NED University of Engineering and Technology

Department of Electrical Engineering

Bachelor of Engineering (Electrical)

DEPARTMENTAL OUTCOME BASED EDUCATION CATALOGUE

Batch 2020

Contents

1. Vision Statement

a. University Vision

Be a leader in enabling Pakistan's social and economic transformation.

b. Department Vision

Be an innovator in electrical engineering education and research to spearhead sustainable and environment-friendly socio-economic growth.

2. Mission Statement

a. University Mission

Acquire education and research excellence in engineering and allied disciplines to produce leadership and enabling application of knowledge and skills for the benefit of the society with integrity and wisdom.

b. Programme Mission

To inculcate students with essential knowledge, skills and values required for sustainable design, development and innovation in the field of electrical engineering for socio-economic growth and enabling them for lifelong learning to contribute towards interdisciplinary engineering solutions.

3. Program Educational Objectives (PEOs)

PEO-1: Demonstrate clear understanding and a vision of the core domains of electrical engineering as well as contemporary interdisciplinary research areas.

PEO-2: Identify prevalent engineering problems in work/social environments, investigate their causes and propose sustainable solutions with complete cognizance of environmental impacts.

PEO-3: Spearhead goal-oriented execution of engineering and/or research projects by applying relevant knowledge and skill set innovatively while adhering to work ethics and contemporary project management practices.

PEO-4: Pursue lifelong learning goals, continual professional development and contribute to sustainable growth of the society.

4. Mapping of PEOs to University and Departmental Vision and Mission

Vision and Mission		Program Educational Objectives (PEOs)			
		PEO-1	PEO-2	PEO-3	PEO-4
University Vision	Be a leader[1,3] in enabling Pakistan's social[2] and economic transformation[4].	✓	✓	✓	✓
University Mission	Acquire education and research excellence[1] in engineering and allied disciplines to produce leadership[3] and enabling application of knowledge and skills[4] for the benefit of the society[2] with integrity and wisdom.	✓	✓	✓	✓
Department's Vision	Be an innovator[2] in electrical engineering education[1] and research to spearhead[3] sustainable and environment-friendly socio-economic growth[4].	✓	✓	✓	✓
Programme's Mission	To inculcate students with essential knowledge, skills and values[1] required for sustainable design, development[3] and innovation in the field of electrical engineering for socio-economic growth[2] and enabling them for lifelong learning to contribute towards interdisciplinary engineering solutions[4].	✓	✓	✓	✓

5. Program Learning Outcomes (PLOs)

The following graduate attributes as defined by PEC, have been adopted as Program Learning Outcomes (PLOs) by the department.

PLO-1 Engineering Knowledge: An ability to apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.

PLO-2 Problem Analysis: An ability to identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.

PLO-3 Design / Development of Solutions: An ability to design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

PLO-4 Investigation: An ability to investigate complex engineering problems in a methodical way including literature survey, design and conduct of experiments, analysis and interpretation of experimental data, and synthesis of information to derive valid conclusions.

PLO-5 Modern Tool Usage: An ability to create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering activities, with an understanding of the limitations.

PLO-6 The Engineer and Society: An ability to apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice and solution to complex engineering problems.

PLO-7 Environment and Sustainability: An ability to understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development.

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

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

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

PLO-11 Project Management: An ability to demonstrate management skills and apply engineering principles to one's own work, as a member and/or leader in a team, to manage projects in a multidisciplinary environment.

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

6. Mapping of PLOs to PEOs

Program Learning Outcomes (PLOs)	Program Educational Objectives (PEOs)			
	PEO-1	PEO-2	PEO-3	PEO-4
PLO 1: Engineering Knowledge	✓			
PLO 2: Problem Analysis	✓			
PLO 3: Design / Development of solutions		✓		
PLO 4: Investigation		✓		
PLO 5: Modern Tool Usage			✓	
PLO 6: The Engineer and Society				✓
PLO 7: Environment and Sustainability		✓		
PLO 8: Ethics			✓	
PLO 9: Individual and Team Work			✓	
PLO 10: Communication	✓			
PLO 11: Project Management			✓	
PLO 12: Lifelong Learning				✓

7. Scheme of Studies

Electrical Engineering

First Year

Fall Semester					Spring Semester				
Course Code	Course Title	Credit Hrs			Course Code	Course Title	Credit Hrs		
		Th	Pr	Total			Th	Pr	Total
EE-125	Basic Electrical Engineering	3	1	4	EE-156	Engineering Drawing	0	2	2
PH-122	Applied Physics	3	1	4	EE-126	Circuit Analysis	3	1	4
HS-111	Functional English	2	0	2	MT-227	Differential Equations	3	0	3
ME-116	Basic Mechanical Engineering	3	0	3	CE-109	Engineering Surveying	2	1	3
MT-114	Calculus	3	0	3	EE-163	Computers and Programming	3	1	4
CS-113	Introduction to Computing	1	1	2	HS-105/ HS-127	Pak. Studies/ Pak. Studies (For Foreigners)	2	0	2
					HSK-I/HS-231	Chinese Language/Turkish Language I			NC
	Total	**15**	**3**	**18**		**Total**	**13**	**5**	**18**

Second Year

Fall Semester					Spring Semester				
Course Code	Course Title	Credit Hrs			Course Code	Course Title	Credit Hrs		
		Th	Pr	Total			Th	Pr	Total
EL-240	Electronic Devices and Circuits	3	1	4	EE-282	Electromagnetic Fields	3	0	3
EE-264	Data Structures and Algorithms	2	1	3	EE-223	Instrumentation and Measurement	2	1	3
MT-272	Linear Algebra and Geometry	3	0	3	EE-232	Signals and Systems	3	1	4
MT-226	Multi Variable Calculus	3	0	3	TC-201	Digital Logic Design	2	1	3
HS-214	Academic Writing	3	0	3	MT-331	Probability and Statistics	3	0	3
HS-205/ HS-209	Islamic Studies / Ethical Behavior	2	0	2	HS-200	Community Service			NC
HSK-II /HS-232	Chinese Language/Turkish Language II			NC					
	Total	**16**	**2**	**18**		**Total**	**13**	**3**	**16**

Third Year

Fall Semester					Spring Semester				
Course Code	Course Title	Credit Hrs			Course Code	Course Title	Credit Hrs		
		Th	Pr	Total			Th	Pr	Total
EE-346	Electrical Machines I	2	1	3	EE-362	Power System Analysis	3	1	4
EE-395	Digital Signal Processing	2	1	3	TC-306	Communication Systems	3	0	3
EE-359	Electrical Power Distribution and Utilization	3	1	4	HS-304	Business Communications & Ethics	3	0	3
EE-313	Power Electronics	3	1	4	EE-347	Electrical Machines II	2	1	3
MT-442	Numerical Methods	3	0	3	EE-354	Embedded Systems	2	1	3
	Total	**13**	**4**	**14**		**Total**	**13**	**3**	**16**

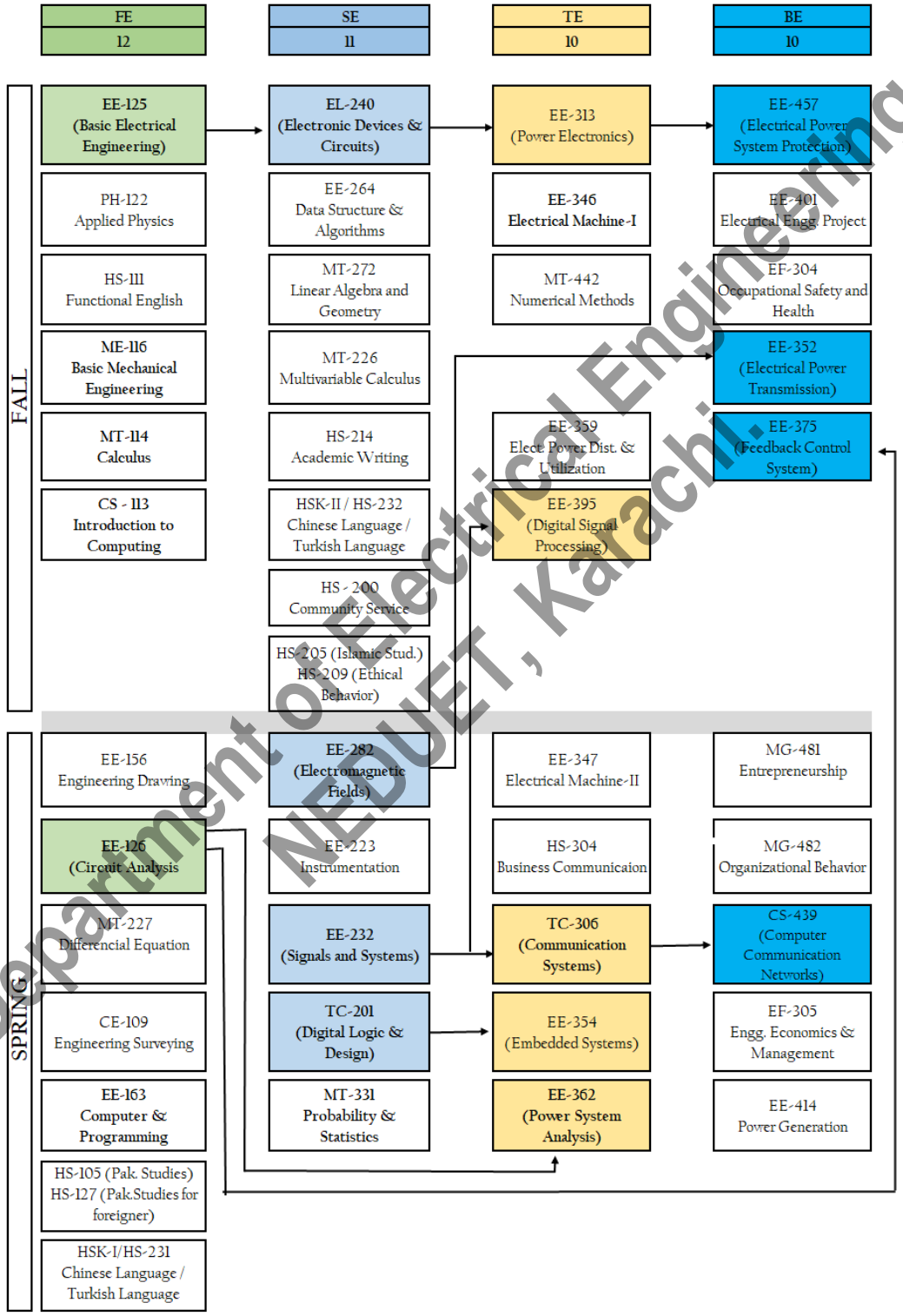
Final Year

Course Code	Course Title	Credit Hrs			Course Code	Course Title	Credit Hrs		
		Th	Pr	Total			Th	Pr	Total
EE-401	*Electrical Engineering Project	0	3	3	EE-401	*Electrical Engineering Project	0	3	3
EE-457	Electrical Power System Protection	3	1	4	MG-482	Organizational Behaviour	3	0	3
EF-304	Occupational Safety and Health	2	0	2	MG-481	Entrepreneurship	3	0	3
EE-352	Electrical Power Transmission	3	0	3	CS-439	Computer Communication Networks	2	0	2
EE-375	Feedback Control Systems	3	1	4	EE-414	Power Generation	3	0	3
					EF-305	Engineering Economics and Management	3	0	3
	Total	**11**	**5**	**16**		**Total**	**14**	**3**	**17**

** Duration one academic year: Requires literature survey and preliminary work during this Semester*

Department of Electrical Engineering

Prerequisite Courses - Bachelor of Engineering (Electrical)



8. Mapping of Curriculum to PLOs

Bachelor of Engineering (Electrical) Courses			Program Learning Outcomes (PLOs)											
			PLO-1	PLO-2	PLO-3	PLO-4	PLO-5	PLO-6	PLO-7	PLO-8	PLO-9	PLO-10	PLO-11	PLO-12
First Year	Fall	EE-125 Basic Electrical Engineering	C3	C4, P3										
		PH-122 Applied Physics	C2, P3	C3, C3										
		HS-111 Functional English										C2, C6, A3		
		ME-116 Basic Mechanical Engineering	C2	C4										
		MT-114 Calculus	C1	C2, C3										
		CS-113 Introduction to Computing	C2				P3							
	Spring	EE-156 Engineering Drawing	C3				P3	A4						
		EE-126 Circuit Analysis	C4	C4			P3							
		MT-227 Differential Equations	C2	C3										
		CE-109 Engineering Surveying	C2	C3			P3							
		EE-163 Computers and Programming	C3				C3, P3							
		HS-105/HS-127 Pak. Studies/ Pak. Studies (For Foreigners)						C2						C2
		HSK-I/HS-231 Chinese Language / Turkish Language I												
Second Year	Fall	EL-240 Electronic Devices and Circuits	C3	C4		P3								
		EE-264 Data Structures and Algorithms			C4, P3		C4							
		MT-272 Linear Algebra and Geometry	C2	C3										
		MT-226 Multi Variable Calculus	C2	C3										
		HS-214 Academic Writing										C2, C6, C3		
		HS-205/HS-209 Islamic Studies / Ethical Behavior								C2, C2				
		HSK-II/HS-232 Chinese Language/Turkish Language II												
	Spring	EE-282 Electromagnetic Fields	C5, C5											
		EE-223 Instrumentation and Measurement	C3	C4, P3										
		EE-232 Signals and Systems	C4	C4, P3										
		TC-201 Digital Logic Design	C2		C4	P3								
		MT-331 Probability and Statistics	C2	C4										
		HS-200 Community Service						A3						A2

