ABES ENGINEERING COLLEGE, GHAZIABAD

Department of Electronics and Communication Engineering

PROGRAM: Bachelor of Technology (B. TECH)

COURSE OUTCOMES (CO) Statements & CO-PO-PSO Mapping

(SESSION 2023-24)

Prepared By:

Arpita Johri

Rakhi Kumari

Prof. (Dr.) Sanjay Kr. Singh

HOD

INDEX

1. **Vision and Mission Statement of College, along with Quality Policy**

2. **Vision and Mission Statement of the Department**

3. **Program Educational Objectives (PEOs), Program Outcomes (POs) & Program Specific Outcomes (PSOs) Statements**

Vision and Mission of the College

Vision

To take ABES Engineering College to such a level that, it is at par with the leading institutions of the world in providing leadership to the international education system and be amongst the top-rated institutions of the world by providing a transformative education to create leaders and innovators embedded in traditional Indian values.

Mission

1. To create an ambiance for healthy teaching-learning process.
2. To nurture the students and infuse in them-
    - A passion to excel professionally.
    - A spirit to be of utmost use to the industry, corporate sector and the society at large.
    - An intense desire to take challenging responsibilities and leadership roles.
    - A craving to be wholesome good human beings.
3. To develop an environment for creating new knowledge through research and by thriving to explore innovative ideas.

Quality Policy

To continuously thrive to provide a congenial and wholesome academic environment and a healthy culture for faculty, staff and students which would motivate teachers' full participation with passion and develop an intense desire in the students to acquire comprehensive education and hence become a useful and confident human resource for the industry and academia.

Vision and Mission
of
Department of Electronics & Communication Engineering

Vision

To contribute to India and the world through excellence in education and research in the field of Electronics & Communication Engineering and serve as valuable resource for the industry and the society at large.

Mission

To create an environment, which shall encourage the development of innovative professionals and researchers in the cutting-edge technologies of Electronics & Communication Engineering, in line with industry requirements and to impart professional ethics with positive attitude.

Programme Educational Objectives (PEOs)

PEO 1. To impart the students sound technical knowledge and skills in the core & related science & mathematics subjects of Electronics & Communication Engineering so that they graduate as professionally competent engineers, capable of applying & implementing the acquired skills.

PEO 2. To inculcate in students a desire to be innovative and passionate about excelling in the field of Electronics & Communication Engineering.

PEO 3. To develop managerial and soft skills so that they become confident and competent enough to take challenging responsibilities & leadership roles in the industry & corporate.

PEO 4. To equip them with solid foundation in ECE engineering so that they can pursue higher studies in the subject.

PEO 5. To groom the students to acquire professional ethics, moral values and devotion to duty so that they prove to be worthy citizen of India with international outlook.

Program Outcomes (POs)

PO1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. **Modern tool usage:** 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.

PO6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. **Individual and teamwork:** Function effectively as an individual, and as a member or leader in diverse exams, and in multidisciplinary settings.

PO10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. **Life-long learning:** Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs) relevant to the Course:

PSO1. An ability to design and analyze the concepts and applications in the field of communication/ networking, signal processing, embedded systems, and semiconductor technology.

PSO2. An ability to comprehend the technological advancements in the usage of modern design tools to analyze and design subsystems/processes for a variety of applications.

PSO3. An ability to learn the courses related to Microelectronics; Signal processing, Microcomputers, Embedded and Communication Systems to develop solutions to real world problems.

PSO4. An ability to communicate in both oral and written forms, the work already done and the future with necessary road maps, demonstrating the practice of professional ethics and the concerns for social and environmental impact.

4. Evaluation Scheme as received from University

B. TECH. ELECTRONICS AND COMMUNICATION ENGINEERING (FIRST YEAR)

S.No.	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical (P)	Credits
SEMESTER I						
1	BAS101	Engineering Physics	3	1	0	4
2	BAS103	Engineering Mathematics I	3	1	0	4
3	BEE101	Fundamentals of Electrical Engineering	2	1	0	3
4	BCS101	Programming for Problem Solving	2	1	0	3
5	BAS104	Environment and Ecology	3	0	0	3
6	BAS151	Engineering Physics Lab	0	0	3	1
7	BEE151	Basic Electrical Engineering Lab	0	0	3	1
8	BCS151	Programming for Problem Solving Lab	0	0	3	1
9	BCE151	Engineering Graphics & Design Lab	0	1	3	2
10	BVA251/ BVA252	Sports and Yoga / NSS	0	0	3	0
TOTAL SEMESTER CREDITS						**22**

**The Mini Project or internship (3-4 weeks) conducted during summer break after II semester and will be assessed during III semester.*

S.No.	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical (P)	Credits
SEMESTER II						
1	BAS202	Engineering Chemistry	3	1	0	4
2	BAS203	Engineering Mathematics I	3	1	0	4
3	BEC201	Fundamentals of Electronics Engineering	2	1	0	3
4	BME201	Fundamentals of Mechanical Engineering	2	1	0	3
5	BAS205	Soft Skills	3	0	0	3
6	BAS252	Engineering Chemistry Lab	0	0	3	1
7	BEC251	Basic Electronics Engineering Lab	0	0	3	1
8	BAS255	English Language Lab	0	0	3	1
9	BWS251	Workshop Practice Lab	0	1	3	2
TOTAL SEMESTER CREDITS						**22**
**The Mini Project or internship (3-4 weeks) conducted during summer break after II semester and will be assessed during III semester.*						

B. TECH. ELECTRONICS AND COMMUNICATION ENGINEERING (SECOND YEAR)

S.No.	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical (P)	Credits
SEMESTER III						
1	BOE305	Sensor & Instrumentation	3	1	0	4
2	BVE301	Universal Human Value and Professional Ethics	2	1	0	3
3	BEC301	Electronic Devices	3	1	0	4
4	BEC302	Digital System Design	3	1	0	4
5	BEC303	Network Analysis and Synthesis	2	1	0	3
6	BEC351	Electronic Devices Lab	0	0	2	1
7	BEC352	Digital System Design Lab	0	0	2	1
8	BEC353	Network Analysis and Synthesis lab	0	0	2	1
9	BCC302	Python programming	2	0	0	2
10	BCC351	Internship Assessment /Mini Project	-	-	-	2
TOTAL SEMESTER CREDITS						**25**

**The Mini Project or internship (3-4 weeks) conducted during summer break after II semester and will be assessed during III semester.*

SEMESTER IV						
1	BAS403	Math IV	3	1	0	4
2	BAS401	Technical Communication	2	1	0	3
3	BEC401	Communication Engineering	3	1	0	4
4	BEC402	Analog Circuits	3	1	0	4
5	BEC403	Signal System	2	1	0	3
6	BEC451	Communication Engineering Lab	0	0	2	1
7	BEC452	Analog Circuits Lab	0	0	2	1
8	BEC453	Signal System Lab	0	0	2	1
9	BCC401	Cyber Security	2	0	0	2
10	BVE451	Sports and Yoga - II	0	0	3	NC
		Minor Degree/ Honors Degree MT1/HT-1	-	-	-	-
TOTAL SEMESTER CREDITS						**23**
***The Mini Project or internship (4 weeks) will be done during summer break after 4th Semester and will be assessed during V semester.**						

LIST OF ENGINEERING SCIENCE COURSES						
1.	BOE301/BOE401 BOE301H/BOE401H	Electric and Hybrid Vehicles	3	1	0	4
2.	BOE302/ BOE402 BOE302H/BOE402H	Automation and Robotics	3	1	0	4
3.	BOE303/ BOE403 BOE303H/BOE403H	Material Science	3	1	0	4
4.	BOE304/ BOE404 BOE304H/BOE404H	Energy Science & Engineering	3	1	0	4
5.	BOE305/ BOE405 BOE305H/BOE405H	Sensor & Instrumentation	3	1	0	4
6.	BOE306/ BOE406 BOE306H/BOE406H	Basics Data Structure & Algorithms	3	1	0	4
7.	BOE307/ BOE407 BOE307H/BOE407H	Basics of Database Management Systems	3	1	0	4
8.	BOE308/ BOE408 BOE308H/BOE408H	Analog Electronics Circuits	3	1	0	4
9.	BOE309/ BOE409 BOE309H/BOE409H	Electronics Engineering	3	1	0	4
10.	BOE310/ BOE410 BOE310H/BOE410H	Digital Electronics	3	1	0	4
11.	BOE311/ BOE411 BOE311H/BOE411H	Polymer Science and Technology	3	1	0	4
12.	BOE312/ BOE412 BOE312H/BOE412H	Laser System and Applications	3	1	0	4
13.	BOE313/ BOE413 BOE313H/BOE413H	Food Science and Nutrition	3	1	0	4
14.	BOE314/ BOE414 BOE314H/BOE414H	Building Science and Engineering	3	1	0	4

B. TECH. ELECTRONICS AND COMMUNICATION ENGINEERING (THIRD YEAR)

S.No.	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical (P)	Credits
SEMESTER V						
1.	KEC-501	Integrated Circuits	3	1	0	4
2.	KEC-502	Microprocessor & Microcontroller	3	0	0	4
3.	KEC-503	Digital Signal Processing	3	0	0	4
4.	KEC-053	Department Elective-I VLSI Technology	3	0	0	3
5.	KEC-058	Departmental Elective Course-II Optical Communication	3	1	0	3
6.	KEC-551	Integrated Circuits Lab	0	0	2	1
7.	KEC-552	Microprocessor & Microcontroller Lab	0	0	2	1
8.	KEC-553	Digital Signal Processing Lab	0	0	2	1
9.	KEC-554	Mini Project/Internship	0	0	2	1
10.	KNC501	Constitution of India, Law and Engineering	2	0	0	NC
11.		MOOCs (Essential for Hons. Degree)				
TOTAL SEMESTER CREDITS					**22**	

**The Mini Project or Internship (4weeks) conducted during summer break after IV Semester and will be assessed during Vth Semester.

Departmental Elective Course- I	**Departmental Elective Course - II**
KEC-051 Computer Architecture and Organization	KEC-055 Electronics Switching
KEC-052 Industrial Electronics	KEC-056 Advance Semiconductor Device
KEC-053 VLSI Technology	KEC-057 Electronic Instrumentation and Measurements
KEC-054 Advance Digital Design using Verilog	KEC-058 Optical Communication

S.No.	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical (P)	Credits
SEMESTER VI						
1.	KEC-601	Digital Communication	3	1	0	4
2.	KEC-602	Control System	3	1	0	4
3.	KEC-603	Antenna and Wave Propagation	3	1	0	4
4.	KEC-063	Department Elective–III- Data Communication Networks	3	0	0	3
5.	KOE067	Open Elective-I- Basics of Data Base Management System	3	0	0	3
6.	KEC-651	Digital Communication Lab	0	0	2	1
7.	KEC-652	Control System Lab	0	0	2	1
8.	KEC-653	Elective Lab- CAD for Electronics Lab	0	0	2	1
9.	KNC602	Indian Tradition, Culture and Society	2	0	0	NC
10.		MOOCs (Essential for Hons. Degree)	-	-	-	-
TOTAL SEMESTER CREDITS						**21**

Departmental Elective Course - III	**Elective Lab Course**
KEC-061 Microcontroller & Embedded System KEC-062 Satellite Communication KEC-063 Data Communication Networks KEC-064 Analog Signal Processing	KEC-653A Measurement & Instrumentation Lab KEC-653B CAD for Electronics Lab KEC-653C Microcontroller & Embedded System Lab

LIST OF OPEN ELECTIVE COURSES -I

KOE061- REAL TIME SYSTEMS
KOE062 -EMBEDDED SYSTEM
KOE063 -INTRODUCTION TO MEMS
KOE064 -OBJECT ORIENTED PROGRAMMING
KOE065- COMPUTER BASED NUMERICAL TECHNIQUES
KOE066- GIS & REMOTE SENSING
KOE067 -BASICS OF DATA BASE MANAGEMENT SYSTEM
KOE068 -SOFTWARE PROJECT MANAGEMENT
KOE069 -UNDERSTANDING THE HUMAN BEING COMPREHENSIVELYHUMAN ASPIRATIONS AND ITS FULFILLMENT

