deital and Deital	9th Edition

COURSE DESCRIPTION:

This course teaches object-oriented programming to those who have learnt basic programming concepts and are ready to learn in-depth programming. It focuses on object-oriented programming using Java. In just a few years java grew from a concept into one of the world's dominant computer language. The topics discussed are: Moving from C to Java class design and objects, Data Encapsulation, Polymorphism and Inheritance, Interfaces, Exception Handling, GUI Programming

COURSE LEARNING OUTCOMES

CLO 1: To be able to describe fundamentals of object-oriented programming in Java, including Encapsulation, Abstraction, Inheritance and Polymorphism

CLO 2: Analyze programming problems through object oriented programming principles in Java, including defining classes, invoking methods, using class libraries, etc.

CLO3: Design object oriented solutions for small problems involving multiple objects. Implement, test and debug solutions in Java.

CLOs	Level of learning	Mapped OBE PLOs	Mapped ABET SOs	Teaching Methods	CLO attainment checked in
CLO1	**Cog-2**	**1**	1	Lectures, tutorials	First mid, Second Mid, Final exam
CLO2	**Cog-3**	**2**	**2**	Lectures, tutorials	Second mid, Final Exam
CLO3	**Cog-3**	**3**	3	Lectures, tutorials	First Mid, Second Mid , Final exam Pr.

Mapped OBE Program Learning Outcomes (PLOs):

PLO1 Engineering Knowledge: An ability to gain and apply knowledge of mathematics, science, engineering fundamentals and engineering specialization to solve complex engineering problems.

PLO2 Problem Analysis: An ability to identify, formulate, research literature and analyses complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.

PLO3 Design / Development of Solutions

An ability to design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

SESSION / WEEK WISE DETAILS:

Lecture No.	Topics	CLO Mapping	Assignments/ Quizzes	Suggested Readings
01-02	**Moving C to Java** Procedural vs. OOP, Why OOP? , History of Programming Languages, Why JAVA? , History of JAVA , Buzzwords , JDK, JRE and JVM			Computer Network A Top Down Approach
03-04	**Introduction to OOP ,** Programming Paradigm, Abstraction , Three OOP Principles , Encapsulation Inheritance & Polymorphism Together	CLO1		
05-06	**Introduction to Java** First Java application, A second Short Example, Two Control Statements (if and for), Using Block Code, Lexical Issues, Programming Style.	CLO1		
07-08	**Fundamental Elements of Language** Fundamental Elements of Java (Datatypes, Variables and Arrays)	CLO1		
09-10	Primitive Types ,Literals , String Literal , Escape Sequence , Scope and lifetime of Variables ,	CLO1		Computer Network A Top Down Approach
11-12	Type Conversion and Casting , Automatic Type Promotion in Expressions	CLO1		
13-14	Arrays (One Dimension and Multi Dimension			
15-16	**Operators** (Arithmetic, Bitwise, Relational and Logical) ,Ternary operator		Quiz1	
17-18	Control Statements (Selection, iteration, jump)			
19-20	**Classes & Methods ,** Constructor ,new Operator , Parameterized Constructor			
	FIRST MID TERM EXAMS			
21-22	**Classes & Methods** Constructor , new Operator , Parameterized Constructor , this keyword , Instance Variable Hiding , Garbage Collection finalize( ) Method			Computer Network A Top Down Approach
23-24	**Encapsulation: Closer look at Classes, Methods, Access Controllers & References**	CLO2		

	Methods Overloading, Methods Overloading Methods – Automatic Conversion, Overloading Constructors ,Using Objects as Parameters, Object to its Constructor as Parameter			
25-26	A Closer Look at Argument Passing , Arguments in JAVA, Call by value, Call by Reference Returning Objects , Access Control (Specifiers: public, private protected) Understanding static and final Nested Classes Inner Class within any block scope Exploring String Class Useful methods of String class (equals(), length(), charAt()) Varargs: Variable-Length Arguments Old approach of variable length arguments	CLO2		
27-28	**Inheritance** Inheritance , Extends , Supper & Subclass , Advantages of Inheritance , Extension in existing class , Reference a Subclass Object	CLO2		
29-30	Using super , Multilevel Hierarchy ,Constructors Call , Method Overriding	CLO2		
31-32	**Polymorphism** Method Overloading Using Abstract Classes usage of final	CLO2	Quiz2	
33-34	Packages and Interfaces Packages Compilation & Executing	CLO2		
35-36	**Packages & Interfaces** Creating & Importing packages , Interfaces Defining an interface , Implementing Interfaces , Accessing through references , Polymorphic Methods , Partial Implementation of an interface , Interfaces Can Be Extended	CLO2		
	SECOND MID TERM EXAMS			
37-38	**Exception Handling and File, I/O** Uncaught exceptions			Computer Network A Top Down Approach
39-40	Try, catch, Throw, throws and final	CLO2		
41-42	File I/O Streams Simple file I/O	CLO2		

43-44	Create a file, Add the record to the file, Read from existing file	CLO2		
45-46	**Graphic User Interface** Introduction to GUI Java Swing			
47-48	Steps for GUI Creation First Java GUI Application JFrame Swing Components, JButton class, JRadioButton class, JTextArea class, JComboBox class, JTable class		Quiz3	
49-50	Action Listeners	CLO2		
51-52	Layout Managers (FlowLayout, GridLayout, BorderLayout) Revision	CLO2		
		FINAL EXAMS		

For Lab Courses, Insert list of lab experiments and proposed lab projects here:

Week	**Objective**	**Mapped CLO**
1	Data Types, Operators, and Control Structures	
2	Control Structure Switch. Loops for, while and do - while	
3	Arrays Single Dimension, Two Dimension, Modifiers	
4	Classes, Objects, Constructors and Methods.	
5 & 6	**MIDTERM 1**	
7	Nested Classes.	CLO3
8	Inheritance	
9	Abstract classes	CLO3
Week	**Objective**	**Mapped CLO**
10	Interfaces	CLO3
11 & 12	**MIDTERM 2**	
13	Package	
14	Exception Handling throws	CLO3

S. No	**Project Title**
1	Course Management System
2	E Health Care Management System
3	Grade Book System
4	Hostel Management System
5	E-Portal
6	Airline Reservation System
7	Mess Management System
8	Computerization of Health Records
S. No	**Project Title**
9	Online Book Store
10	Online Bank Management system
11	ATM
12	

15	GUI Components and Layouts Management	CLO3	13	
16	Open Ended Task Design	CLO3	14	
17	**FINALTERM**		15	

Reviewed by ACC on _____

Review

Comments:_____

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Head of ACC **HoD, Electrical Engineering**

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Department of Electrical Engineering

Complex Variable & Transform

Course Identification and General Information	
Program and Class: **BE-III(EE)**	**Semester**: Fall 2019
Credit Hours: 3+0	**Instructors:** Umair Khan **Email:** umairkhan@iba-suk.edu.pk **Office:** Room 01 (Academic Block – I)
Pre-requisite Course: MTS-111	**Counseling Hours:**

2. Schedule of Assessment Tasks for Students during the Semester

S. No:	**Assessment Task (e.g. essay, test, group project, examination etc.)**	**Week Due**	**Proportion of Final Assessment/Marks**
1	Quizzes	Academic Calendar	10
2	Assignments + Class Participation	Academic Calendar	05+05
3	Two Term Exams	Academic Calendar	20+20
4	Final Exam	Academic Calendar	40

3. Learning Resources

Text Book: Complex Variables and applications (8th Edition) by James W. Brown and Ruel V. Churchill. Advanced Engineering Mathematics (9th Edition) by Erwin Kreyszig
Reference: **Dennis G. Zill and Patrick D. Shanahan; A First Course in Complex Analysis with Applications (2th Edition)** Tristan Needham, **Visual Complex Analysis**, Calendron Oxford University Press 1999 **Web Resources:** **Imaginary Numbers are Real** Welch Labs https://www.youtube.com/watch?v=T647CGsuOVU&list=PLiaHhY2iBX9g6KIvZ_703G3KJXapKkNaF

4. Course Description

The course of complex variables and transform is a vital course in the EE department where the understanding of several advanced courses e.g. Control Systems, Linear Circuit Analysis, Electrical Network Analysis entirely depends on the core concepts of CVT. Needless to say research in these disciplines also rely on the understanding of basic concepts of a student in CVT.

5. Course Learning Outcomes

Nr	CLO	Domain	Taxonomy level	PLO
1.	Identify the complex number system, complex functions and derivatives of complex functions	Cognitive	C1	1
2.	Apply Laplace Transform for solving problems in engineering science.	Cognitive	C2	2

6. Lesson Plan & week wise Schedule

Lecture No.	Topics	**Assignments/ Quizzes / Digital Library work**	**CLOs**	**Suggested Readings**
01-02	Complex Numbers and their properties, Complex Plane		CLO 1	Complex Variables and applications

03-04	Vector and Moduli, Complex Conjugates And Polar form of Complex Numbers		CLO 1	Chapter 01
05-06	Euler's formula for powers of complex numbers, introduction to complex valued-functions		CLO 1	
07-08	Concepts of limits of complex functions		CLO 1	
09-10	Analytic and harmonic complex functions		CLO 1	Complex Variables and applications Chapter 02
11-12	Derivative of complex valued functions		CLO 1	
13-14	Cauchy-Riemann equations			
15-20	Complex Trigonometric Functions	Quiz 1	CLO 1	
FIRST MID TERM EXAMS				
21-22	Complex Hyperbolic Functions		CLO 2	Complex Variables and applications Chapter 03 And Selected topics from Advanced Engineering Mathematics 9e Chapter 13
23-30	Complex Logarithimic Function		CLO 2	
31-32	Laplace Tranforms	Quiz2	CLO 2	
33-34	Shifting Theorems		CLO 2	
35-44	Laplace Tranforms of derivatives, Integrals		CLO 2	
SECOND MID TERM EXAMS				
44-46	Inverse Laplace transform		CLO 2	Selected topics from Advanced Engineering Mathematics 9e Chapter 6
46-50	Solving Differential Equations using Laplace Tranform	Quiz 3	CLO 2	

50-54	Applications RLC circuits using Laplace Tranforms		CLO 2	
		FINAL EXAMS		

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Embedded Systems

Programs & Class: BE-IV (EE)	**Semester:** Fall 2019
Credit Hours: 03	**Instructor:** Dr. Safeer Hyder Laghari **Support Instructor :** TBA
Pre-requisite Courses: Introduction to Embedded Systems/MIT	**Post-requisite Courses: None**
Co-requisite Courses: None	**e-mail: safeer.hyder@iba-suk.edu.pk**
Office Hours: 09 am -5 pm	**Consulting Hours: 3 pm- 5 pm (Wed-Thu-Sat)** **Otherwise please make an appointment**
Office Location: Room#206, Academic Block 03	

ASSESSMENT/ EVALUATION

	THEORY	
1.	First Term Exams	**20%**
2.	Second Term Exams	**20%**
3.	Final Examination	**40%**
4.	Semester Project	**15%**
5.	Assignment/Presentation	**05%**
	LAB	
1.	First Term Exams	**20%**
2.	Second Term Exams	**20%**
3.	Final Examination	**40%**
4.	Lab Report Submissions	**20%**

RECOMMENDED BOOKS:

S.No	Book Name	Author/s Name	Publisher Name & Edition
1.	Digital Design and Verilog HDL Fundamentals	Joseph Cavanagh Santa Clara University, USA	CRC Press
2.	Verilog HDL A Guide to Digital Design and Synthesis	Samir Palnitkar Digital Design Entrepreneur	Pearson education, 2nd Edition
3.	Fundamentals of Digital Logic with Verilog Design	Stephen Brown University of Toronto	MH Education, 3rd Edition

REFERENCE BOOKS:

1.	Advanced Digital Design with the Verilog HDL	Michael D. Ciletti University of Colorado, USA	Pearson Education

COURSE DESCRIPTION:

The course covers digital design topics such as digital logic, sequential building blocks, finite-state machines, FPGAs, timing and synchronization. The semester begins with lectures and problem sets, to introduce fundamental topics before students embark on lab assignments and ultimately, a digital design project. The course relies on extensive use of Verilog® for describing and implementing digital logic designs on state-of-the-art FPGA.

COURSE LEARNING OUTCOMES

The students will be able to:

CLO1: Design combinational circuits using Verilog Gate-level and Data-flow Modelling

CLO2: **Investigate** combinational and sequential circuits using Verilog Testbench

CLOs	Level of learning	Mapped OBE PLOs	Mapped ABET SOs	Teaching Methods	CLO attainment checked in
CLO1	**Cog-6**	**3**		Lectures, tutorials	First Term Theory, First Term Lab
CLO2	**Cog-5**	**4**		Lectures, tutorials	Second Term Theory, Second Term Lab

Mapped OBE Program Learning Outcomes (PLOs):

PLO3 Design/Development of Solutions: An ability to design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

PLO4 Investigation: An ability to investigate complex engineering problems in a methodical way including literature survey, design and conduct of experiments, analysis and interpretation of experimental data, and synthesis of information to derive valid conclusions.

Mapped ABET Student Outcomes (SOs):

SO1: An ability to identify, formulate and solve complex engineering problems by applying principles of engineering science and mathematics

Performance Indicator for SO1 are:

a. Identification of specific facts of mathematics, science and engineering for a given situation.
b. Convert real world situation into an appropriate model
c. Ability to solve engineering problems using relevant facts of mathematics, science and engineering

SESSION / WEEK WISE DETAILS:

Lecture No.	Topics	CLO Mapping	Assignments/ Quizzes	Suggested Readings
01-03	FPGA, Verilog HDL and Xilinx Vivado Design Flow	CLO1		Verilog HDL A Guide to Digital Design and Synthesis by Samir Palnitkar & Lab Notes Verilog HDL
04-06	Hierarchical Modelling Concepts	CLO1		
07-09	Verilog HDL Basic Concepts-I	CLO1		
10-12	Verilog HDL Basic Concepts-II	CLO1	Assignment	
13-15	Modules and Ports, and Gate-level Modelling	CLO1		
16-18	Dataflow Modelling	CLO1		
19-21	Behavioral Modelling-I	CLO1		
FIRST TERM EXAMS				
22-24	Behavioral Modelling-II	CLO2		Verilog HDL A Guide to Digital Design and Synthesis by Samir Palnitkar & Lab Notes
25-27	Behavioral Modelling-III	CLO2		
28-30	Design Project – Moving Average Filter	CLO2		
31-33	Design Project – Gaussian FIR Filter	CLO2		
34-35	Design Project – IIR Filter	CLO2		
36-38	Design Project – FSM based “11011”sequencer detector	CLO2		
SECOND TERM EXAMS				
39-41	Zybo Zynq – Vivado IP Integrator, Hello World, LEDs, and Switches			Verilog HDL A Guide to Digital Design and Synthesis by Samir Palnitkar & Lab Notes
42-44	Zybo Zynq – Vivado IP Integrator, PMOD OLED RGB			
45-47	PynQ Z1 – Python Jupyter, LEDs, Switches Interfacing, AXI Memory Map Interfacing			
48-50	PynQ Z1 – Python Jupyter, XADC and FFT			
51-52	Assignment Presentation			
47-48	Project Design			
49-50	Project Design			
51-52	Project Design			
FINAL EXAMS				

For Lab Courses, Insert list of lab experiments and proposed lab projects here:

Week #	Lab Experiments Outline
1	Gate Level Modelling – Hello World, Adder, Mux, DeMux
2	Data Flow Modelling –ALU, CLA Adder, Moving Average Filter
3	Behavioral Modelling – Combinational circuits and test bench
4	Behavioral Modelling – Sequential circuits and test bench
5	Design Example – Gaussian FIR Filter , IIR Filter
6 & 7	***FIRST TERM EXAMS***
8	FSM – Theory and basic design of sequence detector
9	Zybo Zynq – Vivado IP Integrator, Hello World, LEDs, and Switches
10	Zybo Zynq – Vivado IP Integrator, PMOD OLED RGB
11	PynQ Z1 – Python Jupyter, LEDs, Switches Interfacing, AXI Memory Map Interfacing
12	PynQ Z1 – Python Jupyter, XADC and FFT
13 & 14	***SECOND TERM EXAMS***
15	Project Design
16	Project Design
17	Project Design
18	Project Design

S. No	Project Titles
1	Zybo Zynq based Playing Video on PMOD OLED using C++
2	PynQ Z1 based FFT implementation for XADC acquired data using Python
3	Simulation and Hardware based Implementation of UART RX and TX using Verilog HDL
4	Simulation and Hardware based Implementation of FSM powered Traffic Light Signal Controller using Verilog HDL
5	Simulation and Hardware based Implementation of PWM powered RGB LEDs color changing using Verilog HDL

Reviewed by ACC on _____

Review Comments:_____

Approved by ACC on_____

Head of ACC

HoD, Electrical Engineering

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Department of Electrical Engineering

Electromagnetics Field Theory

Programs & Class: BE-IV (EE)	**Semester:** Fall 2019
Credit Hours: 03	**Instructor:** Dr Suresh Kumar
Pre-requisite Courses: Multivariable Calculus	**Post-requisite Courses: None**
Co-requisite Courses: None	**e-mail: suresh@iba-suk.edu.pk**
Office Hours: 09 am -5 pm	**Consulting Hours: 11 pm- 1 pm (Tue- Fri) Otherwise please make an appointment**
Office Location: Room# 204, Academic Block III	

ASSESSMENT/ EVALUATION

1.	Presentations (Best 01 out of total 02)	**10%**
2.	Quizzes (Best 02 out of total 03)	**10%**
3.	First Term Exams	**20%**
4.	Second Term Exams	**20%**
5.	Final Examination	**40%**

RECOMMENDED BOOKS:

S. No	Book Name	Author/s Name	Publisher Name & Edition
A.	Engineering Electromagnetics	William Hayt and John A. Buck	McGraw-Hill, 8th Edition

REFERENCE BOOKS:

B.	Electromagnetism Theory & Applications	Ashutosh Pramanik	Prentice Hall

COURSE DESCRIPTION:

This course is designed for the students to learn and practice the theory of electric, magnetic and electromagnetic fields. The course starts with the revision of essential vector calculus followed by static and dynamic electric and magnetic fields. Maxwell's equations and their mathematical formulation describing electromagnetic phenomenon

are introduced.

COURSE LEARNING OUTCOMES

The students will be able:

CLO1: To use vector calculus and the fundamental laws of physics to describe the electromagnetic phenomena

CLO2: To analyze and solve problems in electrostatic, magneto-static, and electromagnetic fields using first principle of math, science and engineering.

PROJECTS & ASSIGNMENTS DETAILS ALONGWITH PREDEFINED ASSESSMENT CRITERIA

Quizzes:

- Three quizzes clearly linked with the CLOs will be taken, each before the mid and final exam.
- Best two out of three quizzes will be considered.
- Questions will be self-explanatory.

Presentations:

- Two presentations will be taken and best one will be counted for sessional marks.
- A Presentation topic will be assigned to each student for remaining sessional marks.
- The presentation topics may include, but not limited to, Electromagnetics in industry and current research in the area. Presentation assessment rubrics are provided as below:

Criteria/ Level	1	2	3	4
Understanding	Unable to explain the topic/area of the field	Able to explain, to some level, the presentation topic	Able to explain the presentation topic & but couldn't identify any current research on the topic	Able to explain the presentation topic & identify current research on the topic
Presentation delivery	Lack of confidence and couldn't present well	Demonstrated some level of confidence and presented very well, mostly used English, but failed to answer question(s)	Delivered with confidence and presented in English, but failed to provide satisfactory answer to the question(s) asked	Delivered with confidence, presented in English and provided satisfactory answer to the question(s) asked
Presentation	Not prepared very well, Vague, Alignments, Fonts etc. not matching in the presentation	Prepared well, however, found some grammatical mistakes, Alignments, Fonts etc. in the presentation	Prepared well, with a couple of grammatical mistakes, Alignments, Fonts etc. in the presentation	Prepared well, without any grammatical mistakes, Alignments, Fonts etc. in the presentation

IMPORTANT POLICIES (subject to the course instructor)

- Class attendance is mandatory and late comers will not be allowed to attend the lecture.
- The quizzes or presentation will not be postponed, unless there are any changes in the department/university schedule.

CLOs and PLOs Mapping

CLOs	**Level of learning**	**Related PLOs**	**Teaching Methods**	**CLO attainment checked in**
CLO1	**Cog-2**	**1**	Lectures	First mid, Quiz 1, Final exam
CLO2	**Cog-4**	**2**	Lectures	First Mid, Second mid, Quiz- 2, Quiz 3, Presentations, Final Exam

Mapped OBE Program Learning Outcomes (PLOs):

PLO1 Engineering Knowledge: An ability to gain and apply knowledge of mathematics, science, engineering fundamentals and engineering specialization to solve complex engineering problems.

PLO2 Problem Analysis: An ability to identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.

SESSION / WEEK WISE DETAILS

Lecture No.	Topics	**CLO Mapping**	**Assignments / Quizzes**	**Suggested Readings**
01-02	Course introduction, Vector Basics, Unit Vector			Engineering Electromagnetics by William Hayt
03-04	Dot and cross product of vectors, Scalar & Vector fields	CLO1		
05-06	One parameter vector, Vector differentiation, Space curves, Coordinate systems	CLO1		
07-08	Transformation of coordinates	CLO1		

09-12	Vector Integration, Gradient, Divergence and Curl	CLO-1		Engineering Electromagnetics by William Hayt
11-12	Gradient, Divergence and Curl examples, Coulombs law and electric field intensity			
13-14	Electric field arising from an infinite line and sheet of charges with examples	CLO2		
15-16	Electric flux density, Gauss's law & its Application	CLO2		
17-18	Maxwell's first equation		Quiz1	
19-20	Maxwell's first equation in point & integral	CLO2		
	forms			
FIRST MID TERM EXAMS				
21-22	Work done, Potential difference and absolute potential, Potential field due to different charge distributions			Engineering Electromagnetics by William Hayt
23-24	Potential gradient	CLO2		
25-26	Electric dipole, Energy density	CLO2		
27-28	Current density, Continuity of current, Ohm's law	CLO2		
29-30	Polarization of dielectric materials	CLO2	Quiz2	
31-32	Boundary conditions for conductor and dielectric materials	CLO2		
SECOND MID TERM EXAMS				
33-34	Capacitance calculation of parallel plate and two wire line using boundary conditions		Presentations	
35-36	Poisson's and Laplace's equations			
37-38	Biot-Savart law, Stokes' theorem	CLO2		
39-40	Magnetic flux density, Scalar and vector magnetic potentials	CLO2		
41-42	Ampere's circuital laws	CLO2		

43-44	Nature of Magnetic materials and boundary conditions			Engineering Electromagnetics by William Hayt
45-46	Magnetic circuit, Magnetic force on moving charge and current carrying conductor			
47-48	Faraday's law and displacement current	CLO2		
49-50	Maxwell's Equations in point and integral form	CLO2	Quiz3	
51-52	Review (Selected topics)	CLO2	Presentations	
	FINAL EXAMS			

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Department of Electrical Engineering

Electronic Circuit Design

Programs & Class: BE-IV (EE)	**Semester:** Fall 2019
Credit Hours: 03	**Instructor:** Dr. Muhammad Yameen Sandhu
Pre-requisite Courses: ESE-121 Electronic Devices and Circuits	**Post-requisite Courses: None**
Co-requisite Courses: None	**e-mail: yameen@iba-suk.edu.pk**
Office Hours: 09 am -5 pm	**Consulting Hours: 2 pm- 4 pm (Mon-Friday)** **Otherwise please make an appointment**
Office Location: Room# 107, Academic Block 03	

ASSESSMENT/ EVALUATION

1.	Semester Project	**10%**
2.	Quizzes (Best 02 out of total 03)	**10%**
3.	First Term Exams	**20%**
4.	Second Term Exams	**20%**
5.	Final Examination	**40%**

RECOMMENDED BOOKS:

S.No	Book Name	Author/s Name	Publisher Name & Edition
1.	Microelectronic Circuits and Design	Muhammad H. Rashid	PWS Publishing ISBN:9780534951740
2.	Principals and Applications of Electronics	V K Mehta	S Chand
3.	Electronic Devices and Circuits	Thomas L. Floyd	Pearson
4.	Basic Electronic Devices, circuits and Systems	MM Cirovic	Reston Publisher

REFERENCE BOOKS:

1.	Microelectronic Circuits, 6th Edition.	Adel S. Sedra, Kenneth C. Smith	Oxford University Press ISBN: 9780195323030
2.	Fundamentals of Microelectronics Latest Edition 2014	Behzad Razavi	John Wiley and Sons ISBN: 9781118156322

Course Description:

This course provides an insight of the BJT, FET and Op-amp Circuit Models for the design and Analysis of Electronic Circuits. The topics include Single and multistage analysis and design, amplifier operating point design, frequency response of single and multistage amplifiers, active filters, Op-amp circuits and oscillators.