Bachelor of Engineering (Electrical) Courses			Program Learning Outcomes (PLOs)											
			PLO-1	PLO-2	PLO-3	PLO-4	PLO-5	PLO-6	PLO-7	PLO-8	PLO-9	PLO-10	PLO-11	PLO-12
Third Year	Fall	EE-346 Electrical Machines I		C3	P3					A4				
		EE-395 Digital Signal Processing		C4, C4			P3						A4	
		EE-359 Electrical Power Distribution and Utilization			C6	C5, P3			C6	A4				
		EE-313 Power Electronics		C4, P3	C6						A3	C6		
		MT-442 Numerical Methods	C2, C3	C3										
	Spring	EE-362 Power System Analysis		C4	C5	P3					A3	C6		
		TC-306 Communication Systems	C3	C4		C3								
		HS-304 Business Communications & Ethics								C3		C6, A3		
		EE-347 Electrical Machines II		C3	P3				A4					
		EE-354 Embedded Systems			C6								C5	P3
Fourth Year	Fall	EE-401 Electrical Engineering Project		C	C				C	A	A	A	A	
		EE-457 Electrical Power System Protection			C6	C5, P3								
		EF-304 Occupational Safety and Health						C2	C4	A2				A2
		EE-352 Electrical Power Transmission		C4		C5		A3	C2					
		EE-375 Feedback Control Systems		C4	C6	P3					A3		C5	
	Spring	EE-401 Electrical Engineering Project		C	C					A	C, A	C, A	C	C
		MG-482 Organizational Behaviour						C4			A3			C2
		MG-481 Entrepreneurship								A3			C3	C2
		CS-439 Computer Communication Networks	C2	C3										
		EE-414 Power Generation	C4	C4					C4		A3			
		EF-305 Engineering Economics and Management							C2	C1			C3	
		Internship	C	C				A		A	A	A		

9. Key Performance Indicators (KPIs)

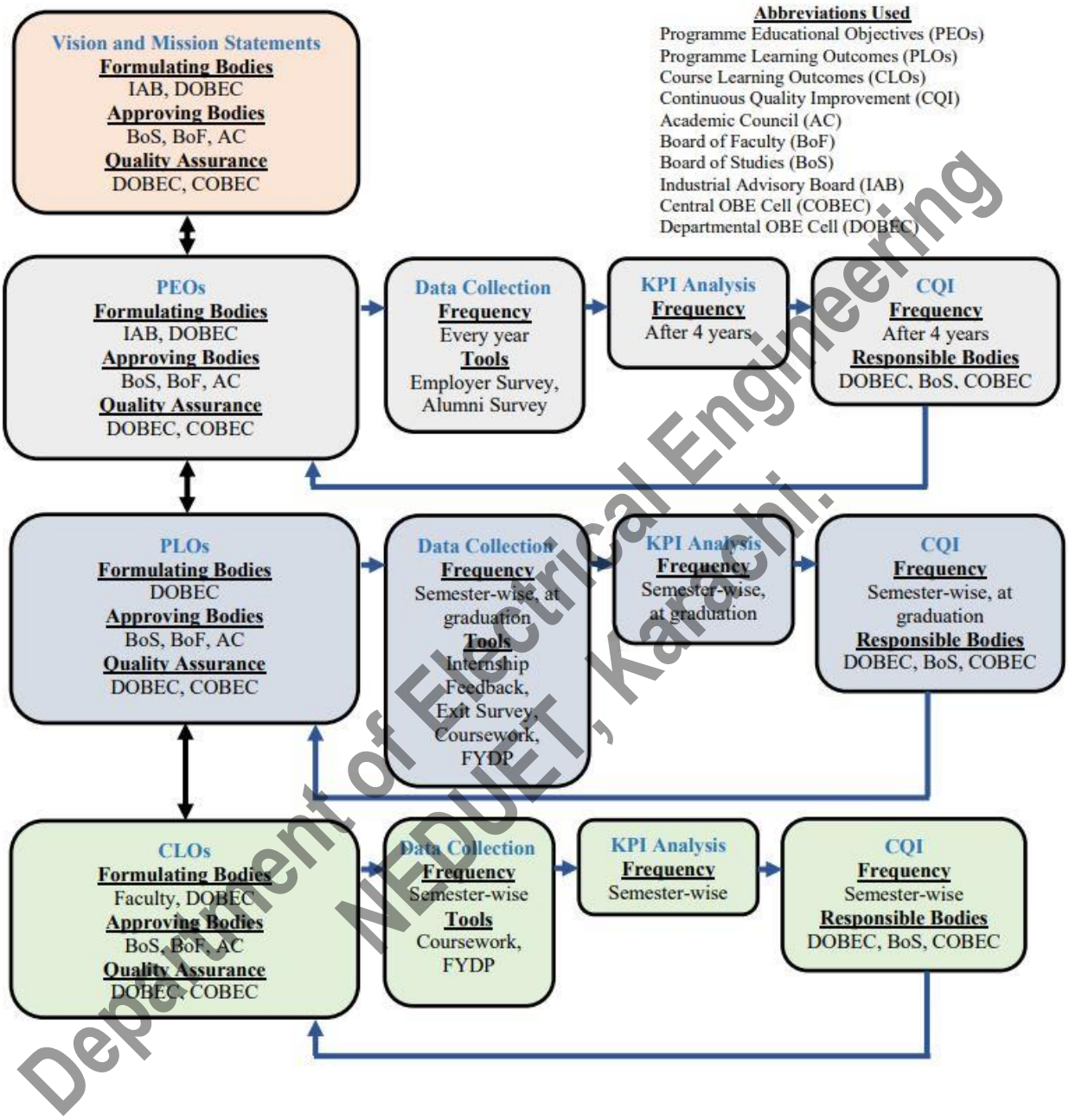
		Evaluation Tool	KPI	Data Collection Frequency	Analysis Frequency
PEO	Programme	▪ Employer Feedback Survey ▪ Alumni Feedback Survey ▪ Employment Statistics	50% of the Survey Form responses must attain a score of 3 or above (on a scale of 1 to 5), and 50% of the graduates must be employed and/or engaged in higher studies.	Every Year	4 years from graduation
PLO	Student	▪ CLO scores of the student in the mapped course(s)	Each PLO must be attained in at least 50% of the respective mapped course(s), with an average score of at least 60%.	Every Semester	Every Semester
	Course	▪ PLO scores of all the students in the mapped course	At least 60% of the students must attain that PLO	Every Semester	Every Semester
	Programme	▪ Final PLO attainment statistics of all the courses including FYDP ▪ Internship Feedback Form ▪ Exit Survey	At least 50% of the mapped courses must attain the PLO and at least 60% of the students / responses must attain a score of 3 or above on a scale of 1 to 5.	At graduation	At graduation
CLO	Student	▪ Course work	The student must obtain at least 60% average percentage score from all attempts.	Every Semester	Every Semester
	Course	▪ CLO scores of all students in the course	At least 60% of the students must attain that CLO	Every Semester	Every Semester

10.Continuous Quality Improvement (CQI)

The following table shows the severity-wise post KPI evaluation actions.

	PEO CQI	PLO CQI			CLO CQI	
	Program KPI	**Student KPI**	**Course KPI**	**Programme KPI**	**Student KPI**	**Course KPI**
KPIs Achieved	▪ No Action	▪ No Action	▪ No Action	▪ No Action	▪ No Action	▪ No Action
KPIs Not Achieved	1. Review of curriculum strategies. 2. Review of assessment methods. 3. Review of the relevant KPIs. 4. Review of PEOs. 5. Revisions implemented.	1. Warning through the progressive attainment sheet. 2. Student counselling.	1. Review of teaching and learning process. 2. Review of CLOs assessment methods. 3. Review of CLO-PLO mapping and the relevant KPIs. 4. Review of curriculum design. 5. Revisions implemented.	1. Review of teaching and learning process. 2. Review of PLOs assessment methods. 3. Review of Course-PLO mapping and the relevant KPIs. 4. Review of curriculum design. 5. Revisions implemented.	1. Student provided further chances through direct assessment tools. 2. Student counselling.	1. Review of CLO assessment methods. 2. Review of CLOs and taxonomy levels. 3. Review of students' course feedback. 4. Review of CLO KPIs. 5. Faculty advice by Departmental OBE Cell. 6. Faculty training.

The following figure shows the overall OBE framework for the BE (Electrical) Programme.



11. Course Profiles

Course profiles of all the engineering and non-engineering courses listed in the Scheme of Studies are given in OBE Catalogue. Course contents, as approved from Academic Council, are provided in the course profiles.

First Year

NED University of Engineering and Technology

Department of Electrical Engineering

Program BE-Electrical

F/QSP 11/17/01

Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
EE-125 & Basic Electrical Engineering	☐ SPRING ■ FALL	TH ■3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ■1 ☐0
PREREQUISITE COURSE(S) Nil	**DATE OF COURSE CONTENT APPROVAL** 29-09-2020	**APPLIED FROM BATCH** 2020

COURSE CONTENTS

Fundamentals of Electric Circuits: Charge, Current, Voltage and Power, Voltage and Current Sources, Ohm's Law. Equivalent resistance of a circuit.

Voltage and Current Laws: Node, Loop and Branches, Kirchhoff's Current Law (KCL), Kirchhoff's Voltage Law (KVL), single-loop circuits, single Node Pair Circuit, Series and Parallel Connected Independent Sources.

Circuit Analysis Techniques: Nodal Analysis, Mesh Analysis, Linearity and Superposition, Source Transformations, Thevenin and Norton Equivalent Circuits, Maximum Power Transfer theorem.

Capacitors and Inductors: Capacitor, Inductor, Inductance and Capacitance Combination, voltage current relationship for inductor and capacitor. Energy storage.

Introduction to AC Circuits: Sinusoids and Phasors, Phasor Relationships for Circuit Elements, Impedance and Admittance, Kirchhoff's Laws in the Frequency Domain, Impedance Combinations, Instantaneous and Average Power, Maximum Average Power Transfer, Effective or RMS Value, Apparent Power and Power Factor, Complex Power, Conservation of AC Power.

Sinusoidal Steady-State Analysis: Nodal Analysis, Mesh Analysis, Superposition Theorem, Source Transformation, Thevenin and Norton Equivalent Circuits.

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
CLO1	Have understanding of basic circuit analysis laws and **apply** them to solve various electric circuits	**C3**	**PLO1**
CLO2	To enable students to use various techniques to solve and **analyze** electric circuits and problems effectively	**C4**	**PLO2**
CLO3	Have ability to **manipulate** various electrical circuits under guidance and are able to verify different network theorem experimentally	**P3**	**PLO2**

REMARKS (if any):

Recommended by: _____ (Chairperson/Date)

Approved by: _____ (Dean/Date)

NED University of Engineering and Technology

Department of Electrical Engineering

Program BE-Electrical

F/QSP 11/17/01

Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
EE-126 & Circuit Analysis	■ SPRING ☐ FALL	TH ■3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ■1 ☐0
PREREQUISITE COURSE(S)	**DATE OF COURSE CONTENT APPROVAL**	**APPLIED FROM BATCH**
Nil	29-09-2020	2020

COURSE CONTENTS

AC Circuits - Sinusoids and Phasors, Phasor Relationships for Circuit Elements, Impedance and Admittance, Kirchhoff's Laws in the Frequency Domain, Impedance Combinations

Sinusoidal Steady-State Analysis - Nodal Analysis, Mesh Analysis, Superposition Theorem, Source Transformation, Thevenin and Norton Equivalent Circuits, Op Amp AC Circuits

AC Power Analysis - Instantaneous and Average Power, Maximum Average Power Transfer, Effective or RMS Value, Apparent Power and Power Factor, Complex Power, Conservation of AC Power, Power Factor Correction

Three-Phase Circuits - Balanced Three-Phase Voltages, Balanced Wye-Wye Connection, Balanced Wye-Delta Connection, Balanced Delta-Delta Connection, Balanced Delta-Wye Connection, Power in Balanced System, Unbalanced Three Phase Systems

Magnetically Coupled Circuits - Mutual Inductance, Energy in a Coupled Circuit, Linear Transformers, Ideal Transformers, Ideal Autotransformers, Three Phase Transformers

Two-Port Network - Impedance Parameters, Admittance Parameters, Hybrid Parameters, Transmission Parameters, Relationship between Parameters, Interconnection of networks

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
CLO1	**Analyze** first order and second order electric circuits	**C4**	**PLO1**
CLO2	**ANALYZE** magnetic circuits, two port networks and three phase systems.	**C4**	**PLO2**
CLO3	**Imitate** circuits on breadboards and PERFORM electrical measurements using modern engineering tools	**P3**	**PLO5**

REMARKS (if any):

Recommended by: _____ (Chairperson/Date)

Approved by: _____ (Dean/Date)

NED University of Engineering and Technology

Department of Electrical Engineering

Program BE-Electrical

F/QSP 11/17/01

Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
MT-114 & Calculus	☐ SPRING ■ FALL	TH ■3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ☐1 ■0
PREREQUISITE COURSE(S) Nil	**DATE OF COURSE CONTENT APPROVAL** 29-09-2020	**APPLIED FROM BATCH** 2020

COURSE CONTENTS

Set and Functions: Define rational, irrational and real numbers; rounding off a numerical value to specified value to specified number of decimal places or significant figures; solving quadratic, and rational inequalities in involving modulus with graphical representation; Definition of set, set operations, Venn diagrams, DeMorgan's laws, Cartesian product, Relation, Function and their types (Absolute value, greatest integer and combining functions). Graph of some well-known functions. Limit of functions and continuous and discontinuous functions with graphical representation.

Differential Calculus: Differentiation and Successive differentiation and its application: Leibnitz theorem. Taylor and Maclaurin theorems with remainders in Cauchy and Lagrange form, power series. Taylor and Maclaurin series, L Hopitals rule, extreme values of a function of one variable using first and second derivative test, asymptotes of a function, curvature and radius of curvature of a curve, partial differentiation, exact differential and its application in computing errors, extreme values of a function of two variables with and without constraints. Solution of non-linear equation, using Newton Raphson method.

Integral Calculus: Indefinite integrals and their computational techniques, reduction formulae, definite integrals and their convergence. Beta and Gamma functions and their identities, applications of integration. Centre of pressure and depth of centre of pressure.

Sequence & Series: Sequence, Infinite Series, Application of convergence tests such as comparison, Root, Ratio, Raabe's and Gauss tests on the behavior of series.

Complex Number: Argand diagram, De Moivre formula, root of polynomial equations, curve and regions in the complex plane, standard functions and their inverses (exponential, circular and Hyperbolic functions).