B. TECH. ELECTRONICS AND COMMUNICATION ENGINEERING (FOURTH YEAR)

S. No	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical (P)	Credits
SEMESTER VII						
1.	KHU702	HSMC-1-Project Management & Entrepreneurship Development	3	0	0	3
2.	KEC-072	Department Elective –IV VLSI Design	3	0	0	3
3.	KEC-075	Department Elective –V Information Theory & Coding	3	0	0	3
4.	KEC-076	Department Elective –V Wireless & Mobile Communication	3	0	0	3
5.	KOE074	Open Elective-II Renewable Energy Resources	3	0	0	3
6.	KEC751B	VLSI Design Lab	0	0	2	1
8.	KEC-752	Mini Project or Internship Assessment	0	0	2	1
9.	KEC753	Project-I	0	0	8	4
TOTAL SEMESTER CREDITS						18

Department Elective - 3 1. KEC-071 Digital Image Processing 2. KEC-072 VLSI Design 3. KEC-073 Optical Network 4. KEC-074 Microwave & Radar Engineering	**Department Elective Course-V** 1. KEC-075 Information Theory & Coding 2. KEC-076 Wireless & Mobile Communication 3. KEC-077 Micro & Smart Systems 4. KEC-078 Speech Processing
Lab for Department Elective 1. KEC753A Digital Image Processing Lab 2. KEC753B VLSI Design Lab 3. KEC753C Optical System and Networking Lab 4. KEC753D Microwave & Radar Engineering Lab	**Open Elective-II** 1. KOE071 FILTER DESIGN 2. KOE072 BIOECONOMICS 3. KOE073 MACHINE LEARNING 4. KOE074 RENEWABLE ENERGY RESOURCES 5. KOE075 OPERATIONS RESEARCH

S. No	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical (P)	Credits
SEMESTER VIII						
1.	KHU801	HSMC-2-Rural Development: Administration and Planning	3	0	0	3
2.	KOE-081	Cloud Computing	3	0	0	3
3.	KOE-094	Open Elective –IV Digital and Social Media Marketing	3	0	0	3
4.	KEC-851	Project II	0	0	18	9
		MOOCs (Essential for Hons. Degree)	-	-	-	-
TOTAL SEMESTER CREDITS						18

Open Elective-III	**Open Elective-IV**
1. KOE-080 FUNDAMENTALS OF DRONE TECHNOLOGY 2. KOE-081 CLOUD COMPUTING 3. KOE-082 BIO MEDICAL SIGNAL PROCESSING 4. KOE-083 ENTREPRENEURSHIP DEVELOPMENT 5. KOE-084 INTRODUCTION TO SMART GRID 6. KOE-085 QUALITY MANAGEMENT 7. KOE-086 INDUSTRIAL OPTIMIZATION TECHNIQUES 8. KOE-087 VIROLOGY 9. KOE-088 NATURAL LANGUAGE PROCESSING 10. KOE-089 **HUMAN VALUES IN MADHYASTH	1. KOE-090 ELECTRIC VEHICLES 2. KOE-091 AUTOMATION AND ROBOTICS 3. KOE-092 COMPUTERIZED PROCESS CONTROL 4. KOE-093 DATA WAREHOUSING & DATA MINING 5. KOE-094 DIGITAL AND SOCIAL MEDIA MARKETING 6. KOE-095 MODELING OF FIELD-EFFECT NANO DEVICES 7. KOE-096 MODELLING AND SIMULATION OF DYNAMIC SYSTEMS 8. KOE-097 BIG DATA 9. KOE-098 **HUMAN VALUES IN BUDDHA AND JAIN

5. Course Outcome (CO) Statements, its mapping with POs and PSOs for Odd Sem

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: Engineering Physics [BAS101]	**NAME(S) OF FACULTY INVOLVED:** Dr. Satyendra Kumar, Dr. Stuti Singh, Dr. Isha Mehra
SESSION: 2023-24	**YEAR / SEM:** I/ I

Course Outcome No.	**Statements**	**Knowledge Level, KL**
CO1	To explain the distribution of energy in black body radiation and to understand the difference in particle and wave nature with explanation of Compton effect and Schrodinger wave equation.	K3 (Apply)
CO2	To understand the concept of displacement current and consistency of Ampere's law and also the properties of electromagnetic waves in different medium with the use of Maxwell's equations	K3 (Apply)
CO3	To understand the behavior of waves through various examples/applications of interference and diffraction phenomenon and the concept of grating and resolving power.	K3 (Apply)
CO4	To know the functioning of optical fiber and its properties and applications. To understand the concept, properties and applications of Laser	K3 (Apply)
CO5	To know the properties and applications of superconducting materials and nano materials.	K3 (Apply)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	2	2	1	1	1	3	2			2		3				
CO2	3	2	1	1	1	3	2			2		3				
CO3	3	2	1	1	1	3	2			2		3				
CO4	2	2	1	1	1	3	2			2		3				
CO5	2	2	1	1	1	3	2			2		3				
Average	**2.4**	**2**	**1**	**1**	**1**	**3**	**2**			**2**		**3**				

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: Engineering Mathematics – I [BAS 103]	**NAME(S) OF FACULTY INVOLVED:** Dr. Tej Singh, Dr. Vimal Srivastava , Dr. Divya Saxena
SESSION: 2023-24	**YEAR / SEM:** I/ I

Course Outcome No.	**Statements**	**Knowledge Level, KL**
CO1	Enhance the knowledge of Matrices for its application in various domains of Mathematics.	K3 (Apply)
CO2	Understand the various concepts of successive differentiation, partial derivative, Total Derivative and it's applications in Leibnitz theorems, curve tracing and Euler's Theorem.	K2 (Understand)
CO3	Apply the concept of ordinary and partial differentiation to evaluate extrema, series expansion, error approximation of functions and jacobians.	K3 (Apply)
CO4	Understnd the concept of multiple integral, Beta and Gamma Function, Dirichlet's theorem and its application to find area and volume.	K3 (Apply)
CO5	Apply the concept of Vector Calculus to analyze and evaluate directional derivative, line. Surface and volume integrals.	K3 (Apply)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	3	1	3	2					3		3				
CO2	2	3	1	3	2					3		3				
CO3	3	3	1	3	2					3		3				
CO4	2	3	1	3	2					3		3				
CO5	3	3	1	3	2					3		3				
Average	2.6	3	1	3	2					3		3				

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: Fundamentals of Electrical Engineering [BEE101]	**NAME(S) OF FACULTY INVOLVED:** Mr. Abhishek Gupta , Mr. Manish Kumar Singh , Mr. Praveen Raghuvanshi
SESSION: 2023-24	**YEAR / SEM:** I/ I

Course Outcome No.	**Statements**	**Knowledge Level, KL**
CO1	Illustrate the application of KVL/KCL and network theorems to DC electrical circuits.	K3 (Apply)
CO2	Analyze the power factor and measure power of single phase and three phase AC electrical circuits.	K3 (Apply)
CO3	Plot the frequency response curve of a Single Phase AC series resonant circuit..	K3 (Apply)
CO4	Calculate efficiency of a single phase transformer and DC machine.	K3 (Apply)
CO5	Demonstrate speed measurement and speed reversal of three phase induction motor and Identify the type of DC and AC machines based on their construction.	K3 (Apply)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	3	2	3	3		2		3	3	1	1				
CO2	3	2	1	3	3	3	2		3	3	1	1				
CO3	3	2	1	3	3		2		3	3	1	1				
CO4	3	3	2	3	3	3	2		3	3	1	1				
CO5	3	2	2	3	3	3	2		3	3	1	1				
Average	**3**	**2.4**	**1.6**	**3**	**3**	**3**	**2**		**3**	**3**	**1**	**1**				

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: Programming for Problem Solving [BCS101]	**NAME(S) OF FACULTY INVOLVED:** MS. LOPAMUDRA MOHANTY , MR. GAURAV VATS , MS. POOJA SINGHAL
SESSION: 2023-24	**YEAR / SEM:** I/ I

Course Outcome No.	**Statements**	**Knowledge Level, KL**
CO1	To Develop Simple Algorithms for Arithmetic and Logical Problems	K3 (Apply)
CO2	To Translate the Algorithms to Programs & Execution (in C Language).	K3 (Apply)
CO3	To Implement Conditional Branching, Iteration and Recursion.	K3 (Apply)
CO4	To Decompose a Problem into Functions and Synthesize a Complete Program Using Divide and Conquer Approach.	K4 (Analyze)
CO5	To Use Arrays, Pointers, and Structures to Develop Algorithms and Programs.	K3 (Apply)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	3	3	3	3			2	1	2						
CO2	3	3	3	3	3			2	1	2						
CO3	3	3	3	3	3		3	2	3	2						
CO4	3	3	3	3	3		3	2	3	2						
CO5	3	3	3	3	3		3	2	3	2						
Average	**3**	**3**	**3**	**3**	**3**		**3**	**2**	**2.2**	**2**						

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: Environment & Ecology (BAS104)	**NAME(S) OF FACULTY INVOLVED:** Dr. Divyanshi Sharma , Dr. Twinkle Razdan , Dr. Nidhi Ahuja
SESSION: 2023-24	**YEAR / SEM:** I/ I

Course Outcome No.	**Statements**	**Knowledge Level, KL**
CO1	Gain in-depth knowledge on natural processes that sustain life, and govern economy	K2 (Understand)
CO2	Estimate and predict the consequences of human actions on the web of life, global economy and quality of human life.	K3 (Apply)
CO3	Develop critical thinking for shaping strategies (scientific, social, economic and legal) for environmental protection and conservation of biodiversity, social equity and sustainable development	K4 (Analyze)
CO4	Acquire values and attitudes towards understanding complex environmental economic social challenges, and participate actively in solving current environmental problems and preventing the future ones.	K3 (Apply)
CO5	Adopt sustainability as a practice in life, society and industry.	K3 (Apply)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1		1				3	3	2	1	1		1				
CO2	1	1	2	2	1				1	1	1	2				
CO3	3		2	2	1		3	3	2	1	2					
CO4	1					2	1	1	3	1		3				
CO5		1	2				3	3				2				
Average	**1.67**	**1**	**2**	**2**	**1**	**2.5**	**2.5**	**2.25**	**1.75**	**1**	**1.5**	**2**				

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: Engg. Physics Lab (BAS151)	**NAME(S) OF FACULTY INVOLVED:** Dr. Satyendra Kumar , Dr. Vikash Singh, Dr. Stuti Singh , Dr. Isha Mehra
SESSION: 2023-24	**YEAR / SEM:** I/ I

Course Outcome No.	**Statements**	**Knowledge Level, KL**
CO1	Determine the wavelengths of light emerging from a monochromatic source or polychromatic source and specific rotation of an optically active substance applying the principles of interference, diffraction and polarization phenomenon.	K3 (Apply)
CO2	Measure the variation of magnetic field with the distance along the axis of a current carrying coil and ECE of copper applying Biot-Savart's and Faraday's law.	K3 (Apply)
CO3	Estimate the power radiated by the black body and the energy band gap of the semiconductor by electrical method.	K3 (Apply)
CO4	Measure specific resistance of a wire and rate the ammeter and voltmeter, applying Wheatstone Bridge principle.	K3 (Apply)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	2	1		3	3			2	3	1	3	1				
CO2	2	1		3	2			2	3	1	3	1				
CO3	2	1		3	3			2	3	1	3	1				
CO4	2	1		3	1			2	3	1	3	1				
Average	**2**	**1**		**3**	**2.25**			**2**	**3**	**1**	**3**	**1**				

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: Basic Electrical Engg. Lab (BEE151)	**NAME(S) OF FACULTY INVOLVED:** Mr. Rahul Virmani , Mr. Saibal Manna, Mr. Manish Kumar Singh , Mr. Praveen Raghuvanshi , DR. AMIT AGARWAL
SESSION: 2023-24	**YEAR / SEM:** I/ I

Course Outcome No.	**Statements**	**Knowledge Level, KL**
CO1	Illustrate the application of kvl/kcl and network theorems to dc electrical circuits.	K3 (Apply)
CO2	Analyze the power factor and measure power of single phase and three phase ac electrical circuits.	K4 (Analyze)
CO3	Demonstrate the behavior of a single phase ac series resonant circuit.	K3 (Apply)
CO4	Calculate efficiency of a single phase transformer and dc machine.	K3 (Apply)
CO5	Demonstrate speed measurement and speed reversal of three phase induction motor and identify the type of dc and ac machines based on their construction.	K3 (Apply)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	3	2	3	3		2		3	3	1	1				
CO2	3	2	1	3	3	3	2		3	3	1	1				
CO3	3	2	1	3	3		2		3	3	1	1				
CO4	3	3	2	3	3	3	2		3	3	1	1				
CO5	3	2	2	3	3	3	2		3	3	1	1				
Average	**3**	**2.4**	**1.6**	**3**	**3**	**3**	**2**		**3**	**3**	**1**	**1**				