COURSE LEARNING OUTCOMES

The students will be able to:

1. Simulate, design and troubleshoot amplifier and oscillator circuits as per specified constraints of frequency response, gain, and power consumption.
2. Demonstrate ability to be an effective team member.

CLOs	Level of learning	Mapped OBE PLOs	Mapped ABET SOs	Teaching Methods	CLO attainment checked in
CLO1	**C6**	**5**		Lectures, Tutorials, Lab activities	Lab Exercise & Semester Projects
CLO2	**A3**	**9**	**5**	Briefing sessions about individual and teamwork	Semester Projects

Mapped OBE Program Learning Outcomes (PLOs):

PLO5 Modern Tool Usage: An ability to create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling, to complex engineering activities, with an understanding of the limitations.

PLO9 Individual and Team Work: An ability to work effectively, as an individual or in a team, on multifaceted and /or multidisciplinary settings.

Mapped ABET Student Outcomes (SOs):

SO5: An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives

Performance Indicator for SO5 are:

- **a.** Contributes strongly as a team member
- **b.** Defines realistic milestones
- **c.** Completes the task in allocated time

SESSION / WEEK WISE DETAILS:

Week #	Topics	CLO Mapping	Assignments/ Quizzes	Suggested Readings
01	Review of BJT amplifiers			Floyd

02	Multistage Cascaded BJT amplifiers			
03	Amplifier Classes		Quiz1	
04	Field effect transistors (FET)			
05	FET Amplifiers			
06-07	Amplifier Frequency response		Quiz2	
08	Operational Amplifiers			
09	Op-Amp special purpose circuits			
10-11	Active Filters		Quiz3	
12-14	Oscillators			

Week	**Objective**	**Mapped CLO**
1	Common Emitter Amplifier Design	CLO1
2	Common Base Amplifier Design	
3	Multistage Amplifier	
4	Amplifier Classes	
5 & 6	**MIDTERM 1**	
7	Common Source Amplifier	
8	Amplifier low and high frequency response	
9	OP-Amp circuits	
10	Active filters	
11 & 12	**MIDTERM 2**	
13	Colpitts, Hartley Oscillator Design	
14	RC Phase shift Oscillator design	
15-16	Project	CLO1, CLO2
17	**FINALTERM**	

S. No	**Project Title**
1	FM Transmitter
2	FM receiver
3	Function Generator
4	Stereo Amplifier
5	Electronic Thermometer
6	Woofer and tweeter circuit
7	Metal Detector
8	5 tone Audio Mixer
9	Audio Amplifier
10	Brake Failure indicator Circuit
11	Smoke detector
12	Cell phone detector circuit
13	Music operated dancing LEDs
15	Mosquitto repellent circuit
16	Wireless Battery charger

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Approved by ACC on_____

Head of ACC **HoD, Electrical Engineering**

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Department of Electrical Engineering

Object Oriented Programming

Programs & Class: BE-IV	**Semester:** Fall 2019
Credit Hours: 04(3+)	**Instructor:** Irfan Latif Memon **Support Instructor :**
Pre-requisite Courses: No	**Post-requisite Courses: None**
Co-requisite Courses: None	**e-mail: irfan_memon@iba-suk.edu.pk**
Office Hours: 09 am -5 pm	**Consulting Hours: 2 pm- 4 pm (Mon-Tues)** **Otherwise please make an appointment**
Office Location: Room# 107, Academic Block 03	

ASSESSMENT/ EVALUATION

1.	Quizzes (Best 02 out of total 03)	**20%**
2.	First Term Exams	**20%**
3.	Second Term Exams	**20%**
4.	Final Examination	**40%**
6.	Semester project/ assignments/ group activities etc	

RECOMMENDED BOOKS:

S.No	Book Name	Author/s Name	Publisher Name & Edition
1.	The Complete Reference JAVA	Herbert Schildt	Latest edition
2.			

REFERENCE BOOKS:

1.	Java How to Program	Deital and Deital	9th Edition

COURSE DESCRIPTION:

This course teaches object-oriented programming to those who have learnt basic programming concepts and are ready to learn in-depth programming. It focuses on object-oriented programming using Java. In just a few years java grew from a concept into one of the world's dominant computer language. The topics discussed are: Moving from C to Java class design and objects, Data Encapsulation, Polymorphism and Inheritance, Interfaces, Exception Handling, GUI Programming

COURSE LEARNING OUTCOMES

CLO 1: To be able to describe fundamentals of object-oriented programming in Java, including Encapsulation, Abstraction, Inheritance and Polymorphism

CLO 2: Analyze programming problems through object oriented programming principles in Java, including defining classes, invoking methods, using class libraries, etc.

CLO3: Design object oriented solutions for small problems involving multiple objects. Implement, test and debug solutions in Java.

CLOs	Level of learning	Mapped OBE PLOs	Mapped ABET SOs	Teaching Methods	CLO attainment checked in
CLO1	**Cog-2**	**1**	1	Lectures, tutorials	First mid, Second Mid, Final exam
CLO2	**Cog-3**	**2**	**2**	Lectures, tutorials	Second mid, Final Exam
CLO3	**Cog-3**	**3**	3	Lectures, tutorials	First Mid, Second Mid , Final exam Pr.

Mapped OBE Program Learning Outcomes (PLOs):

PLO1 Engineering Knowledge: An ability to gain and apply knowledge of mathematics, science, engineering fundamentals and engineering specialization to solve complex engineering problems.

PLO2 Problem Analysis: An ability to identify, formulate, research literature and analyses complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.

PLO3 Design / Development of Solutions

An ability to design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

SESSION / WEEK WISE DETAILS:

Lecture No.	Topics	CLO Mapping	Assignments/ Quizzes	Suggested Readings
01-02	**Moving C to Java** Procedural vs. OOP, Why OOP? , History of Programming Languages, Why JAVA? , History of JAVA , Buzzwords , JDK, JRE and JVM			Computer Network A Top Down Approach
03-04	**Introduction to OOP ,** Programming Paradigm, Abstraction , Three OOP Principles , Encapsulation Inheritance & Polymorphism Together	CLO1		
05-06	**Introduction to Java** First Java application, A second Short Example, Two Control Statements (if and for), Using Block Code, Lexical Issues, Programming Style.	CLO1		
07-08	**Fundamental Elements of Language** Fundamental Elements of Java (Datatypes, Variables and Arrays)	CLO1		
09-10	Primitive Types ,Literals , String Literal , Escape Sequence , Scope and lifetime of Variables ,	CLO1		Computer Network A Top Down Approach
11-12	Type Conversion and Casting , Automatic Type Promotion in Expressions	CLO1		
13-14	Arrays (One Dimension and Multi Dimension			
15-16	**Operators** (Arithmetic, Bitwise, Relational and Logical) ,Ternary operator		Quiz1	
17-18	Control Statements (Selection, iteration, jump)			
19-20	**Classes & Methods ,** Constructor ,new Operator , Parameterized Constructor			
	FIRST MID TERM EXAMS			
21-22	**Classes & Methods**			

	Constructor , new Operator , Parameterized Constructor , this keyword , Instance Variable Hiding , Garbage Collection finalize( ) Method			Computer Network A Top Down Approach
23-24	**Encapsulation:** **Closer look at Classes, Methods, Access Controllers & References** Methods Overloading, Methods Overloading Methods – Automatic Conversion, Overloading Constructors ,Using Objects as Parameters, Object to its Constructor as Parameter	CLO2		
25-26	A Closer Look at Argument Passing , Arguments in JAVA, Call by value, Call by Reference Returning Objects , Access Control (Specifiers: public, private protected) Understanding static and final Nested Classes Inner Class within any block scope Exploring String Class Useful methods of String class (equals(), length(), charAt()) Varargs: Variable-Length Arguments Old approach of variable length arguments	CLO2		
27-28	**Inheritance** Inheritance , Extends , Supper & Subclass , Advantages of Inheritance , Extension in existing class , Reference a Subclass Object	CLO2		
29-30	Using super , Multilevel Hierarchy ,Constructors Call , Method Overriding	CLO2		
31-32	**Polymorphism** Method Overloading Using Abstract Classes usage of final	CLO2	Quiz2	
33-34	Packages and Interfaces Packages Compilation & Executing	CLO2		
35-36	**Packages & Interfaces** Creating & Importing packages , Interfaces Defining an interface , Implementing Interfaces , Accessing through references , Polymorphic Methods , Partial Implementation of an interface , Interfaces Can Be Extended	CLO2		

	SECOND MID TERM EXAMS			
37-38	**Exception Handling and File, I/O** Uncaught exceptions			Computer Network A Top Down Approach
39-40	Try, catch, Throw, throws and final	CLO2		
41-42	File I/O Streams Simple file I/O	CLO2		
43-44	Create a file, Add the record to the file, Read from existing file	CLO2		
45-46	**Graphic User Interface** Introduction to GUI Java Swing			
47-48	Steps for GUI Creation First Java GUI Application JFrame Swing Components, JButton class, JRadioButton class, JTextArea class, JComboBox class, JTable class		Quiz3	
49-50	Action Listeners	CLO2		
51-52	Layout Managers (FlowLayout, GridLayout, BorderLayout) Revision	CLO2		
		FINAL EXAMS		

For Lab Courses, Insert list of lab experiments and proposed lab projects here:

Week	**Objective**	**Mapped CLO**
1	Data Types, Operators, and Control Structures	
2	Control Structure Switch. Loops for, while and do - while	
3	Arrays Single Dimension, Two Dimension, Modifiers	
4	Classes, Objects, Constructors and Methods.	
5 & 6	**MIDTERM 1**	
7	Nested Classes.	CLO3
8	Inheritance	
9	Abstract classes	CLO3

S. No	**Project Title**
1	Course Management System
2	E Health Care Management System
3	Grade Book System
4	Hostel Management System
5	E-Portal
6	Airline Reservation System
7	Mess Management System
8	Computerization of Health Records

Week	Objective	Mapped CLO
10	Interfaces	CLO3
11 & 12	**MIDTERM 2**	
13	Package	
14	Exception Handling throws	CLO3
15	GUI Components and Layouts Management	CLO3
16	Open Ended Task Design	CLO3
17	**FINALTERM**	

S. No	Project Title
9	Online Book Store
10	Online Bank Management system
11	ATM
12	
13	
14	
15	

Reviewed by ACC on _____

Review

Comments:_____

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Approved by ACC on_____

Head of ACC **HoD, Electrical Engineering**

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Department of Electrical Engineering

Computer Networks

1. Programs & Class: BE-IV (Computer Systems)	**Semester:** Fall 2019
Credit Hours: 04(3+)	**Instructor:** Irfan Latif Memon **Support Instructor :**
Pre-requisite Courses: No	**Post-requisite Courses: None**
Co-requisite Courses: None	**e-mail: irfan_memon@iba-suk.edu.pk**
Office Hours: 09 am -5 pm	**Consulting Hours: 2 pm- 4 pm (Mon-Tues)** **Otherwise please make an appointment**
Office Location: Room# 107, Academic Block 03	

ASSESSMENT/ EVALUATION

1.	Quizzes (Best 02 out of total 03)	**20%**
2.	First Term Exams	**20%**
3.	Second Term Exams	**20%**
4.	Final Examination	**40%**
6.	Semester project/ assignments/ group activities etc	

RECOMMENDED BOOKS:

S.No	Book Name	Author/s Name	Publisher Name & Edition
1.	Computer Network A Top Down Approach	Behrouz A Forouzon	McGraw-Hill, 1st Edition
2.	Computer Network	Andrew S. Tanenbaum	Pearson Prentice Hall, 4th Edition

REFERENCE BOOKS:

1.	Data Communication and Networking	Behrouz A Forouzon	McGraw-Hill

COURSE DESCRIPTION:

This course is designed for the students to learn basics of computer networks which is an essential part of any technological system that is being implemented and operated throughout the world. Here the student will be taught layer wise to understand the different aspects of networks and their devices.

COURSE LEARNING OUTCOMES

The students will be able:

CLO1: Explain Interconnection of OSI and TCP/IP Model.

CLO2: Design and Apply ipv4 network models using classful and classless IP address scheme for a given Network.

CLO3: configure Static and Dynamic Protocol though Network Simulator Software

CLOs	Level of learning	Mapped OBE PLOs	Mapped ABET SOs	Teaching Methods	CLO attainment checked in
CLO1	**Cog-2**	**1**		Lectures, tutorials	First mid, Second Mid, Final exam
CLO2	**Cog-4**	**3**	**1**	Lectures, tutorials	Second mid, Final Exam, Assignment
CLO3	**Cog-3**	**5**		Lectures, tutorials	First Mid Second Mid, Final exam

Mapped OBE Program Learning Outcomes (PLOs):

PLO1 Engineering Knowledge: An ability to gain and apply knowledge of mathematics, science, engineering fundamentals and engineering specialization to solve complex engineering problems.

PLO2 Problem Analysis: An ability to identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.

PLO5

SESSION / WEEK WISE DETAILS:

Lecture No.	Topics	CLO Mapping	Assignments/ Quizzes	Suggested Readings
01-02	**OBE introduction**, Course introduction, Overview Of The Internet Networks LAN , WAN, Internetwork Switching , Circuit Switched Network , Packet Switched Network , The Internet Accessing the Internet , Hardware and Software			Vector Analysis by Murray Spiegel
03-04	**PROTOCOL LAYERING** Scenarios ,TCP/IP Protocol Suite , The OSI Model	CLO1		

	Encapsulation and Decapsulation, Multiplexing and demultiplexing			
05-06	**INTERNET HISTORY** Early History, Birth of the Internet, Internet Today , STANDARDS AND ADMINISTRATION Internet Standards, Internet Administration	CLO1		
07-08	**ADDRESSING**: Physical Addresses , Logical Addresses ,Port Addresses , Specific Addresses **NETWORK DEVICES** Repeaters, Hubs, Wireless Access Points, Wireless Network Components, Wireless Security Measures, Network Segmentation, Bridges, Switches, Routers, routers, Gateways	CLO1		
09-10	**PHYSICAL LAYER: TRANSMISSION MEDIA** Data and Signals, Analog and digital ,Transmission Impairment **GUIDED MEDIA : WIRED** Twisted-Pair Cable UTP , STP , Categories of UTP , Performance and Applications, Coaxial Cable, Fiber Optic **UNGUIDED MEDIA: WIRELESS** Wireless Networks and Mobile IP Bands, Frequencies, Microwave, Radio, Infrared			Engineering Electromagnetics by William Hayt
11-12	**DATA LINK LAYER** INTRODUCTION Nodes and Links Two Types of Links DLC, MAC.			
13-14	DATA LINK CONTROL (DLC) Framing Flow and Error Control Error Detection and Correction Bit Oriented Character Oriented	CLO2		
15-16	Types of Errors □ Redundancy □ Detection versus Correction □ Coding □ Block Coding	CLO2	Quiz1	

17-18	Error Detection Hamming Distance Minimum Hamming Distance for Error Detection	CLO3		
19-20	Parity-Check Code Cyclic Codes Cyclic Redundancy Check Checksum			
	FIRST MID TERM EXAMS			
21-22	MULTIPLE ACCESS PROTOCOLS RANDOMACCESS Protocol ALOHA Carrier Sense Multiple Access (CSMA) Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA)			Engineering Electromagnetics by William Hayt
23-24	LINK-LAYER ADDRESSING ARP Packet Format , operation and Activities at the Alice Site Activities at Routers Activities at Bob's Site WIRED LANS: ETHERNET PROTOCOL IEEE Project 802 Standard Ethernet Frame Format Connectionless and Unreliable Service Frame Length Transmission of Address Bits Unicast, Multicast, and Broadcast Addresses Distinguish between Unicast, Multicast, and	CLO2		
25-26	Broadcast Transmission Addressing Access Method Efficiency of Standard Ethernet Implementation	CLO2		

27-28	Virtual LANs Point-to-Point Networks Dial-up Digital Subscriber Line (DSL)	CLO2		
29-30	4.2 NETWORK-LAYER PROTOCOLS 261 IPv4 Datagram Format 262	CLO2		
31-32	IPv4 Addresses 269 Classes , CIDR , VLSM IP and Address Mapping NAT , ARP and RARP	CLO2	Quiz2	
33-34	4.2.3 Forwarding of IP Packets 286 .2.4 ICMPv4 295 4.3 UNICAST ROUTING 299 4.3.1 General Idea 300 4.3.2 Routing Algorithms 302 4.3.3 Unicast Routing Protocols 313			
35-36	.4.3 Intradomain Routing Protocols 343 4.4.4 Interdomain Routing Protocols 349 4.5 NEXT GENERATION IP 350 4.5.1 Packet Format 351 4.5.2 IPv6 Addressing 353 4.5.3 Transition from IPv4 to IPv6 358 4.5.4 ICMPv6 359			
	SECOND MID TERM EXAMS			
37-38	3.1 INTRODUCTION 140 3.1.1 Transport-Layer Services 141 3.2 TRANSPORT-LAYER PROTOCOLS 154 3.2.1 Simple Protocol 154 3.2.2 Stop-and-Wait Protocol 155 3.2.3 Go-Back-/V Protocol (GBN) 160 3.2.4 Selective-Repeat Protocol 166 3.2.5 Bidirectional Protocols: Piggybacking 173			Engineering Electromagnetics by William Hayt
39-40	3.2.6 Internet Transport-Layer Protocols 173 3.3 USER DATAGRAM PROTOCOL (UDP) 175 3.3.1 User Datagram 175 3.3.2 UDP Services 176 3.3.3 UDP Applications 179	CLO2		

41-42	3.4 TRANSMISSION CONTROL PROTOCOL (TCP) 181 3.4.1 TCP Services 181 3.4.2 TCP Features 184 3.4.3 Segment 185 3.4.4 A TCP Connection 188 3.4.5 State Transition Diagram 194	CLO2		
43-44	3.4.6 Windows in TCP 198 3.4.7 Flow Control 200 3.4.8 Error Control 205 3.4.9 TCP Congestion Control 213 3.4.10 TCP Timers 223 3.4.11 Options 227	CLO2		
45-46	1 INTRODUCTION 34 2.1.1 Providing Services 35 2.1.2 Application-Layer Paradigms 36 2.2 CLIENT-SERVER PARADIGM 38 2.2.1 Application Programming Interface 39 2.2.2 Using Services of the Transport Layer 43			
47-48	2.3 STANDARD CLIENT-SERVER APPLICATIONS 44 2.3.1 World Wide Web and HTTP 44 2.3.2 FTP 59		Quiz3	
49-50	2.3.3 Electronic Mail 63 2.3.4 TELNET 76 2.3.5 Secure Shell (SSH) 78 2.3.6 Domain Name System (DNS) 81 2.4 PEER-TO-PEER PARADIGM 92 2.4.1 P2P Networks 92	CLO2		
51-52	2.4.2 Distributed Hash Table (DHT) 95 2.4.3 Chord 97 2.4.4 Pastry 104 2.4.5 Kademlia 108 2.4.6 A Popular P2P Network: BitTorrent 1	CLO3		
		FINAL EXAMS		

For Lab Courses, Insert list of lab experiments and proposed lab projects here:

Week	Objective	Mapped CLO
1	Lab experiment 1	
2	Lab experiment 2	
3	Lab experiment 3	
4	Lab experiment 4	
5 & 6	**MIDTERM 1**	
7	Lab experiment 5	
8	Lab experiment 6	
9	Lab experiment 7	
10	Lab experiment 8	
11 & 12	**MIDTERM 2**	
13	Lab experiment 9	
14	Lab experiment 10	
15	Open ended Lab	
16	Lab Project	
17	**FINALTERM**	

S. No	Project Title
1	Project 1
2	Project 2
3	Project 3
4	Project 4
5	Project 5
6	Project 6
7	Project 7
8	Project 8
9	Project 9
10	Project 10
11	Project 11
12	Project 12
13	Project 13
14	Project 14
15	Project 5

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Head of ACC **HoD, Electrical Engineering**

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Data Structure & Algorithms

Programs & Class:BE-IV (CS)	**Semester:** Fall 2019
Credit Hours: 4	**Course Instructor:Engr. Dr. Abdul Sattar Chan** **Support instructor : TBA**
Pre-requisite Courses: Programming fundamentals	**Post-requisite Courses:None**
Co-requisite Courses: None	**e-mail: abdul.sattar@iba-suk.edu.pk**
Office Hours: 0900 hrs – 1700 hrs	**Consulting Hours:---**
Office Location: 202, Academic Block-III	

ASSESSMENT/ EVALUATION

7.	Presentation	10%
8.	Assignments	10%
9.	First Term exam	20%
10	Second Term exam	20%
11	Final Examination	40%

RECOMMENDED BOOKS:

S.No	Book Name	Author/s Name	Publisher Name & Edition
1.	Data structures using c++, 2nd edition,	D.S. Malik	
2.	C++ plus Data Structures, 3rd edition,	Nell Dale	

COURSE DESCRIPTION:

The objective of this course is to make students familiar with the concepts of the way data is stored inside computer and its manipulation using different algorithms. Students will learn different data structures such as array, stack, queue, link list, trees, graphs, sorting algorithm etc. Since Programming fundamentals is the pre-requisite of this course, therefore, this course would be using c++ language to implement all the data structures.

COURSE LEARNING OUTCOMES

The students will be able:

CLO1: Demonstrate the knowledge of linear and non-linear data structures such as array, list, queue, stack, trees and graphs.

CLO2: Implement algorithms for the efficient representation and manipulation of data.

PROJECTS & ASSIGNMENTS DETAILS ALONGWITH PREDEFINED ASSESSMENT CRITERIA

CLOs	Related PLOs	Teaching Methods	CLO attainment checked in
CLO1	PLO1 Engineering knowledge		First Mid Exam, Second Mid Exam, Final Exam
CLO2	PLO2 Problem Analysis		First Mid Exam, Second Mid Exam, Final Exam

Lecture Plan

SESSION / WEEK WISE DETAILS:

Course Content

Week No	Topics	Chapters

1	• Introduction to the course
	• What is data structure?
	  ○ Need of data structures
	• Elementary data structures
	• Arrays
	  ○ Review of single-dimension arrays
	  ○ Concept and implementation of dynamic arrays
	• What are limitations of Arrays?	

2	• Linked lists
	  ○ Arrays vs. Linked list
	• Types of linked list
	  ○ Singly linked list
	  ○ Circular singly linked list
	  ○ Doubly linked list
	  ○ Circular doubly linked list
	• Defining the Node class
	• Linked Lists Functions	

3	• The LIFO structures
	• Introduction to the stack data structure
	• Applications of stack
	• Stack operations
	• Stack specifications
	  o List and arrays
	  o Stacks
	• Stack implementation
	  o Using arrays
	  o Using linked list
	• Methods of stack
	  o Push
	  o Pop
	• Infix, Prefix and Postfix Expressions	

4	• The FIFO structures
	• Introduction to Queues
	• The Queue data structure
	• Application of queues
	• Array Representation of Queue
	  o Algorithm for Addition of an Element to the Queue
	  o Algorithm for Deletion of an Element to the Queue
	• Queue operations
	• The priority queues	

5	• Searching Techniques • Binary Search • Linear Search • Algorithm and Pseudocode of Linear Search • Pseudocode of Binary Search	
6	**First Mid Term Examination**	

7	• What is algorithm?
	• Properties of an algorithm
	• Designing the algorithms
	  o Simple algorithm design with daily life examples
	  o Algorithms for mathematical formulas
	• Complexity of algorithm
	  o Time complexity
	  o Space complexity
	• Analysis of algorithms
	• Big O Notation
	  o Best-case analysis
	  o Worst-case analysis
	  Average-case analysis	

8-9	• Sorting Techniques o Understanding why sorting is important • Bubble Sort • Selection Sort • Insertion sort • Quicksort	

	Efficiency of Quicksort	
10-11	• Concept of Binary Trees • Why use binary trees • Tree terminology • Concept of Binary Search trees and how they work • Finding a node in a binary search tree • Inserting a node • Traversing the tree in In order, Pre and Post order • Applications of tree traversing in sorting • Deleting a node in a Binary Tree with all three cases • Efficiency of Binary Trees • Handling duplicate nodes in BST • Applications of BST	
12	**Second Mid Term Examination**	
13	• The Huffman code: Encoding and Decoding • Coding a complete message • Balanced and unbalanced trees The AVL trees Overview	

14	• Hashing
	• Graphs
	  ○ Introduction
	  ○ Searches (DFS & BFS)	

15	• Presentations and Revision	

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BE-V SEMESTER

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Probability & Statistics

GENERAL INFORMATION:

Programs & Class: *BE-EE-V*	***Semester:*** *Fall 2019*
Credit Hours:03 Hours	***Instructor:*** *Muhammad Shoaib Khan*
Pre-requisite course: Calculus	***Post-requisite Course: None***
Co-requisite Course: None	***e-mail: shoaib.khan@iba-suk.edu.pk***
Office Hours: 9:00am – 5:00 pm	***Consulting Hours: 3:00pm-5:00pm(Monday)***
Office Location: 314, AB-II	

EVALUATION:

1.	*Assignment*	***10%***
2.	*Quizzes*	***10%***
3.	*First Term*	***20%***
4.	*Second Term*	***20%***
5.	*Final Examination*	***40%***

TEXT BOOKS:

(1) *Ronald E. Walpole, Raymond H, Myers and Sharon L. Myers and Keying Ye, Probability and Statistics for Engineers and Scientists, 9th e, Prentice Hall.*

RECOMMENDED BOOKS:

(1) *Anthony Hayter, University of Denver, Probability and Statistics for Engineers and Scientists 4th e, CENGAGE Learning*

(2) *Roy D. Yates, David J. Goodman Probability and Stochastic Processes; A Friendly Introduction for Electrical and Computer Engineers, 3rd e, John Wiley & Sons, Inc.*
(3) *Alberto Leon-Garcia, University of Toronto, Probability, Statistics, and Random Processes for Electrical Engineering, 3rd e, PEARSON Prentice Hall.*
(4) *Susan Milton and Jesse C. Arnold, Introduction to Probability and Statistics: Principles and Application for Engineering and the Computing Sciences, McGraw Hill.*
(5) *Douglas C. Montgomery and George C. Runger, "Applied Statistics and Probability for Engineers", Fifth Edition, 2010, John Wiley, ISBN-13: 978-0470910610.*

COURSE DESCRIPTION:

This is an introductory course in probability and statistics designed to introduce students to its applications that are relevant in a variety of discipline including Engineering and Computer science etc. The content of this course includes descriptive statistics, set theory review, axioms of probability, addition multiplication laws of probability, independence ,conditional probability, law of total probability, Baye's rule, random variables, some special discrete and continuous probability distributions, expected values, joint distributions, marginal distribution, central limit theorem, sampling distributions and confidence intervals regarding sample mean and variances, along with descriptive methods in simple linear regression analysis.