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
CLO1	**Identify** functions and define real and complex numbers	C1	PLO1
CLO2	**Apply** differential and integral calculus to engineering problems.	C3	PLO2
CLO3	**Discuss** the behavior of sequence and series	C2	PLO2

REMARKS (if any):

Recommended by: _____ (Chairperson/Date)

Approved by: _____ (Dean/Date)

NED University of Engineering and Technology

Department of Electrical Engineering

Program BE-Electrical

Course Profile

F/QSP 11/17/01

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
EE-163 & Computers & Programming	■ SPRING ☐ FALL	TH ■3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ■1 ☐0
PREREQUISITE COURSE(S) Nil	**DATE OF COURSE CONTENT APPROVAL** 29-09-2020	**APPLIED FROM BATCH** 2020

COURSE CONTENTS

Introduction and History of Computing: Contribution of Charles Babbage, foundation of IBM, Allan Turing's Bombe, Post-WWII era: digital electronic computers, Micro-processor revolution, evolution of computer programming (programming paradigms) and its modern outlook.

Introduction to C/C++: Brief history and development, Typical C/C++ development environment, structure of C/C++ programs, compilation process and debugging.

C/C++ Building Blocks: Data-types, Variables, representation of variables in memory, IEEE 754 Floating Point Standard, Input/output Functions, Operators, Comments.

Structured Programming: Loops (for() loop, while() loop and do-while() loop), Decision making constructs (if() and if()-else statements), nested loops and nested decision making constructs.

Arrays and Vectors: Array as linear data structure, Defining and manipulating 1D and 2D arrays, array memory allocation – Static vs. Automatic, C++ Standard Library Class Template Vector.

Functions: C++ Standard Library Header Functions, Function Prototype, Function Definition with multiple arguments, return multiple outputs with Global variables, Storage Classes and Scope rules, Array as argument to Function, Function Over-loading, and Recursion.

Pointers: Pointer Overview, Returning data from functions, Pointers and Arrays, Pointers and Strings, Double Indirection, Pointers to Pointers, Pointers to perform disk I/O operation.

Structures: Classical C Structure, Structure of Array, and Union.

Object Oriented Programming: Classes, Constructors and Destructors, Objects and Member Functions, Objects as Members of Classes, Operator Overloading, Inheritance, and Polymorphism

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
CLO1	**Demonstrate** proficiency in usage of basic structured programming building blocks	**C3**	**PLO1**
CLO2	Select appropriate tool (integrated development environment) and **apply** structured and/or Object Oriented Programming (OOP) techniques to solve programming problems.	**C3**	**PLO5**
CLO3	**Operate under guidance** the appropriate IDE and compiler to practice code in structured and/or OOP style to solve programming problems.	**P3**	**PLO5**

REMARKS (if any):

Recommended by: _____ **Approved by:** _____

(Chairperson/Date) (Dean/Date)

NED University of Engineering and Technology

Department of Electrical Engineering

Program BE-Electrical

F/QSP 11/17/01

Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
MT-227 & Differential Equations	■ SPRING ☐ FALL	TH ■3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ☐1 ■0
PREREQUISITE COURSE(S) Nil	**DATE OF COURSE CONTENT APPROVAL** 29-09-2020	**APPLIED FROM BATCH** 2020

COURSE CONTENTS

1st Order Differential Equations: Basic concept; Formation of differential equations and solution of differential equations by direct integration and by separating the variables; Homogeneous equations and equations reducible to homogeneous from; Linear differential equations of the order and equations reducible to the linear form; Bernoulli's equations . Application in relevant Engineering: orthogonal trajectories: Numerical approximation to solutions ; Solution in series. Euler method, Euler modified method, Runge Kutta method of order 4.

2nd and Higher Orders Equations: Special types of II nd order differential equations with constant coefficients and their solutions; The operator D; Inverse operator l/D ; Solution of differential by operator D methods; Special cases, Cauchy's differential equations; Simultaneous differential equations; simple application of differential equations in relevant Engineering.

Partial Differential Equation: Basic concepts and formation of partial differential equations; Linear homogeneous partial differential equations and relations to ordinary differential equations; Solution of first order linear and special types of second and higher order differential equations; D' Alembert's solution of the wave equation and two dimensional wave equations; Lagrange's solution: Various standard forms.

Laplace Integral & Transformation: Definition, Laplace transforms of some elementary functions, first translation or shifting theorem, second translation or shifting theorem, change of scale property, Laplace transform of the nth order derivative, initial and final value theorem Laplace transform of integrals. Laplace transform of functions tn F(t) and F(t)/ t, Laplace transform of periodic function, evaluation of integrals, definition of inverse Laplace transform and inverse transforms, convolution theorem, solutions of ordinary differential using Laplace transform.

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
CLO1	**Describe** formation of differential equations to explain physical situations	**C2**	**PLO1**
CLO2	**Apply** appropriate methods to solve differential equations and use Laplace transform in relevant engineering problems	**C3**	**PLO2**

REMARKS (if any):

Recommended by: _____ (Chairperson/Date)

Approved by: _____ (Dean/Date)

NED University of Engineering and Technology

Department of Electrical Engineering

Program BE-Electrical

F/QSP 11/17/01

Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
EE-156 & Engineering Drawing	■ SPRING ☐ FALL	TH ☐3 ☐2 ☐1 ■0 PR ☐3 ■2 ☐1 ☐0
PREREQUISITE COURSE(S) Nil	**DATE OF COURSE CONTENT APPROVAL** 29-09-2020	**APPLIED FROM BATCH** 2020

COURSE CONTENTS

Mechanical Drawing - Drawing equipment and the use of instruments. Basic drafting techniques and standards, Pictorial Drawing and their Projections including Isometric view, Oblique view, Orthographic projections and standard practices, Development of Isometric views from orthographic Projects.

Section Views - Intersection at various positions of geometrical bodies, such as pyramids, Cylinders and Cones, section views of transformer and motor.

Civil Drawing - Plan, Elevations (front, left and right) and details of buildings such as Bungalows, Flats, Offices, Workshops school and market etc., Elements of Perspective drawings.

Electrical Drawing - Understand of basic electrical symbols, Schematic Diagrams of substations, lighting and power distribution boards, home electrical wiring, industrial wiring, electrical drawings of industrial buildings and their specifications. Control drawings and their operation using simple diagrams of automation systems used in substation. Electrical Symbols and One line diagrams of a typical power system ,11 KV Electric substation building plan including equipment layout, Trenches (for cabling etc.) Manholes, Doors, Windows, Ventilators etc

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
CLO1	Have understanding of different architectural (civil), mechanical and electrical drawings and have ability to **ILLUSTRATE** them.	**C3**	**PLO1**
CLO2	Have ability to **COPY** or **IMITATE** different architectural (civil), mechanical and electrical drawings both on drawing sheets and AUTOCAD software.	**P3**	**PLO5**
CLO3	**Organize** a short report categorizing at least two types of electrical hazards and accordingly select safety measures.	**A4**	**PLO6**

REMARKS (if any):

Recommended by: _____ **Approved by:** _____

(Chairperson/Date) (Dean/Date)

NED University of Engineering and Technology

Department of Electrical Engineering

Program BE-Electrical

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Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
CE-109 Engineering Surveying	■ SPRING ☐ FALL	TH ☐3 ■2 ☐1 ☐0 PR ☐3 ☐2 ■1 ☐0
PREREQUISITE COURSE(S) Nil	**DATE OF COURSE CONTENT APPROVAL** 29-09-2020	**APPLIED FROM BATCH** 2020

COURSE CONTENTS

Introduction: Introduction to land surveying, Definitions of basic surveying terms branches and their application, Instruments used

Survey Techniques: Distance measurement techniques, Compass survey, Traversing and triangulation, Plane table surveying, Computation of areas and volumes by various methods, Tachometry, Theodolite survey

Modern Methods in Surveying: Principles of EDM operation, EDM characteristics, Total stations, field procedures in Surveying: for total stations in topographic surveys, Construction layouts using total station

Levelling and Contouring: Methods and types of levels, precise levelling, Methods and applications of contouring

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
CLO1	EXPLAIN basic surveying techniques used for surveying and levelling	**C2**	**PLO1**
CLO2	PREPARE maps, contour maps, profiles, cross-sections, traverses etc. using surveying techniques.	**C3**	**PLO2**
CLO3	OPERATE various survey equipment for measurements with required accuracy	**P3**	**PLO5**

REMARKS (if any):

Recommended by: _____ (Chairperson/Date)

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NED University of Engineering and Technology

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Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
HS-111 Functional English	☐ SPRING ■ FALL	TH ☐3 ■2 ☐1 ☐0 PR ☐3 ☐2 ☐1 ■0
PREREQUISITE COURSE(S)	**DATE OF COURSE CONTENT APPROVAL**	**APPLIED FROM BATCH**
Nil	29-09-2020	2020

COURSE CONTENTS

Objectives of the Course

- The course aims at improving the four language skills –listening, speaking, reading and writing.
- The functional aspect of language will be stressed further through development of students' vocabulary and use of grammar.

Course Contents

Speaking and Listening

- Listening actively through the use of skills and sub skills, and in a variety of situations.
- Speaking: Fluency and confidence building through group discussions, role plays and public speaking.

Vocabulary development

- Tips / strategies in vocabulary enhancement
- Practice in vocabulary development

Reading

- Reading skills, Sub skills
- Reading strategies
- Reading practice through variety of reading texts and comprehension exercises
- Précis writing

Writing

- Note taking: Techniques for taking notes from lectures, from books (integrated with listening & reading) Process of Writing with practice in pre writing strategies, in revising, and in, editing for grammar. Writing well- structured and effective paragraphs, essays and letters (routine communication) using proper writing mechanics. Writing descriptions, narrations, cause and effect, compare and contrast etc.

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Course Profile

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
CLO1	**Demonstrate** effective presentation skills in academic settings.	**A3**	**PLO10**
CLO2	**Comprehend** explicit and implicit information through reading and listening strategies.	**C2**	**PLO10**
CLO3	**Compose** drafts of various academic genres using writing processes and strategies.	**C6**	**PLO10**

REMARKS (if any):

Recommended by: _____ **Approved by:** _____

(Chairperson/Date) (Dean/Date)

NED University of Engineering and Technology

Department of Electrical Engineering

Program: BE(Electrical)

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Course Profile

COURSE CODE & TITLE	SEMESTER	CREDIT HOURS
HS-127 – Pakistan Studies for Foreigners	■ SPRING ☐ FALL	TH ☐3 ■2 ☐1 ☐0 PR ☐3 ☐2 ☐1 ■0
PREREQUISITE COURSE(S) Nil	**DATE OF COURSE CONTENT APPROVAL** 29-09-2020	**APPLIED FROM BATCH:** 2020

COURSE CONTENTS

Land of Pakistan: Land & People – Physical features and demography; Geographical and strategic importance of Pakistan; Natural resources – Mineral, water, and power; Natural Landscape; Environmental issues in Pakistan; Cultural heritage: important remnants of ancient civilizations in Pakistan

Creation of Pakistan: A brief Historical survey of Muslim community in the sub-continent; Two-Nation theory – its origin & development; Rationale for Pakistan – Factors leading to the demand of Pakistan; Emergence of Pakistan; Role of Quaid-e-Azam the struggle for Pakistan

Government & Politics in Pakistan: Political History of Pakistan – A brief account (1947 to date); Constitution of Pakistan 1973 – Salient features; Governmental structure – Federal, Provincial and Local

Pakistan in the Community of Nations: An overview of Pakistan's foreign policy; Relations of Pakistan with neighbors, Super Powers, and the Muslim World

Pakistan's Stand Point on Human Rights: Constitutional provisions; Comparative analysis of Western and Islamic perspective of Human Rights; Pakistan's Stand on national and international level

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
01	**Describe** the historical, ideological, socio-economic, and political aspects of Pakistan as a nation and state.	C2	PLO6
02	**Discuss** Pakistan's culture, issues, and challenges through appropriate actions and advocacy	C2	PLO12

REMARKS (if any):

Recommended by: _____ (Chairperson/Date)

Approved by: _____ (Dean/Date)

NED University of Engineering and Technology

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Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
CS-113 Introduction to Computing	☐ SPRING ■ FALL	TH ☐3 ☐2 ■1 ☐0 PR ☐3 ☐2 ■1 ☐0
PREREQUISITE COURSE(S) Nil	**DATE OF COURSE CONTENT APPROVAL** 29-09-2020	**APPLIED FROM BATCH** 2020

COURSE CONTENTS

Number Systems; Digital logic Gates, Classification of computer Systems, Structure and Organization of Computers and Computer system, Computer peripherals, Classification of software systems, Introduction, software Development Process, Levels of programming language.

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
CLO1	**Discuss** / Review the basics of computer hardware, software, and peripherals	C2	PLO1
CLO2	**Practice** with software and hardware tools commonly used in development of computerized or computer aided applications	P3	PLO5

REMARKS (if any):

Recommended by:_____ **Approved by:** _____

(Chairperson/Date) (Dean/Date)

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Department of Electrical Engineering

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Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
ME-116 & Basic Mechanical Engineering	☐ SPRING ■ FALL	TH ■3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ☐1 ■0
PREREQUISITE COURSE(S) Nil	**DATE OF COURSE CONTENT APPROVAL** 29-09-2020	**APPLIED FROM BATCH** 2020

COURSE CONTENTS

Engineering Mechanics (Statics): Fundamental concepts, Definitions and Units, Newton's First Law, Forces

Statics: Moments and Couples, Law of Equilibrium, Free Body Diagrams, Structures, Frames and Mechanics.

Engineering Mechanics (Dynamics): Fundamentals of Dynamics, Rigid Body Dynamics, Newton's Second Law, Analysis of Motion in two & three-dimensional Spaces, Rectilinear & Curvilinear Motions, Work & Energy, Conservation of Energy.

Thermodynamics: Work, heat, open, closed and steady flow systems, thermodynamics properties and processes, absolute & gauge pressure, pressure temperature and flow measurement, laws of thermodynamics, equation of continuity, two phase systems, ideal gas, conservation of mass & energy, basic heat engine & refrigeration cycles.

Heat Transfer: Fundamentals of heat transfer, conduction, convection, radiation, thermal conductivity, overall heat transfer coefficient.