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: Programming for Problem Solving Lab [BCS151]	**NAME(S) OF FACULTY INVOLVED:** MS. LOPAMUDRA MOHANTY , DR. MANU SINGH, MR. GAURAV VATS , MS. SHALINI SINGH, MS. POOJA SINGHAL , MR. VIVEK KUMAR
SESSION: 2023-24	**YEAR / SEM:** I/ I

Course Outcome No.	**Statements**	**Knowledge Level, KL**
CO1	Able to implement the algorithms and draw flowcharts for solving Mathematical and Engineering problems.	K3 (Apply)
CO2	Able to define data types and use them in simple data processing applications.	K3 (Apply)
CO3	Ability to design and develop Computer programs using decision making statements, iteration, function and recursion.	K3 (Apply)
CO4	Demonstrate an understanding of computer programming language concepts using array and structures.	K3 (Apply)
CO5	Able to implement Computer programs, analyzes, and interprets the concept of pointers and file handling and their usage.	K3 (Apply)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	3	3	3	3			2	1	2		3				
CO2	3	3	3	3	3			2	1	2		3				
CO3	3	3	3	3	3		3	2	3	2		3				
CO4	3	3	3	3	3		3	2	3	2		3				
CO5	3	3	3	3	3		3	2	3	2		3				
Average	**3**	**3**	**3**	**3**	**3**		**3**	**2**	**2.2**	**2**		**3**				

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: Engineering Graphics & Design Lab [BCE151]	**NAME(S) OF FACULTY INVOLVED:** Dr. Abhishek Pandey , Mr. Manish Mangal, Mr. Mohit Bansal , Mr. Shailendra Pratap Singh, Dr. Abhishek Pandey &Mr. Harvir Singh
SESSION: 2023-24	**YEAR / SEM:** I/ II

Course Outcome No.	**Statements**	**Knowledge Level, KL**
CO1	Draw orthographic projection of basic identities such as points and lines.	K3 (Apply)
CO2	Draw orthographic projections of plane surfaces and simple regular solids.	K3 (Apply)
CO3	Draw isometric projections of compound geometrical solids.	K3 (Apply)
CO4	Apply autocad software for creation of engineering drawing and models.	K3 (Apply)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	2	2						2	1		2				
CO2	3	2	2						2	1		2				
CO3	3	2	2						2	1		2				
CO4	3	1	2		3				2	1		2				
Average	**3**	**1.75**	**2**		**3**				**2**	**1**		**2**				

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: Engineering Chemistry [BAS 202]	**NAME(S) OF FACULTY INVOLVED:** DR. SUNITA GOYAL, DR. NEELAM YADAV , DR. NEHA SINGH
SESSION: 2023-24	**YEAR / SEM:** I/ II

Course Outcome No.	**Statements**	**Knowledge Level, KL**
CO1	Get an understanding of the theoretical principles of chemistry of molecular structure, bonding and properties, Chemistry of advanced materials (liquid crystals, Nanomaterials, Graphite & Fullerene) as well as the Principles of Green Chemistry.	K2 (Understand)
CO2	Apply the fundamental concepts of determination of structure with various spectral techniques and stereochemistry.	K3 (Apply)
CO3	Utilize the theory of construction of electrodes, batteries and fuel cells in redesigning new engineering products and categorize the reasons for corrosion and study methods to control corrosion and develop understanding of Chemistry of Engineering materials (Cement).	K3 (Apply)
CO4	Develop understanding of the sources, impurities and hardness of water, apply the concepts of determination of calorific values and analyze the coal.	K2 (Understand)
CO5	Develop the understanding of Chemical structure of polymers and its effect on their various properties when used as engineering materials. Understanding the applications of specific polymers and Chemistry applicable in industrial process.	K2 (Understand)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	2	1	3	1	1	3					1				
CO2	3	3	2	3	2	2	2					1				
CO3	3	3	1	2	2	1	1					1				
CO4	3	3	3	3	2	3	2				1	2				
CO5	2	2	1	2	2	1	2	1	1			2				
Average	**2.8**	**2.6**	**1.6**	**2.6**	**1.8**	**1.6**	**2**	**1**	**1**		**1**	**1.4**				

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: Engineering Mathematics II [BAS203]	**NAME(S) OF FACULTY INVOLVED:** Ms. Priti Madan , PROF. (DR.) BHANUMATI PANDA, PROF. (DR.) TARUN KR. ARORA
SESSION: 2023-24	**YEAR / SEM:** I/ II

Course Outcome No.	**Statements**	**Knowledge Level, KL**
CO1	Apply the concept of differentiation and integration for solving LDE of nth order with constant coefficient and LDE with variable coefficient of 2nd order	K3 (Apply)
CO2	Understand and apply the concept of Laplace Transform to evaluate differential Equations.	K3 (Apply)
CO3	Understand the concept of convergence of sequence and series and also expand the function as Fourier series.	K3 (Apply)
CO4	Understand the concept of analyticity and Harmonic Function and its application to find analytic function and the image of function applying conformal transformation.	K3 (Apply)
CO5	Apply the concept of complex functions for finding Taylor's series, Laurent's series and evaluation of definite integrals.	K3 (Apply)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	2	3	1	3	2					3		3				
CO2	2	3	1	3	2					3		3				
CO3	2	3	1	3	2					3		3				
CO4	2	3	1	3	2					3		3				
CO5	2	3	1	3	2					3		3				
Average	**2**	**3**	**1**	**3**	**2**					**3**		**3**				

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: Fundamentals of Electronics Engineering [BEC201]	**NAME(S) OF FACULTY INVOLVED:** Mr. Mudit Saxena , MR. HITESH TOMAR, DR. MANISH ZADOO
SESSION: 2023-24	**YEAR / SEM:** I/ II

Course Outcome No.	**Statements**	**Knowledge Level, KL**
CO1	Describe the concept of PN Junction and devices.	K2 (Understand)
CO2	Explain the concept of BJT, FET and MOFET.	K2 (Understand)
CO3	Apply the concept of Operational amplifier to design linear and non-linear applications.	K3 (Apply)
CO4	Perform number systems conversions, binary arithmetic and minimize logic functions.	K3 (Apply)
CO5	Describe the fundamentals of communication technologies.	K2 (Understand)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	3	1	1	2			3		1		1				
CO2	2	2	1	1	2			3		1		1				
CO3	3	2	1	1	2			3		1		1				
CO4	2	2	2	1	2			3		1		1				
CO5	2	2	1	1	2			3		1		1				
Average	**2.4**	**2.4**	**1.2**	**1**	**2**			**3**		**1**		**1**				

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: Fundamentals of Mechanical Engineering [BME201]	**NAME(S) OF FACULTY INVOLVED:** MR. MAYANK KUSHWAHA , MR. ABHISHEK SAXENA, DR. RAHUL VERMA
SESSION: 2023-24	**YEAR / SEM:** I/ II

Course Outcome No.	**Statements**	**Knowledge Level, KL**
CO1	Apply the concept of force resolution and stress and strain to solve basic problems.	K3 (Apply)
CO2	Understand the construction details and working of internal combustion engines, electric vehicle and hybrid vehicles.	K2 (Understand)
CO3	Explain the construction detail and working of refrigerator, heat pump and air-conditioner.	K2 (Understand)
CO4	Understand fluid properties, conservation laws and hydraulic machinery used in real life.	K2 (Understand)
CO5	Understand the working principle of different measuring instrument and mechatronics with their advantages, scope and industrial application.	K2 (Understand)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	2	1	2			2			3		3				
CO2	2	2	2	2	1		3			3	1	3				
CO3	3	1	1	1			2			3		2				
CO4	3	2	1	1	1		2			3		3				
CO5	2	3	2	2	3	3				3		3				
Average	**2.6**	**2**	**1.4**	**1.6**	**1.67**	**3**	**2.25**			**3**	**1**	**2.8**				

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: Soft Skills [BAS205]	**NAME(S) OF FACULTY INVOLVED:** MS. BHARTI CHAUHANDR, DUSHYANT RANA, Dr. Mokshi Juyal
SESSION: 2023-24	**YEAR / SEM:** I/ II

Course Outcome No.	**Statements**	**Knowledge Level, KL**
CO1	Write professionally in simple and correct English.	K3 (Apply)
CO2	Demonstrate active listening with comprehension, and the ability to write clear and well-structured emails and proposals.	K3 (Apply)
CO3	Learn the use of correct body language and tone of voice to enhance communication.	K2 (Understand)
CO4	Acquire the skills necessary to communicate effectively and deliver presentations with clarity and impact.	K3 (Apply)
CO5	Understand and apply some important aspects of core skills, like Leadership and stress management.	K2 (Understand)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1		1	3	2		3	3	3	2	3	1	2	3			
CO2		1	2	2				3	2	3	2		3			
CO3			1						1	3						
CO4		2	2	3	3	3	3	3	3	3	3	3	3			
CO5								3	3	3	2	1	3			
Average		**1.33**	**2**	**2.33**	**3**	**3**	**3**	**3**	**2.2**	**3**	**2**	**2**	**3**			

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: Engineering Chemistry Lab [BAS252]	**NAME(S) OF FACULTY INVOLVED:** DR. SUNITA GOYAL, DR. ANUPRIYA, DR. NEELAM YADAV, DR. SHIKHA
SESSION: 2023-24	**YEAR / SEM:** I/ II

Course Outcome No.	**Statements**	**Knowledge Level, KL**
CO1	Get an understanding of the use of different analytical instruments.	K3 (Apply)
CO2	Measure the molecular / system properties such as surface tension, viscosity, conductance of solution, chloride and iron content in the water.	K3 (Apply)
CO3	Measure the hardness and alkalinity of the water.	K3 (Apply)
CO4	Know the fundamental concepts of the preparation of phenol formaldehyde & urea formaldehyde resin, adipic acid and Paracetamol.	K3 (Apply)
CO5	Estimate the rate constant of reaction.	

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	2	2	3	2	2	1		1		2	2				
CO2	3	2	1	3	2	1	1		1	1	1	2				
CO3	3	3	3	3	2	1	1		1		2	2				
CO4	2	1	2	2	1	1	1		1		1	1				
CO5	3	2	2	2	1	1	2	1	3	1	1	2				
Average	**2.8**	**2**	**2**	**2.6**	**1.6**	**1.2**	**1.2**	**1**	**1.4**	**1**	**1.4**	**1.8**				

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: Basic Electronics Engineering Lab [BEC251]	**NAME(S) OF FACULTY INVOLVED:** DR. AJAY SURI, MS. UPASANA SHARMA, DR. NAVNEET SHARMA, MR. KAMAL BHATIA, DR. MANISH ZADOO, MS. ANUPAM
SESSION: 2023-24	**YEAR / SEM:** I/ II

Course Outcome No.	**Statements**	**Knowledge Level, KL**
CO1	Recognize various types of Active & Passive Components based on their ratings.	K2 (Understand)
CO2	Identify various types of Printed Circuit Boards (PCB), Soldering Techniques and preparing PCBs.	K3 (Apply)
CO3	Wind a Step down transformer winding of less than 5VA.	K3 (Apply)
CO4	Demonstrate the working of Lab Equipment	K3 (Apply)
CO5	Interpret the characteristics and applications of PN junction diode, Zener diode, BJT and op-amp	K3 (Apply)
CO6	Verify the Truth Table of various Logic Gate and implement a Boolean function using logic gates in both SOP and POS forms.	K3 (Apply)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	2	2		2		1	1		1	1	3				
CO2	3	2	2		2		1	1		1	1	3				
CO3	3	2			2		1	1		3	2	3				
CO4	3	2	3	2	3	2	1	1	2	3	3	3				
CO5	3	2	3	2	2	3	1	1	2	3	3	3				
CO6	3	3	3	2	2	2			2	3	3	3				
Average	**3**	**2.17**	**2.6**	**2**	**2.33**	**2.33**	**1**	**1**	**2**	**2.33**	**2.17**	**3**				

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: English Language Lab [BAS255]	**NAME(S) OF FACULTY INVOLVED:** DR. MOKSHI JUYAL, MS. BHARTI CHAUHAN, MS. BHARTI CHAUHAN, DR. SEEMA VERMA, DR. DUSHYANT RANA, MS. MOKSHI JUYAL
SESSION: 2023-24	**YEAR / SEM:** I/ II