COURSE LEARNING OUTCOMES:

Course Learning Outcome	*CLO Statement*	*PLO*	*Bloom Taxonomy*
CLO-1	Application of Probability and Statistics for understanding and analysis of different electrical engineering problems.	*PLO-2*	*Cog-4*

Mapping of CLOs with PLOs and Bloom's Taxonomy Cognitive Levels:												
PLO	***1***	***2***	***3***	***4***	***5***	***6***	***7***	***8***	***9***	***10***	***11***	***12***
CLO-1		***Cog-4***										

Mapping of CLOs with Assessment Methods:	
CLOs/Assessment	***CLO-1***
Quizzes	✓
Assignments	✓
Mid Term Exam	✓
Final Term Exam	✓

SESSION / WEEK WISE DETAILS:

Date / Week	Topics	***Assignments/ Quizzes / Digital Library work***	***Suggested Readings***
Week 01	***Introduction to Statistics and Data Analysis*** *Observation and variables* *Populations* *Samples* *Measurement scale and variables* *Inferential statistics* *Descriptive statistics*	*Reading*	*Chapter 1* ***Probability and Statistics for Engineers and Scientists, 9th e,*** ***Ronald E. Walpole*** *Give the overview about the subject interest and discuss the terminlogy of the subject and related terms.*
Week 02	***Descriptive Statistics*** ***Tabulation*** *Introduction* *Classification* *Tabulation* *Frequency distribution* ***Graphical Display*** *Scatter Plot* *Stem and leaf Plot* *Histogram* ***Measures of Central Location*** *Arithmetic Mean* *Median* *Mode* ***Measures of Dispersion*** *Range* *Variance*	*Examples and Exercises*	*Chapter 1* ***Probability and Statistics for Engineers and Scientists, 9th e,*** ***Ronald E. Walpole*** *In this week discuss about the applications of presentation of data, measures of central tendency and variations.*

	Standard deviation		
Week 03	***Probability*** *Introduction* *set theory and algebra of sets* *Sample space* *events* *Random experiment* *Axioms of Probability* *Sample space* *Counting sample points*	*Examples and Exercises*	*Chapter 2* ***Probability and Statistics for Engineers and Scientists, 9th e,*** ***Ronald E. Walpole***
Week 04	*Definition of probability* *Laws of probability* *Independent and dependent events* *Conditional probability* *Bayes' Rule*	*Examples and Exercises* ***Quiz #1***	*Chapter 2* ***Probability and Statistics for Engineers and Scientists, 9th e,*** ***Ronald E. Walpole***
Week 05	***Random Variables & Probability Distributions*** *Introduction* *Distribution function* *Discrete random variable and its probability distribution*	*Examples and Exercises* ***Assignment#1***	*Chapter 3* ***Probability and Statistics for Engineers and Scientists, 9th e,*** ***Ronald E. Walpole***
Week 06	*Continuous random variables and its probability density function.* *Joint distribution*	*Examples and Exercises*	*Chapter 3* ***Probability and Statistics for Engineers and Scientists, 9th e,*** ***Ronald E. Walpole***
Week 07	***Mathematical Expectation*** *Mean of random variable* *Variance and co variance of random variable*	*Examples and Exercises*	*Chapter 4* ***Probability and Statistics for Engineers and Scientists, 9th e,*** ***Ronald E. Walpole***

	Mean and Variances of Linear Combinations of Random Variables		
Week 08	***Some Discrete probability distributions*** *Introduction* *Binomial probability distribution* *Multinomial probability distribution*	*Examples and Exercises*	*Chapter 5* ***Probability and Statistics for Engineers and Scientists, 9th e,*** ***Ronald E. Walpole***
Week 09	*Hyper geometric probability distribution* *Poisson probability distribution* *Geometric probability distribution* *Negative probability distribution*	*Examples and Exercises* ***Quiz #2***	*Chapter 5* ***Probability and Statistics for Engineers and Scientists, 9th e,*** ***Ronald E. Walpole***
Week 10	***Some Continuous Probability Distributions*** *Introduction* *Uniform distribution* *Normal distribution* *Area under normal curve*	*Examples and Exercises* ***Assignment#2***	*Chapter 6* ***Probability and Statistics for Engineers and Scientists, 9th e,*** ***Ronald E. Walpole***
Week 11	*Application of normal curve* *Gamma distribution* *Exponential distribution*	*Examples and Exercises*	*Chapter 6* ***Probability and Statistics for Engineers and Scientists, 9th e,*** ***Ronald E. Walpole***
Week 12	***Fundamental Sampling Distributions and Data Description*** *Random sampling* *Sampling distribution of sample mean* *Central limit theorem* *Sampling distribution of sample variance*	*Examples and Exercises*	*Chapter 8* ***Probability and Statistics for Engineers and Scientists, 9th e,*** ***Ronald E. Walpole***

Week 13	***One- and Two-Sample Estimation Problems*** *t-Distribution* *Confidence interval about a population mean* *Standard error of a point estimate* *Confidence interval for difference between two population means*	*Examples and Exercises*	*Chapter 9* ***Probability and Statistics for Engineers and Scientists, 9th e,*** ***Ronald E. Walpole***
Week 14	*F-Distribution* *Confidence interval about a population variance* *Confidence interval for the ratio of two population variances*	*Examples and Exercises* ***Quiz #3***	*Chapter 9* ***Probability and Statistics for Engineers and Scientists, 9th e,*** ***Ronald E. Walpole***
Week 15	***Simple Linear Regression and Correlation(Descriptive Methods)*** *Introduction to linear Regression* *The Simple Linear Regression (SLR) Model* *The Least Squares and the Fitted Model* *Coefficient of Correlation* *Coefficient of Determination*	*Examples and Exercises* ***Assignment#3***	*Chapter 11* ***Probability and Statistics for Engineers and Scientists, 9th e,*** ***Ronald E. Walpole***
Week 16	*Worksheets* *Revision*	*Examples*	***Related topics from reference books***

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Department of Electrical Engineering

Electrical Machines

Programs & Class: BE-V	**Semester:** Fall- 2019
Credit Hours: Class Work = 03 **Lab Work = 01** **Total = 04**	**Course Organizer: Dr. Faheem A. Chachar** **Course Instructor: Engr.Ghulam Akbar Dahani/Dr Sabir Hussain** **Support instructor: TBA**
Pre-requisite Courses: Linear Circuit Analysis	**Post-requisite Courses: None**
Co-requisite Courses: None	**e-mail: ghulamakbar@iba-suk.edu.pk**
Office Hours: 09 am - 05 pm	**Consulting Hours: 10:00AM to 1:00PM (Wednesday)**
Office Location: Room No.107 AB-3	

ASSESSMENT/ EVALUATION

1.	Class performance and behavior	**0%**
2.	Semester Project	**0%**
3.	Assignments (01)	**5%**
4.	Quizzes (03)	**15%**
5.	First Term exam	**20%**
6.	Second Term exam	**20%**
7.	Final Examination	**40%**

RECOMMENDED BOOKS:

S.No	Book Name	Author/s Name	Publisher Name & Edition
1.	Electric Machinery Fundamentals	Stephen J. Chapman	McGraw Hill, 5th Edition.
2.	Principles of Electrical Engineering	V.K. Mehta	S.channd.

COURSE DESCRIPTION:

This course introduces the fundamentals of transformers, DC and AC electromechanical systems and their operating principles. The course starts with the study of fundamental physical laws and their implementation in electrical devices and appropriate mathematical models are developed to understand their operation and design. The physical construction, operation and mathematical design of transformers, DC machines, and AC machines will be discussed in detail.

REFERENCE BOOKS:

1.	Electric Machinery	A. E. Fitzgerald, C. Kingsley, Jr., and S. D. Umans	McGraw Hill, 7th Edition.

COURSE LEARNING OUTCOMES

The student will be able:

CLO1: To ***analyze*** the phenomenon of rotating magnetic field under balanced and unbalanced power supply conditions.

PROJECTS & ASSIGNMENTS DETAILS ALONGWITH PREDEFINED ASSESSMENT CRITERIA

Quizzes:

- Three quizzes will be taken at the end of 4th, 6th and 10th week.
- All of three quizzes will be considered.

Assignments:

- The assignment would be based on the latest research trends in the field of Electrical Machines.

IMPORTANT POLICIES (subject to the course instructor)

- Class attendance is mandatory and late comers will not be allowed to attend the lecture.
- Late submission of coursework will not be accepted.

CLOs	Related PLOs	Mapped ABET SOs	Teaching Methods	CLO attainment checked in
CLO1	2	1	Labs	Lab Examination

Mapped OBE Program Learning Outcomes (PLOs):

PLO2 Problem Analysis: An ability to identify, formulate, research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.

Mapped ABET Student Outcomes (SOs):

SO1: An ability to identify, formulate and solve complex engineering problems by applying principles of engineering science and mathematics

Performance Indicator for SO1 are:

a. Identification of specific facts of mathematics, science and engineering for a given situation.
b. Convert real world situation into an appropriate model
c. Ability to solve engineering problems using relevant facts of mathematics, science and engineering

LECTURE WISE DETAILS:

Lecture No.	Topics	Assignments/ Quizzes / Digital Library work	Suggested Readings
01-04	-Introduction to Machinery Principles -Laws governing linear and rotational motion		Chapman: 1.1, 1.2, 1.3
04-09	-The Magnetic Field, Magnetic circuits -Electric losses in ferromagnetic materials -Interaction of changing magnetic fields -Transformer -Motor and generator principle basics		Chapman: 1.4, 1.5, 1.6, 1.7
10-14	-The Ideal Transformer -Theory of operation of single phase transformer -Equivalent Circuit of a Transformer -Transformer Voltage Regulation and Efficiency		Chapman: 2.3, 2.4, 2.5, 2.7, 2.9
15-20	-A simple loop in a uniform magnetic field -The rotating magnetic field -Induced voltage in an AC machine -Induced torque in an AC machine -AC Machines power flows and losses -Voltage and Speed regulation	Assignment 1 and Quiz 1	Chapman: 4.1, 4.2, 4.4, 4.5, 4.7, 4.8
21-26	-Speed of rotation of a synchronous generator -Internally generated voltage of a synchronous generator -Equivalent circuit of a synchronous generator -Phasor diagram of a synchronous generator -Synchronous generator operation -Parallel operation of AC Generators		Chapman: 5.2, 5.3, 5.4, 5.5, 5.6, 5.8, 5.9
1st MID TERM EXAMINATION			
27-32	-Basic principles of motor operation -Steady-state synchronous motor operation -Effect of load changes on a synchronous motor -Power-factor correction -Starting synchronous motors		Chapman: 6.1, 6.2, 6.2, 6.3, 6.4

33-39	-Basic induction motor concepts -Equivalent circuit of induction motor -Power and Torque in Induction motors -Torque-speed characteristics -The induction generator	Assignment 2 and Quiz 2	Chapman: 7.2, 7.3, 7.4, 7.5, 7.9, 7.12
40-44	-A simple rotating loop between curved pole faces -Commutation in a simple four-loop DC machine -Problems with commutation in real machines -The internal generated voltage and induced torque equations of DC machines -The construction of DC Machines -Power flow in DC machines -Losses in DC Machines		Chapman: 8.1, 8.2, 8.4, 8.5, 8.6, 8.7,
2nd MID TERM EXAMINATION			
45-49	-Equivalent circuit – DC machines -Magnetization curve – DC machines -Separately excited and shunt DC Motors -Permanent Magnet DC Motor -Series DC Motor -Compound DC Motor -DC motor efficiency calculations -Separately excited DC Generator -Shunt DC Generator -Series DC Generator -Compounded DC Generators	Quiz 3	NOTES/CHAPMAN/V.K MEHTA
50-52	-Single Phase Synchronous Motors -Universal Motor -Single Phase Induction Motor -Starting of Single Phase Induction Motor		Chapman 10.1, 10.2, 10.3

For Lab Courses, Insert list of lab experiments and proposed lab projects here:

Week	Objective	Mapped CLO
1	TRASNFORMER	
2	TRASNFORMER	
3	TRASNFORMER	
4	TRASNFORMER	
5 & 6	**MIDTERM 1**	
7	ROTATING MAGNETIC FIELD PHENOMENON	CLO-1
8	DC MOTOR	
9	DC MOTOR	
10	INDUCTION MOTOR	
11 & 12	**MIDTERM 2**	
13	INDUCTION MOTOR	
14	INDUCTION MOTOR	
15	SYNCHRONOUS GENERATOR	
16	SINGLE PHASE ROTATING FIELD	CLO-1
17	**FINALTERM**	

S. No	Project Title
1	TRASNFORMER(1000 VA – 5000VA)
2	AUTO-TRANSFORMER(UPTO 5000VA)
3	ANGLE GRINDER
4	TABLE SAW
5	RECHARGABLE DRILL MACHINE
6	VACUMME CLEANER PROTOTYPE
7	DRONE
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Reviewed by ACC on _____

Review Comments: _____

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Head of ACC **HoD, Electrical Engineering**

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Instrumentation & Measurement

Programs & Class: BE-V	**Semester:** Fall 2019
Credit Hours: 3+1	**Course Organizer: Dr. Saeed Khan Abro** **Course Instructor: Dr. Ahmed Ali /Engr. Fida Memon** **Support instructor :TBA**
Pre-requisite Courses: No	**Post-requisite Courses: No**
Co-requisite Courses: No	**e-mail: ahmedali.shah@iba-suk.edu.pk**
Office Hours: 9 am to 5 pm	**Consulting Hours: Friday**
Office Location: Room 203 Block 03	

ASSESSMENT/ EVALUATION

1.		
2.	Lab Report	**10%**
3.	Assignments	**5%**
4.	Quizzes	**5%**
5.	First Term exam	**20%**
6.	Second Term exam	**20%**
7.	Final Examination	**40%**

RECOMMENDED BOOKS:

S.No	Book Name	Author/s Name	Publisher Name & Edition
1.	Electronic Instrumentation	Kalsi	McGraw Hill 3rd Edition
2.	Electrical Measurement & Measuring Instruments	Bakshi	Technical Publications

REFERENCE BOOKS:

1.	Elements of Electronic Instrumentation & Measurements	Joseph	Pearson 3rd Edition
2.	Electronic Measurements And Instrumentation	R.S. Sedha	S. C & Company Pvt. Ltd

COURSE DESCRIPTION:

To provide students with a fundamental understanding of the concepts, principles, procedures, and computations used by engineers and technologists to analyze, select, specify, design, and maintain modern instrumentation and measurements systems. Students should gain a sound understanding of the language used to describe modern instrumentation, and measurement systems and an appreciation of the various types of

COURSE LEARNING OUTCOMES:

CLO #	Description	Taxonomy Level	Mapped PLO	Assessment
1	Develop a desirable solution in an efficient way as per given requirements and constraints	C6	3	Final hardware demonstration/ Simulation results/ Computer program
2	Contribute strongly as a team member	A3	9	Record of 3 meetings with project supervisor- Evidence of individual tasks allocated vs completed and role in a team.
3	Compose high quality project report and confidently demonstrate presentation skills	C5	10	Project report and final presentation
4	Define the realistic milestones, and continuously evaluate the progress	C5	11	Record of 3 meetings with project supervisor- Evidence of outcomes set vs achieved
5	Relate the solutionwith the societal needs. Identify possible extension or application area of the developed solution	C3, C5	7, 12	Final presentation Q/A
6	Student will be able to design sensors interfacing circuits, acquire data from sensors, interpret and utilize it for effective usage.	C5,P4 SO6	3	Lab exams

PROJECTS & ASSIGNMENTS DETAILS ALONG WITH PREDEFINED ASSESSMENT CRITERIA

Three quizzes will be taken. Before First Term, Before Second Term and Before Final Exams.

Three assignments will be given.

IMPORTANT POLICIES (subject to the course instructor)

Class attendance is mandatory and late comers will not be allowed to attend the lectures. Late submission of assignments will not be accepted.

LECTURE WISE DETAILS:

Lecture No.	Topics	Recommended Reading	Assessment Instrument
01-02	Introduction of Instrumentation & Measurement, Performance Characteristics.	Electronic Instrumentation by Kalsi, Chapter 01, Wikipedia	
3	Static Characteristics, Range & Span Linearity & Sensitivity		
4	Hysteresis, Resolution, Repeatability, Dead Space, Linearity		
5	Environmental Effects Error in Measurement		
06-07	Types of Static Error, Gross Errors Systematic Errors,	Kalsi, Chapter 01	
08-09	Instrumental Errors, Environmental Errors, Observational Errors	Kalsi Chap 01,	
10	Random Error, Sources of Error.	Kalsi Chap 01	
11	Dynamic Characteristics, Statistical Analysis		
12-14	Arithmetic Mean, Deviation from The Mean, Average Deviations, Standard Deviation		
15	Limiting Errors, Sensitivity of Voltmeter		
16-17	Types of Instrument, Primary/Secondary Instrument, Recording, Integrating, Indicating Instruments	Kalsi Chap 02	
18-19	Basic Meter Movement, Permanent Magnetic Moving Coil Movement		
First Term Exams			
20	Ammeters, Multi Range Ammeters	Kalsi Chap 03	
21	The Aryton Shunt or Universal Shunt	Kalsi Chap 03	
22-23	Basic Meter as A Dc Voltmeter, Multi Range Voltmeter	Kalsi Chap 04	
24-25	Sensor, Transducer, Actuator, Electrical Transducers	Bakshi, Kalsi, Internet	
26-27	Resistive Transducers, Strain Gauges	Kalsi Chap 13	
28-29	Resistance Thermometer, Thermistor, Inductive Transducers	Kalsi Chap 13	
30	Differential Output Transducers, LVDT, Pressure Inductive Transducers,	Kalsi Chap 13	Assignment
31	Temperature Transducers, Thermocouple, Thermistors	Kalsi Chap 13	Quiz
32-22	Piezo Electric Transducers, Photoelectric And Photo Voltic Cell,	Kalsi Chap 13	
33	Semiconductor Photodiode, The Photo Transistor,	Kalsi Chap 13	
Second Term Exams			
34	Electromagnetic Flow Transducer	Kalsi Chap 13	
35	Capacitive Transducers	Kalsi, Bakshi,	
36-	Bridge, Wheatstone Bridge, Balance, Unbalance,	Bakshi, Kalsi,	Assignment

37-38	Virtual Instruments, Labview. Application Of Labview	R.S. Sedha,	
39-40	Biological Signals, Problems With Bio Signals	R.S. Sedha,	
41-42	Biomedical Transducer, Temperature Measurement Of Body,	R.S. Sedha,	
43-44	Body Surface Electrodes, Microelectrodes	R.S. Sedha, C	
45	Electrocardiograph (ECG) Electroencephalograph (EEG) EMG	R.S. Sedha,	
	Revision, Group Discussion,		Quiz
Final Exams			

Lab Experiment List

S.No	Experiment	**Mapped CLO**
1.	Errors In Measurement	
2.	Wheat Stone Bridge	6
3.	Light Dependent Resistor (LDR)	
4.	Photovoltaic Cell Characteristics	
5. & 6	**MIDTERM 1**	
	First Midterm Examination	
7.	Thermistors	
8.	Thermocouples	
9.	Virtual Instrumentations	6
10	Level Measurement System	
11 & 12	**Second Midterm Examination**	
13	Fan Speed Control And Thermocouple Interfacing Using	
14	Introduction To Myrio And Using Its On Board Gyro	6
15	Open ended Lab	
16	Lab Project	
17	**Final Examination**	

S. No	Project Title
1	Anti-Sleep Alarm
2	Bi-Directional Visitors Counter
3	Distance Measurement System Using Ultrasonic Sensor
4	Remote Controlled Solar Car
5	Remote Controlled Fan Regulator
6	Remote Control For Home Appliances
7	EEG Sensors Development
8	Soil Sensor and data logger development
9	Flow sensor
10	Pressure Sensor
11	EEG based monitoring of attention level
12	Automatic Water level control

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Review Comments:__

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Head of ACC

HoD, Electrical Engineering

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Signal & System

Programs & Class: BE-V (EE)	**Semester:** Fall 2019
Credit Hours: 3+1	**Course Instructor: Dr Abdul Aziz/Dr. Abdul Baseer**
Pre-requisite Courses: None	**Post-requisite Courses: Digital Signal Processing**
Co-requisite Courses:	**e-mail: abdul.baseer@iba-suk.edu.pk**
Office Hours: 9:00 am – 5:00 pm	**Consulting Hours:** Monday & Saturday 9:00-11:00 AM
Office Location: Room# 204, Academic Block-III	

ASSESSMENT/ EVALUATION

1.	Quizzes	**10%**
2.	Presentation/Assignment/Project	**10%**
3.	Mid Term-I Examination	**20%**
4.	Mid Term-II Examination	**20%**
5.	Final Term Examination	**40%**
	Total	**100%**

RECOMMENDED BOOKS

S.No	Book Name	Author/s Name	Publisher Name & Edition
1.	Signals & Systems	Alan V. Oppenheim, Alan S. Willsky and S. Hamid Nawab	Prentice-Hall, 2nd edition

REFERENCE MATERIAL

S.No	Name	Author/s Name	Publisher Name & Edition
2.	Signals & Systems	M.J. Roberts	Tata McGraw Hill
3.	Linear Systems and Signals	Carlson	Willey

ONLINE RESOURCES

S.No	Website	Description
1.	http://ocw.mit.edu/resources/res-6-007-signals-and-systems-spring-2011/	MIT Open Course Ware
2.	https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-003-signals-and-systems-fall-2011/	MIT Open Course Ware

COURSE DESCRIPTION:

This basic course is intended to provide the fundamental knowledge about signals and systems in order to build a comprehensive foundation for higher level courses such as digital signal processing, control systems, and communications systems. First part of this course covers various types of signals and their operations followed by classification of LTI systems. Second part of this course covers Fourier and Laplace transforms to have frequency-domain insights.

COURSE LEARNING OUTCOMES (CLO)

Upon successful completion of this course, students should be able to:

CLO 1: **Apply** different operations on a signal and the convolution operation. **Apply** Fourier and Laplace transform on time-domain representation of signal and system.

CLO 4: Use MATLAB to understand various signals and perform operation on signals.

CLOs	Learning Level	PLOs	Teaching Methods	CLO attainment checked in
CLO1	Cog-3	1	Lectures, Demonstration, Discussion	Mid and Final Terms
CLO4	Psychomotor-3	5	Lab handouts, Lectures	

Mapped OBE Program Learning Outcomes (PLOs):

PLO1. Engineering Knowledge: An ability to apply fundamental knowledge of mathematics, science, and engineering to solve different engineering problems.

PLO5. Modern Tool Usage: An ability to select and apply appropriate techniques, resources, and modern engineering tools to various engineering activities.

Mapped ABET Student Outcomes (SOs):

SO1: An ability to identify, formulate and solve complex engineering problems by applying fundamental principles of engineering, science, and mathematics.

Performance Indicator for SO1 are:

a. An ability to apply knowledge of mathematics, science and engineering to solve different engineering problems.