Heating, Ventilation and Air Conditioning (HVAC): Introduction to HVAC components, heating and cooling load, comfort charts, Outline of A/C. systems, consideration for air-conditioning in building, natural ventilations, insulating materials.

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
CLO1	**Discuss** fundamental concepts of Engineering Mechanics and Thermodynamics	**C2**	**PLO1**
CLO2	**Analyze** real life problems related to Engineering Mechanics and Thermodynamics	**C4**	**PLO2**

REMARKS (if any):

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Course Profile

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COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
PH-122 & Applied Physics	☐ SPRING ■ FALL	TH ■3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ■1 ☐0
PREREQUISITE COURSE(S) Nil	**DATE OF COURSE CONTENT APPROVAL** 29-09-2020	**APPLIED FROM BATCH** 2020

COURSE CONTENTS

INTRODUCTION: Types of Errors and Error Calculation, Graphical Techniques (Log, semi-log and other non-linear graphs).

VECTORS: Coordinate Systems, Review of vectors, Vector Differentiation (Ordinary and Partial Differentiation), Vector Integrations.

MECHANICS: Motion under Constant Acceleration, Newton Laws and their Applications, Frictional Forces, Work-Energy Theorem, Law of Conservation of Mechanical Energy, Angular Momentum.

ELECTROSTATICSAND MAGNETISM : Coulombs Law, Continuous charge distribution, Electrostatic potential energy of discrete charges, Gauss's Law, Electric field around conductors, Magnetic fields, Magnetic force on current, Hall effect, Biot-Savart Law, Ampere's Law, Field of rings and coils, Magnetic dipole, Diamagnetism, Paramagnetism and Ferromagnetism.

SEMICONDUCTOR PHYSICS: Energy levels in a semiconductor, Hole concept, Intrinsic and Extrinsic regions, Law of Mass Action, p-n junction, Transistor.

WAVES AND OSCILLATIONS: Simple Harmonic Oscillator, Damped Harmonic Oscillation, Forced Oscillation and Resonance, Type of Waves and Superposition Principle, Wave Speed on a stretched string.

OPTICS AND LASERS: Huygens Principle, Two-slit interference, Single-Slit Diffraction, Resolving power of Optical Instrument Principals for laser action, Types of laser, Applications of laser.

MODERN PHYSICS: Planck's explanations of Black Body Radiation Photoelectric Effect, Compton Effect, Bohr's Theory of Hydrogen Atom, Atomic Spectra, Reduced Mass, De-Broglie Hypothesis, Electron Microscope, Atomic Nucleus and Properties of Nucleus, Radioactive Decay and Radioactive Dating, Radiation Detection Instruments, Nuclear Reactions and Nuclear Reactor, Nuclear Fusion

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COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
CLO1	DISCUSS principle of physics; and explain the concept of classical and modern physics to solve related problems	**C2**	**PLO1**
CLO2	USE the concept of classical physics for engineering problems	**C3**	**PLO2**
CLO3	APPLY the concept of Modern physics to solve physical problem	**C3**	**PLO2**
CLO4	PRACTICE of operating equipment/tools to understand principles of physics under supervision	**P3**	**PLO1**

REMARKS (if any):

Recommended by: _____ **Approved by:** _____

(Chairperson/Date) (Dean/Date)

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Course Profile

COURSE CODE& TITLE HS-105 & Pakistan Studies	SEMESTER ■ SPRING ☐ FALL	CREDIT HOURS TH ☐3 ■2 ☐1 ☐0 PR ☐3 ☐2 ☐1 ■0
PREREQUISITE COURSE(S) Nil	DATE OF COURSE CONTENT APPROVAL 29-09-2020	APPLIED FROM BATCH 2020

COURSE CONTENTS

Historical and ideological perspective of Pakistan Movement

Two Nation Theory Definition: Claim of Muslims of being a separate nation from Hindus, based upon cultural diversity. Significance: Cultural diversity and interests led to the demand of Pakistan – Lahore resolution.

Creation of Pakistan Factors leading to the creation of Pakistan. Quaid-e-Azam and the demand of Pakistan.

Land of Pakistan Geo-physical conditions Geo-political and strategic importance of Pakistan. Natural resource, viz: mineral, water and power.

Constitutional Process Early efforts to make a constitution (1947-1956) problems and issues. Salient features of the constitution of 1956 and its abrogation. Salient features of the constitution of 1962 and its abrogation. Constitutional and political crisis of 1971. Salient features of the constitution of 1973 Constitutional developments since 1973 to date with special reference to the amendments to the constitutions.

Contemporary issues in Pakistan

A brief survey of Pakistan Economy An overview of current economic situation in Pakistan; problems, issues and future prospects.

Social Issues Pakistani Society and Culture-Broad features Citizenship: national and international Literacy and education in Pakistan: problems and issues State of Science and Technology in Pakistan: A comparison with other countries with special reference to the Muslim world

Environmental Issues Environmental pollution and its hazards: causes, and solutions. Environmental issues in Pakistan: government policies and measures and suggestions for improvement. Page 6 of 33 Pakistan's role in the preservation of nature through international conventions / treaties.

Pakistan's Foreign Policies Evolution of Pakistan foreign policy-1947 to date A brief survey of Relation with Neighbours, Super Powers & the Muslim World.

Human Rights

Conceptual foundations of Human Rights What are Human Rights? Definition, origins & significance. Comparative analysis of Islamic and Western Perspectives of Human rights.

UN System for protection Human Rights UN Charter. International Bill of Human Rights – an overview. Implementation mechanism.

Other important international treaties and conventions The convention on the elimination of all forms of discrimination against Women (CEDAW). International convention on the rights of child (CRC) Convention against torture (CAT). Other treaties and Convention.

Pakistan's response to Human Rights at national and international levels Constitutional Provisions. Pakistan's Obligations to international treaties and documents. Human Rights issues in Pakistan- a critical analysis Pakistan's

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stand on violation of Human Rights in the international perspective

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
CLO1	**Understand** the historical and ideological perspectives of Pakistan and their implications for individuals and professionals in societal contexts	**C2**	**PLO6**
CLO2	**Describe** the implications of international conventions and treaties applicable to Pakistan at the national and international level	**C2**	**PLO12**

REMARKS (if any):

Recommended by: _____ **Approved by:** _____

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Second Year

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Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
HS-214 & ACADEMIC WRITING	☐ SPRING ■ FALL	TH ■3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ☐1 ■0
PREREQUISITE COURSE(S) Nil	**DATE OF COURSE CONTENT APPROVAL** 29-09-2020	**APPLIED FROM BATCH** 2020

COURSE CONTENTS

Writing Process

Identifying topic area, narrowing topic, planning, brainstorming, mind mapping, outlining, writing first draft, reviewing, revising, proofreading, writing final draft

Reading & Writing

Analyzing different texts: identifying point of views, claims, assumptions, differentiate facts from opinions Practicing Academic Language: differentiate using language of opinion and fact Synthesize information, developing critical write up with relevant factual information, personal views, academic evidence, examples, cause and effect etc. Presenting and describing visuals (tables & graphs) Avoiding plagiarism and ensuring originality: summarizing, paraphrasing and quoting sources, citing, documenting sources through a referencing system (MLA / APA / Harvard style, as suggested by the discipline)

Writing products

Writing a well-structured paragraph (topic sentence, supporting details, conclusion) Writing narrative, descriptive, expository, and argumentative essays Developing an effective essay using thesis statement, adequate development and argument, supporting details, and conclusion Writing short reports (technical reports)

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
CLO1	**Comprehend** explicit and implicit information in various academic texts using relevant reading strategies.	**C2**	**PLO10**
CLO2	**Compose** organized, coherent, and effective texts of various academic genres using writing processes and strategies.	**C6**	**PLO10**
CLO3	**Use** paraphrasing, summarizing, and referencing skills to avoid plagiarism.	**C3**	**PLO10**

REMARKS (if any):

Recommended by: _____ **Approved by:** _____

(Chairperson/Date) (Dean/Date)

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Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
TC-201 Digital Logic Design	■ SPRING ☐ FALL	TH ☐3 ■2 ☐1 ☐0 PR ☐3 ☐2 ■1 ☐0
PREREQUISITE COURSE(S) Nil	**DATE OF COURSE CONTENT APPROVAL** 29-09-2020	**APPLIED FROM BATCH** 2020

COURSE CONTENTS

Computer Operations: Evaluation of the computer, basic organization of digital computer, instruction formats, some different types of computers, special purpose and general purpose computers.

Number Systems: Conversion between bases, arithmetic with bases other than ten, negative numbers, binary coded decimal numbers, octal and hexadecimal number systems.

Truth Function: Binary connectives, evaluation of truth functions, many statement compounds, physical realisations, sufficient sets of connectives, digital computer examples.

Boolean Algebra: Truth functional calculus as Boolean algebra, duality, fundamental theorems of Boolean algebra, examples of Boolean simplifications, remarks on Switching functions.

Minimizations of Boolean Functions: Standard forms of Boolean functions, Minterm and maxterm, Designation of Boolean functions, Karnaugh map representation of Boolean functions, simplification of functions on Karnaugh maps, map minimisation of product of sums expressions, incompletely specified functions.

Tabular Minimization: Cubical representation of Boolean functions, Determination of prime implicants, Selection of an optimum set of prime implicants, Design of NAND and NOR Networks and properties of combinational network, Introduction to design of NAND and NOR Networks, Switching expressions for NAND and NOR Networks, Transient response of combination Networks.

Introduction to sequential Networks: Latches, Sequential Networks in fundamental mode, Introduction to the Synthesis of Sequential Networks, Minimisation of the number of states, Clocked Networks.

Introduction to Verilog-HDL and VHDL: Coding description of Combinational and sequential circuits.

Switching Devices: Switches and relays logic circuits, speed and delays in logic circuits, integrated logic circuits.

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
CLO1	Able to perform **basics** of number conversion in different bases and also able to perform arithmetic on different bases.	**C2**	**PLO1**
CLO2	**Design** and analyze combinational and sequential digital circuits.	**C4**	**PLO3**
CLO3	Use of computer aided tool and discrete component to design and **investigate** digital circuits	**P3**	**PLO4**

REMARKS (if any):

Recommended by: _____ (Chairperson/Date)

Approved by: _____ (Dean/Date)

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Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
EE-264 & Data Structures and Algorithms	☐ SPRING ■ FALL	TH ☐3 ■2 ☐1 ☐0 PR ☐3 ☐2 ■1 ☐0
PREREQUISITE COURSE(S) Nil	**DATE OF COURSE CONTENT APPROVAL** 29-09-2020	**APPLIED FROM BATCH** 2020

COURSE CONTENTS

Algorithm Fundamentals and Complexity Analysis: Algorithm as technology, Design Approach (Design Paradigms), Representation Techniques, Time and Space Complexity, Order of Growth, common Growth Functions, standard notations.

Data Structure Fundamentals: Revision of C/C++ Data-types and Structures, Abstract Data Type (ADT) concept, 1D Array as ADT, ADT for varying-length character Strings, 2D Array as ADT, Structures and Classes as ADT, Pointer Arrays and Records as ADT.

Recursion, Stacks and Queues: Program design with Recursion, Complexity of recurrence problem, Stack ADT, Stack implementation with Arrays, C++ Template as Stack, Stack applications, Recursion with Stacks, Queue as ADT and, Queue implementation.

String Processing: String Operations, Word Processing, Pattern Matching Algorithms.

Numeric and Number Theoretic Algorithms: Calculating Polynomial Equations, Matrix Multiplication, Linear Equations, Trapezoidal Integration, Root Finding of polynomial, Greatest Common Divisor, Primality Testing, Integer Factorization.

Divide and Conquer Approach: Sorting and Searching Algorithms.

Linked Lists: Linked List as Data Structure, List Operations, Implementation using Arrays and Dynamic Variables, Circular and Doubly Linked List, Linked List Implementation in C++, Linked List applications.

Trees: Binary Trees, Representation in memory, Binary Tree Traversals, Lists as Binary Trees, Finding and Deleting element in Tree, Tree Traversal Algorithms, Binary Search Trees, Heaps, Heap-Sort Algorithm.

Graphs: Representation in memory, Graph implementation, elementary Graph Algorithms, Traversal Algorithms, Shortest Path Algorithms

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
CLO1	**Analyze** engineering challenges in data storages and software developments and **compare** various types of data structures used to build object-oriented data storage	**C4**	**PLO3**
CLO2	**Analyze** usage of software tools and abstract data types to implement algorithms on data structures.	**C4**	**PLO5**
CLO3	**Practice** implementation of optimal algorithms and data structures for common software development problems in C/C++/Python.	**P3**	**PLO3**

REMARKS (if any):

Recommended by: _____ (Chairperson/Date)

Approved by: _____ (Dean/Date)

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Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
EL-240 & Electronic Devices and Circuits	☐ SPRING ■ FALL	TH ■3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ■1 ☐0
PREREQUISITE COURSE(S) EE-125 & Basic Electrical Engineering	**DATE OF COURSE CONTENT APPROVAL** 29-09-2020	**APPLIED FROM BATCH** 2020

COURSE CONTENTS

Semiconductor Basics: Conduction, N and P Types;

Diode: Biasing, V-I Characteristics, Equivalent circuits, Diode as full and half Wave Rectifier, Limiting and Clamping Circuits, Zener and Optical Devices, and their applications;

BJTs: Structure, Operation, Characteristics and Parameters, BJTs as amplifier and switch, Biasing Circuits;

FETs: Basics, Characteristics and Parameters, Biasing, FET as amplifiers;

Power Amplifier: their classes and application

Operational Amplifier: Input modes and parameters, Negative feedback, Bias Current and offset voltage, Open and Closed Loop Response

Basic Op-Amp Applications: Comparators, Summing Amplifiers, Integrators and Differentiators, Instrumentation Amplifiers

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
CLO1	**APPLY** the knowledge and the skills to **ILLUSTRATE** the functionality of diode, BJT, MOSFET, Operational amplifier and Power Amplifier.	**C3**	**PLO1**
CLO2	To be able to **ANALYZE** electronic circuits diode, BJT, MOSFET, Operational amplifier and Power Amplifier.	**C4**	**PLO2**
CLO3	To **OPERATE** and hand **PRACTICE** the design of electronic circuits involving diode, BJT, MOSFET ,Operational amplifier and Power Amplifier.	**P3**	**PLO4**

REMARKS (if any):

Recommended by: _____ (Chairperson/Date)

Approved by: _____ (Dean/Date)

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Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
EE-282 & Electromagnetic Fields	■ SPRING ☐ FALL	TH ■3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ☐1 ■0
PREREQUISITE COURSE(S) Nil	**DATE OF COURSE CONTENT APPROVAL** 29-09-2020	**APPLIED FROM BATCH** 2020

COURSE CONTENTS

Vector Analysis: scalars and vectors, vector algebra, the Cartesian coordinate system, vector components and Unit vectors, the vector field, the dot product the cross product, other coordinate systems, circular cylindrical coordinates, the spherical coordinate system, transformations between coordinate systems.