Course Outcome No.	**Statements**	**Knowledge Level, KL**
CO1	To facilitate software based learning to provide the required English Language proficiency to students.	K3 (Apply)
CO2	To acquaint students with specific dimensions of communication skills i.e. Reading, Writing, Listening, Thinking and Speaking.	K2 (Understand)
CO3	To train students to use the correct and error-free writing by being well versed in rules of English Grammar.	K2 (Understand)
CO4	To cultivate relevant technical style of communication and presentation at their work place and also for academic uses.	K3 (Apply)
CO5	To enable students to apply it for practical and oral presentation purposes by being honed up in presentation skills and voice-dynamics.	K3 (Apply)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1		1	3	2		3	3	3	2	3	1	2	3			2
CO2		1	2	2				3	2	3	2		3			2
CO3			1						1	3						2
CO4		2	2	3	3	3	3	3	3	3	3	3	3			2
CO5								3	3	3	2	1	3			2
Average		**1.33**	**2**	**2.33**	**3**	**3**	**3**	**3**	**2.2**	3	**2**	2	**3**			**2**

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: Workshop Practice Lab [BWS251]	**NAME(S) OF FACULTY INVOLVED:** MR. MAYANK KUSHWAHA, DR. NAMAN JAIN, MR. ABHISHEK SAXENA, MR. DINESH PATHARIA, DR. RAHUL VERMA, DR. SAURABH
SESSION: 2023-24	**YEAR / SEM:** I/ I

Course Outcome No.	**Statements**	**Knowledge Level, KL**
CO1	Use various engineering materials, tools, machines and measuring equipment.	K3 (Apply)
CO2	Perform machine operations in lathe and CNC machine. particle inspection.	K3 (Apply)
CO3	Perform manufacturing operations on components in fitting and carpentry shop.	K3 (Apply)
CO4	Perform operations in welding, molding, casting and gas cutting.	K3 (Apply)
CO5	Fabricate a job by 3D printing manufacturing technique areas.	K3 (Apply)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	2						2		2	1						
CO2	2		2		3		2		2	1						
CO3	2						2		2	1						
CO4	3		2				2		2	1						
CO5	3		2		3		2		2	1						
Average	**2.4**		**2**		**3**		**2**		**2**	**1**						

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: Sensor & Instrumentation [BOE-305]	**NAME(S) OF FACULTY INVOLVED:** Dr. Jugul Kishore Gupta, Ms. Geetanjali
SESSION: 2023-24	**YEAR / SEM:** II / III

Course Outcome No.	**Statements**	**Knowledge Level, KL**
CO1	Apply the use of sensors for measurement of displacement, force and pressure.	K3 (Apply)
CO2	Employ commonly used sensors in industry for measurement of temperature, position, accelerometer, vibration sensor, flow and level.	K3 (Apply)
CO3	Demonstrate the use of virtual instrumentation in automation industries.	K2 (Understand)
CO4	Identify and use data acquisition methods.	K3 (Apply)
CO5	Comprehend intelligent instrumentation in industrial automation.	K2 (Understand)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	2		1	2								1			3	2
CO2	2		1	2								1			3	2
CO3	2	1	1	1	2							1		3	3	2
CO4	2											1			3	2
CO5	2											2			3	2
Average	**2**	**1**	**1**	**1.67**	**2**							**1.2**			**3**	**2**

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: Universal Human Value and Professional Ethics (BVE 301)	**NAME(S) OF FACULTY INVOLVED: Dr. Navneet Sharma, Ms. Rakhi Kumari**
SESSION: 2023-24	**YEAR / SEM:** II / III

Course Outcome No.	**Statements**	**Knowledge Level, KL**
CO1	Understand the significance of value inputs in a classroom, distinguish between values and skills, understand the need, basic guidelines, content and process of value education, explore the meaning of happiness and prosperity and do a correct appraisal of the current scenario in the society.	K2 (Understand)
CO2	Distinguish between the Self and the Body, understand the meaning of Harmony in the Self the Co-existence of Self and Body.	K3 (Apply)
CO3	Understand the value of harmonious relationship based on trust, respect and other naturally acceptable feelings in human-human relationships and explore their role in ensuring a harmonious society	K2 (Understand)
CO4	Understand the harmony in nature and existence and work out their mutually fulfilling participation in the nature.	K2 (Understand)
CO5	Distinguish between ethical and unethical practices and start working out the strategy to actualize a harmonious environment wherever they work.	K3 (Apply)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1												1				2
CO2									1							2
CO3									3							2
CO4							3									2
CO5						3	3	3			1	2				2
Average						**3**	**3**	**3**	**2**		**1**	**1.5**				**2**

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: Electronic Devices (BEC-301)	**NAME(S) OF FACULTY INVOLVED:** Dr. Ajay Suri/Ms. Palak Jain
SESSION: 2023-24	**YEAR / SEM:** II / III

Course Outcome No.	Statements	Knowledge Level, KL
CO1	Understand the principles of semiconductor devices.	K2 (Understand)
CO2	Interpret the carrier transport in semiconductors.	K3 (Apply)
CO3	Analyze and find application of special purpose diodes.	K2 (Understand)
CO4	Explain the working principle and design of Bipolar Junction Transistor.	K3 (Apply)
CO5	Realize the mathematical models of MOS transistors	K2 (Understand)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2								3		2			3	3
CO2	3	2								3		2			3	3
CO3	3	2								3		2			3	3
CO4	3	2								3		2			3	3
CO5	3	2								3		2			3	3
Average	**3**	**2**								**3**		**2**			**3**	**3**

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: Digital System Design (BEC-302)	**NAME(S) OF FACULTY INVOLVED:** Dr. Ritu Aggarwal, Dr. Navneet Sharma, Mr. Hitesh Tomar
SESSION: 2023-24	**YEAR / SEM:** II / III

Course Outcome No.	Statements	Knowledge Level, KL
CO1	Perform numerous arithmetic and logic simplification using various methods.	K3 (Apply)
CO2	Design and analyze modular combinational circuits with MUX / DEMUX, Decoder & Encoder	K3 (Apply)
CO3	Create & Illustrate synchronous sequential logic circuits	K3 (Apply)
CO4	Explain various logic families and design circuits using PLDs.	K2 (Understand)
CO5	Develop various ADCs and DACs according to the given specifications.	K3 (Apply)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	2	3	3	3	3					3	3	3	3	3
CO2	3	3	3	3	3	3	3					3	3	3	3	3
CO3	3	3	3	3	3	3	3					3	3	3	3	3
CO4	3	3	2	3	3	3	3					3	3	3	3	3
CO5	3	3	2	3	3	3	3					3	3	3	3	3
Average	**3**	**3**	**2.4**	**3**	**3**	**3**	**3**					**3**	**3**	**3**	**3**	**3**

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: Network Analysis & Synthesis (BEC-303)	**NAME(S) OF FACULTY INVOLVED:** Ms. Rakhi Kumari, Mr. Kamal Bhatia
SESSION: 2023-24	**YEAR / SEM:** II/ III

Course Outcome No.	**Statements**	**Knowledge Level, KL**
CO1	Understand basics electrical circuits with nodal and mesh analysis.	K3 (Apply)
CO2	Appreciate electrical network theorems.	K3 (Apply)
CO3	Apply Laplace transform for steady state and transient analysis.	K3 (Apply)
CO4	Determine different network functions.	K3 (Apply)
CO5	Analyze the frequency response of various filters	K3 (Apply)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	2			3							3	3	3	3	
CO2	3	3			3							3	3	3	3	
CO3	3	2			3							3	3		3	
CO4	3	3			3							3	3	3	3	
CO5	3	2	1		3							3	3	3	3	
Average	**3**	**2.4**	**1**		**3**							**3**	**3**	**3**	**3**	

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: Electronic Devices Lab (BEC-351)	**NAME(S) OF FACULTY INVOLVED:** Dr. Ajay Suri, Dr. Jugul Kishore Gupta, Ms. Palak Jain, Mr. Hitesh Tomar, Ms
SESSION: 2023-24	**YEAR / SEM:** II / III

Course Outcome No.	Statements	Knowledge Level, KL
CO1	Understand working of basic electronics lab equipment.	K2 (Understand)
CO2	Clarify working of PN junction diode and its applications.	K3 (Apply)
CO3	Describe characteristics of Zener diode.	K3 (Apply)
CO4	Design a voltage regulator using Zener diode.	K3 (Apply)
CO5	Elaborate working of BJT, FET, MOSFET and apply the concept in designing of amplifiers.	K3 (Apply)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	1		3				3	3		3	3	3		
CO2	3	2	1		3				3	3		3	3	3		
CO3	3	2	1		3				3	3		3	3			
CO4	3	2	2		3				3	3		3	3	3		
CO5	3	2	1		3				3	3		3	3	3		
Average	**3**	**2**	**1.2**		**3**				**3**	**3**		**3**	**3**	**2.4**		

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: Digital System Design Lab (BEC-352)	**NAME (S) OF FACULTY INVOLVED:** Dr. Ritu Aggarwal, Dr. Navneet Sharma, Ms. Upasana Sharma, Mr. Hitesh Tomar
SESSION: 2023-24	**YEAR / SEM:** II / III

Course Outcome No.	**Statements**	**Knowledge Level, KL**
CO1	Design and analyze combinational logic circuits.	K3 (Apply)
CO2	Design & analyze modular combinational circuits with MUX/DEMUX, decoder, encoder.	K3 (Apply)
CO3	Design & analyze synchronous sequential logic circuits.	K3 (Apply)
CO4	Design & build mini project using digital ICs.	K6 (Create)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	3	1	2	2							3	3	3	3	3
CO2	3	3	2	2	2	3						3	3	3	3	3
CO3	3	3	3	2	2	3						3	3	3	3	3
CO4	3	3	3	2	2	3						3	3	3	3	3
Average	**3**	**3**	**2.25**	**2**	**2**	**3**						**3**	**3**	**3**	**3**	**3**

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: Network Analysis & Synthesis Lab (BEC-353)	**NAME(S) OF FACULTY INVOLVED:** Mr. Manish, Ms. Rakhi Kumari, Mr. Kamal Bhatia
SESSION: 2023-24	**YEAR / SEM:** II / III

Course Outcome No.	**Statements**	**Knowledge Level, KL**
CO1	Understand basics of electrical circuits with nodal and mesh analysis.	K3 (Apply)
CO2	Appreciate electrical network theorems.	K3 (Apply)
CO3	Analyze RLC circuits.	K4 (Analyze)
CO4	Determine the stability of an electrical circuit.	K3 (Apply)
CO5	Design network filters.	K3 (Apply)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	2	1	1	3				3	3		3	3	3		
CO2	3	2	1	1	3				3	3		3	3	3		
CO3	3	2	1	1	3				3	3		3	3			
CO4	3	2	2	1	3				3	3		3	3	3		
CO5	3	3	1	1	3				3	3		3	3	3		
Average	3	2.2	1.2	1	3				3	3		3	3	2.4		

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: Python programming ((BCC302))	**NAME(S) OF FACULTY INVOLVED:** Ms. Indu Mallik,
SESSION: 2023-24	**YEAR / SEM**: II / III

Course Outcome No.	**Statements**	**Knowledge Level, KL**
CO1	Interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements.	K3 (Apply)
CO2	Express proficiency in the handling of strings and functions.	K3 (Apply)
CO3	Determine the methods to create and manipulate Python programs by utilizing the data structures like lists, dictionaries, tuples and sets.	K3 (Apply)
CO4	Identify the commonly used operations involving file systems and regular expressions	K3 (Apply)
CO5	Articulate the Object-Oriented Programming concepts such as encapsulation, inheritance and polymorphism as used in Python	K3 (Apply)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	2	1	1	1	3				3	3	1	3				
CO2	3	3	1	1	3				3	3	1	3				
CO3	3	3	1	2	3				3	3	1	3				
CO4	2	2	1	1	3				3	3	1	3				
CO5	3	3	2	3	3				3	3	1	3				
Average	**2.6**	**2.4**	**1.2**	**1.6**	**3**				**3**	**3**	**1**	**3**				

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: Mini Project and Internship Lab (BEC-354)	**NAME(S) OF FACULTY INVOLVED:** Mr. Deepak Garg, Dr. Manidipa Roy, Ms. Upasana Sharma
SESSION: 2023-24	**YEAR / SEM**: II / III

Course Outcome No.	**Statements**	**Knowledge Level, KL**
CO1	Understand the organogram of the industry and appreciate the skill enhancement	K2 (Understand)
CO2	Write an effective mini-project or internship report	K3 (Apply)
CO3	Deliver an effective presentation	K3 (Apply)
CO4	Inculcate non-plagiarism and teamwork ethics	K4 (Apply)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	3	3	3	3		3	3	3	3		3	3	3	3	3
CO2	1	3	3	3	3			3	3	3		3	3	3	3	3
CO3	1	3	3	3	3			3	3	3		3	3	3	3	3
CO4	1	3	3	3	3			3	3	3		3	3	3	3	3
Average	**1.5**	**3**	**3**	**3**	**3**		**3**	**3**	**3**	**3**		**3**	**3**	**3**	**3**	**3**