LECTURE WISE DETAILS:

Lect: No.	Topics	CLO	Recommended Reading	Assessment instrument
Signal and Systems				
01-02	Introduction • Course learning outcomes • Assessment instruments • Semester project • Laboratory equipment, software • Overview of course outline	CLO1	Chapter 1: Linear Systems and Signals	Midterm-I
03-06	• Signal Energy • Signal Power • Signal operations (transformation) on independent variable (i.e., time-shifting, time-scaling, and time-reversal) • Operations on a signal (i.e., amplitude scaling, addition, multiplication, differentiation, and integration)			
07-09	• Continuous- and discrete-time signals • Periodic and Aperiodic Signals • Deterministic and Random Signals			
10	• Unit Step Function • The Unit Impulse Function • The Exponential Function			
11	• Even and Odd Functions • Even and Odd Components of a Signal			
12-15	Classification of Systems • Linear and Nonlinear Systems • Time-Invariant and Time-Varying • Causal and Noncausal Systems • Continuous-Time and Discrete-Time • Invertible and Noninvertible Systems • Stable and Unstable Systems • Memory and memoryless system			
	Mid-I			
Linear Time-Invariant Systems				
16-18	• Introduction • DT signal representation in terms of impulses • Convolution sum representation of DT systems • Examples	CLO1	Chapter 2: Signals and Systems	Mid-II + Assignment (Engineering problem)
19-21	• CT Signal representation with unit impulses • The Continuous-Time Unit Impulse Response and the Convolution integral • Examples			
22-24	• Commutative, distributive, and associative properties of LTI systems • LTI systems with and without memory • Invertibility, causality, and stability of LTI systems • The unit step response of LTI systems • Examples			

25-28	• LTI systems described by differential and difference equations • Block diagram representations of first-order systems • Singularity Functions • Examples			
	Mid-II			
The Fourier Series				
29-31	• Introduction to exponential Fourier series • Definition, formula, advantages • Simple examples of Sine and Cosine • F.S. Coefficients and their properties • From F.S. coefficients to time domain • System response due to exp: signal • Derivation of FS coefficients • Magnitude and phase plot • Existence of F.S. • Dirichlet conditions • Gibbs phenomenon	CLO1	Chapter 3: Signals and Systems	Final + Quiz
32-34	• Fourier series properties • Linearity • Time shifting • Time reversal • Time scaling • Multiplication • Conjugation and conjugate symmetry • Parseval's theorem • Examples			
Fourier Transform				
35-37	• Continuous-time Fourier transform • Fourier Transform pair • The convergence of Fourier transform • Examples	CLO1	Chapter 4: Signals and Systems	Final + Quiz
38-40	• Properties of Fourier Transform • Linearity • Time and frequency scaling • Time and frequency shifting • Differentiation and integration • Duality • Convolution			
41-42	• Inverse Fourier transforms • Examples • Parseval's theorem			
	<u>The Laplace Transform</u>		Chapter 9: Signals and Systems	Final
43-44	• Basics of Laplace transform • Numerical			

45-48	• Pole, zero, and region of convergence • Numericals • Properties of the region of convergence • Numerical • Properties of Laplace transform • Linearity • Time Shifting • Shifting in the *s*-Domain • Time Scaling • Differentiation in the Time Domain • Differentiation in the *s*-Domain			

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Department of Electrical Engineering

CSE-311: Signals and Systems Lab, Spring 2019

Week #	Lab Experiments CLO-4
1	An introduction to MATLAB
2	Signal generation and plotting in MATLAB
3	Basic operations on signals using MATLAB
4	MATLAB programming (Control flow)
5	Project-I: Project title search and title submission
6 & 7	*MID-TERM I EXAM*
8	MATLAB programming (Scripts and functions)
9	Convolution
10	Fourier series representation of the signals
11	Project-II: Project working and demo
12 & 13	*MID-TERM II EXAM*
14	Introduction to Simulink
15	Fourier transform
16	The Laplace transform
17	Project-III: Project discussion
18 & 19	*FINAL EXAM*

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Organizational Behavior

Programs & Class: BE-V (EE)	**Semester:** Fall 2019
Credit Hours: 03	**Instructor:** Sehrish Bukhari **Support Instructor :**
Pre-requisite Courses:	**Post-requisite Courses: None**
Co-requisite Courses: None	**e-mail: sehrish.bukhari@iba-suk.edu.pk**
Office Hours: 09 am -5 pm	**Consulting Hours:---** **Otherwise please make an appointment**
Office Location: Room# 114, Academic Block 02	

ASSESSMENT/ EVALUATION

1	Quizzes (Best 2 out of total 3)	8%
2	Assignments (Best 1 out of 2)	4%
3	Class Participation (News articles + Discussion)	5%
4	Presentations	3%
5	First Mid Term	20%
6	Second Mid Term	20%
6	Final Exam	40%

RECOMMENDED BOOKS:

S. No	Book Name	Author Name	Publisher & Edition
1	Organizational Behavior	Stephen P. Robbins, Timothy Judge & Neharika Vohra	18th Edition- Prentice Hall

REFERENCE BOOKS:

1.	Managing OB	Ronald R.Sims	Latest Ed

COURSE DESCRIPTION:

This course deals with human behavior in organizations. Conceptual frameworks, case discussions, and skill-oriented activities are applied to course topics which include: motivation, learning and development, group dynamics, leadership, communication, power and influence, change, diversity, organizational design, and culture. It provides the student with the tools to understand and evaluate individual, group and organizational processes. This course is intended to help participants acquire skills and analytic concepts to improve organizational relationships and effectiveness. The student will also gain an appreciation of the relevance of the study of organizational behavior.

COURSE LEARNING OUTCOMES

The students will be able:

CLO 1: To respond organizational ethics and be aware of ethical dilemmas that organization face on day to day basis.

CLO 2: To fit and work/take part in group and team dynamics effectively.

CLO 3: To demonstrate capability to make effective decision considering the environmental issues like health, societal and cultural in complex engineering problems

CLOs	Level of learning	Mapped OBE PLOs	Mapped ABET SOs	Teaching Methods	CLO attainment checked in
CLO1	**Cog-3**	**8**		Lectures, tutorials	First mid, Quiz 1,
CLO2	**Cog-3**	**9**		Lectures, tutorials	Activities, Second mid
CLO3	**Cog-3**	**6**		Lectures, tutorials	Case studies

Mapped OBE Program Learning Outcomes (PLOs):

PLO6: The Engineer and Society: An ability to apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice and solution to complex engineering problems.

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

PLO 9: Individual and Team Work: An ability to work effectively, as an individual or in a team, on multifaceted and /or multidisciplinary settings.

Mapped ABET Student Outcomes (SOs):

SO1: To be aware of different behavioral issues of organization and adapt the behaviors according to the Organizational practices

Performance Indicator for SO1 are:

SESSION / WEEK WISE DETAILS:

Week	Topics	Recommended Readings	Assessment Instrument
1	**Introduction to Organizational Behavior** - The Importance of Interpersonal Skills - What Managers Do (Management Functions, Roles & Skills) - Enter Organizational Behavior	Chapter 1 (CLO 01)	Discussion
1	- Complementing Intuition with Systematic Study - Disciplines That Contribute to the OB Field - There Are Few Absolutes in OB - Challenges and Opportunities for OB	Chapter 1	

2-3	**Attitude and Job Satisfaction** - Attitudes & its main Components - Major Job Attitudes - Job Satisfaction & Measurement - How Satisfied Are People in their Jobs? - Causes of Job Satisfaction - The Impact of Satisfied and Dissatisfied Employees on the Workplace.	Chapter 3	Discussion
4-5	**Emotions and Moods** - Emotions and Moods - The Functions of Emotions - Sources of Emotions and Moods - Emotional Labor - Affective Events Theory - Emotional Intelligence - OB Applications of Emotions and Moods Selection.	Chapter 4	Exam Emotion Techniques
5-6	**FIRST MID TERM**		
7	**Personality and Values** - Personality & its determinants - MBTI & Big Five Personality Model - Other Personality Traits - Personality, Job search and Unemployment - Personality and Situations - Learning - Global implications - Values (Terminal vs. Instrumental) - Linking an Individual's Personality and Values to the Workplace - International Values	Chapter 5 (CLO 03)	Self-Evaluation Activities
8-9	**Perception and Individual Decision Making** - Perception & Influencing Factors - Making Judgment about Others - Attribution Theory - Common Shortcuts of Judging Others - Link between perception & Individual decision making	Chapter 6	Current NEWS Issues
	- Decision Making in Organizations - Common Biases & Errors in decision making - Influences on Decision making: Personality & its determinants - What about Ethics in decision making	(CLO 01)	MBTI Questionnaire Exam
10-11	**Motivation** - Defining Motivation Early Theories of Motivation - Maslow's Hierarchy, Two Factor Theory, McClelland's Theory of Needs - Contemporary Theories of Motivation - Goal Setting Theory, - Self-Efficacy (Social Learning Theory) - Reinforcement Theory - Expectancy theory - Equity theory/Organizational Justice	Chapter 7	Current NEWS Issues Article
12	**SECOND TERM EXAM**		

13	**Understanding Work Teams** - Difference between teams and groups - Types of Teams - Creating effective teams - Turning individuals in to team players	Chapter 10 (CLO 02)	Class Activities
14	**Power and Politics** - Power and its bases - Power Tactics - Sexual Harassment: Unequal Power in the Workplace - Politics: Power in Action - Organizational Politics - How Do People Respond to Organizational? Politics - Impression Management	Chapter 13	Current NEWS Issues
15 & 16	**Conflict & Negotiation** - A Definition of Conflict - Transitions in Conflict Thought - The Conflict Process Stage - Negotiation - Negotiation Strategies - Third Party Negotiations	Chapter 14	Case Presentations Exam
17	**Presentations**		
FINAL EXAM			

Reviewed by ACC on _____

Review Comments:_____

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Head of ACC **HoD, Electrical Engineering**

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Power Electronics

Programs & Class: BE-VI	**Semester: Fall- 2019**
Credit Hours: (3+1)	**Course Organizer: Dr. Faheem A. Chachar & Jahangeer Badar**
Pre-requisite Courses: Electronic Devices and Circuits	**Post-requisite Courses: None**
Co-requisite Courses: None	**e-mail: faheem.akhtar@iba-suk.edu.pk**
Office Hours: 9am-5pm	**Consulting Hours: 10:00 am- 12 pm (Monday)**
Office Location: Academic Block 3, Faculty Offices Cubical K.	

ASSESSMENT/ EVALUATION

1.	First Term Exam	**30%**
2.	Quizzes	**10%**
3.	Complex Engineering Task	**10%**
4.	Final Examination	**50%**

RECOMMENDED BOOKS:

S.No	Book Name	Author/s Name	Publisher Name & Edition
1.	Power Electronics Converters Applications and Design	Ned Mohan, Undeland, Robbins	3rd Edition, John Wiley and Sons, 2003
2.	Fundamentals of Power Electronics	Erickson and Maksimovic	2nd Edition, Oxford University Press, 2005
3	Power Electronics (Circuits, Devices and Applications)	M.H. Rashid	3rd Edition, Academic Press.

COURSE DESCRIPTION:

This is the first course in Power Electronics. Students will learn about specific areas of application and the reasons Power Electronics is becoming popular in areas traditionally occupied by analog electronics. The course will cover applications in conversion and control of power using Power semiconductor devices, physics of their structure and operation and passive components in power circuits. Students will also learn the principles governing the operation of converters, different standard topologies, applications in power systems, motor drives, and applications in renewable energy sources.

COURSE LEARNING OUTCOMES

CLO1: Students will be able to **design and simulate** power converter circuits using modern tools such as MATLAB/Simulink, LabVIEW-Multisim Co-Simulation.

Relation with PLOs

CLOs	Related PLOs	Learning Level	Teaching Methods	CLO attainment checked in
CLO1	PLO5	Psycho4	Instruction, Labs	Lab Exam, Lab Reports

LECTURE WISE DETAILS:

Week	Topics	Recommended Reading	Assessment instrument
01	Introduction: Review of concepts Application examples Classification of Power processors Elements of Power Electronics	Mohan: Chapter 1 Erickson: Chapter 1	
02	Switch Realization: Types of switches Overview of Power semiconductor devices Comparison Driver circuits Power Diodes: Structure Switching characteristics	Mohan: Chapter 2 Erickson: Chapter 4 Mohan: Chapter 20	CLO1
03	Power MOSFET & POWER BJT Basic Structure I-V characteristics and device operation Switching characteristics Operating limitations and safe operating areas	Erickson: Chapter 4 Mohan: Chapter 22	CLO1
04-05	Thyristors Basic Structure I-V characteristics and device operation Switching characteristics Two Transistor Model of Thyristor IGBTs, TRIAC and DIAC Basic Structure I-V characteristics and device operation Switching characteristics	Mohan: Chapter 23 Mohan: Chapter 25	CLO1 Quiz1
06	AC-DC Converters: Rectifiers 1- Phase and 3- Phase Rectifiers using various loads Harmonic Analysis of Rectifiers	Chapter 11 and 12 M.H. Rashid	
07	**FIRST TERM EXAM**		
08-09	Steady State Converter Analysis	Erickson: Chapter 2	CLO2

	Inductor Volt-Sec Balance Capacitor Amp-Sec Balance CCM Analysis Converter Analysis (Boost, Buck-Boost, etc.) Ripple estimation and design		
10-12	DCM Analysis of Converters -Conduction Mode Boundary -Converter Examples, Boost, etc.	Erickson: Chapter 6	CLO2 Assignment
13	**SECOND TERM EXAM**		
14	1- Phase and 3- Phase AC Voltage controllers: Principle of ON-OFF control, Principle of phase control, single phase bi-directional and Unidirectional controller with resistive and inductive load	Mohan: Chapter 3	
15	1- Phase and 3- Phase cyclo-converters with resistive and inductive loads, PWM control and different topologies of circuit.	Mohan: Chapter 3	
16	1- Phase and 3- Phase Inverters Introduction, principle of operation, performance parameters, and single phase bridge Inverters, quasi square wave inverter, sinusoidal PWM Multilevel inverters and Harmonic analysis	Chapter 14 M.H. Rashid	
17	**Revision**		
18	**FINAL EXAM**		

Sukkur IBA University

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Department of Electrical Engineering

Control System

Programs & Class: BE-VI	**Semester:** Fall 2019
Credit Hours: 4(3+1)	**Course Organizer :** Dr. Arslan Ahmed **Instructor:** Dr. Arslan Ahmed
Pre-requisite Courses:	**Post-requisite Courses:** None
Co-requisite Courses: None	**e-mail:** arslan-ahmed@iba-suk.edu.pk
Office Hours: 09 am -5 pm	**Consulting Hours: 2:30pm- 4:30pm (wed-Thu)**

ASSESSMENT/ EVALUATION

3.	Quizzes (Mid-I&II)	**20%**
4.	First Mid Term Exam	**20%**
5.	Second Mid Term Exam	**20%**
6.	Final Examination	**40%**

RECOMMENDED TEXT BOOKS:

S.No	Book Name	Author/s Name	Publisher Name & Edition
1.	Control System Engineering	S K Battacharya	Pearson Education, 2013, ISBN: 9788131791653
2.	Modern Control Engineering	Katsuhiko Ogata	Prentice Hall, 9th Edition, 2009, ISBN: 6290708174

REFERENCE BOOKS:

1.	Control System	Samarjit Ghosh	Pearson Education, 2014, ISBN: 978813170

COURSE DESCRIPTION:

This course has been designed to introduce the students with basic theory of Control Systems. Given that all engineering processes are time varying in nature, it is highly desirable to be able to model and hence predict their behavior in time. This course initiates the skills necessary for the analysis, modification and achievement of specific behavior in physical and dynamic Engineering systems. After studying this course, students should be able to derive mathematical models of physical systems and check stability of control system in Time and Frequency domain. The students should also be able to analyze transient as

well as steady state behavior of linear time invariant systems and analyze steady state errors. Control system design will be demonstrated by using PID controllers. The subject will be supported by software simulations like LABVIEW to demonstrate real time simulations and control system implementation.

COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able:

CLO 1: To **Design** a project using either PD/PI/PID controller or a feedback control mechanism as per given requirements and constraints.
CLO 2: To **demonstrate** the ability to contribute strongly as an effective team member
CLO 3: To compose a concise project report and **defend** the outcomes through results validation.
CLO 4: To define the realistic milestones, and **evaluate** the progress to demonstrate project management skills.
CLO 5: To relate the solution with the societal needs in order to **Identify** possible extension or application area of the developed solution.

CLOs	Level of learning	Mapped OBE PLOs	Mapped ABET SOs	Teaching Methods	CLO attainment checked in
CLO1	**Cog-6**	**3**	2	Lectures, tutorials	Semester Project
CLO2	**Aff-3**	**9**		Lectures, tutorials	Semester Project
CLO3	**Cog-5**	**10**		Lectures, tutorials	Semester Project
CLO4	**Cog-5**	**11**		Lectures, tutorials	Semester Project
CLO5	**Cog-3/5**	**7**		Lectures, tutorials	Semester Project

Mapped OBE Program Learning Outcomes (PLOs):

PLO3-- Design/Development of Solutions: An ability to design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
PLO7 -- Environment and Sustainability: An ability to understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development.
PLO9 -- Individual and Team Work: An ability to work effectively, as an individual or in a team, on multifaceted and /or multidisciplinary settings.
PLO10 -- Communication: An ability to communicate effectively, orally as well as in writing, on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PLO11 -- Project Management: An ability to demonstrate management skills and apply engineering principles to one's own work, as a member and/or leader in a team, to manage projects in a multidisciplinary environment.

Mapped ABET Student Outcomes (SOs):

SO2: An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

Performance Indicator for SO2 are:

d. Has clear idea about design requirements
e. Identifies constrains on design problem and established criteria for acceptability of solution.
f. Develops a desirable solution through economical approach and justifies it.

SESSION / WEEK WISE DETAILS:

Week	Topics	Assessment Instrument	Suggested Readings	CLO Mapping
01	Introduction to Control Systems • Introduction to course • Examples of control systems • Types of Control Systems • Manual and Automatic Control Systems • Closed-loop versus open-loop control systems • Linear and Non-linear control systems • Lumped vs Distributed Parameters control systems. • Deterministic and Stochastic control systems • Static and Dynamic Control Systems • Feedback vs Feedforward control systems • Adaptive Control Systems • Classification of different models of control systems. • A brief overview of Laplace transforms and its use for identifying the system stability through pole-zero plotting.		Chapter 1 Ogata, Chapter 1 Bhattacharya	
02-03	Modelling of a Control System using Block Diagram • Introduction to Chapter. • Transfer function and impulse-response function. • Procedure for drawing block diagram. • Procedure for determining the transfer function of a control system. • Open-loop transfer function, closed-loop transfer function, feedforward transfer function, error ratio, feedback ratio and control ratio. • Block diagram of open-loop and closed systems. • Block Diagram reduction techniques • Multiple Inputs and Multiple output systems block diagram.	**Quiz, 1st Mid-term and Lab**	Chapter 2 Ogata, Chapter 3 Bhattacharya	
04	Signal Flow Graphs (SFG) • Introduction to SFG • Signal flow graph and the transfer function. • Signal flow graph and the block diagram • Rules for drawing signal flow graphs • Input nodes, output nodes and gains of the feedback and feed forward paths. • Touching and Non-touching loops. • From block diagrams to signal flow graphs. • Mason's Gain formula for finding the transfer function from signal flow graphs.		Chapter 4 Bhattacharya	
05	Time-Response Analysis: First Order Systems	**Quiz, 1st Mid-term and Lab**		

	• Time-Response of Control Systems • Transient vs Steady State Response • Impulse Response, Step Response and Ramp response of 1st order systems • Relationship between impulse, step, ramp response and parabolic response. • Time Response of First-order Electrical circuits. • Transfer Function of 1st order systems • Natural and Forced Response for first order systems.		Chapter 5 Ogata, Chapter 7 Bhattacharya	
06	**1st Midterm (September 2019)**			
07-09	Time-Response Analysis: 2nd Order Systems • Introduction • 2nd and higher order systems • Block diagram representation of a 2nd order system and its transfer function. • Damped and un-damped frequencies and damping ratio. • Over-damped, under-damped, un-damped and critically damped systems. • Impulse and Step-Response of a 2nd order system and its derivation. • Pole-zero plot and 2nd order system characteristics. • Identifying the Rise Time, Peak Time, Maximum Overshoot and settling time of a 2nd order system.	**Quiz, 2nd Mid-term and Lab**	Chapter 5 Ogata, Chapter 7 Bhattacharya	
10	Routh-Hurwitz stability criteria • Concept of Stability • Conditions for stability • Types of systems stability • Routh-Hurwitz Stability Criterion	**Quiz and 2nd Mid-term**	Chapter 5 Ogata, Chapter 8 Bhattacharya	
11, 12	**2nd Midterm (November 2019)**			
13-14	Modelling of Electrical and Mechanical Systems • Transfer function of RC, RL and RLC circuits. • Transfer Function of Operational Amplifiers. • Inverting and Non-Inverting Amplifiers. • Lead or Lag Networks using Operational Amplifiers. • Mathematical Modelling of Mechanical Systems. • Spring-mass-dashpot systems. • Modelling of Translational	**Quiz and Final Exam**	Chapter 3 Ogata, Chapter 2 Bhattacharya	

	Mechanical Systems and their transfer function.			
15-16	Frequency-Response Analysis • Introduction to Frequency Response • Bode Plots: Magnitude and Phase Plots • Bode plots of 1st order and higher order systems. • Stability Analysis using the Bode Plots • Phase Cross-over frequency and the Gain cross-over frequency • Phase Margin and Gain Margin • Problems and solutions	**Quiz, Final Exam and Lab**	Chapter 7 Ogata, Chapter 10 Bhattacharya	
17	**Final Exams (December 2019)**			

List of Lab Experiments

Week	**Objective**	**Mapped CLO**
1	Introduction to Labview	
2	Introduction to Control System Design in LabVIEW	
3	Stability Analysis of Control Systems	
4	Time Response Analysis of Control System	
5, 6	**MIDTERM 1**	
7	Introduction to NI myRIO (Reconfigurable IO)	
8	Speed and Direction Control of DC Motor using NI Quanser Plant	
9	Stability Analysis and Bump Test for DC Motor NI Quanser Plant	
10	Automatic Speed Control of Servo System using P and PD Controller	
11, 12	**MIDTERM 2**	
13	Time Response Analysis of 2nd order control systems	
14	Balance Control System: Rotary Pendulum	
15	Frequency Response Analysis of Control Systems	
16,17	Lab Project	
	FINALTERM	

Semester Project Lists

S. No	Project Name
1	Balance Control System – Rotary Pendulum
2	Hand Gesture Based Robot Control
3	IoT Based Servo Control System
4	Automatic Railway Gate Control
5	WSN Based Smart Control and Remote Field Monitoring of Pakistan's Irrigation System
6	Smart Heart Beat Monitoring and Irregular Pattern Detection

Reviewed by ACC on _____

Review Comments:_____

Approved by ACC on_____

Head of ACC **HoD, Electrical Engineering**

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Department of Electrical Engineering

Communication Systems

Programs & Class: BE-VI (EE)	**Semester:** Fall 2019
Credit Hours: 4(3+1)	**Course Instructor: Dr. Sharjeel Afridi**
Pre-requisite Courses: NO	**Post-requisite Courses: None**
Co-requisite Courses: None	**e-mail:** sharjeel.afridi@iba-suk.edu.pk
Office Hours: 09:00am-05:00pm	**Consulting Hours:** **12:10PM- 01:10PM (Tuesday)** **12:10PM- 01:10PM (Wednesday)**
Office Location: Academic Block- III (Office# 102)	

ASSESSMENT/ EVALUATION

1.	Presentation	**10%**
2.	Quizzes	**10%**
3.	First Term exam	**20%**
4.	Second Term exam	**20%**
5.	Final Examination	**40%**

RECOMMENDED BOOKS:

S. No	Book Name	Author/s Name	Publisher Name & Edition
1.	Data Communication and Networking	Behroz Forouzan	5th Edition
2	Wireless Communication Principle and Practice	Theodore S. Rappaport (NYU Wireless)	Pearson Education India, 2009
3	Communication Systems	Simon Haykin	Second Edition, John Wiley and Sons

REFERENCE BOOKS:

1.	Interconnecting Cisco Network Device Part 1 Foundation Learning Guide	Anthony Sequeira	

2.	Data and Computer Network	William Stallings	6th Edition

COURSE DESCRIPTION:

This course begins by introducing the basic components in Communication System. Students will have clear understanding of Data communication, Analog and Digital Modulation and wireless communication.

COURSE LEARNING OUTCOMES

CLO1: **Design and simulate** IP based computer networks as per specification.