Coulomb's Law and Electric Field Intensity: The experimental law of coulomb, Electric field intensity, field of a point charge, field due to a continuous volume charge distribution, field of line charge, field of sheet charge, streamlines & sketches of fields.

Electric Flux Density Gauss's Law and Divergence: Electric flux density, Gauss's law, application of Gauss's law, some symmetrical charge distributions, differential volume element, divergence, Maxwell's first equation for electrostatics, the divergence theorem.

Energy and Potential: Energy expanded in moving a point charge in an electric field, the line integral, definition of potential difference and potential, the potential field of a point charge, the potential field of a system of charges, conservative property, potential gradient, the dipole, energy density in the electrostatic field.

Conductor Dielectrics and Capacitances: Current and current density, continuity of current, metallic conductors, conductor properties and boundary conditions, semiconductors, the nature of dielectric materials, capacitance, several capacitance examples, of a two wire lines, current analogies.

The Steady Magnetic Field: Biot Savart's Law, Amperes circuit law, curl, Stoke's theorem, Magnetic flux and magnetic flux density, the scalar and vector magnetic potentials, derivation of steady magnetic field laws.

Magnetic Forces Materials and Inductance: Force on a moving charge, force on a differential current element, force between differential current element, force and torque on a closed circuit, the nature of magnetic materials, Magnetization and permeability, magnetic boundary conditions, the magnetic circuit, potential energy and forces on magnetic materials, inductance and mutual inductance.

Time Varying fields and Maxwell's Equations: Faraday's Law, displacement current, Maxwell's equation in point form, Equation in integral form, the related potentials

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Course Profile

F/QSP 11/17/01

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
CLO1	Apply mathematical tools to ***formulate***, ***analyze*** and ***evaluate*** problems of electrostatics from basic to engineering levels.	**C5**	**PLO1**
CLO2	Describe, explain and apply mathematical tools to ***formulate***, ***analyze*** and ***evaluate*** problems in fundamentals of electrodynamics.	**C5**	**PLO1**

REMARKS (if any):

Recommended by: _____ **Approved by:** _____

(Chairperson/Date) (Dean/Date)

NED University of Engineering and Technology

Department of Electrical Engineering

Program BE-Electrical

F/QSP 11/17/01

Course Profile

COURSE CODE & TITLE	SEMESTER	CREDIT HOURS
HS-209 – Ethical Behaviour	☐ SPRING ■ FALL	TH ☐3 ■2 ☐1 ☐0 PR ☐3 ☐2 ☐1 ■0
PREREQUISITE COURSE(S) Nil	**DATE OF COURSE CONTENT APPROVAL** 29-09-2020	**APPLIED FROM BATCH** 2020

COURSE CONTENTS

Introduction to Ethics: Definition of Ethics; Definition between normative and positive science; Problem of freewill; Method of Ethics; Uses of Ethics

Ethical Theories: History of Ethics: Greek Ethics, Medieval, Modern Ethics; Basic concept of right and wrong: good and evil; Utilitarianism, hedonism, self-realization: egoism, intuitionism, rationalism; Kant's moral philosophy

Ethics & Religion: The relation of Ethics to religion; Basic ethical principles of major religions: Hinduism, Judaism, Buddhism, Zoroastrianism, Christianity, Islam

Ethics, Society, and moral theory: Ethical foundation of Rights and Duties; Applied Ethics; Society as the background of moral life; Universalism and Altruism; Theories of punishment

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
01	**Explain** the ethical teachings of the world's major religions.	**C2**	**PLO8**
02	**Describe** the importance and implications of ethics on individuals and societies.	**C2**	**PLO8**

REMARKS (if any):

Recommended by: _____ (Chairperson/Date)

Approved by: _____ (Dean/Date)

NED University of Engineering and Technology

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Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
EE-223 & Instrumentation and Measurements	■ SPRING ☐ FALL	TH ☐3 ■2 ☐1 ☐0 PR ☐3 ☐2 ■1 ☐0
PREREQUISITE COURSE(S) Nil	**DATE OF COURSE CONTENT APPROVAL** 29-09-2020	**APPLIED FROM BATCH** 2020

COURSE CONTENTS

General Theory- Classification of instruments, Block diagrams of various instrumentation schemes, Performance characteristics of instruments.

Measurement of Electrical Quantities - Basics of electromechanical instruments, moving coil and electrodynamometer instruments as ammeter, voltmeter and ohmmeter, Extension of ranges

Instrument Transformers - their burden and accuracy, clamp meter, Active and Reactive power measurement, Max. Demand indicator, Classification of energy meter, Induction type KWH meter, p.f meter. Measurement of resistance by bridge method and meggar, Measurement of Inductance and capacitance. Measurement of dielectric strength of insulators, high voltage surges.

Electronic Instruments: Data Acquisition, A/D conversion. Electronic and digital voltmeters, digital frequency meter, time interval measurement, Power and energy meter.

Transducers - Temperature transducers, Pressure transducers, Variable, resistance and inductance transducers, linear variable differential transformer (LVDT), capacitive, photoconductive, and piezo-electric transducers, thermo electric transducers.

Measurement of Nonelectrical Quantities- Measurement of temperature, pressure, flow, strains, thermal conductivity, motion, speed and vibrations

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
CLO1	To ***apply*** the basic knowledge acquired in order to design various instruments.	**C3**	**PLO1**
CLO2	To ***analyze*** performance of instruments based on different working principles	**C4**	**PLO2**
CLO3	To **operate** the use of different instruments under guidance and **replicate** hardware project involving analog/digital instrumentation.	**P3**	**PLO2**

REMARKS (if any):

Recommended by: _____ (Chairperson/Date)

Approved by: _____ (Dean/Date)

NED University of Engineering and Technology

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Course Profile

F/QSP 11/17/01

COURSE CODE& TITLE HS-205 & Islamic Studies	SEMESTER ☐ SPRING ■ FALL	CREDIT HOURS TH ☐3 ■2 ☐1 ☐0 PR ☐3 ☐2 ☐1 ■0
PREREQUISITE COURSE(S) Nil	DATE OF COURSE CONTENT APPROVAL 29-09-2020	APPLIED FROM BATCH 2020

COURSE CONTENTS

Section-A: Quranic Verses

Tauheed: Al-Ambiya-22, Al-Baqarah - 163&164.

Prophet Hood: Al-Imran-79, Al –Huda-7, Al-Maida0h-3.

Here-After: Al –Baqarah-48, and one Hadith.

Basic Islamic Practices: Al-Mu' minun-1-11, and two Ahadith

Amer-Bil-Ma'Roof Wa-Nahi Anil Munkar: the concept of Good & Evil, Importance and necessity of Da'wat-e-Deen Al- Imran – 110 Method of Da'wat-e-Deen An-Nehl-125, Al-Imran-104, and two Ahadith

Unity of the Ummah: Al-Imran-103, Al-Hujurat-10, Al-Imran-64, Al-An' am – 108, and two Ahadith.

Kasb-e-Halal: Ta ha-81, Al- A'raf-32-33, Al-Baqarah-188, and two Ahadith.

Haquq-ul-Ibad: Protection of life Al-Maidah-32 Right to Property Al-Nisa-29 Right to Respect & Dignity Al-Hujurat -11-12 Freedom of Expression: Al-Baqarah-256 Page 16 of 33 Equality: Al-Hujurat-13 Economic Security: Al-Ma'arij-24-25 Employment Opportunity on Merit: An-Nisa-58 Access to Justice: An- Nisa-135

Women's Rights: An-Nehl-97, Al-Ahzab-35, An-Nisa -07

Relations with Non-Muslims: Al-Mumtahanah-8-9, Al-Anfa'al-61 and The last Sermon of Hajj of Holy Prophet (PBUH): Relevant extracts

Section B:

Seerat (life) of the Holy Prophet (PBUH): Birth life at Makkah declaration of prophet hood preaching & its difficulties migration to Madina brotherhood (Mawakhat) & Madina Charter The Holy Wars of the Prophet (Ghazwat-e-Nabawi) Hujjat-ul-Wida The last sermon of Khutbatulwida: Translation and important points

Section C:

Islamic Civilization: In the sub-continent: pre- Islamic civilizations. The political, social & moral impacts of Islamic civilization. In the world: academic, intellectual, social & cultural impact of Islam on the world.

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COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
CLO1	**Explain** the given Quranic verses and Hadiths to their tangible meaning and message.	**C2**	**PLO8**
CLO2	**Describe** the basic concepts of Shariah, the features of Seerat-un-Nabi (SAW), and the impact of Islam on our society.	**C2**	**PLO8**

REMARKS (if any):

Recommended by: _____ **Approved by:** _____

(Chairperson/Date) (Dean/Date)

NED University of Engineering and Technology

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Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
MT-272 & Linear Algebra & Geometry	☐ SPRING ■ FALL	TH ■3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ☐1 ■0
PREREQUISITE COURSE(S) Nil	**DATE OF COURSE CONTENT APPROVAL** 29-09-2020	**APPLIED FROM BATCH** 2020

COURSE CONTENTS

Linear Algebra: Linearity and linear dependence of vectors, basis, dimension of a vector space, field matrix and type of matrices (singular, non- singular, symmetric, non- symmetric, upper, lower, diagonal tri-diagonal matrix), Rank of a matrix using row operations and special method, echelon and reduced echelon forms of a matrix, determination of consistency of a system of linear equation using rank, transitions matrix.

Euclidean Spaces and Transformation: Geometric representation of vector, norm of vector, Euclidean inner product, projections and orthogonal projections, Euclidean n spaces n properties Cauchy-Schwarz inequality, Euclidean transformations, apply geometric transformations to plane figure, composition of transformations.

Application of linear Algebra: Leontief Economic models, Electrical Networks, Scaling, translation, rotation, and projection etc.

Eigen values & Eigen Spaces: Interpret eigenvectors and eigenvalues of a matrix in terms of transformation it represents, convert a transformation into a matrix eigen value problem, find the eigenvalues and eigenvectors of order not more than 3×3 matrices algebraically, determine the modal matrix for a given matrix, reduce a matrix to diagonal (form and Jordan form, state the Cayley-Hamilton theorem and use it to find powers and the inverse of a matrix, understand a simple numerical method for finding the eigenvectors of a matrix, use appropriate software to compute the eigenvalues and eigenvectors of a matrix, Define quadratic form and determine its nature using eigenvalues.

Solid Geometry: Coordinate Systems in three dimensions. Direction cosines and ratios, vector equation of a straight line, plane and sphere, curve tracing of a function of two and three variables, Surfaces of revolutions. Transformations (Cartesian to polar & cylindrical).

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
CLO1	**Describe** formation of system of linear equations and solid geometry to explain physical situations	**C2**	**PLO1**
CLO2	**APPLY** appropriate methods to solve system of linear equations in relevant engineering problems.	**C3**	**PLO2**

REMARKS (if any):

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(Chairperson/Date) (Dean/Date)

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Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
MT-226 & Multivariable Calculus	☐ SPRING ■ FALL	TH ■3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ☐1 ■0
PREREQUISITE COURSE(S) Nil	**DATE OF COURSE CONTENT APPROVAL** 29-09-2020	**APPLIED FROM BATCH** 2020

COURSE CONTENTS

Advanced Calculus: Define a stationary point of a function of several variables, define local maximum and saddle point for a function of two variables the stationary points of a several variables, obtain higher partial derivatives of simple functions of two or more variables, iterated integrals, double and triple integrations with applications (area, centroid, moment of inertia, surface area, and volume, use multiple integrals in solutions of engineering problems.

Vector Calculus: Dot and cross product, Vector differential operator, directional derivative, gradient, divergence, curl of a vector field, and Laplacian operators with applications. (Solenoid, conservative, etc).

Vector Integrations: Evaluate line integrals along simple paths, apply line integrals to calculate work done, apply Green's theorem in the plane to simple examples, evaluate surface integrals over simple surface, use the Jacobean to transform a problem a new coordinate system, apply Gauss' divergence theorem to simple problems, apply Stokes theorem to simple examples.

Curvilinear Coordinates: Unit vectors in curvilinear system; Transformation of coordinates; Orthogonal coordinate system; Cylindrical coordinate system; Spherical coordinate system; Parabolic cylindrical coordinates; Elliptical cylindrical coordinate system

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
CLO1	**Describe** multivariable calculus to explain physical situations	**C2**	**PLO1**
CLO2	**Use** Vector calculus and curvilinear coordinate system to solve relevant engineering problems	**C3**	**PLO2**

REMARKS (if any):

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NED University of Engineering and Technology

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Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
MT-331 & Probability & Statistics	■ SPRING ☐ FALL	TH ■3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ☐1 ■0
PREREQUISITE COURSE(S) Nil	**DATE OF COURSE CONTENT APPROVAL** 29-09-2020	**APPLIED FROM BATCH** 2020

COURSE CONTENTS

Statistics: Introduction, Types of data & variables, presentation to data, object, classifications, Tabulation, Frequency distribution, Graphical representation, Simple & Multiple Bar diagrams, Sartorial & Pie-Diagram, Histogram, Frequency Polygon, Frequency Curves & their types.

Measures of Central Tendency and Dispersion: Statistics Averages, Median Mode, Quartiles, Range, Moments, Skew ness & Kurtosis, Quartile Deviation, Mean Deviation, Standard Deviation, Variance & its coefficient, Practical Significance in related problems.