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: Mathematics IV (BAS 402)	**NAME(S) OF FACULTY INVOLVED:** Dr. Ashish Arora, Dr. Ashish Prakash
SESSION: 2023-24	**YEAR / SEM:** II/ IV

Course Outcome No.	**Statements**	**Knowledge Level, KL**
CO1	The idea of Fourier Transforms, Z- Transform and application to solve numerical problems.	K3 (Apply)
CO2	The concept of probability distribution and their application.	K3 (Apply)
CO3	The concepts of numerical techniques.	K3 (Apply)
CO4	The concept of hypothesis and ANOVA, t – test, and $\chi 2$- test.	K3 (Apply)
CO5	The idea of design ,statistical quality control and control charts	K3 (Apply)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	3	1	2	3	3				3		3	3	3	3	2
CO2	3	3	1	2	3	3				3		3	3	3	3	2
CO3	2	3	1	3	3	3				3		3	3	3	3	2
CO4	3	3	1	3	3	3				3		3	3	3	3	2
CO5	2	3	2	3	3	3				3		3	3	3	3	2
Average	**2.6**	**3**	**1.2**	**2.6**	**3**	**3**				**3**		**3**	**3**	**3**	**3**	**2**

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: Technical Communication (BAS-301)	**NAME(S) OF FACULTY INVOLVED:** Dr. R.R Panda, Mr. Dushyant Rana
SESSION: 2023-24	**YEAR / SEM:** II / III

Course Outcome No.	**Statements**	**Knowledge Level, KL**
CO1	Understand the nature and objective of technical communication relevant for the workplace as engineers.	K2 (Understand)
CO2	Develop an understanding of key concepts of writing, designing and speaking.	K3 (Apply)
CO3	Utilize the technical writing skills for the purposes of Technical Communication and its exposure in various dimensions	K3 (Apply)
CO4	Build up interpersonal communication traits that will make the transition from institution to workplace smoother and help them to excel in their jobs.	K3 (Apply)
CO5	APPLY technical communication to build their personal brand and handle crisis communication.	K3 (Apply)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1		2	2	2		3		2	3	3	3	3	3			2
CO2		2	3	3	1	3		3		3	3	3	3			2
CO3			1						1	3						2
CO4		2	2	3	3	3	3	3	3	3	3	3	3			2
CO5								3	3	3	2	1	3			2
Average		**2**	**2**	**2.67**	**2**	**3**	**3**	**2.75**	**2.5**	**3**	**2.75**	**2.5**	**3**			**2**

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: Communication Engineering (BEC-401)	**NAME (S) OF FACULTY INVOLVED:** Dr. Rohit Sharma ,Dr. Ajay Suri, Dr. Ritu Aggarwal
SESSION: 2023-24	**YEAR / SEM:** II / IV

Course Outcome No.	**Statements**	**Knowledge Level, KL**
CO1	Analyze and compare different analog modulation schemes for their efficiency and bandwidth.	K2 (Understand)
CO2	Appraise the behavior of a communication system in presence of noise.	K2 (Understand)
CO3	Assess pulsed modulation system and analyze their system performance.	K2 (Understand)
CO4	Investigate various multiplexing techniques.	K3 (Apply)
CO5	Illustrate different digital modulation schemes and compute the bit error performance.	K2 (Understand)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	3	3	3	3			2		2		3		3	3	3
CO2	3	3	3	3	3			2		2		3		3	3	3
CO3	3	3	3	3	3			2		2		3		3	3	3
CO4	3	3	3	3	3			2		2		3		3	3	3
CO5	3	3	3	3	3			2		2		3		3	3	3
Average	**3**	**3**	**3**	**3**	**3**			**2**		**2**		**3**		**3**	**3**	**3**

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: Analog Circuits (BEC-402)	**NAME (S) OF FACULTY INVOLVED:** Mr. Deepak Garg, Mr. Shailendra Bisariya, Ms. Unnati Mehta
SESSION: 2023-24	**YEAR / SEM:** II / IV

Course Outcome No.	**Statements**	**Knowledge Level, KL**
CO1	Understand the design of diodes and transistors-based circuits.	K2 (Understand)
CO2	Explain the concept of feedback topologies.	K3 (Apply)
CO3	Design the different types of oscillators.	K3 (Apply)
CO4	Describe the functioning of OP-AMP and design OP-AMP based circuits.	K2 (Understand)
CO5	Apply the concept of Operational amplifier to design linear and non-linear applications.	K3 (Apply)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	3	2	2	2					3		3	3		3	3
CO2	3	3	2	1	2					3		3	3		3	3
CO3	3	3	2	2	2					3		3	3		3	3
CO4	3	3	2	1	2					3		3	3		3	3
CO5	3	3	2	2	2					3		3	3		3	3
Average	**3**	**3**	**2**	**1.6**	**2**					**3**		**3**	**3**		**3**	**3**

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: Signal & System (BEC-403)	**NAME(S) OF FACULTY INVOLVED:** Ms. Pooja Pathak, Ms. Rakhi Kumari
SESSION:2023-2024	**YEAR / SEM:** II / IV

Course Outcome No.	**Statements**	**Knowledge Level, KL**
CO1	Analyze different types of signals	K3 (Apply)
CO2	Characterize linear shift-invariant (LSI) systems	K3 (Apply)
CO3	Represent continuous and discrete systems in time and frequency domain using Fourier series and transform.	K3 (Apply)
CO4	Diagnose discrete time signals in z-domain.	K3 (Apply)
CO5	Study sampling and reconstruction of a signal.	K2 (Understand)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	1										3	3	3	3	
CO2	3	2		1								3	3	3	3	
CO3	2	3	1	1	3							3	3	3	3	
CO4	2	3	1	1	3							3	3	3	3	
CO5	3	2	1	2	3							3	3	3	3	
Average	**2.6**	**2.2**	**1**	**1.25**	**3**							**3**	**3**	**3**	**3**	

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: Communication Engineering Lab (BEC-451)	**NAME(S) OF FACULTY INVOLVED:** Dr. Rohit Sharma, Dr. Ajay Suri, Dr. Navneet Sharma
SESSION: 2023-24	**YEAR / SEM:** II / IV

Course Outcome No.	**Statements**	**Knowledge Level, KL**
CO1	Analyze and compare different analog modulation schemes for their modulation factor and power.	K2 (Understand)
CO2	Study pulse amplitude modulation.	K2 (Understand)
CO3	Characterize different digital modulation schemes and can compute the bit error performance.	K2 (Understand)
CO4	Define and simulate the Phase shift keying.	K3 (Apply)
CO5	Design a front end BPSK modulator and demodulator.	K3 (Apply)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	3	1	3	3				3	3		3	3	3	3	2
CO2	3	3	2	3	3				3	3		3	3	3	3	2
CO3	3	3	1	3	3				3	3		3	3	3	3	2
CO4	3	3	2	3	3				3	3		3	3	3	3	2
CO5	3	3	2	3	3				3	3		3	3	3	3	2
Average	**3**	**3**	**1.6**	**3**	**3**				**3**	**3**		**3**	**3**	**3**	**3**	**2**

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: Analog circuit Lab (BEC-452)	**NAME (S) OF FACULTY INVOLVED:** Dr. Manish Zadoo, Mr. Shailendra BisariyaMs. Unnati Mehta,
SESSION:2023-24	**YEAR / SEM:** II / IV

Course Outcome No.	Statements	Knowledge Level, KL
CO1	Describe the characteristics of transistors.	K2 (Understand)
CO2	Practically demonstrate various configurations of amplifier circuits.	K3 (Apply)
CO3	Demonstrate the performance for sinusoidal and non- sinusoidal oscillators.	K3 (Apply)
CO4	Perform measurement and study of functioning of op-amp and design op-amp based circuits.	K3 (Apply)
CO5	Interpret the basics of ADC and DAC	K3 (Apply)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	2	3	3				3	3		1	3	3	3	3
CO2	3	3	2	3	3				3	3		1	3	3	3	3
CO3	3	3	2	3	3				3	3		1	3	3	3	3
CO4	3	3	2	3	3				3	3		1	3	3	3	3
CO5	3	3	2	3	3				3	3		1	3	3	3	3
Average	**3**	**3**	**2**	**3**	**3**				**3**	**3**		**1**	**3**	**3**	**3**	**3**

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: Signal System Lab (BEC-453)	**NAME(S) OF FACULTY INVOLVED:** Mr. Kamal Bhatia, Ms. Geetanjali Raj, Mr. Hitesh Tomar
SESSION: 2023-24	**YEAR / SEM:** II / IV

Course Outcome No.	**Statements**	**Knowledge Level, KL**
CO1	Understand the basics operation of MATLAB.	K2 (Understand)
CO2	Analyze the time domain and frequency domain signals.	K4 (Analyze)
CO3	Implement the concept of Fourier series and Fourier transforms.	K3 (Apply)
CO4	Find the stability of system using pole-zero diagrams and bode diagram.	K3 (Apply)
CO5	Design frequency response of the system.	K3 (Apply)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	3	2	3	3				3	3		3	3	3	3	2
CO2	3	3	2	3	3				3	3		3	3	3	3	2
CO3	3	3	2	3	3				3	3		3	3	3	3	2
CO4	3	3	2	3	3				3	3		3	3	3	3	2
CO5	3	3	3	3	3				3	3		3	3	3	3	2
Average	**3**	**3**	**2.2**	**3**	**3**				**3**	**3**		**3**	**3**	**3**	**3**	**2**

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: Cyber Security (BCC401)	**NAME(S) OF FACULTY INVOLVED:** Mr. Gaurav Vats
SESSION: 2023-24	**YEAR / SEM:** II / IV

Course Outcome No.	**Statements**	**Knowledge Level, KL**
CO1	Understand the basic concepts of cyber security and cybercrimes.	K2 (Understand)
CO2	Understand the security policies and cyber laws.	K2 (Understand)
CO3	Understand the tools and methods used in cyber crime	K2 (Understand)
CO4	Understand the concepts of cyber forensics	K2 (Understand)
CO5	Understand the cyber security policies and cyber laws	K2 (Understand)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	2	3		1	2	1	1	2	2		2	3	1	2	1
CO2	3	2	3	2	1			2	2	1		2	3	2	3	1
CO3	3	3	2	1	1	1		2	3	2		3	3	2	3	2
CO4	3	2	3	2	1	1	2	1	2	2		3	3	2	3	2
CO5	3	2	3		1	1	1	1	2	1		3	2	1	2	1
Average	**3**	**2.2**	**2.8**	**1.67**	**1**	**1.25**	**1.33**	**1.4**	**2.2**	**1.6**		**2.6**	**2.8**	**1.6**	**2.6**	**1.4**

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: Integrated Circuits (KEC-501])	**NAME (S) OF FACULTY INVOLVED:** Ms. Unnati Mehta
SESSION: 2023-24	**YEAR / SEM:** III / V

Course Outcome No.	**Statements**	**Knowledge Level, KL**
CO1	Explain complete internal analysis of op-amp 741-ic	K2 (Understand)
CO2	Examine and design op-amp based circuits and basic components of ics such as various types of filter.	K3 (Apply)
CO3	Implement the concept of op-amp to design op-amp based non-linear applications and wave-shaping circuits.	K3 (Apply)
CO4	Analyse and design basic digital ic circuits using CMOS technology.	K3 (Apply)
CO5	Describe the functioning of application specific ics such as 555Timer, VCO IC 566 and PLL.	K2 (Understand)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	3	2	1	2							3	3	3	3	3
CO2	3	3	3	2	2	3						3	3	3	3	3
CO3	3	3	3	1	2							3	3	3	3	3
CO4	3	3	3	2	2							3	3	3	3	3
CO5	2	3	3		2	3						3	3	3	3	3
Average	**2.8**	**2.8**	**2.8**	**1.5**	**2**	**3**						**3**	**3**	**3**	**3**	**3**

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: MICROPROCESSOR & MICROCONTROLLERS (KEC502)	**NAME (S) OF FACULTY INVOLVED:** Ms. Ranjeeta Yadav , Ms. Anupam Singh
SESSION: 2023-24	**YEAR / SEM:** III / V