CLO2: Demonstrate professional ethics

CLOs	Domain: Level of Learning	Related PLOs	Teaching Methods	CLO attainment checked in
CLO1	Cognitive-2	2	Lecture, tutorials.	Lab exam 1 & 2
CLO2		8	Lecture	Lab activity [rubrics proforma for affective domain- record handling of equipment by students and punctuality] + Project reports [citation, plagiarism]

IMPORTANT POLICIES (subject to the course instructor)

- Class attendance is mandatory and late comers will not be allowed to attend the lecture
-

LECTURE WISE DETAILS:

Lecture No.	Topics	Assignment / Quizzes/ Digital Library work	Suggested Reading	Course Learning Outcomes
01-02	**Introduction of Communication System** Key Components of a Communication System, Components of Data Communications Network, **Data Transmission modes** Simplex, Half duplex, Full duplex, **Network Topology** Mesh, Bus, Ring, Star, Hybrid,		Behroz Forouzan Ch#1	
03-06	**Why layered communication? Reference Models Network Models** Layered Tasks the OSI Model Layered Architecture, Peer-to-Peer Processes, Encapsulation, OSI Layer Model TCP/IP PROTOCOL SUITE		Behroz Forouzan Ch#2	

8-10	**Physical Layer: Transmission Media** GUIDED MEDIA Twisted-Pair Cable Coaxial Cable Fiber-Optic Cable UNGUIDED MEDIA: WIRELESS Radio Waves Microwaves CONNECTING DEVICES Passive Hubs, Repeaters Active Hubs, Bridges,	Quiz 1	Behroz Forouzan	
11-15	ADDRESSING: Physical Addresses, Logical Addresses, Port Addresses, Specific Addresses Logical Addressing IPV4 addresses, Address Space, Notations, Classful Addressing, Classless Addressing, Network Address Translation (NAT) IPV4 and IPV6 addresses		Behroz Forouzan	
MIDTERM - 1				
16-17	Error Detection & Correction Types of Errors Redundancy, Detection vs Correction Multiplexing and Demultiplexing		Behroz Forouzan	
18-19	Analog and Digital Signals Channel Noise Signal Power and Bandwidth Need for Modulation		Simon Haykin	
20-22	Time domain and Frequency domain Representation of Signal Shanon Channel Capacity Sampling and Quantization.		Simon Haykin	
23-26	Need for Modulation AM Modulation Suppression of Carrier Suppression of Side bands Frequency Modulation Phase Modulation		Simon Haykin	
27-28	Analog to Digital Conversion		Simon Haykin	

	Amplitude shift keying			
29-30	Frequency Shift keying Phase Shift keying	Quiz 2	Simon Haykin	
MIDTERM -2				
31-32	Concept of free space propagation model, Radio Propagation mechanism		Theodore S. Rappaport	
33-35	Reflection and Transmission, Ground Reflected Ways, Propagation of Waves Free space Propagation,		Theodore S. Rappaport	
36-38	Antenna Gain, Effective Area, Path Loss Terrestrial Propagation Line of Sight Propagation Multipath Propagation The mobile Environment Control of fading in mobile system Examples and Problems		Theodore S. Rappaport	
39-40	The cellular concept: AMPS, cellular carriers and frequencies, Frequency reuse strategy,		Theodore S. Rappaport	
41-43	Brief Description of GSM, GSM Architecture. Improving capacity in cellular systems		Theodore S. Rappaport	
44-45	GPRS, EDGE, 3G, 4G and 5G networks		Theodore S. Rappaport	
FINAL TERM EXAMS				

List of Lab Experiments:

S. No	Experiment	Date of Conduct	Date of Submission	Grade Obtained	Course Learning Outcomes
1.	- Prepare Ethernet cables using T-568A or T-568B twisted pair wire and RJ-45 Connector. - Understand Straight through and Cross over cable. - Establish pc-to-pc connection through LAN card and get pinged.				CLO3
2.	- Introduction to Packet Tracer. - Make pc-to-pc connection using static IP addressing.				CLO3
3.	- Static Routing and Dynamic Routing for a network				CLO3

4.	- Hubs and switches				CLO3
	1st Midterm Theory				
	1st Midterm Practical				
5.	- Amplitude Modulation and Demodulation				
6.	- AM DSB-SC Modulation & Demodulation				
7.	- Frequency Modulation & Demodulation				
8.	- Phase Modulation & Demodulation				
	2ndMidterm Theory				
	2ndMidterm Practical				
9.	- Digital Modulation Techniques (ASK, FSK, PSK				
10.	- Projects/ Open Ended Lab				CLO3
	Final Examination				

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Department of Electrical Engineering

Health Safety & Environment

Programs & Class: BE-VI (EE)	**Semester:** Fall 2019
Credit Hours: 03	**Instructor:** Dr. Fareed Hussain Mangi **Support Instructor :** N/A
Pre-requisite Courses: N/A	**Post-requisite Courses: None**
Co-requisite Courses: None	**e-mail: fareed.mangi@iba-suk.edu.pk**
Office Hours: 09 am -5 pm	**Consulting Hours: 11PM- 01 PM (Mon-Tues)** **Otherwise please make an appointment**
Office Location: Room# 201, Academic Block 03	

ASSESSMENT/ EVALUATION

6.	Presentations	**5%**
7.	Quizzes (Best 01 out of total 02)	**5%**
8.	Group activities (Best 02 out of 05)	**5%**
9.	First Term Exams	**20%**
10.	Second Term Exams	**20%**
11.	Final Examination	**40%**
12.	Semester project/ assignments/ group activities etc.,	**5%**

RECOMMENDED BOOKS:

S.No	Book Name	Author/s Name	Publisher Name & Edition
1.	NEBOSH Unit IA	NEBOSH International	Green World Group
2.	NEBOSH Unit IB	NEBOSH International	Green World Group
3.	NEBOSH Unit IC	NEBOSH International	Green World Group
4.	NEBOSH Unit ID	NEBOSH International	Green World Group

COURSE DESCRIPTION:

This course is focus occupational health and safety. The course starts with the basics of health safety and environment along with the safe workplace environment in different type of industries/organizations. The benefits and problems associated with the occupational health and safety management systems, hazard identification, job hazard analysis, risk assessment techniques (PRA, FMEA, FTA, and Risk Assessment Matrix) and accident/incident investigation.

COURSE LEARNING OUTCOMES

The students will be able:

CLO1: Able to identify hazards of industry to the humans, property and environment.

CLO2: Able to assess the risk of workplace-based hazards through group activity.

CLO3: Evaluate the effects of human factors for safe and unsafe behavior in the working environment

CLOs	Level of learning	Mapped OBE PLOs	Mapped ABET SOs	Teaching Methods	CLO attainment checked in
CLO1	**Cog-2**	**6**		Lectures, Group activities	1st mid, Quiz 1
CLO2	**Cog-4**	**9**		Lectures, Group activities	Group activity, Assignment
CLO3	**Cog-3**	**8**		Lectures, Group activities	Assignment, Final exam,

Mapped OBE Program Learning Outcomes (PLOs):

PLO6:

PLO6

PLO9

Mapped ABET Student Outcomes (SOs): N/A

SO1: An ability to identify, formulate and solve complex engineering problems by applying principles of engineering science and mathematics

SESSION / WEEK WISE DETAILS:

Week	Topics	CLO Mapping	Assignment/Quiz/ group activity	Suggested Readings
01	Introduction to Health Safety and Environment Basics of Health safety and Environment Types of Industries in Pakistan			
02	Safety Signs and Symbols, Different colors on safety signs, Introduction to IOSH, NEBOSH, OSHA			NEBOSH IA, IB, IC and ID
03	Health and Safety management Pakistan Labor and Human Resource Statistics Legislation and coverage of Occupational Health & Safety		Quiz 1	
04	The benefits and problems associated with occupational health and safety management systems Key elements and characteristics of a health and safety management system			NEBOSH IA, IB, IC and ID
05	Safe working environment			

	Types of Hazards Electrical, Mechanical and Chemical Hazards			
06	Hazard Identification and Risk Assessment	CLO 1	Group activity 1	
07	Risk Assessment Methods (Preliminary Risk Analysis PRA, Failure mode Effects Analysis FMEA, Fault Tree Analysis FTA)	CLO 2	Group activity 2 Group activity 3 Group activity 4	

08	Fire extinguishing agents, Fire extinguishers, Firefighting equipment and ways of fighting fire			
09	Fire hazard control Principles of heat transmission and fire spread Fire risk assessment			
10	Accident/Incident Investigation 1. The initial response to an accident/incident 2. Collecting evidence and information		Quiz 2	NEBOSH IA, IB, IC and ID
11	Accident/Incident Investigation 3. Analysis and correction 4. Loss causation			
12	Human Factors in Health and Safety Safe and unsafe Behaviors in workplace environment Safety in Noisy environment	CLO 3	Assignment	
13	Workplace transport and driving for work Loss of control, overturning of vehicles, vehicle collisions, moving and non-moving types of hazards, control measures in workplace transport operations.			
14	Introduction to Environment, Industrial Solid Waste			
15	Industrial Liquid waste, air and noise pollution			

Reviewed by ACC on _____

Review Comments:_____

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Approved by ACC on_____

Head of ACC **HoD, Electrical Engineering**

Sukkur IBA University

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Department of Electrical Engineering

Engineering Economics & Management

Programs & Class: B.E -VI	**Semester: Fall-2019**
Credit Hours: 04	**Course Organizer: Dr. M Asim Samejo** **Course Instructor: Engr. Shoaib Ahmed Shaikh**
Post-requisite Courses:	**E-mail: shoaibahmed@iba-suk.edu.pk**
Office Hours: 9 A.M to 5 P.M	**Consulting Hours: Wednesday 9 A.M to 12 Noon**
Office Location: Room-107,Academic Block- III	

ASSESSMENT/ EVALUATION

1.	Presentation +Class performance and behavior	5%
2.	Assignment	5%
3.	Case study	5 %
4.	Quiz	5 %
5.	First Term exam	20 %
6.	Second Term exam	20 %
7.	Final Examination	40 %

RECOMMENDED BOOKS:

1	Engineering Economy	By: Leland Blank & Anthony Tarquin	McGraw Hill, ISBN: 0073205346, 6th Edition
2	Fundamentals of Power System Economics	By: Daniels.Kirschen Goran Strbac	Latest Edition
3	Engineering Economics	By: James L. Riggs TATA	TATA McGraw Hill 4th Edition, ISBN-13:9780070586703

REFERENCE BOOKS:

1	Fundamentals of Financial Management	By: Eugene F. Brigham & Joel F. Houston – (B)	Thomson Learning (SW), 11th Edition
2	Economics	McConnell and Brue	16th Edition
3	Principles of Power system	VK Mehta	Latest Edition

COURSE DESCRIPTION:

This course emphasis on economic and financial feasibility of engineering projects by applying related economic and financial techniques and procedure. The alternative engineering projects analysis and selecting project from several alternatives by the tools of time value of money, present worth comparison, risk analysis and breakeven analysis.

COURSE LEARNING OUTCOMES

COURSE LEARNING OUTCOMES:

The Students will be able to:

1. Apply the principles of accounting and energy economics to determine power tariffs, revenue and profit, evaluate the feasibility of a project.
2. Demonstrate cognizance of Ethical and Legal issues for Professional Engineering and demonstrate ability to take informed decisions based on relevant ethical and legal considerations and relate the engineering solutions with societal needs or values.
3. Apply project management knowledge (including processes, lifecycle and the embodied concepts, tools and techniques) to achieve project success.

CLOs	Level of Learning	Mapped OBE PLOs	Mapped ABET SOs	Teaching Methods	CLO attainment checked in
CLO_1	C_4 (Analyzing)	PLO-2		Lectures, Tutorials, Problem sheets	First Term, Second Term
CLO_2	C_5 (Evaluating)	PLO-6,7,8	SO-4	Case studies, Assignments	Case studies, Assignments
CLO_3	C_6 (Creating)	PLO-11		Lectures, Tutorials, Problem sheets	Final Exams

Mapped OBE Program Learning Outcomes (PLOs):

PLO2 Problem Analysis: An ability to identify, formulate, research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.

PLO8 Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.

PLO11 Project Management: An ability to demonstrate management skills and apply engineering principles to one's own work, as a member and/or leader in a team, to manage projects in a multidisciplinary environment

Mapped ABET Student Outcomes (SOs):

SO4 Ethics + Engineer & society +Environment & Sustainability: An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts.

Performance Indicator for SO-4 are:

a. Cognizance of ethical and professional responsibilities. (Case studies NSPE)
b. Relate the engineering solution with societal needs or values. (Assignments)
c. Demonstrates professional ethics

LECTURE WISE DETAILS:

Lecture No.	Topics	Suggested Readings	Assessment instrument
1-4	**Introduction to Engineering Economics:** 1. Economics and its types 2. Principles of engineering economy 3. Solutions to engineering problems with certain criteria 4. Importance of Engineering Economy for Engineers. 5. Forms of Business Organizations	Engineering Economy by Leland Blank & Anthony Tarquin + NSPE code of ethics (Website) + Principles of power system by VK Mehta	CLO_1 PLO-2 1st Term Exam + CLO_2 Case study
	Code of ethics for engineers: 1. The fundamental Canons 2. The rules of practice 3. Professional Obligations 4. Case studies		
5-8	Time value of Money: 1. Equivalency 2. Interest • Simple interest & • Compound interest 3. Depreciation • Straight line method • Diminishing value method • Sinking fund method 4. Inflation 5. Examples		
9-12	**Some important terms:** 1. Revenue, Expenses & Net Income. 2. Cash flow diagram 3. Cost and Its types 4. Examples	Engineering Economy by Leland Blank & Anthony Tarquin + Notes	CLO_1 PLO-1 1st term Exam
13-16	How time and interest Affect money: 1. Present and future value 2. Present Value of a Single Sum of Money 3. Present Value of an Annuity 4. Future Value of a Single Sum of Money 5. Future Value of an Annuity 6. Future value of uneven cash flows		

17-20	1. Case studies Discussion		
Mid-1 Exam			
21-26	1. Variable Load on Power stations and Load management	Principles of power system by VK Mehta + Notes	CLO_1 PLO-2 2nd Term Exam + CLO_2 Assignment
27-30	**Tariff :** 1. Introduction 2. Tariff types 3. Calculations of Electricity Bills		
31-34	**Power factor:** 1. Introduction 2. Techniques to improve Power factor 3. Most economics locations of power factor improvement apparatus 4. Advantages of power factor improvement and the effects on economy		
35-38	1. Efficient use and conservation of electric power		
39-40	1. Practical Examples		
Mid-2 Exam			
41-44	**Management:** 1. Introduction to Management 2. Management levels 3. Difference between management and administration 4. Managerial roles 5. Management skills	Notes	CLO_3 PLO-11 Final Exam
45-48	**Project management:** 1. Project and its characteristics 2. Project management and project life cycle 3. The challenge and importance of project management 4. Various project management tools 5. Network analysis (CPM and PERT technique)		
49-52	**Project evaluation terms:(selection criteria)** 1. Net present value 2. IRR 3. Payback period method 4. Discounted Payback period		
53-56	1. Examples and Revision		
Final Exam			

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Department of Electrical Engineering

Technical Writing

Programs & Class: BE-III (EE)	**Semester:** Spring 2018
Credit Hours:03	**Course Organizer :** Dr. Muhammad Yameen Sindhu **Instructor:** Zulfiqar Ali Chachar **Support Instructor :**
Pre-requisite Courses: Functional English	**Post-requisite Courses: None**
Co-requisite Courses: None	**e-mail: zchachar@iba-suk.edu.pk**
Office Hours: 09 am -5 pm	**Consulting Hours: Friday 10:AM to 1:30 PM**
Office Location: Room# 01, Academic Block 01	

ASSESSMENT/ EVALUATION

1.	Class performance and behavior	**05%**
2.	Semester Report	**10%**
4.	Quizzes (Best 01 out of total 03)	**05%**
5.	First Term Exams	**20%**
6.	Second Term Exams	**20%**
7.	Final Examination	**40%**

RECOMMENDED BOOKS:

S.No	Book Name	Author/s Name	Publisher Name & Edition
1.	Technical Communication.	Sharon J Gerson and Steven M Gerson	Pearson Education Inc., 8th Edition

REFERENCE BOOKS:

1		John M Lannon.Laura J. Guruk	Pearson Education Inc., Thirteen Edition

	Technical Communication		

COURSE DESCRIPTION:

This course teaches technical writing skills for application in various academic and professional settings. Course will help students improve their technical writing skills which will help them in their academic and upcoming career. The course aims at imparting to the students competence in technical report writing. The mechanics and conventions of technical writing are introduced through communicative activities and tasks.. Main topics to be covered in this course are: introduction to technical writing, writing process, Audience analysis, technical writing style; use of brevity, clarity, positive tone and accuracy in writing; formatting and writing documents; writing emails, letters, memos, short reports, formal reports, user-manuals executive summaries, , progress reports, and proposals

COURSE LEARNING OUTCOMES

The students will be able:

CLO1: Define the scope and importance of technical writing in academic and professional life

CLO2: Choose and identify audience types and style of technical writing and write accordingly

CLO3: Develop basic concept of research writing and applying referencing tools in reports

CLO4: Identify and apply writing process in generating different types of correspondences (e.g.: letters, memos, emails, short reports, long reports, proposals, technical instructions and resumes.

PROJECTS & ASSIGNMENTS DETAILS ALONGWITH PREDEFINED ASSESSMENT CRITERIA

Quizzes:

- Two quizzes clearly linked with the CLOs will be taken at the end 4st, and 14thweek of teaching.
- Best One out of two quizzes will be considered.

Report: Student will have to submit a long report or proposal at the end of the 14th Week.

IMPORTANT POLICIES (subject to the course instructor)

- Class attendance is mandatory and late comers will not be allowed to attend the lectures.
- Late submission of assignment will not be accepted.
- 5 Marks are also allocated on Class discipline and class participation.

- All students will have to maintain a portfolio throughout the semester.
- All students must bring textbooks prescribed for them otherwise they will be marked absent
- Students must show respect in the class for each other.
- There will be announced and unannounced quizzes.
- Students will have to complete their reading and writing assignments in the specified period.

CLOs	**Level of learning**	**Related PLOs**	**level of PLO covered by (1 = High, 2 = medium, 3 = low)**	**Teaching Methods**	**CLO attainment checked in**
CLO1	**Cog-1**	**10**	2	Lectures, tutorials,	First mid, Quiz 1
CLO2	**Cog-2**	**10**	2	Lectures, tutorials,	First Mid, Quiz 2
CLO3	**Cog-2**	**5**	2	Lectures, tutorials,	Long Report Quiz 3
CLO4	**Cog-2**	**12**	2	Lectures, tutorials,	Second Mid, Final exam,

SESSION / WEEK WISE DETAILS:

Date Week	Lecture No.	Topics	CLO Mapping	Assignment /Quizzes	Suggested Reading
1	01-02	**Introduction to the course** • Technical Writing; Definitions • Technical Writing Scenarios • Importance Of Technical writing • Types of technical writing • Role of technical writing in academic and professional contexts	CLO1		Text Book
1	03-04	**The Writing Process** • Pre. Writing • First Phase of writing	CLO1		Text Book
		Writing • Making a first draft • Organization • Formatting			
2	05-06	**Rewriting** • Making a final draft • The Process In Practice • Collaborative Evaluation • Usability Testing			

		• Revision Techniques			
2	07-08	**Objectives/Style In Technical Writing** **Clarity** • Ways to achieve clarity	CLO 2		Text Book
		Conciseness • Ways to achieve conciseness **Accuracy** • Ways to achieve accuracy			
3	9,10	**Organization patterns in writing** • Spatial • Chronological • Importance • Comparison/ Contrast • Problem/solution • Cause and Effect	CLO2		Text Book
		What is Research • Types of research • Referencing techniques • Using quotes ,Paraphrases, and summaries	CLO2		Text Book
3	11,12	**Audience Recognition and Involvement** **Audience Recognition** • Knowledge of the Subject matter • Audience types • Writing for future audience • Defining terms for audience • Audience personality traits **Audience Involvement** • Ways to involve the audience • Using positive tone in the correspondence	CLO2	Quiz 1	Text Book
4	13-16	**Routine correspondences Memos, E-mail and Letters** • The Differences among routine correspondence Channels	CLO 4		Text Book

		• Reasons for writing Routine correspondences • Using an all purpose template **Criteria for writing Memos** Style of effective memos • Effective Memo Checklist			
5	17-20	**E-mail** • Why Is E-mail Important? • Techniques for Writing Effective E-mail Messages • Case studies on Memo and Email • Exercises on email writing	CLO 4		Text Book
		First Midterm Examination			
6	21-22	**Letters** • Letter essential and optional Components • Letter Formats • Effective Memo Checklist	CLO 4		
7	23-28	**Criteria for different Types of routine Correspondences** • Inquiry • Cover (Transmittal) • Good news • Bad-News • Complaint • Adjustment • Confirmation • Case studies on letter	CLO 4		Text Book
8	29-32	**Employment Communication** • The Three Rs of Searching for a job • How To Find Job Openings • Criteria For Effective Resumes • Ethical consideration when writing a resume	CLO 4		Text Book

		• Types of Resume • Style of effective resume • Methods Of Delivery • Criteria For Effective Letters Of Application • Job acceptance Letter			
	33-36	**User-manuals & short Technical Instructions** • Its importance in professional life • Why Write User-manuals and Technical Instructions • Criteria For Writing User-manuals and Technical Instructions • Practicing user-manuals and technical instructions	CLO 4		
		Second Midterm Examination			
10,11	37-44	**Short/Informal Reports** • What is a Report • Types of Reports • Criteria for Writing Reports • Organization and Development of reports • Types Of short Reports • Trip Reports • Progress Reports • Feasibility/ Recommendation Reports • Incident Reports	CLO 4		Text Book
12	45-48	**Long /Formal Reports** • Why Write a long, Formal Report • Types of long Formal Reports • Information reports • Analytical reports • Recommendation reports • Major Components of Long Formal Reports	CLO 4 CLO 3		Text Book

13,14	49-54	**Proposals** • Why Write a proposal • Types of Proposals • Major Components of a proposals		Quiz 2	Text Book
15	55-56	**Grammar Rules** • Punctuation • Mechanics • Spelling	CLO 2		Text Book

Sukkur IBA University

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Department of Electrical Engineering

Power Generation

Programs & Class: BE-VI(EE)	**Semester:** Spring 2019
Credit Hours: 03+ 01	**Course Organizer:** Dr. Faheem A. Chachar **Course Instructor:** Engr. Veer Bhan **Support instructor :** TBA
Pre-requisite Courses: Electrical Machines	**Post-requisite Courses:** None
Co-requisite Courses: None	**E-mail:** veer.bhan@iba-suk.edu.pk
Office Hours: 9:00 am – 5:00 pm	**Consulting Hours:** 11:00 AM to 01:00 PM (Mon to Thu)
Office Location: Room No. 107 Academic Block-III	

ASSESSMENT/ EVALUATION

1.	Class Performance and Behavior/Presentation	**5%**
2.	Assignments	**5%**
3.	Quizzes	**10%**
4.	First Mid Term exam	**20%**
5.	Second Mid Term exam	**20%**
6.	Final Examination	**40%**

RECOMMENDED BOOKS:

S.No	Book Name	Author/s Name	Publisher Name & Edition
1.	Principles of Energy Conversion	Arche W. Culp	McGraw-Hill & 3rd Edition
2.	Power Plant Technology	M.M. Wakel	McGraw-Hill & 2nd Edition
3.	Advanced Power Generation Technology	Halina.P Kruczek	PRINTPAP Łódź & 1st Edition

REFERENCE BOOKS:

1.	Principles of Power System	V. K Mehta	McGraw-Hill & 5th Edition
2.	Power System Generation, Transmission and Distribution	D.P Kothari	McGraw-Hill & 7th Edition

COURSE DESCRIPTION:

This course focuses on the electric power generation. The students learn different power plant and methods of energy conversion to generate electrical energy. Conventional heat engine-based techniques as well as the new renewable energy based electrical energy generation technologies will be discussed. The principals of main renewable electric energy systems (REES) - solar, wind, and fuel cells- will be covered. Economic and environmental

COURSE LEARNING OUTCOMES

Students will be able to

CLO1: Identify the ecological and economical aspects of Conventional Power Stations.

CLO2: Illustrate the characteristics of Renewable Energy Sources for sustainable solution to energy crisis.

CLO3: Conduct experiments on Power Generation Trainers to observe and verify the

QUIZZES & ASSIGNMENTS DETAILS ALONGWITH PREDEFINED ASSESSMENT CRITERIA

Quizzes:

- Three quizzes clearly linked with the CLOs will be taken at the end of 5th, 11th and 17th week of teaching.
- Best two out of three quizzes will be considered.

Assignments:

- One practical task based assignment will be given at the end of 13th of teaching.
- The assessment would be based on students' ability to identify,

IMPORTANT POLICIES (subject to the course instructor)

- Class attendance is mandatory and late comers will not be allowed in the class.
- Late submission of coursework will not be accepted.