Curve Fitting: Introduction, fitting of a first- and second-degree curve, fitting of exponential and logarithmic curves, related problems. Principle of least squares, Second order Statistics & Time series not in bit detail.

Simple Regression & Correlation: Introduction, Scatter diagrams, Correlation & its Coefficient, Regression lines, Rank Correlation & its Coefficient, Probable Error (P.E), Related problems.

Sampling and Sampling Distributions: Introduction, Population, Parameter & Statistic, Objects of sampling, Sampling distribution of Mean, Standard errors, Sampling & Non-Sampling Errors, Random Sampling, Sampling with & without replacement, Sequential Sampling, Central limit theorem with practical significance in related problems.

Statistical Inference and Testing Of Hypothesis: Introduction, Estimation, Types of Estimates, Confidence interval, Tests of Hypothesis, ChiSquare distribution/test, one tails & two tails tests. Application in related problems.

Probability: Basic concepts, Permutation & Combination, Definitions of probability, Laws of probability. Conditional probability, Baye's nile. Related problems in practical significance.

Random Variables: Introduction, Discrete & Continuous random variables, Random Sequences and transformations. Probability distribution, Probability density function, Distribution function, Mathematical expectations, Moment Generating Function (M.G.F.), Markove random walks chain/ Related problems.

Probability Distributions: Introduction, Discrete probability distributions, Binomial Poisson, Hyper geometric & Negative binomial distributions. Continuous probability distribution, Uniform, Exponential & Normal distributions & their practical significance.

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COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
CLO1	**Discuss** the fundamental concepts in Probability and Statistics	**C2**	**PLO1**
CLO2	**Analyze** data to produce mathematical or probabilistic models in relevant engineering problems	**C4**	**PLO2**

REMARKS (if any):

Recommended by: _____ (Chairperson/Date)

Approved by: _____ (Dean/Date)

NED University of Engineering and Technology

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Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
EE-232 & Signal and Systems	■ SPRING ☐ FALL	TH ■3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ■1 ☐0
PREREQUISITE COURSE(S) Nil	**DATE OF COURSE CONTENT APPROVAL** 29-09-2020	**APPLIED FROM BATCH** 2020

COURSE CONTENTS

LTI Systems: Continuous time LTI Systems, modeling of different physical systems (Electrical, Mechanical and coupled systems), state-space representation of LTI systems, Type of inputs, Zero-input response, Convolution Integral, transient and forced/steady-state response, complete response of LTI systems using classical solution of differential equations, second order systems and their responses (underdamped, overdamped, critically damped)

Fourier Series: Fourier Series Representation of continuous time periodic signals, properties of continuous time Fourier series, exponential form of Fourier series (analysis and synthesis equations)

Fourier Transform: Fourier Transform Representation of continuous time aperiodic signals, properties of continuous time Fourier transform,

Laplace Transform: Definition, derivation of Laplace transforms of simple functions, inverse transformation techniques Properties, application of Laplace for solution of differential equations of physical systems, analysis of LTI systems using Laplace transform

Magnitude-Phase: representation (for Frequency response) of LTI systems, transfer functions, Bode-plots, frequency responses of first and second order transfer functions. Design of passive and active 1st and 2nd order analog filters

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
CLO1	**Analyze** signals using Fourier series, Fourier transform, and Laplace transform techniques and should have understanding of formulating these techniques	**C4**	**PLO1**
CLO2	**Analyze** systems (especially electrical systems) with the help of time-domain technique (i.e. differential equations and convolution integral) and frequency domain techniques	**C4**	**PLO2**
CLO3	**Observe** experimentally dynamics of linear signals and systems, and verify results of analytical tools developed for signals and systems in theory	**P3**	**PLO2**

REMARKS (if any):

Recommended by: _____ (Chairperson/Date)

Approved by: _____ (Dean/Date)

Third Year

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Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
HS-304 & Business Communication & Ethics	■ SPRING ☐ FALL	TH ■3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ☐1 ■0
PREREQUISITE COURSE(S) Nil	**DATE OF COURSE CONTENT APPROVAL** 29-09-2020	**APPLIED FROM BATCH** 2020

COURSE CONTENTS

Communication Skills (oral): Definitions and Conditions, Modes: verbal, non-verbal, vocal, non-vocal, sender, Receiver, en-coding, decoding, noise, context, emotional maturity, relationships, etc. Language, perception, Non-verbal, body language, physical appearance, cultural differences etc. Personal and interpersonal skills / perceptions. Communication dilemmas and problems Public Speaking – speaking situation, persuasion, Making presentations, Interviews

Business Writing: Formal / Business letters, e-mails: a) job applications and resumes/ cv, b) enquiries, c) complaints / adjustments, d) orders, e) quotations, f) banking etc. Memos: layout, language, style Page 27 of 33 Meeting management: notice, agenda, conducting / participating, writing minutes. Contracts and agreements (basic theoretical knowledge and comprehension), Research / scientific reports : types, structure, layout / presentation, writing process etc. Tenders (basic theoretical knowledge and comprehension)

Engineering / Business Ethics: Need and objectives for code of ethics and its importance Type of ethics, involvement and impact in daily life Problems / conflicts / dilemmas in application (case studies) Sexual Harassment / discrimination in the workplace why it occurs, myths regarding sexual harassment, how to deal with it, gender equality, respect etc.

Codes of conduct: Pakistan Engineering Council Code for Gender Justice, Brief study of other codes of conduct

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
CLO1	**Demonstrate/exhibit** effective oral communication and interpersonal skills in simulated professional and business situations.	**A3**	**PLO10**
CLO2	**Compose** effective business messages for various purposes and audiences.	**C6**	**PLO10**
CLO3	**Apply** principles, theories, and codes of ethics in situations related to professional practice.	**C3**	**PLO8**

REMARKS (if any):

Recommended by: _____ **Approved by:** _____

(Chairperson/Date) (Dean/Date)

NED University of Engineering and Technology

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Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
TC-306 & Communication Systems	■ SPRING ☐ FALL	TH ■3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ☐1 ■0
PREREQUISITE COURSE(S) EE-232 Signal & Systems	**DATE OF COURSE CONTENT APPROVAL** 29-09-2020	**APPLIED FROM BATCH** 2020

COURSE CONTENTS

Introduction: Introduction to Communication, elements of Communication system, Fundamental Limitations, Hartley Shannon law Needs and benefits of Modulation, electromagnetic spectrum, multiplexing and multiple access, Phasors and Line Spectra

Analog Communication: Baseband and carrier communication, Linear CW (AM, SSB, DSB, VSB) Modulation and demodulation techniques, modulator and demodulator Circuits, AM and SSB Transmitters and Receivers, SSB Filters, Transmission Bandwidth for AM, Angle/ Exponential CW (FM, PM) Modulation and demodulation techniques, modulator and demodulator Circuits, FM/ PM Transmitter, FM Generation Methods, Transmission Bandwidth for FM/PM , Carson's rule, PLL Systems, Preemphasis and De-emphasis circuits, Narrowband and wideband FM, Demodulation of FM/PM and Receivers

Noise: Mathematical representation, Signal to Noise Ratio, Noise in AM, FM, and PM systems

Digital Communication systems: Digital transmitters and receivers,

Pulse Modulation: Pulse Amplitude Modulation, Pulse Position and Pulse width Modulation, BER, Introduction to information theory, Digital CW modulation, Coherent and nonCoherent systems, Digital modulation error-control coding

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
CLO1	Understanding and applying fundamental concepts basics of analog and digital communication system	**C3**	**PLO1**
CLO2	Ability to analyze analog modulation schemes including the effect of noise	**C4**	**PLO2**
CLO3	Able to examine the performance of digital communication systems	**C3**	**PLO4**

REMARKS (if any):

Recommended by: _____ **Approved by:** _____

(Chairperson/Date) (Dean/Date)

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Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
EE-395 & Digital Signal Processing	☐ SPRING ■ FALL	TH ☐3 ■2 ☐1 ☐0 PR ☐3 ☐2 ■1 ☐0
PREREQUISITE COURSE(S) EE-232 Signal and Systems	**DATE OF COURSE CONTENT APPROVAL** 29-09-2020	**APPLIED FROM BATCH** 2020

COURSE CONTENTS

Overview of Discrete-time Signals and Systems: Sampling, Aliasing, Quantization, Convolution, Correlation, Properties of Discrete time Signals and Systems;
Linear Constant Coefficient Difference Equations: Modeling discrete systems, conversion of differential equations into difference equations, solution of difference equations.
Discrete Time Fourier Series: Representation of discrete time periodic signals, signal analysis using discrete time Fourier series, properties of discrete time Fourier series.
Discrete Fourier Transform: Frequency Domain Sampling, DFT Properties, Inverse DFT, Windowing and DFT Leakage, Direct Computation of DFT;
Fast Fourier Transform: Divide and Conquer, Radix algorithms; Inverse FFT, Applications of FFT
Discrete time systems implementation: Overview of z-transform, Analysis of discrete system, Structures of Discrete time systems, Fixed and Floating number types, Quantization effects.
Design of Digital Filters: General Considerations, FIR and IIR Filters, Techniques of FIR and IIR filter Design.
Multi-rate Signal Processing: Down sampling and Up sampling, Decimation and Interpolation

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
CLO1	**Analyze** discrete signals using Fourier series, Fourier transforms, and z-transform techniques and should have understanding of discretizing continuous time signals	**C4**	**PLO2**
CLO2	**Analyze** discrete-time systems with the help of various techniques (difference equation, convolution and frequency domain techniques)	**C4**	**PLO2**
CLO3	Be able to **organize** complex DSP tasks to complete the assigned project in professional and timely manner **(CEP).**	**A4**	**PLO11**
CLO4	**Practice** experimental verification of the analytical and design techniques developed for discrete time signals and systems.	**P3**	**PLO5**

REMARKS (if any):

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Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
EE-346 & Electrical Machines-I	☐ SPRING ■ FALL	TH ☐3 ■2 ☐1 ☐0 PR ☐3 ☐2 ■1 ☐0
PREREQUISITE COURSE(S) Nil	**DATE OF COURSE CONTENT APPROVAL** 29-09-2020	**APPLIED FROM BATCH** 2020

COURSE CONTENTS

Fundamentals of Electrical Machinery: A linear machine, Left hand rule, right hand rule, a simple single loop AC and DC. Magnetic flux, flux density, magneto motive force, permeability, hysteresis, Faraday's law, Lenz's law, induced force on wire, induction of voltage on a conductor.

DC Generators: Construction and working, types, emf equation, losses, efficiency, armature reaction, performance characteristics and their curves.

DC Motors: Types, Back EMF, torque, speed and speed regulation, performance characteristics and their curves, losses, and efficiency.

Transformers: Types of transformer, single phase and three phase transformer, construction, principle of working, emf equation, Transformation ratios, no load working and vector diagram, magnetizing current, vector diagram on load, Equivalent circuit, Poly phase transformers, star delta and zig-zag connections for parallel operation, sharing of load, tertiary windings, harmonics and transients in transformers, on load tap changing transformers, auto transformers, vector groups, distribution and power transformer

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
CLO1	**Carry out** the performance analysis of DC machines and transformers under different operating conditions.	**C3**	**PLO2**
CLO2	Be able to **organize** an open-ended lab report in an ethical and timely manner. **(OEL)**	**A4**	**PLO8**
CLO3	**Practice** experimental analysis of DC machines and transformers under different operating conditions.	**P3**	**PLO3**

REMARKS (if any):

Recommended by: _____ (Chairperson/Date)

Approved by: _____ (Dean/Date)

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Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
EE-347 & Electrical Machines-II	■ SPRING ☐ FALL	TH ☐3 ■2 ☐1 ☐0 PR ☐3 ☐2 ■1 ☐0
PREREQUISITE COURSE(S) Nil	**DATE OF COURSE CONTENT APPROVAL** 29-09-2020	**APPLIED FROM BATCH** 2020

COURSE CONTENTS

Synchronous Generators: Construction and working, speed control, Internal Generated Voltage, Equivalent Circuit, Phasor Diagram, Power and Torque relationship, Modes of an alternator operation (Standalone and Parallel), voltage regulation of alternators.

Synchronous Motors: Overexcited and under-excited motors, power factor and power factor control, starting of synchronous motors, torque speed, V-curves circle diagram.

Single Phase Induction Motor: Single phase induction motors, construction and working, rotating field theory, slip and its effect on motor current quantities. Losses, efficiency and performance curves. Starting, full load and maximum torque relations, torque slip characteristics.

Three Phase Induction Motor: Equivalent circuit of induction motor, cage rotor, double cage and high torque motor, magnetizing current of an induction motor, noise of induction motor, crawling and cogging, speed and power factor control of induction motors by injecting EMF in the circuit, phase advancers and phase compensated induction motor, induction generators and regulators, testing of induction motor, efficiency and losses, circle diagram, starter calculations

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
CLO1	**Carry out** the performance analysis of AC machines under different operating conditions.	**C3**	**PLO2**
CLO2	Be able to **organize** an open-ended lab report highlighting aspects of environment and sustainability with context to electric machines **(OEL).**	**A4**	**PLO7**
CLO3	**Practice** experimental analysis of AC machines under different operating conditions.	**P3**	**PLO3**

REMARKS (if any):

Recommended by: _____ (Chairperson/Date)

Approved by: _____ (Dean/Date)

NED University of Engineering and Technology

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Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
EE-359 & Electrical Power Distribution & Utilization	☐ SPRING ■ FALL	TH ■3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ■1 ☐0
PREREQUISITE COURSE(S) Nil	**DATE OF COURSE CONTENT APPROVAL** 29-09-2020	**APPLIED FROM BATCH** 2020

COURSE CONTENTS

Distribution System Planning and Automation – Introduction and Factors affecting system planning, Present Planning Techniques and Modules, Upcoming Planning techniques, Futuristic Nature of Distribution Planning, Distribution System Automation.