Course Outcome No.	**Statements**	**Knowledge Level, KL**
CO1	Demonstrate the basic architecture of 8085.	K2 (Understand)
CO2	Illustrate the programming model of microprocessors & write program using 8085 microprocessor.	K3 (Apply)
CO3	Interpret the basics of 8086 Microprocessor and interface different external Peripheral Devices like timer, USART etc. with Microprocessor (8085/8086).	K2 (Understand)
CO4	Compare Microprocessors & Microcontrollers, and comprehend the architecture of 8051 microcontroller	K3 (Apply)
CO5	Outline the programming model of 8051 and implement them to design projects on real time problems.	K4 (Analyze)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	2	3			3							3	3	3	3	
CO2	2	3	1	2	3							3	3	3	3	
CO3	2	3	1	2	3							3	3	3	3	
CO4	2	3		2	3							3	3	3	3	
CO5	2	3	2	2	3							3	3	3	3	
Average	**2**	**3**	**1.33**	**2**	**3**							**3**	**3**	**3**	**3**	

ABES ENGINEERING COLLEGE, GHAZIABAD	
DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING	
CO-PO-PSO MAPPING Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic	
NAME OF SUBJECT WITH SUBJECT CODE: Digital Signal Processing (KEC-503)	**NAME(S) OF FACULTY INVOLVED:** Ms. Tania Gupta
SESSION: 2023-24	**YEAR / SEM:** III/ V

Course Outcome No.	Statements	Knowledge Level, KL
CO1	Design and describe different types of realizations of digital systems (IIR and FIR) and their utilities.	K3 (Apply)
CO2	Select design parameters of analog IIR digital filters (Butterworth and Chebyshev filters) and implement various methods such as impulse invariant transformation and bilinear transformation of conversion of analog to digital filters.	K3 (Apply)
CO3	Develop FIR filter using various types of window functions.	K3 (Apply)
CO4	Define the principle of discrete Fourier transform & its various properties and concept of circular and linear convolution. Also, students will be able to define and implement FFT i.e. a fast computation method of DFT.	K3 (Apply)
CO5	Identify the concept of decimation and interpolation. Also, implement it in various practical applications.	K3 (Apply)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1		1									3	3		
CO2	3	1	1	1									3	3		
CO3	3	1	1	1									3			
CO4	3	1		1									3	3		
CO5	3	1	1	1									3	3		
Average	**2.8**	**1**	**1**	**1**									**3**	**3**		

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: VLSI Technology (KEC-053)	**NAME (S) OF FACULTY INVOLVED:** Mr. Shailendra Bisariya
SESSION: 2023-24	**YEAR / SEM:** III/ V

Course Outcome No.	**Statements**	**Knowledge Level, KL**
CO1	Interpret the basics of crystal growth, wafer preparation and wafer cleaning.	K2 (Understand)
CO2	Evaluate the process of Epitaxy and oxidation.	K3 (Apply)
CO3	Differentiate the lithography, etching and deposition process.	K2 (Understand)
CO4	Analyze the process of diffusion and ion implantation.	K3 (Apply)
CO5	Express the basic process involved in metallization and packaging.	K2 (Understand)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	2	2	1	1	3		2					3	3	3	3	
CO2	2	3	1	2	1							3	3	3	3	
CO3	2	2	1	2	3							3	3	3	3	
CO4	2	3	1	1	1							3	3	3	3	
CO5	2	2	2	2	1							3	3	3	3	
Average	**2**	**2.4**	**1.2**	**1.6**	**1.8**		**2**					**3**	**3**	**3**	**3**	

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: Optical Communication (KEC-058)	**NAME(S) OF FACULTY INVOLVED:** Dr. Priyanka Bhardwaj, Dr. ManiDipa Roy
SESSION:2023-2024	**YEAR / SEM:** III/V

Course Outcome No.	**Statements**	**Knowledge Level, KL**
CO1	Define and explain the basic concepts and theory of optical communication.	K2 (Understand)
CO2	Describe the signal losses with their computation and dispersion mechanism occurring inside the optical fiber cable.	K3 (Apply)
CO3	Differentiate the optical sources used in optical communication with their comparative study.	K3 (Apply)
CO4	Identify different optical components on receiver side; assemble them to solve real world problems related to optical communication systems.	K3 (Apply)
CO5	Evaluate the performance of an optical receiver to get idea about power budget and ultimately be an engineer with adequate knowledge in optical domain.	K4 (Analyze)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	2	1	2	3							3	3	3	3	2
CO2	3	2	1	2	3							3	3	3	3	2
CO3	3	2		1	3							3	3	3	3	2
CO4	3	1	1	3	3							3	3	3	3	2
CO5	3	1	2	2	3	3	3					3	3	3	3	2
Average	**3**	**1.6**	**1.25**	**2**	**3**	**3**	**3**					**3**	**3**	**3**	**3**	**2**

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: Integrated Circuit Lab (KEC-551)	**NAME(S) OF FACULTY INVOLVED:** Mr. Deepak Garg, Ms. Unnati Mehta, Ms. Shilpa Srivastava
SESSION: 2023-24	**YEAR / SEM:** III / V

Course Outcome No.	**Statements**	**Knowledge Level, KL**
CO1	Design different non-linear applications of operational amplifiers such as log, antilog amplifiers and voltage comparators.	K3 (Apply)
CO2	Explain and design different linear applications of operational amplifiers such as filters.	K3 (Apply)
CO3	Demonstrate the function of waveforms generator using op-Amp.	K3 (Apply)
CO4	Construct multivibrator and oscillator circuits using IC555 and IC566 and perform measurements of frequency and time.	K3 (Apply)
CO5	Develop and practically demonstrate the applications based on IC555 and IC566.	K3 (Apply)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	3	2	3	3				3	3			3	3		
CO2	3	3	2	3	3				3	3			3	3		
CO3	3	3	2	3	3				3	3			3			
CO4	3	3	2	3	3				3	3			3	3		
CO5	3	3	2	3	3				3	3			3	3		
Average	**2.5**	**2.5**	**1.67**	**2.5**	**2.5**				**2.5**	**2.5**			**2.5**	**3**		

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: Microprocessor & Microcontroller Lab (KEC-552)	**NAME(S) OF FACULTY INVOLVED:** Dr. Jugul Kishore Gupta, Ms. Ranjeeta Yadav , Dr. Rajeesh Kr. Singh, Mr. Rajeev Pandey, Ms. Anupam
SESSION: 2023-24	**YEAR / SEM:** III / V

Course Outcome No.	**Statements**	**Knowledge Level, KL**
CO1	Use techniques, skills, modern engineering tools, instrumentation and software/hardware appropriately to list and demonstrate arithmetic and logical operations on 8 bit data using microprocessor 8085.	K3 (Apply)
CO2	Examine 8085 & 8086 microprocessor and its interfacing with peripheral devices.	K3 (Apply)
CO3	State various conversion techniques using 8085 & 8086 and generate waveforms using 8085.	K3 (Apply)
CO4	Implement programming concept of 8051 Microcontroller.	K3 (Apply)
CO5	Design concepts to Interface peripheral devices with Microcontroller so as to design Microcontroller based projects.	K3 (Apply)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	3	2	3	2	3		3	3	3		3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO3	2	3	1	3	3	3		3	3	3		3	3	3	3	3
CO4	2	2	2	2	1	3		3	3	3		3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Average	**2.6**	**2.8**	**2.2**	**2.8**	**2.4**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: Digital Signal Processing Lab (KEC-553)	**NAME(S) OF FACULTY INVOLVED:** Dr. Jugul Kishore Gupta, Ms. Ranjeeta Yadav, Ms. Geetanjali Raj,
SESSION: 2023-24	**YEAR / SEM:** III / V

Course Outcome No.	**Statements**	**Knowledge Level, KL**
CO1	Create and visualize various discrete/digital signals using MATLAB/Scilab	K3 (Apply)
CO2	Implement and test the basic operations of Signal Processing	K3 (Apply)
CO3	Examine and analyze the spectral parameters of window functions	K3 (Apply)
CO4	Design IIR and FIR filters for band pass, band stop, low pass and high pass filters.	K3 (Apply)
CO5	Develop the signal processing algorithms using MATLAB/Scilab.	K3 (Apply)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	3	2	2	3				3	2		3	3	3	3	2
CO2	3	3	2	2	3				3	2		3	3	3	3	2
CO3	3	3	2	2	3				3	2		3	3		3	2
CO4	3	3	2	2	3				3	2		3	3	3	3	2
CO5	3	3	2	2	3				3	2		3	3	3	3	2
Average	**3**	**3**	**2**	**2**	**3**				**3**	**2**		**3**	**3**	**3**	**3**	**2**

ABES ENGINEERING COLLEGE, GHAZIABAD	
DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING	
CO-PO-PSO MAPPING Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic	
NAME OF SUBJECT WITH SUBJECT CODE: Mini Project and Internship Lab Assessment (KEC-554)	**NAME(S) OF FACULTY INVOLVED:** Dr. Manish Zadoo, Dr. Manidipa Roy, Mr. Hitesh Tomar
SESSION:2023-24	**YEAR / SEM:** III / V

Course Outcome No.	Statements	Knowledge Level, KL
CO1	Understand the organ gram of the industry and appreciate the skill enhancement	K5 (Understand)
CO2	Write an effective mini-project or internship report	K3 (Apply)
CO3	Deliver an effective presentation	K3 (Apply)
CO4	Inculcate non-plagiarism and team work ethics	K3 (Apply)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3	3		3	3	3	3		3	3	3	3	3
CO2	1	3	3	3	3			3	3	3		3	3	3	3	3
CO3	1	3	3	3	3			3	3	3		3	3	3	3	3
CO4	1	3	3	3	3			3	3	3		3	3	3	3	3
Average	**1.5**	**3**	**3**	**3**	**3**		**3**	**3**	**3**	**3**		**3**	**3**	**3**	**3**	**3**

ABES ENGINEERING COLLEGE, GHAZIABAD	
DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING	
CO-PO-PSO MAPPING Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic	
NAME OF SUBJECT WITH SUBJECT CODE: Digital communication (KEC-601)	**NAME(S) OF FACULTY INVOLVED:** Dr. Priyanka Bharadwaj Ms. Upasana Sharma
SESSION:2023-24	**YEAR / SEM:** III / VI

Course Outcome No.	Statements	Knowledge Level, KL
CO1	To formulate basic statistics involved in communication theory.	K3 (Apply)
CO2	To demonstrate the concepts involved in digital communication.	K3 (Apply)
CO3	To explain the concepts of digital modulation schemes.	K2 (Understand)
CO4	To analyze the performance of digital communication systems.	K4 (Analyze)
CO5	To apply the concept of information theory in digital systems.	K3 (Apply)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3	3	3	2			3	1	3	3	3	3	3
CO2	3	3	2	3	3	3	2			3		3	3	3	3	3
CO3	2	3	3	3	3	3	3			3	1	3	3	3	3	3
CO4	3	3	3	3	3	3	3			3	1	3	3	3	3	3
CO5	3	3	3	3	3	3	2			3	2	3	3	3	3	3
Average	**2.8**	**3**	**2.8**	**3**	**3**	**3**	**2.4**			**3**	**1.25**	**3**	**3**	**3**	**3**	**3**

ABES ENGINEERING COLLEGE, GHAZIABAD	
DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING	
CO-PO-PSO MAPPING Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic	
NAME OF SUBJECT WITH SUBJECT CODE: Control System [KEC-602]	**NAME(S) OF FACULTY INVOLVED:** Dr. Raman Kapoor, Ms. Ranjeeta Yadav
SESSION:2023-24	**YEAR / SEM:** III / VI

Course Outcome No.	Statements	Knowledge Level, KL
CO1	Describe the basics of control systems along with different types of feedback and its effect. Additionally they will also be able to explain the techniques such as block diagrams reduction, signal flow graph and modelling of various physical systems along with modelling of DC servomotor.	K3 (Apply)
CO2	Explain the concept of state variables for the representation of LTI system.	K3 (Apply)
CO3	Interpret the time domain response analysis for various types of inputs along with the time domain specifications.	K3 (Apply)
CO4	Distinguish the concepts of absolute and relative stability for continuous data systems along with different methods.	K3 (Apply)
CO5	Interpret the concept of frequency domain response analysis and their specifications.	K3 (Apply)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	2	2	3					2		3	3	3	3	2
CO2	3	3	3	2	3					2		3	3	3	3	2
CO3	3	3	2	3	3					2		3	3	3	3	2
CO4	2	3	1	3	3					2		3	3	3	3	2
CO5	3	3	2	3	3					2		3	3	3	3	2
Average	**2.8**	**3**	**2**	**2.6**	**3**					**2**		**3**	**3**	**3**	**3**	**2**