CLOs	PLOs	Level of Learning	Teaching Methods	CLOs Attainment Techniques
CLO1	6	Cog-2	Lectures, short seminars & tutorials	First mid, Second Mid
CLO2	7	Cog-2	Lectures, short seminars & tutorials	Second Mid, Final exam
CLO3	5	Psy-3	Lectures, demonstrations & tutorials	First mid Lab Task, Second mid Lab Task, Final exam Lab Task

LECTURE WISE DETAILS:

Lecture No#	Topics	Suggested Reading	Seminar / Tutorial

1-6	• Introduction to Subject
	• Conventional & Non-Conventional Energy sources
	• World Energy Situation and Energy Recourses in Pakistan
	• Thermodynamics for Power System
	  o Carnot Vapor Cycle
	  o Rankine Cycle
	  o Brayton Cycle
		H.P Kruczek " Advanced Power Generation Technology" Latest Edition	Generation of electric power from conventional and non conventional sources of energy in Pakistan and in some developed countries

7-10	Coal Fired Power Station, • Working Principle • Schematic arrangements • Advantages and disadvantages • Efficiency of steam power station • Environmental aspects of selecting the site and location of thermal power stations. • Steam power plant controls and auxiliaries	V.K Mehta "Principles of Power System", Latest Edition & Internet Sources	

11-14	Hydro Power Stations:
	• Schematic arrangements of a hydro power plan
	• Choice of site constituents of hydro power plant
	• Hydro turbines
	• Environmental aspects for selecting the sites and locations of hydro power stations
	• Types of Hydro Electric Power stations
	  o Run off River
	  o Pumped Storage
	  o Reservoir Based
		V.K Mehta "Principles of Power System", Latest Edition & Internet Sources	Hydro Potentials in Pakistan

15-18	Nuclear power station: • Schematic arrangement • Advantages and disadvantages selection of site • Types of reactors • Hazards, Environmental aspects for selecting the sites and locations of nuclear power stations • Numerical for studied plants	M.M. Wakel, "Power Plant Technology", McGraw-Hill, Latest Edition	Status of Nuclear power generation in the world and in Pakistan.
	1st MID TERM EXAM		

19-22	Gas Turbines Power Plants: • Schematic arrangement • Advantages and disadvantages of Gas turbine power plant • Open cycle and Closed cycle gas turbine power plant Combined cycle power plant • Schematic Arrangement • Muti-Shaft and Single shaft • Efficiency Analysis	M.M. Wakel, "Power Plant Technology", McGraw-Hill, Latest Edition.	Comparison of a gas Turbine Power Plant with Diesel engine and steam power plant.
23-26	Diesel power station • Introduction • Schematic arrangement • Advantages and disadvantages • Choice and characteristic of diesel engines • Auxiliaries • Comparison of various power plants • Numerical of Studied plants	V.K Mehta "Principles of Power System", Latest Edition & Internet Souces	
27-28	Introduction: Need of Renewable Energy Non-conventional energy – seasonal variations and availability • Renewable energy – sources and features • Distributed energy systems and dispersed generation (DG)	Arche W. Culp, "Principles of Energy Conversion", Latest Edition	Present status of PV in Pakistan
29-32	Solar Power Conversion systems: • Solar radiation spectrum • Radiation measurement • Applications of Solar Thermal Systems: • Heating, Cooling, Distillation, Power generation. Solar Photovoltaic (SPV) system Applications of SPV systems	M.M. Wakel, "Power Plant Technology", McGraw-Hill, Latest Edition & Internet Sources	
33-38	• Wind Power Plant • Bet'z Law • MHD Power Plant • Types of MHD System • Geothermal Power Plant o Types of Geothermal Power Plant	M.M. Wakel, "Power Plant Technology", McGraw-Hill, Latest Edition. & Internet Sources	Availability of these sources in Pakistan
	2nd MID TERM EXAM		
39-41.	Energy Conversion • Direct Conversion Methods • Indirect Conversion Methods Fuel Cell Generation • Working & Advantages	M.M. Wakel, "Power Plant Technology", McGraw-Hill, Latest Edition.	Technical and Economical analysis of power generation from renewable energy sources

	• Efficiency • PEM Fuel Cell Technology		
42-46.	Tariff and Economic aspects in power Generation: • Terms commonly used in system operation • various factors affecting cost of generation • Load curves, load duration curves, Connected load, maximum load, Peak load, base load and peak load power plants	V.K Mehta "Principles of Power System", Latest Edition & Internet Sources	
47-51.	Tariff and Economic aspects in power Generation: • Load factor, Plant capacity factor, Plant use factor, Demand factor, diversity factor, Cost of power plant, Tariffs and its types • Numerical for Studied plants	V.K Mehta "Principles of Power System", Latest Edition & Internet Sources	
52.	• Queries and problems regarding subject • A quick overview before final exam		

5. Teaching and learning methods

a. Class based teaching

b. Directed unsupervised activities

c. In-class test

6. Facilities required for teaching and learning

The course will make the use of class-based teaching materials

Course coordinator:

Date: / /

Head of Department

Date: / /

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Department of Electrical Engineering

Power Distribution & Utilization

Programs & Class: BE-VII (EE)	**Semester:** Fall 2019
Credit Hours: 04(3+1)	**Instructor:** Eng. Mahnoor Mughal **Support Instructor:**
Pre-requisite Courses: None	**Post-requisite Courses: None**
Co-requisite Courses: None	**e-mail: mahnoor@iba-suk.edu.pk**
Office Hours: 09 am -5 pm	**Consulting Hours: 4 pm- 5 pm (Mon-Wed)** **Otherwise please make an appointment**
Office Location: Room# 107, Academic Block 03	

ASSESSMENT/ EVALUATION

1.	Presentations/ Assignments (Best 01 out of total 02)	**5%**
2.	Quizzes (Best 01 out of total 02)	**5%**
3.	First Term Exams	**20%**
4.	Second Term Exams	**20%**
5.	Final Examination	**40%**
6.	Semester project/ assignments/ group activities etc	**10%**

RECOMMENDED BOOKS:

S.No	Book Name	Author/s Name	Publisher Name & Edition
1.	A Text Book of Electrical Power	M. L. Anand	Latest Edition.
2.	Electrical Power Distribution System	Turan Gonen	Latest Edition.

REFERENCE BOOKS:

1.	Principals of Power System	V.K Mehta	Latest Edition

COURSE DESCRIPTION:

This course includes all basic and advanced information about Electrical Power Distribution schemes and proper utilization techniques for engineering graduates of Electrical Power Engineering. The course is designed in such a way that it gives review of basic structure of power distribution system with its effective utilization in heating, and lightening schemes.

COURSE LEARNING OUTCOMES

The students will be able:

CLO1: To **analyze** the basic structure of Power Distribution System and to **distinguish** various power distribution schemes, bus bar arrangements and the proper illumination schemes for a specified purpose by applying the law of illumination.

CLO2: To **adopt** the necessary safety rules while performing labs in Power Systems lab and **behave** ethically in teams.

CLO3: To **plan** and **propose** the solutions to Complex Engineering Problems by using the contextual knowledge to solve the societal problems in the Field of Electrical Engineering and Power Distribution Network of Pakistan.

CLOs	Level of learning	Mapped OBE PLOs	Mapped ABET SOs	Teaching Methods	CLO attainment checked in
CLO1	**Cog-4**	**4**	**6**	Lectures, tutorials, Lab Experiments	Quiz 1, Final exam, Lab Exam Final, Lab Exam Mid 2
CLO2	**Affective-3**	**8**	**4**	Lab Experiments	Lab Exam Mid 1
CLO3	**Cog-5**	**6**	**4**	Lectures, tutorials & News Articles(Dawn)	Complex Engineering Problem (Assignment)

Mapped OBE Program Learning Outcomes (PLOs):

PLO4 Investigation: An ability to investigate complex engineering problems in a methodical way including literature survey, design and conduct of experiments, analysis and interpretation of experimental data, and synthesis of information to derive valid conclusions.

PLO8 Ethics: Apply ethical principles and commit to professional ethics, responsibilities, and norms of engineering practice.

PLO6 The Engineer and Society: An ability to apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice and solution to complex engineering problems

Mapped ABET Student Outcomes (SOs):

SO6: An ability to develop and conduct appropriate experimentation, analyze and interpret data and use engineering judgment to draw conclusions.

SO4: An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts.

Performance Indicator for SO6 are:

- Able to develop appropriate setup and acquire data
- Analyze and interpret data
- Draw valid conclusions using engineering principles.

Performance Indicator for SO4 are:

- Cognizance of ethical and professional responsibilities
- Relate the engineering solution with societal needs or values
- Demonstrates professional ethics

SESSION / WEEK WISE DETAILS:

Lecture No.	Topics	CLO Mapping	Assignments/ Quizzes	Suggested Readings
01-02	Course introduction, Introduction to Electrical Power System			Principles of Power Systems by VK Mehta / A text of Electrical power by M.L Anand
03-04	Single Line Diagram Of Power System and Introduction to Distribution System	CLO1		
05-06	Primary Distribution Configurations Primary Voltage Levels, Distribution Substations			
07-08	Classification of Power Distribution System(01) • According to nature of current(AC/DC) • According to type of construction(Overhead/Underground)			
09-10	Classification of Power Distribution System(02) • According to scheme of connection(Radial, Ring main & Interconnected) Urban, Suburban and Rural Distribution Systems.			Principles of Power Systems by VK Mehta
11-12	AC Distribution Schemes (Radial ,Ring Main Systems and Interconnected systems)	CLO1	Quiz1	
13-14	DC Distribution Schemes (2 Wire DC Distribution system and 3 Wire DC Distribution system)			
15-16	Types of DC Distributors ➢ Distributor fed at one end ➢ Distributor fed at both ends ➢ Distributor fed at center ➢ Ring distributor			
17-18	Introduction to Switch Gears ➢ Switch ➢ Circuit Breaker ➢ Fuse Features of switchgear			
19-20	Bus Bar Arrangements ➢ Single Bus Bar Scheme ➢ Single Bus bar scheme with sectionalization ➢ Double Bus bar scheme	CLO1		
	FIRST MID TERM EXAMS			
21-22	Calculation Of Voltage Drop And Regulation In Distribution Feeders.			Principles of Power Systems by VK Mehta
23-24	Estimation Of Load, Load Characteristics	CLO1		
25-26	Introduction to Grounding And Earthing			
27-28	Importance of earthing in power system			
29-30	Types Of Equipment Earthing, Types Of System Earthing			
31-32	Batteries And Their Working, Battery Charging, Electroplating, Electrolysis		Quiz2	
33-34	Power triangle, Disadvantages of Low power			

	factor			
35-36	Power factor and its Improvement Methods	CLO2	Assignment 01	
	SECOND MID TERM EXAMS			
37-38	Electric Heating and its type			
39-40	Electric welding and its types			
41-42	Laws Of Illumination, Units And Terms Used			
43-44	Requirements For Good Lighting		Assignment 02/Presentation 02	
45-46	Types Of Lamps, Their Working And Relative Merit			
47-48	Requirements of illumination For Various Situations Street Lighting	CLO1		
49-50	Commercial Lighting and its types (Stadium/Flood/Stage/Spot Lighting etc)	CLO1		
51-52	Industrial Loads / Lighting			
	FINAL EXAMS			

For Lab Courses, Insert list of lab experiments and proposed lab projects here:

Week	**Objective**	**Mapped CLO**
1	Introduction to Power System Lab, Its equipment and safety precautions to be adopted.	
2	To Analyze the effects of unbalanced star-connected load on distribution transformer.	CLO2
4	To analyze a Double Bus bar Scheme with different types of loads	CLO2
5 & 6	To analyze the performance of Bus bar Coupler in Double bus bar scheme.	CLO2
7	*MID-TERM I EXAM*	
8	Improvement of power factor using static capacitors.	CLO2
9	To analyze and measure the Power Consumption of Electrical Distribution system using active and reactrive energy meter	
10	Introduction to PSS Sincal, and Single Line Diagram of Electrical Power System	
11 & 12	Introduction to Dialux, design of illumination scheme for office building/ home	
13	Voltage collapse in Power Distribution System and solution in PSS Sincal	
14	*MID-TERM II EXAM*	
15	Improvement of Power factor of induction motor by using Capacitor banks	CLO2
16	Course Project Design	CLO2
17	**FINALTERM**	

Reviewed by ACC on _____

Review Comments:_____

_____

Approved by ACC on_____

Head of ACC **HoD, Electrical Engineering**

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Department of Electrical Engineering

Power System Analysis

Programs & Class: BE-VII (EE)	**Semester:** Fall 2019
Credit Hours: 3+1	**Instructor:** Engr. Muhammmad Fawad Shaikh **Support Instructor :** TBA
Pre-requisite Courses: ---	**Post-requisite Courses: None**
Co-requisite Courses: None	**e-mail: muhammadfawad@iba-suk.edu.pk**
Office Hours: 0900 hrs – 1700 hrs	**Consulting Hours: 2 pm- 4 pm (Tues-Wed)** **Otherwise please make an appointment**
Office Location: Room# 107, Academic Block 03	

ASSESSMENT/ EVALUATION

1.	Semester Project	**5%**
2.	Quizzes (Best 02 out of total 03)	**5%**
3.	Assignments/ group activities etc	**5%**
4.	Presentations	**5%**
5.	First Term Exams	**20%**
6.	Second Term Exams	**20%**
7.	Final Examination	**40%**

RECOMMENDED BOOKS:

S.No	Book Name	Author/s Name	Publisher Name & Edition
1.	Elements of Power System Analysis	William D. Steveson	McGraw-Hill & 4th Edition
2.	Power System Analysis	Hadi Saadat	McGraw-Hill & 3nd Edition
3.	Power System Analysis	Grainger	McGraw-Hill & 2nd Edition

REFERENCE BOOKS:

1.	Power System Analysis and Design	J. Duncan Glover and Mulukutla S. Sarma	Brooks/Cole Third Edition, 2002

COURSE DESCRIPTION:

The course will help students understand how power systems are modeled both at the distribution and transmission levels. The course covers long-distance transmission of electric power with emphasis on admittance and impedance modeling of components and system, power-flow studies and calculations, symmetrical and unsymmetrical fault calculations, economic operation of large-scale generation and transmission systems. The course paves the foundation for exploring the ways and means to perform power system analysis in normal operation and under symmetrical and unsymmetrical faults. Models of generators, transformers and transmission lines essential for such analyses are assembled. Additionally, principles for the formulation, solution, and application of optimal power flow are established.

TENTATIVE COURSE LEARNING OUTCOMES

CLO1: Students will able to demonstrate ethical values in academic activities.

CLO2: Student will able to actively participate individually and help group, develop team skills.

CLO3: Student will able to demonstrate proficiency in technical writing and ability to communicate effectively and orally

CLO4: Students will able to demonstrate life-long learning capability for solving engineering problem.

CLOs	Level of learning	Mapped OBE PLOs	Teaching Methods	CLO attainment checked in
CLO-1	**Cog-2**	**8**		Project Report, Presentation
CLO-2	**Cog-6**	**9**		Project Report, Presentation
CLO-3	**Cog-2**	**10**		Project Report (Writing), Presentation (Communication)
CLO-4	**Cog-6**	**12**		Project

Mapped OBE Program Learning Outcomes (PLOs):

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

PLO-9 Individual and Team Work: An ability to work effectively, as an individual or in a team, on multifaceted and /or multidisciplinary settings.

PLO-10 Communication: An ability to communicate effectively, orally as well as in writing, on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PLO-12 Lifelong Learning: An ability to recognize importance of, and pursue lifelong learning in the broader context of innovation and technological developments

SESSION / WEEK WISE DETAILS:

Weeks	Topics	CLO Mapping	Assignments/ Quizzes	Suggested Readings
01-02	Introduction to the subject • Basics of Power System • Power System Network • Need of Power System Analysis Representation of power systems: Symbols, building blocks • Single phase solution of three phase system • Single Line Diagram Modelling of Power System Components • Modelling of Generator • Modelling of Synchronous Motor • Modelling of Induction Motor • Modelling of Static Loads • Modelling of Transmission Lines • Modelling of Transformer			William D. Steveson & J.Duncan Glover and Mulukutla S. Sarma
03-04	Impedance Diagram Reactance Diagram Per Unit and Percentage Methods • Per Unit Quantities • Selection / Change of base of p.u quantities • P.U impedance in Transformer circuit • Advantages of P.U computation • Solution of numerical			
05-07	Faults in Power Systems • Causes of Fault in Power System Short Circuit Currents • Harmful Effects of Short Circuit Faults on Power System • Sources of Fault Power Symmetrical Fault Analysis. • Short Circuit KVA Calculations • Switching Operation in an R-L Series Circuit • Transient on Transmission Line • Short Circuit of Synchronous Machine (No Load) • Short Circuit of Synchronous Machine (Loaded) • Internal Voltages of Loaded Machines under transient condition • Selection of Circuit Breakers • Numerical			
FIRST MID TERM EXAMS				
8-10	Load Flow Studies • Network equations and Solutions o Node Elimination by Star-Mesh Transformations • Load Flow Problem			William D. Steveson

	○ Bus Admittance Matrix or Y-Bus Matrix ▪ Formation of Bus Admittance Matrix ▪ Numerical ○ Bus Classifications ○ Need of Slack Bus • Power Flow Solution ○ Power Flow Equation • Power Flow Solution Method ○ Gauss Seidal iterative method & algorithm for load flow solution ▪ Numerical ○ Newton Raphson Method & NR-Algorithm for load flow Solution ▪ Numerical • Comparison of load flow methods			
11-13	Analysis of Symmetrical Components • Operators • Symmetrical Components of Unsymmetrical phasors • Power in Terms of Symmetrical Components Sequence Impedance & Sequence Networks • Sequence Impedances of Transmission Lines • Sequence Impedances and Networks of Synchronous Machine ○ Positive Sequence Impedance and Networks ○ Negative Sequence Impedance and Networks ○ Zero Sequence Impedance and Networks • Sequence Impedance and Networks of Transformer ○ Zero Sequence Networks of Transformer ▪ Y-Y with any Neutral grounded ▪ Y-Y with both Neutrals grounded ▪ Y-D with Neutral grounded ▪ Y-D with Ungrounded system ▪ D-D System • Zero Sequence Networks for Loads • Construction of Sequence Networks of Power System ○ Numerical			
SECOND MID TERM EXAMS				

14-16	Fault Analysis
	• Types of Faults
	• Line to ground fault on unloaded generator
	  o Numerical
	• Double Line to Ground Fault on Unloaded generator
	  o Numerical
	• Unsymmetrical faults on Power System
	  o Single to Ground Fault on Power System
	  o Fault Occurring on Loading conditions
	  o Line to Line Fault on Power System
	  o Double Line to Ground Fault on Power System
	• Numerical
				Hadi Saadat

FINAL EXAMS				

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Department of Electrical Engineering

Engineering Entrepreneurship

Programs & Class: BE-VII (EE)	**Semester:** Fall 2018
Credit Hours: 03	**Course Organizer :** **Instructor:** Prof. Dr. Manzoor Ali Mirani **Support Instructor :**
Pre-requisite Courses:	**Post-requisite Courses: None**
Co-requisite Courses: None	**e-mail: manzoor@iba-suk.edu.pk**
Office Hours: 09 am -5 pm	**Consulting Hours: 3 pm- 5 pm (Mon-Tues)** **Otherwise please make an appointment**
Office Location: Room# 22, Academic Block 01	

ASSESSMENT/ EVALUATION

1.	Class performance and behavior	--
2.	Semester Project	**10%**
3.	Presentations	**5%**
4.	Quizzes (Best 02 out of total 03)	**5%**
5.	First Term Exams	**20%**
6.	Second Term Exams	**20%**
7.	Final Examination	**40%**

RECOMMENDED BOOKS:

S.No	Book Name	Author/s Name	Publisher Name & Edition
1.	Entrepreneurship	Robert D. Hisrich, Michal P. Peters and Dean A. Shephard	McGraw-Hill, 9th Edition

REFERENCE BOOKS:

1.	Entrepreneurship	Zimmer	6th Edidtion

COURSE DESCRIPTION:

This course has been designed to facilitate engineering students on how to create, manage, develop and grow a new ventur on the basis of new technologies. Especially students are to be exposed to detailed descriptions of 'how to' embark on new venture in a logical manner. Our focus here is on the entrepreneurial mindset, or the ability for students to think and act in more creative, innovative, opportunistic and proactive ways.

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COURSE LEARNING OUTCOMES

The students will be able to:

CLO1 : Identify with the policies, ethical and legal issues in business.

CLO2 : Analyze modern and innovative ideas for sustainable development through the basic knowledge and understanding of entrepreneurship and entrepreneurial process.

CLO3 : Explain the challenges in different organizational roles i.e leaders, managers, employees and analyze the importance of teamwork in successful business.

PROJECTS & ASSIGNMENTS DETAILS ALONGWITH PREDEFINED ASSESSMENT CRITERIA

Quizzes:

- Three quizzes clearly linked with the CLOs will be taken at the end of 4th, 9th and 14th week of teaching.
- Best two out of three quizzes will be considered.

Presentations:

- The presentations will be taken in the last week

IMPORTANT POLICIES (subject to the course instructor)

- Class attendance is mandatory and late comers will not be allowed to attend the lecture.

CLOs	Level of learning	Related PLOs	Teaching Methods	CLO attainment checked in
CLO1	Cog-2	08	Lectures, tutorials	First Mid, Second mid, Final Exam
CLO2	Cog-4	07	Lectures, tutorials	First Mid, Second mid, Final Exam
CLO3	Cog-3	09	Lectures, tutorials	First Mid, Second mid, Final Exam
CLO4	Cog-6	11	Lectures, tutorials	First Mid, Second mid, Final Exam

SESSION / WEEK WISE DETAILS:

Session No.	Date / Week	Topics	Assignments/ Quizzes /	Suggested Readings
01-02	Week 01	**Introduction to course syllabus and learning outcomes**		
03-04	Week 01	**Entrepreneurship and Entrepreneur Mindset:** • Nature of Entrepreneurship • How Entrepreneurs think • Entrepreneurial Process • Ethics and Social Responsibility		Chapter 1

05-06	Week 02	**The Entrepreneurial Intentions and Corporate Entrepreneurship** • Causes for Interest in Intrapreneurship • Corporate versus Intrapreneurial Culture		Chapter 2

		• Climate for Intrapreneurship • Managerial versus Entrepreneurial Decision Making		
07:08	Week 02	• Intrapreneurial Leadership Characteristics • Establishing Intrapreneurship in the Organization • Problems and Successful Efforts • Learning from Business Failure • Recovery and learning process		Chapter 2
09-10	Week 03	**Entrepreneurial Strategy: Generating and Exploiting New Entries** • New Entry • Entrepreneurial Strategy • Generation of New Entry opportunity • Decision to Exploit new entry • Strategy for New Entry • First Mover Advantages		Chapter 3
11-12	Week 03	• First Mover Disadvantages • Technology Uncertainty • Lead Time • Risk Reduction for new entry • Market scope strategy • Managing Newness		Chapter 3
13-14	Week 04	**Creativity and Business Idea:** • Sources of New Ideas • Consumers • Existing Products and Services • Distribution Channels • Federal Government • Research and Development • Methods of Generating Ideas		Chapter 4
15-16	Week 04	• Focus Groups • Brainstorming • Problem Inventory Analysis • Creative Problem Solving • Brainstorming • Reverse Brainstorming • Brainwriting • Forced Relationships • Collective Notebook Method • E-Commerce and Business Start-Up • Using E-Commerce Creativity • Website		Chapter 4
17-18	Week 05	**Identifying and Analyzing Domestic and International Opportunities.** • The Nature of International Entrepreneurship • The Importance of International Business to the Firm • International versus Domestic Entrepreneurship • Economics • Stage of Economic Development		Chapter 5
19-20	Week 05	• Balance of Payments • Type of System • Political-Legal Environment • Cultural Environment • Technological Environment • Strategic Issues • Exporting		Chapter 5

21-22	Week 06	• Nonequity Arrangements • Direct Foreign Investment • Barriers to International Trade		Chapter 5
23-24	Week 06	**Legal Issues for the Entrepreneur:** • What Is Intellectual Property? • Need for a Lawyer • How to Select a Lawyer • Legal Issues in Setting Up the Organization • Patents		Chapter 6
	Week 07	**FIRST MID TERM EXAM**		
25-26	Week 08	***Legal Issues for the Entrepreneur:*** • International Patents • The Disclosure Document • The Patent Application • Patent Infringement • Business Method Patents		Chapter 6
27-28	Week 08	• Trademarks • Registering the Trademark • Copyrights • Trade Secrets • Licensing • Product Safety and Liability • Insurance • Contracts		Chapter 6
29-30	Week 09	**The Business Plan: Creating/Starting the Venture** : • Planning as Part of the Business Operation • What Is the Business Plan? • Who Should Write the Plan? • Scope and Value of the Business Plan? Who Reads the Plan? • How Do Potential Lenders and Investors Evaluate the Plan? • Presenting the Plan • Information Needs • Market Information • Operations Information Needs • Financial Information Needs • Using the Internet as a Resource Tool		Chapter 7
31-32	Week 09	• Writing the Business Plan • Introductory Page • Executive Summary • Environmental and Industry Analysis • Description of Venture • Production Plan • Operations Plan		Chapter 7
33-34	Week 10	• Marketing Plan • Organizational Plan • Assessment of Risk • Financial Plan		Chapter 7