Load Characteristics - Relationship between load and loss factors, Load Forecasting, Load Management, Rate Structure, and Electric Meter Types;

Applications of Distribution Transformers –Types, Regulation, Transformer Efficiency, Terminal or Lead markings, Transformer Polarity, Distribution Transformer loading guides, Three phase connections;

Substation Design - Schemes, Substation location, Rating, Comparison of four and six feeders, SCADA, Substation Cabling and Grounding;

Design Consideration of Primary System - Radial and Loop Type primary feeders, Primary Network, Tie Lines, Radial Feeders with uniformly and nonuniformly distributed loads;

Voltage Drop and Power Loss Calculations in different configurations, Power Factor Improvement Calculations.

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
CLO1	**Propose** economic solutions by analyzing the problems in electrical power distribution system such as lighting design, tariffs, economic power factor.	**C6**	**PLO3**
CLO2	**Assessment** of the faults occurred in underground power cables and **selection** of proper cable size as per application and standards.	**C5**	**PLO4**
CLO3	**Compose a** coherent and effective report related to feeder/substation design giving due consideration to environment and sustainability.	**C6**	**PLO7**
CLO4	**Organize** the report giving due consideration to scholarly ethics	**A4**	**PLO8**
CLO5	**Operate under supervision,** experiments based on trainers and verify the experimental results.	**P3**	**PLO4**

REMARKS (if any):

Recommended by: _____ **Approved by:** _____

(Chairperson/Date) (Dean/Date)

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Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
EE-354 Embedded Systems	■ SPRING ☐ FALL	TH ☐3 ■2 ☐1 ☐0 PR ☐3 ☐2 ■1 ☐0
PREREQUISITE COURSE(S) TC-201 Digital Logic Design	**DATE OF COURSE CONTENT APPROVAL** 29-09-2020	**APPLIED FROM BATCH** 2020

COURSE CONTENTS

Microprocessor and Microcontroller (latest) Architecture. Internal Registers, Machine code, addressing modes and Instruction Set, C and the Compiler, Debugging Software and Hardware, Threads, Tasks and Simple Scheduling, Branching, Interrupt handling, I/O and Communication Ports programming, Digital and Analog I/O Peripherals, Analog to Digital (A/D) and Digital to Analog (D/A) interfacing, Simulation design and debugging, Introduction and applications of Internet of Things (IoT).

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
CLO1	***Interpret*** instruction set guidelines under RISC/Harvard architecture in order to ***select*** hardware requirements and software constructs best suited for given design constraints.	**C5**	**PLO11**
CLO2	***Combine*** the knowledge of digital hardware design and embedded C programming in order to ***propose*** and/or ***design*** custom embedded systems.	**C6**	**PLO3**
CLO3	***Duplicate*** wiring connections for given circuit design while *manipulating the embedded software with C/Assembly IDE in order to* change system behaviour.	**P3**	**PLO12**

REMARKS (if any):

Recommended by: _____ **Approved by:** _____

(Chairperson/Date) (Dean/Date)

NED University of Engineering and Technology

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Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
MT-442 & Numerical Methods	☐ SPRING ■ FALL	TH ■3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ☐1 ■0
PREREQUISITE COURSE(S) Nil	**DATE OF COURSE CONTENT APPROVAL** 29-09-2020	**APPLIED FROM BATCH** 2020

COURSE CONTENTS

Error Analysis: Types of errors (relative, Absolute, inherent, round off, truncation), significant digits and numerical instability, flow chart. Use any Computational tools to Analysis the Numerical Solutions.

Linear Operators: Functions of operators, difference operators and the derivative operators, identities.

Difference Equations Linear homogeneous and non-homogeneous difference equations.

Solution of Non-linear Equations: Numerical methods for finding the roots of transcendental and polynomial equations (Secant, Newton – Raphson Chebyshev and Graeffe's root squaring methods), rate of convergence and stability of an iterative method.

Solution of Linear Equations: Numerical methods for finding the solutions of system of linear equations (Gauss Elimination, Gauss-Jordan Elimination, triangularization, Cholesky, Jacobi and Gauss – Seidel).

Interpolation &- Curve Fitting: Lagrange's, Newton, Hermit, Spline, least squares approximation. (Linear and non-linear curves).

Numerical Integration & Differentiation: Computation of integrals using simple Trapezoidal rule, 1/3th Simpson's rule, 3/8th Simpson's rule, Composite Simpson's and Trapezoidal rules, computation of solutions of differential equations using (Euler method, Euler modified method, Runge Kutta method of order 4). Numerical Solutions of Partial differential Equations, Optimization problem (Simplex, Method). Steepest Ascent and Steepest Descent Methods.

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
CLO1	**Explain** numerical method to solve system of linear equations and non-linear equation	**C2**	**PLO1**
CLO2	**Apply** numerical method to solve system of linear equation and non-linear equations in relevant engineering problems	**C3**	**PLO1**
CLO3	**Apply** numerical differentiation and numerical integration in relevant engineering problems	**C3**	**PLO2**

REMARKS (if any):

Recommended by: _____ (Chairperson/Date)

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Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
EE-313 Power Electronics	☐ SPRING ■ FALL	TH ■3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ■1 ☐0
PREREQUISITE COURSE(S) EL-240 Electronic Devices and Circuits	**DATE OF COURSE CONTENT APPROVAL** 29-09-2020	**APPLIED FROM BATCH** 2020

COURSE CONTENTS

Introduction: SSDs in power electronics, power diodes, power transistors, Power MOSFETS, Thyristors, Triacs, Diac. Characteristics of GTO, RCT, etc. Series and parallel operation of SCR, LASCR. Thyristor turn on, integral cycle control and phase angle control, elementary and advanced firing schemes, sequence and close loop control. **Thyristor Commutation:** Self-commutation, impulse commutation, series capacitor commutation, parallel capacitor commutation.

Uncontrolled and Controlled Rectifiers: Single phase, three phase, semi converter, full converter, dual converter, analysis and performance, parameters as harmonic factor, utilization factor, power factor, distortion factor, etc. rectifiers with purely resistive, highly inductive and RL loads. Application of Uncontrolled and Controlled rectifiers in electrical drives and power system.

DC Chopper: Principle, Step-up and Step-down operation, Buck regulator, Boost regulator, Buckboost regulator, Cuck regulator, Choppers using thyristors. Application of DC Uncontrolled and Controlled rectifiers in electrical drives and power system.

Protection Analysis: Over voltage, over current, di/dt & dv/dt protection, heat sinks.

Inverters: Principles, half bridge, full bridge inverters, constant phase width modulation, variable PW modulation, sinusoidal PW modulation, modified SPWM. Application of inverters in electrical drives and power system.

Electronic Power Supplies: Design and analysis of regulated power supplies, switch mode power supplies, Uninterrupted power supplies. Application of Electronic Power supplies in electrical drives and power system

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
CLO1	**Analysis** of AC-DC, DC-DC and DC-AC converter circuits and understanding of their performance parameters under given load conditions.	**C4**	**PLO2**
CLO2	**Construct** the converter circuit according to the given description.	**C6**	**PLO3**
CLO3	**Compose** organized, coherent, and effective report of assigned project/topic using writing processes and strategies. **(CEP)**	**C6**	**PLO10**
CLO4	**Acknowledge** and **value** the need for teamwork, leadership, diversity of ideas and inclusion. **(CEP)**	**A3**	**PLO9**
CLO5	**Practice** experimental verification of the analytical and design techniques developed for converter circuits.	**P3**	**PLO2**

REMARKS (if any):

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Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
EE-362 & Power System Analysis	■ SPRING ☐ FALL	TH ■3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ■1 ☐0
PREREQUISITE COURSE(S) EE-126 Circuit Analysis	**DATE OF COURSE CONTENT APPROVAL** 29-09-2020	**APPLIED FROM BATCH** 2020

COURSE CONTENTS

Fundamentals: Phasors, Instantaneous Power in single phase circuits, complex power, Network Equations, Balanced three Phase Circuits, Power In balanced three phase circuits, Advantages of Balanced three phase circuits' v/s singles circuits.

Power Transformers: Per Units System, Three phase transformer connections and phase shift, per unit equivalent circuits of balanced three phase two winding transformers, three winding transformers, Autotransformers. **The**

Admittance Model and Network Calculations: Branch and Node admittances; Mutually coupled Branches in Y-bus; Equivalent Admittance Network; Modification of Y-bus; Impedance matrix and Y-bus; the method of successive elimination; Node Elimination (Kron Reduction); Triangular Factorization;

Power Flow: Direct Solutions to Linear Algebraic Equations; Gaussian Elimination, Iterative Solutions to linear algebraic equations, Jacobian Gauss Siedal, Iterative Solutions to nonlinear algebraic equations; Newton Raphson Method, The Power Flow Problem, Power Flow Solutions,

Symmetrical Faults: Series RL circuits transients, three phase short circuitUnloaded Synchronous Machine, Power System three phase short circuits, Bus Impedance Matrix.

Symmetrical Components: Definition of symmetrical components, Sequence networks of impedance loads, sequence networks of series impedances, sequence networks of three phase lines, sequence networks of rotating machines, Per unit sequence models of three two winding and three winding transformers., Power in Sequence Networks.

Unsymmetrical Components: System Representation, Single line to ground fault, Line to line fault, double line to ground fault, Sequence bus impedance matrix.

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
CLO1	To ANALYZE the given power system by formulating the system equations.	**C4**	**PLO2**
CLO2	To EVALUATE the given power system by designing the solutions for different system studies.	**C5**	**PLO3**
CLO3	**Compose** organized, coherent, and effective report of assigned project/topic using writing processes and strategies. **(CEP)**	**C6**	**PLO10**
CLO4	**Acknowledge** and **value** the need for teamwork, leadership, diversity of ideas and inclusion. **(CEP)**	**A3**	**PLO9**
CLO5	**To operate and manipulate under guidance** on a given power system in the laboratory.	**P3**	**PLO4**

REMARKS (if any):

Recommended by: _____ **Approved by:** _____

(Chairperson/Date) (Dean/Date)

Final Year

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Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
CS-439 & Computer Communication Networks	■ SPRING ☐ FALL	TH ☐3 ■2 ☐1 ☐0 PR ☐3 ☐2 ☐1 ■0
PREREQUISITE COURSE(S) TC-306 & Communication Systems	**DATE OF COURSE CONTENT APPROVAL** 29-09-2020	**APPLIED FROM BATCH** 2020

COURSE CONTENTS

Introduction to Computer Networks: OSI reference model, the TCP/IP reference model; Packet Switching and Architectures; Circuit Switching and Architectures; Data Link Layer and issues; Error Correction and Congestion Control in Networks; Network Layer and Issues (Protocols and Services); IPv4 and IPv6, IP addressing and subnetting; Network Routing; Wireless Network; Transport Layer and Issues, Transmission Control Protocol, User Datagram Protocol

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
CLO1	Discuss basic computer network topologies and reference models	**C2**	**PLO1**
CLO2	Explore the operation and design issues of OSI layers	**C3**	**PLO2**

REMARKS (if any):

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Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
EF-305 & Engineering Economics and Management	■ SPRING ☐ FALL	TH ■3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ☐1 ■0
PREREQUISITE COURSE(S) Nil	**DATE OF COURSE CONTENT APPROVAL** 29-09-2020	**APPLIED FROM BATCH** 2020

COURSE CONTENTS

Introduction: Basic Concepts and principles of Economics, Micro- and Macro-economic theory, the problem of scarcity. Basic concepts of Engineering Economy, Financial effectiveness and non-monetary factors

Economic Environment: Consumers and producer goods, Goods and services, Demand & Supply concept. Market Equilibrium, Elasticity of demand, Elasticity of Supply, Measures of Economics worth, Price, supply-demand-relationship, Revenue, Cost and profit function.

Elementary Financial Analysis: Basic accounting equation. Development and interpretation of financial statements-Income Statement, Balance Sheet and Cash Flow, Working capital management, Financial Ratio Analysis.

Time Value of Money and Financial Returns: Concepts of simple, compound and effective interest rates, Less often than compounding period and more once a year; Present Value, Future Value and Annuities concepts, Uniform gradient and geometric sequence of cash flow.

Depreciation and Taxes: Depreciation concept, Economic life, Methods of depreciation, Gain (loss) on the disposal of an asset, Depreciation as a tax shield

Basic cost concepts and Break Even Analysis: Types of costs and cost curves; Determination of Cost/Revenues. Numerical and graphical presentations. Practical applications, BEA as a management tools for achieving financial/operational efficiency

Linear Programming: Mathematical statement of linear programming problems, Graphical solutions, Simplex method, Duality Problems.

Business Organizations and financial Institutions: Type of ownership, single ownership, partnerships, corporation, type of stocks and joint stock companies, Banking and specialized credit institutions.

Project Management: Integration of Organization Strategy with Projects, Defining the project, developing a network plan, managing risk, reducing project time, project selection and comparing alternatives techniques scheduling resources

Introduction to Projection Management and Production Concepts: Basic production function, stages of production, returns to scales, Production lead time, Production rate, capacity, operations, planning and control, order processing, Scheduling, planning, line of balance

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COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
CLO1	**Remember** ethical principles and commit to professional ethics and responsibilities and norms of engineering practice in accounting, depreciation calculations and determining time value of money following objectivity principle of accounting.	**C1**	**PLO8**
CLO2	**Identify** and **analyze** microeconomic environment that includes goods and services, market force and equilibrium to help determine price etc.	**C2**	**PLO7**
CLO3	**Apply** project management principles to business and economic scenarios.	**C3**	**PLO11**

REMARKS (if any):

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Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
MG-481 & Entrepreneurship	■ SPRING ☐ FALL	TH ■3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ☐1 ■0
PREREQUISITE COURSE(S)	**DATE OF COURSE CONTENT APPROVAL**	**APPLIED FROM BATCH**
Nil	29-09-2020	2020

COURSE CONTENTS

Entrepreneurship Mind-set: The revolution impact of Entrepreneurship, The individual Entrepreneurship Mind-set, Corporate Entrepreneurship Mind-set, The Social and Ethical perspectives of Entrepreneurship

Launching Entrepreneurship Ventures: Creativity and innovations, Methods to initiate ventures, Legal challenges in Entrepreneurship, The search for Entrepreneurship Capital

Formulation of Entrepreneurship Plan: The assessment of function with opportunities, The marketing aspects of new ventures, Financial statements in new ventures, Business plan preparation for new ventures

Strategic Perspectives in Entrepreneurship: Strategies growth in Entrepreneurship, Valuation challenges in Entrepreneurship, Final harvest of a new venture

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
CLO1	Explain basic functions and importance of entrepreneurship	**C2**	**PLO12**
CLO2	Value business ethics on entrepreneurial activities	**A3**	**PLO8**
CLO3	Demonstrate the entrepreneurial skills to develop business plan	**C3**	**PLO11**

REMARKS (if any):

Recommended by: _____ (Chairperson/Date)

Approved by: _____ (Dean/Date)

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Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
EE-457 & Electrical Power System Protection	☐ SPRING ■ FALL	TH ■3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ■1 ☐0
PREREQUISITE COURSE(S) EE-313 Power Electronics	**DATE OF COURSE CONTENT APPROVAL** 29-09-2020	**APPLIED FROM BATCH** 2020

COURSE CONTENTS

Circuit Breakers and Switchgears: Introduction, Principle of circuit interruption, Short circuit studies in a power system, Faults at Generator Terminals, Faults in the system, Circuit breaker-Types and characteristics, Type of switchgear, Interrupting capacity of a circuit breakers and switchgears, Ratings of circuit breakers, Circuit Breaker operating mechanism, HVDC circuit breaking, Current Limiting Reactors; Use and location, Short circuit currents and size of reactor.