ABES ENGINEERING COLLEGE, GHAZIABAD	
DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING	
CO-PO-PSO MAPPING Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic	
NAME OF SUBJECT WITH SUBJECT CODE: Antenna and Wave Propagation [KEC 603]	**NAME(S) OF FACULTY INVOLVED:** Dr. Manidipa Roy, Dr. Jugul Kishor
SESSION:2023-24	**YEAR / SEM:** III / VI

Course Outcome No.	Statements	Knowledge Level, KL
CO1	Identify different coordinate systems and their applications in electromagnetic field theory to establish a relation between any two systems using the vector calculus.	K3 (Apply)
CO2	Explain the concept of static electric field, current and properties of conductors.	K2 (Understand)
CO3	Express the basic concepts of ground, space, sky wave propagation mechanism.	K2 (Understand)
CO4	Demonstrate the knowledge of antenna fundamentals and radiation mechanism of the antenna.	K3 (Apply)
CO5	Analyze and design different types of basic antennas.	K4 (Analyze)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	2			3	2					3	3			3
CO2	3	3	2			3	2					3	3		3	3
CO3	3	3	2			3	2					3	3		3	3
CO4	3	3	2			3	2					3	3		3	3
CO5	3	3	3			3	3					3	3		3	3
Average	**3**	**3**	**2.2**			**3**	**2.2**					**3**	**3**		**3**	**3**

ABES ENGINEERING COLLEGE, GHAZIABAD	
DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING	
CO-PO-PSO MAPPING Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic	
NAME OF SUBJECT WITH SUBJECT CODE: Data Communication Networks [KEC-063]	**NAME(S) OF FACULTY INVOLVED:** Mr. Kamal Bhatia, Ms. Anupam
SESSION:2023-24	**YEAR / SEM:** III / VI

Course Outcome No.	Statements	Knowledge Level, KL
CO1	Identify the issues and challenges in the architecture of a network.	K2 (Understand)
CO2	Analyze the services and features of various protocol layers in data layer.	K3 (Apply)
CO3	Demonstrate the knowledge of multiple access to design a access technique for a particular application.	K3 (Apply)
CO4	Realize protocols at different layers of a network hierarchy.	K3 (Apply)
CO5	Recognize security issues in a network and various application of application layer.	K2 (Understand)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	2	1	1		3	3	3		3	2	3	3		3	2
CO2	2	2	1	1		3	3	3		3	2	3	3		3	2
CO3	2	2	1	1		3	3	3		3	2	3	3		3	2
CO4	2	2	1	1		3	3	3		3	2	3	3		3	2
CO5	2	2	1	1		3	3	3		3	2	3	3		3	2
Average	**2**	**2**	**1**	**1**		**3**	**3**	**3**		**3**	**2**	**3**	**3**		**3**	**2**

ABES ENGINEERING COLLEGE, GHAZIABAD	
DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING	
CO-PO-PSO MAPPING Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic	
NAME OF SUBJECT WITH SUBJECT CODE: Basics Of DBMS (KOE067)	**NAME(S) OF FACULTY INVOLVED:** Ms. Shalini Shah
SESSION:2023-24	**YEAR / SEM:** III / VI

Course Outcome No.	Statements	Knowledge Level, KL
CO1	Describe the features of a database system and its application and compare various types of data models.	K2 (Understand)
CO2	Construct an ER Model for a given problem and transform it into a relation database schema.	K3 (Apply)
CO3	Formulate solution to a query problem using SQL Commands, relational algebra, tuple calculus and domain calculus.	K3 (Apply)
CO4	Explain the need of normalization and normalize a given relation to the desired normal form.	K3 (Apply)
CO5	Explain different approaches to transaction processing and concurrency control.	K2 (Understand)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1			1												
CO2	1	2	3	3	3		3		3	3	1	3		3		
CO3	2	3	2	3	3	3	2		2		1	3	2			
CO4	1	1	1	1					1			3	3			
CO5	1	1										3				
Average	**1.2**	**1.75**	**2**	**2**	**3**	**3**	**2.5**		**2**	**3**	**1**	**3**	**2.5**	**3**		

ABES ENGINEERING COLLEGE, GHAZIABAD	
DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING	
CO-PO-PSO MAPPING Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic	
NAME OF SUBJECT WITH SUBJECT CODE: DIGITAL COMMUNICATION LAB (KEC651)	**NAME(S) OF FACULTY INVOLVED:** **Dr. Navneet Sharma, Ms. Upasana Sharma**
SESSION:2023-24	**YEAR / SEM:** III / VI

Course Outcome No.	Statements	Knowledge Level, KL
CO1	To formulate basic concepts of pulse shaping in digital communication	K3 (Apply)
CO2	To identify different line coding techniques and demonstrate the concepts.	K3 (Apply)
CO3	To design equipments related to digital modulation and demodulation schemes.	K2 (Understand)
CO4	To analyze the performance of digital communication systems.	K4 (Analyze)
CO5	To conceptualize error detection & correction using different coding schemes in digital communication.	K3 (Apply)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	1	3								3	3	3	3	3
CO2	3	3		3								3	3	3	3	3
CO3	3	3	2	3		3						3	3	3	3	3
CO4	3	3	2	3								3	3	3	3	3
CO5	3	3	2	3								3	3	3	3	3
Average	**3**	**3**	**1.75**	**3**		**3**						**3**	**3**	**3**	**3**	**3**

ABES ENGINEERING COLLEGE, GHAZIABAD	
DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING	
CO-PO-PSO MAPPING Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic	
NAME OF SUBJECT WITH SUBJECT CODE: CONTROL SYSTEM LAB (KEC-652)	**NAME(S) OF FACULTY INVOLVED:** Dr. Jugul Kishore Gupta, Mr. Manish
SESSION:2023-24	**YEAR / SEM:** III / VI

Course Outcome No.	Statements	Knowledge Level, KL
CO1	Classify different tools in MATLAB along with the basic matrix operations used in MATLAB.	K3 (Apply)
CO2	Evaluate the poles and zeros on s-plane along with transfer function of a given system.	K3 (Apply)
CO3	Construct state space model of a linear continuous system.	K3 (Apply)
CO4	Interpret the various specifications of time domain response of a given system.	K3 (Apply)
CO5	Appraise the steady state error of a given transfer function.	K3 (Apply)
CO6	Examine the relative stability of a given transfer function using various methods such as root locus, Bode plot and Nyquist plot.	K3 (Apply)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	2	2	3				3	2		3	3	3	3	2
CO2	3	3	2	2	3				3	2		3	3	3	3	2
CO3	3	3	2	2	3				3	2		3	3		3	2
CO4	3	3	2	2	3				3	2		3	3	3	3	2
CO5	3	3	2	2	3				3	2		3	3	3	3	2
CO6	3	3	2	2	3				3	2		3	3	3	3	2
Average	**3**	**3**	**2**	**2**	**3**				**3**	**2**		**3**	**3**	**3**	**3**	**2**

ABES ENGINEERING COLLEGE, GHAZIABAD	
DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING	
CO-PO-PSO MAPPING Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic	
NAME OF SUBJECT WITH SUBJECT CODE: CAD of Electronics Lab (KEC-653B)	**NAME(S) OF FACULTY INVOLVED:** Dr. Raman Kapoor, Mr. Rajeev Pandey,
SESSION:2023-24	**YEAR / SEM:** III / VI

Course Outcome No.	Statements	Knowledge Level, KL
CO1	Design and analyze the performance of different type of inverters.	K4 (Analyze)
CO2	Create and explain the performance of the basic logic gates using CMOS inverter circuit.	K3 (Apply)
CO3	Construct and survey the performance of the memory based digital circuits using CMOS inverter circuit.	K3 (Apply)
CO4	Appraise the performance of the different configuration of MOS amplifier circuits.	K4 (Analyze)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3	3				3	3		3	3	3	3	2
CO2	3	3	3	3	3				3	3		3	3	3	3	2
CO3	3	3	3	3	3				3	3		3	3	3	3	2
CO4	3	3	3	3	3				3	3		3	3	3	3	2
CO5	3	3	3	3	3				3	3		3	3	3	3	2
Average	**3**	**3**	**3**	**3**	**3**				**3**	**3**		**3**	**3**	**3**	**3**	**2**

ABES ENGINEERING COLLEGE, GHAZIABAD	
DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING	
CO-PO-PSO MAPPING Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic	
NAME OF SUBJECT WITH SUBJECT CODE: Project Management & Entrepreneurship KHU-702	**NAME(S) OF FACULTY INVOLVED:** Mr. Rajeev Pandey
SESSION:2023-24	**YEAR / SEM:** IV / VII

Course Outcome No.	Statements	Knowledge Level, KL
CO1	Understand need, scope and definition of entrepreneurship.	K2 (Understand)
CO2	Explain innovation and create sustaining enterprising model.	K2 (Understand)
CO3	Discuss project management: meaning, scope & importance, role of project manager.	K2 (Understand)
CO4	Estimate project cost & working capital requirements.	K3 (Apply)
CO5	Analyze social sector perspectives and social entrepreneurship.	K4 (Analyze)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1		1	1	1	2	3	3	3	3	1	3	2				3
CO2	1	3	3	3	3	3	3	3	3	2	3	3		2	2	3
CO3	1	1	1	1	1	2	2	3	3	3	3	2				2
CO4						3	3	3			3	2				3
CO5	1	2	2	1	1	3	3	3	2	1		1				3
Average	**1**	**1**	**1.75**	**1.5**	**1.75**	**2.8**	**2.8**	**3**	**2.75**	**1.75**	**3**	**2**		**2**	**2**	**2.8**

ABES ENGINEERING COLLEGE, GHAZIABAD	
DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING	
CO-PO-PSO MAPPING Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic	
NAME OF SUBJECT WITH SUBJECT CODE: VLSI Design [KEC-072]	**NAME(S) OF FACULTY INVOLVED:** Dr. Raman Kapoor
SESSION:2023-24	**YEAR / SEM:** IV / VII

Course Outcome No.	Statements	Knowledge Level, KL
CO1	Express the concept of VLSI design and CMOS circuits and delay study.	K2 (Understand)
CO2	Analyze mathematical methods and circuit analysis models in analysis of CMOS digital electronics circuits.	K4 (Analyze)
CO3	Design and analyze various combinational & sequential circuits based on CMOS technology.	K4 (Analyze)
CO4	Examine power logic circuits and different semiconductor memories used in present day technology.	K3 (Apply)
CO5	Interpret faults in digital circuits, Fault Models and various Testing Methodologies	K3 (Apply)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	2	3	3	2			2		3	3	3	3	2
CO2	3	3	3	3	2	3				2		3	3	3	3	2
CO3	3	3	3	3	3	3				2		3	3	3	3	2
CO4	3	3	3	2	2	3				2		3	3	3	3	2
CO5	3	2	3	3	2	3				2		3	3	3	3	2
Average	**3**	**2.8**	**3**	**2.6**	**2.4**	**3**	**2**			**2**		**3**	**3**	**3**	**3**	**2**

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: Information Theory and Coding (KEC 075)	**NAME(S) OF FACULTY INVOLVED:** Shilpa Srivastava
SESSION:2023-24	**YEAR / SEM:** IV / VII

Course Outcome No.	Statements	Knowledge Level, KL
CO1	Explain each block involved in digital communication thoroughly with applications.	K2 [Understand]
CO2	Apply the knowledge of basic concepts of probability and entropies to analyze the behavior of a communication system.	K2 [Understand]
CO3	Analyze the use of source coding and evaluating all the techniques of source coding.	K2 [Understand]
CO4	Examine the significance of channel coding and evaluating all available techniques of channel coding and decoding with challenges.	K2 [Understand]
CO5	Examine various error control coding techniques.	K2 [Understand]

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3	3		3					3	3	3	3	3
CO2	3	3	3	3	3							3	3	3	3	3
CO3	3	3	3	3	3							3	3	3	3	3
CO4	3	3	3	3	3							3	3	3	3	3
CO5	3	3	3	3	3							3	3	3	3	3
Average	**3**	**3**	**3**	**3**	**3**		**3**					**3**	**3**	**3**	**3**	**3**

ABES ENGINEERING COLLEGE, GHAZIABAD	
DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING	
CO-PO-PSO MAPPING Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic	
NAME OF SUBJECT WITH SUBJECT CODE: Wireless and Mobile Communication (KEC 076)	**NAME(S) OF FACULTY INVOLVED:** Ms. Upasana Sharma
SESSION:2023-24	**YEAR / SEM:** IV / VII