		• Appendix • Using and Implementing the Business Plan • Measuring Plan Progress • Updating the Plan • Why Some Business Plans Fail		
35-36	Week 10	• **The Marketing Plan:** • Marketing Research for the New Venture • Step One: Defining the Purpose or Objectives • Step Two: Gathering Data from Secondary Sources • Step Three: Gathering Information from Primary Sources • Step Four: Analyzing and Interpreting the Results		Chapter 8
37-38	Week 11	• Understanding the Marketing Plan • Characteristics of a Marketing Plan • The Marketing Mix • Steps in Preparing the Marketing Plan • Defining the Business Situation • Defining the Target Market/Opportunities and Threats • Considering Strengths and Weaknesses		Chapter 8
39-40	Week 11	• Establishing Goals and Objectives • Defining Marketing Strategy and Action Programs • Marketing Strategy: Consumer versus Business-to-Business Markets • Budgeting the Marketing Strategy • Implementation of the Market Plan • Monitoring Progress of Marketing Actions • Contingency Planning • Why Some Plans Fail		Chapter 8
41-42	Week 12	**The Organizational Plan:** • Developing the Management Team • Legal Forms of Business • Ownership • Liability of Owners • Costs of Starting a Business • Continuity of Business • Transferability of Interest		Chapter 9
43-44	Week 12	• Capital Requirements • Management Control • Distribution of Profits and Losses • Attractiveness for Raising Capital		Chapter 9
45-46	Week 13	• Advantages of an LLC • Designing the Organization • Building the Management Team and a Successful Organization Culture		Chapter 9
47-48	Week 13	**The Financial Plan:** • Operating and Capital Budgets • Pro Forma Income Statements • Pro Forma Cash Flow		Chapter 10
	Week 14	**2ND MID TERM EXAM**		

49-50	Week 15	**The Financial Plan:** • Pro Forma Balance Sheet • Break-Even Analysis • Pro-Forma Sources and Applications of Funds • Software Packages		Chapter 10
51-52	Week 15	**SOURCES OF CAPITAL** • Debt or Equity Financing • Internal or External Funds • Personal Funds • Family and Friends • Commercial Banks • Types of Bank Loans • Cash Flow Financing • Bank Lending Decisions • Research and Development Limited Partnerships • Major Elements		Chapter 11
53-54	Week 16	• Procedure • Benefits and Costs • Examples • Government Grants • Procedure • Private Placement • Types of Investors • Private Offerings • Bootstrap Financing		Chapter 11
55-56	Week 16	**SUCCESSION PLANNING AND STRATEGIES FOR HARVESTING AND ENDING THE VENTURE** • How to Beat Failure and Be the Boss Again • Exit Strategy • Succession of Business • Transfer to Family Members • Transfer to Non family Members		Chapter 15
57-58	Week 17	• Options for Selling the Business • Direct Sale • Employee Stock Option Plan • Management Buyout • Ethics: Involving Employees, Bankers, and Business Associates in the Problem • Bankruptcy—An Overview		Chapter 15
59-60	Week 17	**Project presentations**		

Head of Accreditation Committee **HoD, Electrical Engineering**

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Department of Electrical Engineering

Power System Stability & Control

Programs & Class: B.E VIII	**Semester: Fall 2017**
Credit Hours: 4 (3+1)	**Course Organizer: Dr. Faheem Akhtar Chachar** **Course Instructor: Engr. Jamshed Ahmed Ansari** **Support instructor :**
Pre-requisite Courses: None	**Post-requisite Courses:**
Co-requisite Courses:	**e-mail: jamshed.ahmed@iba-suk.edu.pk**
Office Hours: 9 A.M to 5 P.M	**Consulting Hours: Saturday 9 A.M to 12 Noon** **Monday 9A.M to 12 Noon**
Office Location: Room 1 Academic Block 1	

ASSESSMENT/ EVALUATION

1.	Class performance and behavior	**----**
2.	Semester Projects	5 %
3.	Assignments	5 %
4.	Quizzes	10 %
5.	First Term exam	20 %
6.	Second Term exam	20 %
7.	Final Examination	40 %

RECOMMENDED BOOKS:

S.No	Book Name	Author/s Name	Publisher Name & Edition
1.	Power Generation, Operation and Control	Woolen Barg	Latest Edition.
2.	Power System Control Technology	Trosten Cegral,	Latest Edition.

REFERENCE BOOKS:

1.	Power System Stability and Control	P. Kundur,	Latest Edition.

2.	Principals of Power System	V.K Mehta	Latest Edition.

COURSE DESCRIPTION:

This course includes all basic and advanced information about power system control and its stability techniques relevant for Engineering graduates from Electrical Power Engineering. The course is designed in such a way that it gives review of fundamental features of power system operation control and its stability techniques.

COURSE LEARNING OUTCOMES

Students will be able:

CLO1: To illustrate the basic requirements and features for a reliable and stable power system

CLO2: To apply modern tools and techniques to monitor and control various parameters and states of power system.

CLO3: To analyze transient and steady-state stability of multi machine connected systems.

CLO4: To design and implement suitable controllers to maintain stability of interconnected power system using MTALLAB/ PSCAD

PROJECTS & ASSIGNMENTS DETAILS ALONGWITH PREDEFINED ASSESSMENT CRITERIA

Two quizzes will be taken and best one will be counted.

Two assignments will be given and best one will be counted.

One semester project at the end of lectures will be given.

Class attendance is mandatory and late comers will not be allowed to attend the lecture.

Late submission of coursework will not be accepted.

CLOs	Level of Learning	Related PLOs	Teaching Methods	CLO attainment checked in
CLO1	Cog 2	1	Lectures, tutorials, problem sheets	First mid, assignment 1, Quiz 1
CLO2	Cog 3	5	Lectures, tutorials, problem sheets	Second Mid, assignment 2, Quiz 2
CLO3	Cog 4	3	Lectures, tutorials, problem sheets	Second Mid, Final exam, Final Lab Exam
CLO4	Psychomotor 3	3	Lab activity	Semester Projects

LECTURE WISE DETAILS:

Lecture No.	Topics	Recommended Reading	Assessment instrument
1-2	Introduction to Power System control and Power System Stability Basic requirements of Power System Operation	Fundamental concepts of DC circuits	CLO 1 Quiz 1
3-4	modes of power system operation, major tasks of operation.		
5-12	SCADA system, control centers, controller tuning,	Text Book / Reference Book	CLO 2 Assignment 1
13-14	Communication sub system, remote terminal unit, data logging.		
15-17	Economics of Power Generation, Economic dispatch, Plans for today's dispatch and tomorrow's dispatch of electrical power, Characteristics of power generation units,		
18-20	Incremental fuel cost neglecting transmission losses and considering transmission losses, Penalty factor, Economic power interchange.		
Mid-1 Exam			
21-25	**Voltage Control Methods:** Importance of voltage control, Location of voltage control equipment, Excitation control, Regulators, AVRs, Tap changing transformers, Auto transformer tap changing, Booster Transformer, Induction Regulator, Synchronous Condenser	Text Book/ Reference Book	CLO 2 Assignment 2
26-28	**Frequency Control Methods:** Primary frequency control methods, Function of LFC. Manual frequency control, Flat frequency control, Flat tie-line control, Secondary frequency control methods		
29-31	Load Dispatch Centre and its responsibilities, Load shedding, Turbine frequency and under frequency limits		
32-33	Basic Requirements of Stability in Power System		

34	History of power system stability problems		
Mid-2 Exam			
35-38	**Classification of power system stability problems:** Voltage stability, Frequency stability and rotor angle stability.		
39	Issues of steady-state and transient stability for multi machine and Interconnected systems		
40-42	Swing equation and its solution, Swing curve	Text Book/ Reference Book	CLO 3 Quiz 2 Semester Project
43-45	Swing equation for Stability Analysis of Motor and Generator		
46	Equal Area Criterion and Power angle Diagram for stability analysis		
47-48	**Case Studies on Stability Analysis:** • System disturbance in the UCTE system 2006 • Italy Blackout 2003		
Final Exams			

LAB DETAILS

Activity No.	**Contact Hours**	**Activity Name**	**Assessment Instrument**
1	3	Introduction to Power System Lab and SCADA software and its features	Lab Activity
2	3	Operation of asynchronous generator connected with infinite bus using SCADA.	
3	3	Control of reactive power and voltage of a transmission line using parallel compensation	
4	3	Control of Impedance of a transmission line and improvement in its voltage stability using series compensation	
5	3	To analyze various modes and states of power system operation using an over current relay connected to HMI	
6	3	To analyze the effect of AVR on excitation control system of synchronous generator using SCADA.	
7	3	Control of reactive power of asynchronous generator using SCADA.	
8	3	Analysis of transient stability limit of a typical power system using an earth fault relay connected to HMI.	
9	3	Design PI controller for speed control of synchronous generator and analysis of three phase transients on parameters of generator using MATLAB/ Simulink.	
10	3	Design of PID based AVR for excitation control of synchronous generator using MATLAB/ Simulink	
11	3	Semester Project Implementation and its Report Writing	**CLO 4**
12	3		

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Department of Electrical Engineering

Power System Protection

Programs & Class: B.E VIII	**Semester: Spring 2019**
Credit Hours: 4 (3+1)	**Course Organizer: Dr. Faheem Akhtar Chachar** **Course Instructor: Engr. Shoaib Ahmed Shaikh** **Support instructor : Engr. G Akbar Dahani**
Pre-requisite Courses: None	**Post-requisite Courses:**
Co-requisite Courses:	**e-mail: shoaibahmed@iba-suk.edu.pk**
Office Hours: 9 A.M to 5 P.M	**Consulting Hours: Wednesday 9 A.M to 12 Noon**
Office Location: Academic Block- 3	

ASSESSMENT/ EVALUATION

1.	Class performance and behavior	----
2.	Presentations	5%
3.	Assignments	5 %
4.	Quizzes	10 %
5.	First Term exam	20 %
6.	Second Term exam	20 %
7.	Final Examination	40 %

RECOMMENDED BOOKS:

S.No	Book Name	Author/s Name	Publisher Name & Edition
1.	Fundamentals of Power System Protection	Y.G. Paithankar and S.R. Bhide	Latest Edition.
2.	Protective Relaying; Principles and Applications	J. Lewis Blackburn, Thomas J. Domin.	Latest Edition.

REFERENCE BOOKS:

1.	Principals of Power System	V.K Mehta	Latest Edition.

COURSE DESCRIPTION:

Reliability of electrical energy systems to a large extent depends upon the reliability of its protection system. Basic building blocks of the protection system include fuses, circuit breakers, over current and distance relays and differential protection schemes. This course will introduce their principles and applications to apparatus and system protection.

COURSE LEARNING OUTCOMES

Students will be able:

CLO1: To analyze the various protection schemes for a power system.

CLO2: To develop various protection systems and ensure protection coordination

CLO3: To execute the layout of grid station in terms of transmission line, feeder and substation equipment protection.

PROJECTS & ASSIGNMENTS DETAILS ALONGWITH PREDEFINED ASSESSMENT CRITERIA

Three quizzes will be taken and best two will be counted.

One assignment will be given.

IMPORTANT POLICIES (subject to the course instructor)

Class attendance is mandatory and late comers will not be allowed to attend the lecture.

Late submission of coursework will not be accepted.

CLOs	Level of Learning	Related PLOs	Teaching Methods	CLO attainment checked in
CLO_1	C4	PLO-2	Lectures, tutorials, problem sheets	First mid
CLO_2	C_6	PLO-3	Lectures, tutorials, problem sheets	First mid, Second Mid and Final
CLO_3	P_4	PLO-4	Lab Activities	Lab Exams

LECTURE WISE DETAILS:

Lecture No.	Topics	Recommended Reading	Assessment instrument
1-5	**Protective Relays:**		CLO_1

	Need For Protective Relaying In Power Systems, Basic Attributes Of Protective Relaying	Text Book/ Reference Book	(Quiz-01)
	Principles And Characteristics Of Protective Relaying,		
6-7	Theory And Classification Of Relays,		
8-11	Instrument Transformers, CT Burden And Accuracy Classes.		
12-15	**Overcurrent Protection:** Inverse Characteristics Of Over-Current (OC) Relays, Inverse Definite Minimum Time (IDMT) Relays,		
16-18	Primary And Backup Protection, Relay Coordination, Application Of IDMT Relays		
19-20	Direct Overcurrent Relays (D-OCR), Application Of D-OCR, Protection Of A Three Phase Feeder		
Mid-1 Exam			
21-22	**Differential Protection:** Dot convention and CT placement, Simple Differential Protection,	Text Book/ Reference Book	CLO_1 CLO_2 (Assignment-01) (Quiz 2)
23-26	Zone of Protection of the Differential Relay, Percentage Differential Relay,		
29-31	Earth Leakage Protection		
27-30	**Protection of Transformers :** Transformer faults, differential Protection of a three-winding transformer,		
31-34	Inrush current and differential protection, Bucholz relays, Over-fluxing in transformer		
Mid-2 Exam			
35-37	**Protection of Generators:** Faults in stator and rotor windings, Protective devices for stator, rotor, and prime mover of a generator,	Text Book/ Reference Book	CLO_2 (Quiz 3)
38-41	Abnormal operating conditions (unbalanced loading, over-speeding, loss of excitation And loss of prime mover) and their protection.		

42-46	**Protection of Transmission Lines:** Drawbacks of over-current protection, Distance prote ction, Zones of protection		
47-48	**Circuit Breakers:** Principle of circuit interruption, Circuit Breaker-Types and characteristics, Ratings of circuit breakers.		
Final Exams			

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Department of Electrical Engineering

Project Management

Course Outline

1. Course Identification and General Information

Program and Class: BE VIII (Power Electronics & Electrical Engineering)	**Semester**: Fall - 2019
Credit Hours: 04	**Instructor:** Zard Ali Khan **Email:** zardalikhan@iba-suk.edu.pk **Office Location:** Room 315 (Block – II)
Pre-requisite Course: 1. Operations Management	**Consultation Hours**: Thursday 03:00 pm to 05:00 pm

2. Schedule of Assessment Tasks for Students during the Semester

S. No:	Assessment Task (e.g. quizzes, tests, group project, examinations, etc.)	Week Due	Proportion of Marks for Assessment Tasks
1	First Mid Term Exams	Academic Calendar	20
2	Second Mid Term Exams	Academic Calendar	20
3	Final Exams (Paper-based)	Academic Calendar	30
4	Final Exams (Software-based: Microsoft Project)	Academic Calendar	10
5	2 Assignments	2, 5	05
6	Grand Quiz	14	05
7	Final Project on Microsoft Project	13, 14	10

3. Learning Resources

I- Recommended Books:

1. Project Management: The Managerial Process, Clifford Gray, Erik Larson, 7th Edition, McGraw Hill
2. Project Management: A Managerial Process, Jack R. Meredith, Samuel J. Mantel, Jr., John Wiley & Sons, Inc.

II- Reference Books/ Material 1. Managing Projects (Expert Solutions to Everyday Challenges) 2. Project Management for Profit 3. HBR Guide to Project Management	**Joe Knight, Roger Thomas & Brad Angus**	**Harvard Business School Publishing** **HBR** **HBR**
III- Electronic Materials, Web Sites etc. 1. http://hbsp.harvard.edu/		
IV- Other Learning Material: Relevant research articles.		

4. Course Description

The use of projects and project management is becoming more and more important for all kinds of organizations. Businesses regularly use project management to accomplish unique outcomes under the constraints of resources, and project management turn to be one of essential ways of achieving an organization's strategy.

Organizations are turning to project management to help them plan and control their businesses. As a result, Project Management is recognized as one of the fastest growing professions today. This course addresses the basic nature of managing general projects. The course uses the project life cycle as the organizational guideline, and contents will cover the whole process of project management, including project initiation, project planning, project implementation and project completion.

5. Course Learning Outcomes (CLOs)

CLOs	Description	PLOs	Course Teaching Strategies	Assessment Methods
1	Students will be able to identify and analyze real life problems in product development, etc. in line with standard project management practices.	**PLO 2** **Problem Analysis**	Lectures Class Activity Class discussion	Mid Terms Final Exams Final Project
2	Students will be able to increase proficiency by utilizing the relevant project management tools: MS Project.	**PLO 5** **Modern Tool Usage**	Lectures Class Activity Class discussion	Mid Terms Final Exams Final Project
3	Students will be able to apply project management principles while efficiently	**PLO 11**	Lectures Class Activity	Assignments Mid Terms

	managing engineering projects in a multidisciplinary environment.	**Project Management**	Class discussion	Final Exams

6. Mapping the Course Learning Outcomes (CLOs) with the Program Learning Outcomes (PLOs)

CLOs	PLOs			
	2	**5**	9	**11**
1				
2				
3				

7. Assessment Task Description

a) Course Reading Material:
The primary reading material for each session will be the two recommended textbooks. There will often be recommended readings associated with a session. Allow yourself enough time for thoughtful, unhurried reading of the materials. These readings provide some conceptual frameworks that may help you in your case analysis. These readings come from a number of different sources: textbooks, reference books, articles, etc., and have been carefully chosen to reflect a variety of perspectives and stimulate your thinking; these will help you in developing a very deep analysis.

b) Exams:
Exams focusing on the concepts, models, and applications discussed from lectures and text will be taken as per SIBAU's policy. Exams will test your ability of understanding of concepts, formulating problems, interpreting solutions and deriving managerial implications. Exam will be closed book and closed notes.

c) Class Participation:
Each student is required to be an active participant in class discussions. Your participation grade will reflect my assessment of your total contribution to the learning environment. This includes not only the frequency of your contributions in class, but also their quality. Quality, includes, among other things: (1) sound, rigorous, and insightful diagnosis (e.g. sharpening of key issues, depth and relevance of analysis); (2) ability to draw on course materials and your own experience productively; (3) ability to advance or sharpen in-class discussion and debate, willingness to take risky or unpopular points of view, use of logic, precision, and evidence in making arguments; (4) professionalism of your conduct (attendance, punctuality, preparedness, and showing respect to all section members and their class contributions). Unexcused absences and lack of preparation will be counted heavily against your grade.

d) Assignments:
Assignments will be based on theoretical concepts and their applications, especially based on PMI's practices, techniques, etc. A number of cases & articles will be given as assignments and students will discuss these cases in the class, mainly the analysis and recommendation part. In addition issues relating to project management are to be highlighted during participation.

Cases will focus on building and analyzing decision models for effective Project Management. These case assignments will require the use of word processing, spreadsheet, and other optimization

software tools. All assignments are due at the beginning of class. No late submissions will be accepted. Students will work in groups (not more than 2 students in each group) in solving these cases. You are responsible for forming your own groups.

i. Assignments based on Simulations:
Student will manage a number of small projects ***or*** parts of a larger project in real life settings in the field of engineering.

e) Quizzes:
Quizzes will be based on theoretical concepts and their applications.

NOTE: There will be NO compensatory quizzes or exams.

f) Final Project Report and Presentation:
Students will have to select a real life project, and will have to manage it (or to work with the Project Manager of the project) in line with standard project management practices ensuring all phases of a project, such as Project Scope Statement, Project Charter, Scheduling, Budgeting, etc. They will also be required to incorporate their project on MS Project software.

g) Contents of the Report:

i. Introduction
ii. Project Scope Statement
iii. Body: Your findings
iv. Conclusion
v. Recommendations
vi. Presentation: Share your project details with your classmates.
vii. References

Each report, 15 to 25 pages long including your findings, and recommendations, must be typed in Times New Roman font (1.5 spaced), and professionally presented to the class. The project report should be around 15-25 pages including the findings, and the recommendations.

8. Other (Please, specify):

*Any other thing the teacher wants to add

Lesson Plan & Week-wise Schedule

Wks	Discussion Themes	Quizzes / Assign.	Suggested Readings
Week 1	**Introduction to Project Management, Thorough Course Overview** **Discussion on Assignments, Quizzes and Final Project** **MODERN PROJECT MANAGEMENT** **What Is a Project?** What a Project Is Not Program versus Project The Project Life Cycle The Project Manager Being Part of a Project Team **Current Drivers of Project Management** Compression of the Product Life Cycle Knowledge Explosion		**Readings:** ***Project Management: The Managerial Process, Ch. 1***
Week 2	**MODERN PROJECT MANAGEMENT (Continued)** **Current Drivers of Project Management (The Topic Continues)** Triple Bottom Line (Planet, People, Profit) Increased Customer Focus Small Projects Represent Big Problems **Project Governance** Alignment of Projects with Organizational Strategy **Project Management Today: A Socio-Technical Approach**		**Readings:** ***Project Management: The Managerial Process, Ch. 1*** ***(Continued)***

Week 3	**ORGANIZATION STRATEGY AND PROJECT SELECTION** **The Strategic Management Process: An Overview** Four Activities of the Strategic Management Process **The Need for a Project Priority System** Problem 1: The Implementation Gap Problem 2: Organization Politics Problem 3: Resource Conflicts and Multitasking **A Portfolio Management System** Classification of the Project **Selection Criteria** Financial Criteria Nonfinancial Criteria **Applying a Selection Model** Project Classification Sources and Solicitation of Project Proposals Ranking Proposals and Selection of Projects	**Assign. 1**	**Readings:** ***Project Management: The Managerial Process, Ch. 2***

Week 4	**ORGANIZATION: STRUCTURE AND CULTURE** **Project Management Structures** Organizing Projects within the Functional Organization Organizing Projects as Dedicated Teams Organizing Projects within a Matrix Arrangement Different Matrix Forms **What Is the Right Project Management Structure?** Organization Considerations Project Considerations **Organizational Cultures** *Cultural Characteristics* **Implications of Organizational Culture for Organizing Projects**		**Readings:** ***Project Management: The Managerial Process, Ch. 3***
Week 5	**DEFINING THE PROJECT** **Step 1: Defining the Project Scope** Employing a Project Scope Checklist **Step 2: Establishing Project Priorities** **Step 3: Creating the Work Breakdown Structure** Major Groupings Found in a WBS How WBS Helps the Project Manager A Simple WBS Development **Step 4: Integrating the WBS with the Organization** **Step 5: Coding the WBS for the Information System** **Process Breakdown Structure**	**Assign. 2**	**Readings:** ***Project Management: The Managerial Process, Ch. 4***

Week 6	**DEVELOPING A PROJECT PLAN** **Developing the Project Network** **From Work Package to Network** **Constructing a Project Network** Terminology Basic Rules to Follow in Developing Project Networks **Activity-on-Node (AON) Fundamentals** Network Computation Process Forward Pass—Earliest Times Backward Pass—Latest Times Determining Slack (or Float) **Using the Forward and Backward Pass Information** **Practical Considerations** Network Logic Errors Activity Numbering Use of Computers to Develop Networks Calendar Dates Multiple Starts and Multiple Projects **Extended Network Techniques to Come Closer to Reality** Laddering Use of Lags to Reduce Schedule Detail and Project Duration An Example Using Lag Relationships—The Forward and Backward Pass Hammock Activities		**Readings:** ***Project Management: The Managerial Process, Ch. 6***

First Mid Term Exams			
Week 7	**ESTIMATING PROJECT TIMES AND COSTS** **Factors Influencing the Quality of Estimates** **Planning Horizon** Project Complexity People Project Structure and Organization Padding Estimates Organization Culture Other Factors **Estimating Guidelines for Times, Costs, and Resources** **Top-Down versus Bottom-Up Estimating** **Level of Detail** **Types of Costs** Direct Costs Direct Project Overhead Costs General and Administrative (G&A) Overhead Costs		**Readings:** ***Project Management: The Managerial Process, Ch. 5***

	MANAGING RISK **Risk Management Process** **Step 1: Risk Identification** **Step 2: Risk Assessment** *Probability Analysis* **Step 3: Risk Response Development** Mitigating Risk Avoiding Risk Transferring Risk Accept Risk **Step 4: Risk Response Control** **Change Control Management** **Appendix 7.1: PERT and PERT Simulation**		**Readings:** ***Project Management: The Managerial Process, Ch. 7***

Week 9	**SCHEDULING RESOURCES AND COSTS** **Overview of the Resource Scheduling Problem** **Types of Resource Constraints** **Classification of a Scheduling Problem** **Resource Allocation Methods** Assumptions Time-Constrained Project: Smoothing Resource Demand Resource-Constrained Projects **Computer Demonstration of Resource-Constrained Scheduling** The Impacts of Resource-Constrained Scheduling **Splitting Activities**		**Readings:** ***Project Management: The Managerial Process, Ch. 8***
Week 10	**SCHEDULING RESOURCES AND COSTS (Cont.)** **Benefits of Scheduling Resources** **Assigning Project Work** **Multiproject Resource Schedules** **Using the Resource Schedule to Develop a Project Cost Baseline** Why a Time-Phased Budget Baseline Is Needed Creating a Time-Phased Budget		**Readings:** ***Project Management: The Managerial Process, Ch. 8 (Cont.)***