Course Outcome No.	Statements	Knowledge Level, KL
CO1	Express the basic knowledge of mobile radio & cellular communication fundamentals and their application to propagation mechanisms, path loss models and multi-path phenomenon.	K3 (Apply)
CO2	Analyze the performance of various voice coding and diversity techniques.	K3 (Apply)
CO3	Apply the knowledge of wireless transmission basics to understand the concepts of equalization and multiple access techniques.	K3 (Apply)
CO4	Examine the performance of cellular systems being employed such as GSM, CDMA and LTE using various theoretical and mathematical aspects.	K2 (Understand)
CO5	Describe basic knowledge of mobile adhoc networks and the existing & upcoming data communication networks in wireless and mobile communication domain.	K3 (Apply)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	2	1		3	2			3	1	3	3			3
CO2	3	3	3	1		3	2			3	1	3	3		3	3
CO3	3	3	3	1		3	2			3	3	3	3		3	3
CO4	3	3	2	1		3	2	2		3	3	3	3		3	3
CO5	3	3	3	3	3	3	3	2		3	2	3	3	3	3	3
Average	**3**	**3**	**2.6**	**1.4**	**3**	**3**	**2.2**	**2**		**3**	**2**	**3**	**3**	**3**	**3**	**3**

ABES ENGINEERING COLLEGE, GHAZIABAD	
DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING	
CO-PO-PSO MAPPING Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic	
NAME OF SUBJECT WITH SUBJECT CODE: Renewable Energy Resources [KOE-074]	**NAME(S) OF FACULTY INVOLVED:** Mr. Deepak Garg
SESSION:2023-24	**YEAR / SEM:** IV / VII

Course Outcome No.	Statements	Knowledge Level, KL
CO1	Distinguish about different types of renewable and nonrenewable energy resources and review their advantages and disadvantages. Also demonstrate the working and limitations of various solar cells, solar arrays and solar cell power plants	K3 (Apply)
CO2	Analyze solar radiation and flat plate collector, solar thermal power plant and thermal energy storage for heating and cooling.	K2 (Understand)
CO3	Differentiate between different types of geothermal resources, analysis of geothermal resources and geothermal energy conversion. Also to understand mhd and their performance and understand different types of fuel cells.	K2 (Understand)
CO4	Understand thermo-electrical power conversion and thermionic power conversion and also wind energy, energy estimation of wind, types of rotors and conversion systems.	K3 (Apply)
CO5	Compare between different forms of biomass and their fuel properties. also ocean thermal energy and their conversion technology, wave energy technology and tidal energy technology.	K2 (Understand)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	2			3	2					3	3		3	3
CO2	3	3	1			3	2					3	3		3	3
CO3	3	3	1			3	2					3	3		3	3
CO4	3	3	1			3	2					3	3		3	3
CO5	3	3	1			3	2					3	3		3	3
Average	**3**	**3**	**1.2**			**3**	**2**					**3**	**3**		**3**	**3**

ABES ENGINEERING COLLEGE, GHAZIABAD	
DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING	
CO-PO-PSO MAPPING Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic	
NAME OF SUBJECT WITH SUBJECT CODE: VLSI Design Lab [KEC-751B]	**NAME(S) OF FACULTY INVOLVED:** Dr. Raman Kapoor & Mr. Shailendra Bisariya
SESSION:2023-24	**YEAR / SEM:** IV / VII

Course Outcome No.	Statements	Knowledge Level, KL
CO1	Designing of Logic Gates.	K3 (Apply)
CO2	Implementation of combinational and sequential circuits using CMOS logic.	K3 (Apply)
CO3	Analyze amplifier circuits.	K4 (Analyze)
CO4	Design sequential circuits such as flip flop.	K3 (Apply)
CO5	Do the layout designing for physical analysis of the MOS transistor and MOS based circuits.	K4 (Analyze)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	2	1	1	3		2					3	3	3	3	
CO2	2	3	1	2	1							3	3	3	3	
CO3	2	2	1	2	3							3	3	3	3	
CO4	2	3	1	1	1							3	3	3	3	
CO5	2	2	2	2	1							3	3	3	3	
Average	**2**	**2.4**	**1.2**	**1.6**	**1.8**		**2**					**3**	**3**	**3**	**3**	

ABES ENGINEERING COLLEGE, GHAZIABAD	
DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING	
CO-PO-PSO MAPPING Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic	
NAME OF SUBJECT WITH SUBJECT CODE: Mini Project and Internship (KEC-752)	**NAME(S) OF FACULTY INVOLVED:** Mr. Deepak Garg, Ms. Shilpa Srivastava, Ms. Upasana Sharma
SESSION:2023-24	**YEAR / SEM:** IV / VII

Course Outcome No.	Statements	Knowledge Level, KL
CO1	Understand the organogram of the industry and appreciate the skill enhancement	K2 (Understand)
CO2	Write effective training report	K3 (Apply)
CO3	Deliver an effective presentation	K3 (Apply)
CO4	Prepare well organized training diary	K3 (Apply)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3	3		3	3	3	3		3	3	3	3	3
CO2	1	3	3	3	3			3	3	3		3	3	3	3	3
CO3	1	3	3	3	3			3	3	3		3	3	3	3	3
CO4	1	3	3	3	3			3	3	3		3	3	3	3	3
Average	**1.5**	**3**	**3**	**3**	**3**		**3**	**3**	**3**	**3**		**3**	**3**	**3**	**3**	**3**

ABES ENGINEERING COLLEGE, GHAZIABAD	
DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING	
CO-PO-PSO MAPPING Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic	
NAME OF SUBJECT WITH SUBJECT CODE: Project I (KEC753)	**NAME(S) OF FACULTY INVOLVED:** Mr. Manish, Dr. Ritu Aggarwal, Dr. Manidipa Roy, Mr. Deepak Garg, Ms. Shilpa Srivastava, Ms. Geetanjali Raj]
SESSION:2023-24	**YEAR / SEM:** IV / VII

Course Outcome No.	Statements	Knowledge Level, KL
CO1	An ability to prepare proposal which is relevant to subject of engineering.	K4 (Analyze)
CO2	An ability to design the system components and process and identify the engineering tools.	K5 (Evaluate)
CO3	An ability to use management skills and implement the task, manages problems encountered, work as a team and present the work progress	K6 (Create)
CO4	An ability to incorporate the suggestions made and manages resources and work as team.	K6 (Create)
CO5	An ability to write a document with standard technical report writing procedures.	K4 (Analysis)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	2	1		3	3	2			1	3	3		3	3
CO2	3	3	3	1		3			3		1	3	3		3	3
CO3	3	3	2	1	1	3			3		1	3	3		3	3
CO4	3	3	2	1	1	3					1	3	3	3	3	3
CO5										2						3
Average	**3**	**3**	**2.25**	**1**	**1**	**3**	**3**	**2**	**3**	**2**	**1**	**3**	**3**	**3**	**3**	**3**

ABES ENGINEERING COLLEGE, GHAZIABAD	
DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING	
CO-PO-PSO MAPPING Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic	
NAME OF SUBJECT WITH SUBJECT CODE: Rural Development: Administration and Planning (KHU-801)	**NAME(S) OF FACULTY INVOLVED:** Mr. Deepak Garg
SESSION:2023-24	**YEAR / SEM:** IV / VIII

Course Outcome No.	Statements	Knowledge Level, KL
CO1	Understand need, scope and definition of entrepreneurship.	K2 (Understand)
CO2	Explain innovation and create sustaining enterprising model.	K2 (Understand)
CO3	Discuss project management: meaning, scope & importance, role of project manager.	K2 (Understand)
CO4	Estimate project cost & working capital requirements.	K3 (Apply)
CO5	Analyze social sector perspectives and social entrepreneurship.	K4 (Analyze)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1						2	3		1			3				3
CO2						3	2				3	3				3
CO3						3	3	2	1	1	2	3				3
CO4						3					3	3				3
CO5						3	1	1	3	1		3				3
Average						**2.8**	**2.25**	**1.5**	**1.67**	**1**	**2.67**	**3**				**3**

ABES ENGINEERING COLLEGE, GHAZIABAD	
DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING	
CO-PO-PSO MAPPING Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic	
NAME OF SUBJECT WITH SUBJECT CODE: Entrepreneurship Development [KOE-083]	**NAME(S) OF FACULTY INVOLVED:** Dr. Navneet Sharma
SESSION:2023-24	**YEAR / SEM:** IV / VIII

Course Outcome No.	Statements	Knowledge Level, KL
CO1	Understand entrepreneurship-small scale and large-scale industries.	K2 (Understand)
CO2	Assess viability, formulation, evaluation, financing for identifying project.	K4 (Analyze)
CO3	Prepare balance sheet and predict economic viability.	K3 (Apply)
CO4	Compile cost of capital approach in project planning and control.	K3 (Apply)
CO5	Explain laws concerning entrepreneur viz, partnership laws, business ownership, sales and income taxes	K2 (Understand)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	1	1	2	2	2	2	2	2	2				2
CO2	2	3	2	2	3	3	3	3	2	2	3	3				3
CO3	1	1		1	2	2	2	2		2	3	1				2
CO4						2		2	2	2	3	2				2
CO5						3		2		2	1	1				2
Average	**1.33**	**1.67**	**1.5**	**1.33**	**2**	**2.4**	**2.33**	**2.2**	**2**	**2**	**2.4**	**1.8**				**2.2**

ABES ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CO-PO-PSO MAPPING

Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic

NAME OF SUBJECT WITH SUBJECT CODE: DIGITAL AND SOCIAL MEDIA MARKETING [KOE-094]	**NAME(S) OF FACULTY INVOLVED:** Mr. RAJEEV KUMAR PANDEY
SESSION:2023-24	**YEAR / SEM:** IV / VIII

Course Outcome No.	Statements	Knowledge Level, KL
CO1	Explain trends that are driving shifts from traditional marketing practices to digital marketing practices.	K2 (Understand)
CO2	Describe different strategies used in Social Media Marketing.	K2 (Understand)
CO3	Generalize steps used to Acquire & Engage Users through Digital Channels.	K2 (Understand)
CO4	Design Organization for Digital Success.	K4 (Analyze)
CO5	Compare different Digital Innovation and Trends.	K4 (Analyze)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1			1	1	2	3	2	3		2		3				
CO2			1	3	2	3	3	3		3	2	3				2
CO3		2	1	3	2	3	3	3		3	3	3				2
CO4		2	1	3	2	3	3	3	3	2	3	1				2
CO5		1	1	1	2	3	2	3		2	1	3				
Average		**1.67**	**1**	**2.2**	**2**	**3**	**2.6**	**3**	**3**	**2.4**	**2.25**	**2.6**				**2**

ABES ENGINEERING COLLEGE, GHAZIABAD	
DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING	
CO-PO-PSO MAPPING Ref: AICTE Examination Reforms (w.e.f. November, 2018) & Prof. Dr.) N.J.Rao, IISc Banglore, NPTEL, https://www.youtube.com/watch?v=28mjSlfKWic	
NAME OF SUBJECT WITH SUBJECT CODE: Project II (KEC851)	**NAME(S) OF FACULTY INVOLVED:** Mr. Manish, Dr. Jugul Kishore Gupta, Dr. Manidipa Roy, Ms. Shilpa Srivastava, Ms. Geetanjali Raj, Dr. Ritu Aggarwal, Mr. Deepak Garg
SESSION:2022-23	**YEAR / SEM:** IV / VIII

Course Outcome No.	Statements	Knowledge Level, KL
CO1	An ability to prepare proposal which is relevant to subject of engineering.	K4 (Analyze)
CO2	An ability to design the system components and process and identify the engineering tools.	K5 (Evaluate)
CO3	An ability to use management skills and implement the task, manages problems encountered, work as a team and present the work progress	K6 (Create)
CO4	An ability to incorporate the suggestions made and manages resources and work as team.	K6 (Create)
CO5	An ability to write a document with standard technical report writing procedures.	K4 (Analysis)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	3	3		3		3	2			1	3	3		3	3
CO2	3	3	3		2				3		1	3	3		3	3
CO3	2	1	1	3	1	2			3		1	3	3		3	3
CO4	3			3	2	3					1	3	3	3	3	3
CO5			1		1					2						3
Average	**2.25**	**2.33**	**2**	**3**	**1.8**	**2.5**	**3**	**2**	**3**	**2**	**1**	**3**	**3**	**3**	**3**	**3**