Second Mid Term Exams

Week 11	**REDUCING PROJECT DURATION** **Rationale for Reducing Project Duration** **Options for Accelerating Project Completion** Options When Resources Are Not Constrained Options When Resources Are Constrained **Project Cost–Duration Graph** Explanation of Project Costs **Constructing a Project Cost–Duration Graph** Determining the Activities to Shorten A Simplified Example		Readings: *Project Management: The Managerial Process, Ch. 9*
Week 12	**REDUCING PROJECT DURATION** **(Continued)** **Practical Considerations** Using the Project Cost–Duration Graph Crash Times Linearity Assumption Choice of Activities to Crash Revisited Time Reduction Decisions and Sensitivity **What If Cost, Not Time, Is the Issue?** Reduce Project Scope Have Owner Take on More Responsibility Outsourcing Project Activities or Even the Entire Project Brainstorming Cost Savings Options		Readings: *Project Management: The Managerial Process, Ch. 9* *(Continued)*

Week 13	**BEING AN EFFECTIVE PROJECT MANAGER** **Managing versus Leading a Project** **Managing Project Stakeholders** **Influence as Exchange** Task-Related Currencies Position-Related Currencies Inspiration-Related Currencies Relationship-Related Currencies Personal-Related Currencies **Social Network Building** Mapping Stakeholder Dependencies Management by Wandering Around (MBWA) Managing Upward Relations Leading by Example **Ethics and Project Management** **Building Trust: The Key to Exercising Influence** **Qualities of an Effective Project Manager**		Readings: *Project Management: The Managerial Process, Ch. 10*
Week 14	**PROJECT CLOSURE** **Types of Project Closure** **Wrap-up Closure Activities** **Post-Implementation Evaluation** Team Evaluation Individual, Team Member, and Project Manager Performance Reviews	Grand Quiz	Readings: *Project Management: The Managerial Process, Ch. 14*

Week 15	**Final Project Report Submission**		

Final Term Exams

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Department of Electrical Engineering

Industrial Electronics

Programs & Class: BE VIII (Electronics)	**Semester:** Fall 2019
Credit Hours: 4 [3(Theory)+1(Practical)]	**Instructor:** Dr. Ahmed Ali Shah **Support Instructor :** TBA
Pre-requisite Courses: 1. Instrumentation and Measurements 2. Electronic Devices and Circuits 3. Circuit Theory	**Post-requisite Courses:** None
Co-requisite Courses: None	**e-mail: ahmedali.shah@iba-suk.edu.pk**
Office Hours: 09 am -5 pm	**Consulting Hours: 11 am- 4 pm (Wed) Otherwise please make an appointment**
Office Location: Room# 203, Academic Block 03	

ASSESSMENT/ EVALUATION

1.	Assignments and Quizzes	10 %
2.	Semester Projects	10%
3.	First Mid Term Exam	20 %
4.	Second Mid Term Exam	20 %
5.	Final Examination	40 %

RECOMMENDED BOOKS:

S. No	Book Name	Author/s Name	Publisher Name & Edition
1.	Industrial Electronics	Petruzella	McGraw-Hill, Textbook
2.	Industrial Electronics and Control	Biswanath Paul	Prentice-Hall Of India Pvt.
3.	Programmable Controllers	Dennis Collins & Eamon Lane	Prentice-Hall Of India Pvt

REFERENCE BOOKS:

4.	Guide to Understanding PLCs	Phil Melore	New Windsor, NY
5.	Programmable Logic Controllers	Max Rabiee - Goodheart-Wilcox	Goodheart-Willcox

COURSE DESCRIPTION:

This is a required course for electronics engineering majors. The goal of the course is to: Introduce students to industrial processes. Design of discrete industrial controllers, ladder control and PLC's. Survey Controller modes, and design of controllers.

COURSE LEARNING OUTCOMES

The students will be able:

CLO1: Apply Ladder Programming and Interfacing skills to conduct experiments using PLCs, run software (TIA Portal/ Simatic Manager/) simulations and explain the results.

CLO2: Demonstrate the knowledge about change in social and environmental dimension rendered by industrial electronics & automation and its impact on society and propose improvements.

CLO3: Identify ethical responsibilities while developing an Industrial automation system for a client organization.

CLOs	Level of learning	Mapped OBE PLOs	Mapped ABET SOs	Teaching Methods	CLO attainment checked in
CLO1	**Cog-2**	**5**		Lecture, tutorials, Lab tasks	First mid, assignment 1,
CLO2	**Cog-3**	**7**		Lecture, tutorials, Lab tasks	second Mid, assignment 2
CLO3	**Cog-2**	**8**		Lectures, Lab tasks/Demos	Lab Exams

Mapped OBE Program Learning Outcomes (PLOs):

PLO5. Modern Tool Usage: An ability to create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering activities, with an understanding of the limitations.

PLO-07: Environment and Sustainability: An ability to understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development.

PLO-08: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.

PROJECTS & ASSIGNMENTS DETAILS ALONG WITH PREDEFINED ASSESSMENT CRITERIA

- Project on simulating various devices over STEP-7 software using ladder programming,
- Designing hardware and integrating software hardware to form an industrial automation prototype.

TOOLS: TIA Portal, Simatic Manager, WinCC Flexible, InTouch Wonderware, PLC S7-1200

IMPORTANT POLICIES (subject to the course instructor)

- **Expectations.** I expect a class atmosphere of respect for your fellow human beings as we travel this road together. I also expect a class atmosphere of critical thinking and your best efforts. Please come prepared to participate. More and more questions are appreciated.
- **Readings:** You are expected to read the assigned materials before the class/period. This helps you grasp the material more fully and creates a better classroom environment.

Attendance: Your attendance in class is critical to the fulfillment of course objectives. You will not be eligible to appear in the exam if you cross six absences. Late coming, even for two minutes, would strictly be marked as absent.

- **Due dates:** No late work will be accepted. Assignments are due at the start of class. Presentations cannot be made up. This is the real world. When speakers accept speaking assignments, they are obligated to be ready to speak on that date at that time. If you are not prepared to speak, you receive a zero on that presentation. Talk to me in advance if there are problems.
- **Discussion:** Since the discussion is vital to the learning process and I want to hear your input in class. Therefore, interactive sessions would be used rather than talking from one end and listening to the other.

SESSION / WEEK WISE DETAILS:

Lecture No.	Topics	CLO Mapping	Assignments/ Quizzes	Suggested Readings
01-02	OBE introduction, **Industrial electronics introduction:** Industrial Safety, GFCI, Lockout-Tagout (LOTO) Power Line Corridor, Pilot Light			Industrial Electronics by Petruzella and Guide To Understanding PLCs By Phil Melore
03-06	**Wiring Diagrams:** Electrical Symbols Ladder Diagram Wiring Diagram Connections and Terminology	CLO1		
07-10	**Plc Introduction:** Brief History, Need of PLCs PLCs Architecture, I/Os Detail, Addresses, Numbering Siemens Plc Plc Size Classification	CLO1		
11-12	**Communication Interface** Wired Logic Control (WLC) Ladder Logic LAD Rung, Rails, Scan Cycle Statement List (STL) Function Block Diagram (FBD)	CLO1		
13-16	**PLC Input/output Module Connections** Ladder Logic Diagrams from Truth Tables PLC Ladder Logic Diagrams from Logic Gate Circuits, Boolean Expressions Logic Gate Circuits from PLC Ladder	CLO1	Quiz1	Industrial Electronics by Petruzella
17	**Plc Mixer Process Control Problem** Plc Output Module Connections Discrete I/O Module Specifications Analog I/O Module Specifications	CLO1		
18-20	**Current Sinking and Current Sourcing** Module and Device Special I/O Module Human Machine Interfaces Master Control Reset (MCR)	CLO1		
	FIRST MID TERM EXAMS			
21-22	**Timers** On-Delay Timing, Off-Delay Timing, Retentive-Timing Cascading Timing, Timer Programming Instructions			Industrial Electronics by

	Automatic Sequential Control System			Petruzella and Guide To Understanding PLCs By Phil Melore
23-24	**Counters** Up, Down, Up/Down Counter Parking Garage Counter Program Cascading Counters, Incremental Encoder- High-Speed Counter	CLO2		
25-26	**Memory Design** Bit-Level Logic Instructions Branch Instructions Math Instructions Data Manipulation Instructions Data Compare Instructions	CLO2		
27-28	**Discrete Input Module and Its Operation** Discrete Output Module and Its Operation Analogue Input Module and Its Operation Analogue Output Module and Its Operation	CLO2		
29-30	**Industrial Control Devices:** Primary and Pilot Control Devices Manually Operated Switches Mechanically Operated Switches Limit Switches Electronic Switches	CLO2		
31-32	**Relay** Classifications Based on Function, Construction Etc. Relay Function	CLO2	Quiz2	Industrial Electronics by Petruzella and Industrial Instrumentation Control by S K Singh
33-34	**Relays & Motor Control Circuits** Internal Utility Relays Output Relays (Coil) Types of Control Motor Lock-Out Contactors			
35-36	**Relays & Motor Control Circuits** Magnetic Contactor Magnetic Motor Starter Motor Seal-In Circuit Electromagnetic Latching Relays			
	SECOND MID TERM EXAMS			
37-39	**Actuators, Solenoid Valves** Inductive Proximity Sensors Capacitive Proximity Sensors Bleeder Resistors Magnetic Reed Switch	CLO2		Industrial Electronics by Petruzella and Industrial Instrumentation Control by S K Singh
40-42	**Electrical Noise** Noise – Suppression Methods Leaky Input/Output Devices Voltage Variations And Surges Suppressing AC /DC Snubbing Circuits Inductive Loads	CLO2		
42-45	**Process Control**: Continuous Process Batch Process Industrial Control,	CLO2		
46-49	**Components Of A Process Control System** Four Modes of Controllers Simple On- Off Control, P control, PI control, PD Control, PID Control, PID Output Instruction	CLO2		
50-52	**Data Acquisition And Communication:** Components Of A Data Acquisition System Modular Data Acquisition System	CLO2		
	FINAL EXAMS			

List Of Lab Experiments

Week	Objective	Mapped CLO
1	Introduction To Logosoft	CLO3
2	S7 1200 Tools And Modules	CLO3
3	Basic Connections of Siemens S7-1200 PLC	CLO3
4	PLC based Timer	CLO3
5 & 6	**MIDTERM 1**	
7	PLC based counter	CLO3
8	SIMATIC S7 Based Ladder Logic Circuits	CLO3
9	SR And RS Flip Flops In Siemens PLC	CLO3
10	HMI Programming	CLO3
11 & 12	**MIDTERM 2**	
13	Conveyer Belt Programming	CLO3
14	Basics of Panasonic PLCs	CLO3
15	Open ended Lab	CLO3
16	Lab Project	CLO3
17	**FINALTERM**	CLO3

Proposed Lab Projects

S. No	Project Title
1	Conveyor Process management for Beverages Industry
2	Manufacturing control for Food Industry
3	Water Purification System
4	Digital Clock
5	Warehouse Monitoring and Control
6	Flight Control System Monitoring
7	Smart Home Automation
8	Intelligent Traffic Light Control system

Reviewed by ACC on ____

Review Comments:_____

Approved by ACC on_____

Head of ACC **HoD, Electrical Engineering**

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Department of Electrical Engineering

Introduction to Robotics

EE-4-- Introduction to Robotics	
Programs & Class: BE VII	**Semester: Fall 2019**
Credit Hours: 03	**Instructor:** Dr Suresh Kumar
Pre-requisite Courses: No	**Post/co-requisite Courses: Artificial Intelligence**
Co-requisite Courses: None	**e-mail: suresh@iba-suk.edu.pk**
Office Hours: 9am to 5pm	**Consulting Hours: 10am -1pm (Tue-Thu) Contact for an appointment otherwise.**
Office Location: Room 204, Academic Block III	

ASSESSMENT/ EVALUATION

1.	Semester Project	**5%**
2.	Quizzes	**10%**
3.	Presentation/Assignments	5%
4.	First Term	**20%**
5.	Second Term	**20%**
6.	Final Examination	**40%**

RECOMMENDED BOOKS:

S. No	Book Name	Author/s Name	Publisher Name & Edition
1.	Robotics Demystified	Edwin Wise	Tata McGraw-Hill (Latest Edition)

REFERENCE BOOKS:

1.	Introduction to Robotics	John J. Craig	Pearson (Latest Edition)
2.	Robot Programming	Cameron Hughes & Tracey Hughes	Pearson (Latest Edition)

COURSE DESCRIPTION:

This course is a breath course, offering students a primer into Robotics. This course provides an introduction to different sub-fields within the robotics and different components of robotic platforms. The course also introduces mathematics involved in designing robotic platforms and knowledge in developing autonomous robots.

COURSE LEARNING OUTCOMES:
Students will be able to:
CLO1: Understand types and categories of robots and their underlying components.
CLO2: Analyse and solve problems related to forward and reverse kinematics & dynamics of different robotic manipulators.
CLO3: Design (in theory) task specific robotic platforms through applying robotics knowledge.

CLOs and PLOs MAPPING

CLOs	**Level of learning**	**Related PLOs**	**Teaching Methods**	**CLO attainment checked in**
CLO1	**Cog-2**	**1**	Lectures	First mid, Quiz 1, Final exam
CLO2	**Cog-3**	**2**	Lectures	First Mid, Second mid Quiz-2, Quiz 3, Presentations, Final Exam
CLO3	**Cog4**	**3**	Lecture, Labs	Quiz-2, Quiz 3, Presentations, Final Exam

PROJECTS & ASSIGNMENTS DETAILS ALONG WITH PREDEFINED ASSESSMENT CRITERIA

The students are assigned to develop a hardware based robotic platform. Students will be divided into a number of groups (depending upon the class strength). And each group will be assigned a task to solve in the robotic platform.

IMPORTANT POLICIES (subject to the course instructor)

- The suggested books are for references purpose. The students are encouraged to explore the topics of this course through the electronic resources (Online short courses, Online presentations etc.).
- Three quizzes, each of 5 marks, will be conducted during the semester. Best two will be counted.
- There will not be any assignment to replace the quizzes. Failure to participate in the quiz(zes) will be treated accordingly. The students are encouraged to participate in the all quizzes.

- Semester assignments/presentations will be assigned in due course of time.
- A semester project will be assigned, involving all the lab course in the semester.
- The students are free to chose any of the semester project.
- The list of semester projects and assessment process will be announced later.
- Presentation assessment rubrics are provided as below:

Criteria/Level	1	2	3	4
Understanding	Unable to explain the topic/area of the field	Able to explain, to some level, the presentation topic	Able to explain the presentation topic & but couldn't identify any current research on the topic	Able to explain the presentation topic & identify current research on the topic
Presentation delivery	Lack of confidence and couldn't present well	Demonstrated some level of confidence and presented very well, mostly used English, but failed to answer question(s)	Delivered with confidence and presented in English, but failed to provide satisfactory answer to the question(s) asked	Delivered with confidence, presented in English and provided satisfactory answer to the question(s) asked
Presentation	Not prepared very well, Vague, Alignments, Fonts etc. not matching in the presentation	Prepared well, however, found some grammatical mistakes, Alignments, Fonts etc. in the presentation	Prepared well, with a couple of grammatical mistakes, Alignments, Fonts etc. in the presentation	Prepared well, without any grammatical mistakes, Alignments, Fonts etc. in the presentation

Lecture Plan: SESSION / WEEK WISE DETAILS:

Session No.	Week	Topics	Assignments/ Quizzes	Suggested Readings
01-03	**01**	Introduction to field of robotics Definition of a Robot, Categories of robots, Types of robots, History of robotics, Asimov's laws of robotics, Components of a robotic system, Force, Work/Energy (PE/ KE), Power, Frictions Coordinate systems (review), Conversion between the coordinate systems		
04-06	**02**	Position, orientation, Rotation matrix, Frame, Euler Angles, Rotational movements (Yaw, Pitch, Roll)		
07-09	**03**	Dofs, Forward & Reverse Kinematics of Manipulators (Polar, Cylindrical, Cartesian, Jointed-arm, SCARA), DH	Assignments/ Presentations	
		notation		
10-12	**04**	Robotic arms, Types of robotic arms & velocity Jacobians		
13-15	**05**	Mathematical modeling & Transfer functions of Gear box Links, Robotic mechanical Joints (Linear, Orthogonal, Rotational, twisting, revolving), Universal joint	Quiz 1	
16-18	**06**	**FIRST MID TERM EXAMS**		
19-21	**07**	Power transmission (Chains, Belts, Cables), Gears, Gear train, Crown gear, Bevel gear, Sensors & implementation Light Sensors (PV, PR, Photo diode, CCD, CMOS)		
22-24	**08**	Temperature sensors (TC, Thermistor, IC LM35, DS1621), Sound sensors, Limit switches, Proximity (IR, US), Distance (IR, US, Laser, Stereo Camera)	Assignments/ Presentations	
25-27	**09**	Touch, Navigation (GPS, MC), IMU, Gyro, Acceleration, velocity, Force and strain sensors		

28-30	**10**	End-effectors & Actuators, Pneumatic & Hydraulic systems, Electric Drives (DC motors, Servo, Stepper), Motor drive circuits, Grippers	Quiz 2	
31-33	**11**	Processors & Control units, Open/Closed loop systems, PID Control, Fuzzy Logic, Control systems (On-board, Wireless, Tethered)		
34-36	**12**	**SECOND MID TERM EXAMS**		
37-39	**13**	Neural Networks, Deep Learning, Sensory motor Control, Robot Learning (Direct, Supervised, Exploratory, Demonstration/Observation/Imitation)		
40-42	**14**	Robot Vision (Colour, Shape, Edges), Robot Path planning, Mapping, Hand-Eye Coordination, Grip Planning	Assignments/ Presentations	
43-45	**15**	Robotic fields & Related research: Swarm Robotics, Developmental robotics, Mobile robotics, Bio-inspired robotics		
46-48	**16**	Robot Design & Applications (Theoretical): Warehouse Robot, Companion Robot, Autonomous Boats, Autonomous Wheelchair		
49-51	**17**	FYP Project discussion, Review	Quiz 3	
52-54	**18**	**FINAL EXAMS**		

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Department of Electrical Engineering

Digital System Design

Programs & Class: BE-VII (EE)	**Semester:** Fall 2019
Credit Hours: 03	**Instructor:** Dr. Safeer Hyder Laghari **Support Instructor:** TBA
Pre-requisite Courses: Introduction to Embedded Systems/MIT	**Post-requisite Courses: None**
Co-requisite Courses: None	**e-mail: safeer.hyder@iba-suk.edu.pk**
Office Hours: 09 am -5 pm	**Consulting Hours: 3 pm- 5 pm (Wed-Thu-Sat)** **Otherwise please make an appointment**
Office Location: Room#206, Academic Block 03	

ASSESSMENT/ EVALUATION

	THEORY	
1.	First Term Exams	**20%**
2.	Second Term Exams	**20%**
3.	Final Examination	**40%**
4.	Semester Project	**15%**
5.	Assignment/Presentation	**05%**
	LAB	
1.	First Term Exams	**20%**
2.	Second Term Exams	**20%**
3.	Final Examination	**40%**
4.	Lab Report Submissions	**20%**

RECOMMENDED BOOKS:

S. No	Book Name	Author/s Name	Publisher Name & Edition
1.	Digital Design and Verilog HDL Fundamentals	Joseph Cavanagh Santa Clara University, USA	CRC Press
2.	Verilog HDL A Guide to Digital Design and Synthesis	Samir Palnitkar Digital Design Entrepreneur	Pearson education, 2nd Edition
3.	Fundamentals of Digital Logic with Verilog Design	Stephen Brown University of Toronto	MH Education, 3rd Edition

REFERENCE BOOKS:

1.	Advanced Digital Design with the Verilog HDL	Michael D. Ciletti University of Colorado, USA	Pearson Education

COURSE DESCRIPTION:

The course covers digital design topics such as digital logic, sequential building blocks, finite-state machines, FPGAs, timing and synchronization. The semester begins with lectures and problem sets, to introduce fundamental topics before students embark on lab assignments and ultimately, a digital design project. The course relies on extensive use of Verilog® for describing and implementing digital logic designs on state-of-the-art FPGA.

COURSE LEARNING OUTCOMES

The students will be able to:

CLO1: Design combinational circuits using Verilog Gate-level and Data-flow Modelling

CLO2: Investigate combinational and sequential circuits using Verilog Testbench

CLOs	Level of learning	Mapped OBE PLOs	Mapped ABET SOs	Teaching Methods	CLO attainment checked in
CLO1	**Cog-6**	**3**		Lectures, tutorials	First Term Theory, First Term Lab
CLO2	**Cog-5**	**4**		Lectures, tutorials	Second Term Theory, Second Term Lab

Mapped OBE Program Learning Outcomes (PLOs):

PLO3 Design/Development of Solutions: An ability to design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

PLO4 Investigation: An ability to investigate complex engineering problems in a methodical way including literature survey, design and conduct of experiments, analysis and interpretation of experimental data, and synthesis of information to derive valid conclusions.

Mapped ABET Student Outcomes (SOs):

SO1: An ability to identify, formulate and solve complex engineering problems by applying principles of engineering science and mathematics

Performance Indicator for SO1 are:

a. Identification of specific facts of mathematics, science and engineering for a given situation.

b. Convert real world situation into an appropriate model

c. Ability to solve engineering problems using relevant facts of mathematics, science and engineering

SESSION / WEEK WISE DETAILS:

Lecture No.	Topics	CLO Mapping	Assignments/ Quizzes	Suggested Readings
01-03	FPGA, Verilog HDL and Xilinx Vivado Design Flow	CLO1		Verilog HDL A Guide to Digital Design and Synthesis by Samir Palnitkar & Lab Notes Verilog HDL
04-06	Hierarchical Modelling Concepts	CLO1		
07-09	Verilog HDL Basic Concepts-I	CLO1		
10-12	Verilog HDL Basic Concepts-II	CLO1	Assignment	
13-15	Modules and Ports, and Gate-level Modelling	CLO1		
16-18	Dataflow Modelling	CLO1		
19-21	Behavioral Modelling-I	CLO1		
FIRST TERM EXAMS				
22-24	Behavioral Modelling-II	CLO2		Verilog HDL A Guide to Digital Design and Synthesis by Samir Palnitkar & Lab Notes
25-27	Behavioral Modelling-III	CLO2		
28-30	Design Project – Moving Average Filter	CLO2		
31-33	Design Project – Gaussian FIR Filter	CLO2		
34-35	Design Project – IIR Filter	CLO2		
36-38	Design Project – FSM based “11011”sequencer detector	CLO2		
SECOND TERM EXAMS				
39-41	Zybo Zynq – Vivado IP Integrator, Hello World, LEDs, and Switches			Verilog HDL A Guide to Digital Design and Synthesis by Samir Palnitkar & Lab Notes
42-44	Zybo Zynq – Vivado IP Integrator, PMOD OLED RGB			
45-47	PynQ Z1 – Python Jupyter, LEDs, Switches Interfacing, AXI Memory Map Interfacing			
48-50	PynQ Z1 – Python Jupyter, XADC and FFT			
51-52	Assignment Presentation			
47-48	Project Design			
49-50	Project Design			
51-52	Project Design			
FINAL EXAMS				

For Lab Courses, Insert list of lab experiments and proposed lab projects here:

Week #	**Lab Experiments Outline**
1	Gate Level Modelling – Hello World, Adder, Mux, DeMux
2	Data Flow Modelling –ALU, CLA Adder, Moving Average Filter
3	Behavioral Modelling – Combinational circuits and test bench
4	Behavioral Modelling – Sequential circuits and test bench
5	Design Example – Gaussian FIR Filter , IIR Filter
6 & 7	***FIRST TERM EXAMS***
8	FSM – Theory and basic design of sequence detector
9	Zybo Zynq – Vivado IP Integrator, Hello World, LEDs, and Switches
10	Zybo Zynq – Vivado IP Integrator, PMOD OLED RGB
11	PynQ Z1 – Python Jupyter, LEDs, Switches Interfacing, AXI Memory Map Interfacing
12	PynQ Z1 – Python Jupyter, XADC and FFT
13 & 14	***SECOND TERM EXAMS***
15	Project Design
16	Project Design
17	Project Design
18	Project Design

S. No	**Project Titles**
1	Zybo Zynq based Playing Video on PMOD OLED using C++
2	PynQ Z1 based FFT implementation for XADC acquired data using Python
3	Simulation and Hardware based Implementation of UART RX and TX using Verilog HDL
4	Simulation and Hardware based Implementation of FSM powered Traffic Light Signal Controller using Verilog HDL
5	Simulation and Hardware based Implementation of PWM powered RGB LEDs color changing using Verilog HDL

Reviewed by ACC on _____

Review Comments:

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Approved by ACC on_____

Head