Modern Circuit Breakers: Construction and testing, Modern trend in HV circuit breakers, Vacuum Circuit breakers, SF6 Power Circuit breakers, Transients in power system, Switching Transients, Testing of circuit breaker, Test techniques for high rating circuit breaker, Selection of circuit breaker.

Protective Relays - Need for protective relaying in power systems, Basic requirements of protective relaying, Principles and characteristics of protective relaying, Theory and classification of relays, Theory of application of relays, Instrument Transformers, Types of relays, Auto reclosing, Under frequency/over frequency relays, Microprocessor based relays, Numerical relays, Protection Coordination.

Protection of Generators - Allocation of protective devices for stator, rotor, and prime mover of a generator, Faults in Generator windings, Generator Protection

Protection of Transformers - Busbars and Motors: Transformer Protection, Short circuit protection of Transformers by percentage differential relays, Differential Protection of a three winding transformer, Generator transformer Unit Protection, Gas accumulator and pressure relays, Protection of Motors, Protection of induction motors by static relays.

Protection of Transmission Lines - Busbar protection, Distance protection, Zones of protection

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
CLO1	DESIGN the protection scheme for a given case study/ problem and run its simulation.	**C6**	**PLO3**
CLO2	ASSESS and EVALUATE the minimum/maximum level of protection scheme for a given system based on cost and reliability trade-off.	**C5**	**PLO4**
CLO3	**Practice** of protection schemes and evaluate their performance in laboratory sessions.	**P3**	**PLO4**

REMARKS (if any):

Recommended by: _____ (Chairperson/Date)

Approved by: _____ (Dean/Date)

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Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
EE-352 Electrical Power Transmission	☐ SPRING ■ FALL	TH ■3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ☐1 ■0
PREREQUISITE COURSE(S) EE-282 Electromagnetic Fields	**DATE OF COURSE CONTENT APPROVAL** 29-09-2020	**APPLIED FROM BATCH** 2020

COURSE CONTENTS

Systems of Transmission: Systems of DC and AC Transmission; Transmission and sub-transmission, standard voltages in and abroad for transmission and sub transmission, WAPDA & KESC practices.

Basic Concepts: Phasor notation, complex power, power triangle, direction of power flow, current and power in balanced three-phase circuits.

Representation of Power Systems: Percent and Per-Unit quantities, Selection of base and change in base of p.u. quantities, Node Equations, One-line diagram, impedance and reactance diagrams.

Series Impedance of Transmission Lines: Conductor types, Resistance, Skin effect, Line inductance based on flux considerations. Inductance of single phase 2-wire line, inductance of composite conductor line, use of tables. Inductance of 3-ph line with equilateral and unsymetrical spacings, transposition, inductance of Bundled conductors.

Capacitance of Transmission Lines: Review of Electric field on a long straight conductors, capacitance of two-wire, 3-ph line; Effect of Earth on capacitance; capacitance of bundled conductors, paralled circuit lines.

Current and Voltage Relations on a Transmission Line: Representation of lines; The short, medium and long transmission lines, solution of equations and their interpretation travelling waves, Hyperbollic form of the equation, Equivalent circuits, power flow through the line, voltage regulation and power circuit diagram, line surges.

Mechanical Design of Overhead Lines: Line supports, sag and tension calculations, total length of conductor, supports at different levels, mechanical degree of safety, effect of wind pressure & ice loading, conductor vibration & use of dampers.

Insulators: Insulator material, types of insulators, voltage distribution over insulator string, string efficiency, methods of improving the string efficiency, testing of insulators.

Corona: The phenomenon of corona, disruptive critical voltage and visual critical voltage, conditions effecting corona loss, power loss due to corona, radio interference due to corona.

Power System Stability: stability problem, steady state and transient stability, rotor dynamics and swing equation, the power angle equation, equal area criterion of stability, solution of swing equation by graphical method.

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COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
CLO1	**Analyze** transmission line Electrical / Mechanical parameters for practical geometries used in Literature/Utility companies.	**C4**	**PLO2**
CLO2	**Evaluate** and **select** transmission line parameters to optimize the system performance	**C5**	**PLO4**
CLO3	**Comprehend** the environmental impact of transmission line.	**C2**	**PLO7**
CLO4	**Assume responsibility** as a team member to assess health and safety issues with regard to solution of complex engineering problem. **(CEP)**	**A3**	**PLO6**

REMARKS (if any):

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Approved by: _____ (Dean/Date)

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Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
EE-375 & Feedback Control Systems	☐ SPRING ■ FALL	TH ■3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ■1 ☐0
PREREQUISITE COURSE(S) EE-126 Circuit Analysis EE-362 Power System Analysis	**DATE OF COURSE CONTENT APPROVAL** 29-09-2020	**APPLIED FROM BATCH** 2020

COURSE CONTENTS

Introduction: Introduction to control systems, examples and classifications, Feedback and its characteristics. Nature and representation of control system problem, block diagram fundamentals and terminology for a feedback control system. Response of second order systems with time-domain specifications. Closed Loop Transfer functions of physical systems.

Block Diagram Algebra: Canonical and unity feedback forms of control system block system block diagram, block diagram reduction techniques and theorems, signal flow graph algebra, block diagram reduction using signal flow graphs.

Control System Stability: Stability of control systems, Routh Hurwitz Criteria for Stability, Conditional Stability, and Classification of feedback systems by type, analysis of system types, Steady State error efficiency, coefficients, and constant

Root Locus: Introduction, rules for construction of root locus, qualitative analysis of root locus, analysis of performance characteristic of systems in time domain, dominant pole zero approximations, System design via root locus compensation, PID controller.

Control System Design: Introduction and review of control system design for closed loop systems via gain and phase margin adjustment in Bode/Nyquist/Polar plots.

Introduction to Digital Control: Computer control systems, Single-loop digital control system, Digital control vs Analog Control systems, Relation between S and z-domain and responses.

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
CLO1	To develop the ability of **analyzing** the output of systems by modeling and **categorizing** different types of control systems with identification of respective system elements and laws governed and then find time response of systems.	**C4**	**PLO2**
CLO2	To prepare students to **apply, modify** and **design** physical systems by applying mathematical methods for **analysis, modification** and **design** including stability criteria, steady state error, transient response analysis, sensitivity and root locus.	**C6**	**PLO3**
CLO3	***Interpret*** design specifications in order to ***select*** hardware requirements and/or software	**C5**	**PLO11**

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	constructs best suited for given design constraints. **(CEP)**		
CLO4	**Acknowledge** and **value** the need for teamwork, leadership, diversity of ideas and inclusion. **(CEP)**	**A3**	**PLO9**
CLO5	To practice **design** of 1st, 2nd and higher order complex systems as per the design specifications, **manipulate** responses using time domain specifications and derive valid conclusions by Lab work.	**P3**	**PLO4**

REMARKS (if any):

CEP will be given related to the control system design of a physical system

Recommended by: _____ **Approved by:** _____

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Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
MG-482 & Organizational Behaviour	■ SPRING ☐ FALL	TH ■3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ☐1 ■0
PREREQUISITE COURSE(S) Nil	**DATE OF COURSE CONTENT APPROVAL** 29-09-2020	**APPLIED FROM BATCH** 2020

COURSE CONTENTS

Introduction to Organizational Behavior Foundations of OB: Management functions, roles, and skills Effective versus successful managerial activities Replacing intuition with systematic study Exploring OB challenges and opportunities facing globalization: Improving quality and productivity Improving people skills Managing work force diversity Responding to globalization Empowering people Stimulating innovation and change Coping with temporariness Handling declining employee loyalty Improving ethical behavior

Foundations of Individual Behaviour Individuals & Organizations: Biographical traits and ability Personality Perceptions and individual decision making: Understanding perception and its significance, factors influencing perception Linking perception and individual decision making Optimizing decision making model Alternative decision making models Issues in decision making Values, attitudes and job satisfaction: Importance, sources, types of values Sources and types of attitude Attitude and consistency Measuring job satisfaction Determinants of job satisfaction Effect of job satisfaction on employee performance Ways employees can express dissatisfaction Motivation - basic concepts and applications

Foundations of Group Behaviour Group in OB: Defining and classifying groups Stages of group development, work group behaviour Dynamics of groups Understanding work teams: Team versus group; types of teams, creating high performance teams Turning individuals into team players Communication: communicating at interpersonal and organizational level Leadership: basic approaches and contemporary issues Conflict & negotiation: defining conflict; transition in conflict thought Conflict process Negotiation - strategies, process and issues

Foundations of Organizational Structure Organizational structure and design Work design Work stress Organizational culture: definition Culture's functions, employees and organizational culture Organization change and development: forces for change Managing planned change, resistance to change Approaches to managing organizational change

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
CLO1	**EXPLAIN** key organizational behavior concepts and its implications	**C2**	**PLO12**
CLO2	**ANALYZE** organizational behavior practices from the perspective of ethical criteria	**C4**	**PLO6**
CLO3	Express strategies to change individual & group behaviors for organizational success	**A3**	**PLO9**

REMARKS (if any):

Recommended by: _____ (Chairperson/Date)

Approved by: _____ (Dean/Date)

NED University of Engineering and Technology

Department of Electrical Engineering

Program BE-Electrical

F/QSP 11/17/01

Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
EF-304 & Occupational Safety and Health	☐ SPRING ■ FALL	TH ☐3 ■2 ☐1 ☐0 PR ☐3 ☐2 ☐1 ■0
PREREQUISITE COURSE(S)	**DATE OF COURSE CONTENT APPROVAL**	**APPLIED FROM BATCH**
Nil	29-09-2020	2020

COURSE CONTENTS

Introduction

Introduction to Occupational Safety and Health, Historic development in the subject, Safety Legislations, Safety and Ethics

Hazards

Hazards-Mechanical and Machine, Falling, lifting and Vision related hazards, Temperature and Pressures, Electrical, Fire, Radiation, Chemical and Material, Noise and Vibration, Computers and Automation related Hazards, Industrial Hygiene and Confined Spaces; Case Studies

Hazard Analysis

Hazards Analysis, Concepts of Risks, Incidents and Accidents, Accidents Prevention and Control, Personal Protective Equipment, Management Responsibilities, Accident Causation, reporting and Investigation; Case Studies

Developing and maintaining Codes

Developing and maintaining Codes, Standards and Regulations, ISO Standards 14001 and 45001/BS OHSAS 18001

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
CLO1	**Understanding** the fundamental concepts of OSH and ISO-OHSAS standards.	C2	PLO6
CLO2	**Identify** and **analyze** hazards and to recommend possible actions in the given vicinity/lab	C4	PLO7
CLO3	**Locate** and **execute** the emergency response plan and explain to the higher management.	A2	PLO8
CLO4	Valuing the organizational safety model, integrating it to private and public life, along with neighborhoods and society. Making safety a habit.	A2	PLO12

REMARKS (if any):

Recommended by: _____ (Chairperson/Date)

Approved by: _____ (Dean/Date)

NED University of Engineering and Technology

Department of Electrical Engineering

Program BE-Electrical

F/QSP 11/17/01

Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
EE-414 & Power Generation	■ SPRING ☐ FALL	TH ■3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ☐1 ■0
PREREQUISITE COURSE(S)	**DATE OF COURSE CONTENT APPROVAL**	**APPLIED FROM BATCH**
Nil	29-09-2020	2020

COURSE CONTENTS

Principles of Energy Conversion and Integration of energy sources– Introduction, types of conventional and non-conventional energy sources, efficiency and cost comparison, site selection, thermodynamic cycles, integration of different energy sources.

Conventional Energy Sources: Thermal Power Plants: Working of power plant, plant layout, types of boiler, types of steam and gas turbines and other station auxiliaries.

Hydroelectric Power Plants: Working, plant layouts, types of hydro-electric turbine and other station auxiliaries.

Nuclear Power Plants: Working, plant layout, fission and fusion reaction, critical mass chain reaction, moderators, reactor control and cooling, classification of reactors, radiation damages and shielding.

Non-Conventional Energy Sources: Solar Photovoltaic: PV system, types of solar cells, charge controllers, shading effect and its protection, power and efficiency calculations.

Wind Energy: Types of wind turbine, kinetic energy conversion, wind turbine generators, power and energy equations, wind speed characteristics of a site, air density, aerodynamics of wind turbine.

Biomass: Components and layout, agricultural residues, environmental benefits and impacts.

Fuel Cells: Thermodynamic principles of fuel cells, efficiency of fuel cell and limiting factors, design of fuel cells, fuel cells in electric vehicles.

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
CLO1	**Outline** the necessary theoretical knowledge for basic and advanced concepts in Electrical Power Generating Stations.	**C4**	**PLO1**
CLO2	**Analyze** and evaluate the technical/economical parameters of Power Generating stations	**C4**	**PLO2**
CLO3	**Compare** the impact of different power generating stations on the environment and sustainability. **(CEP)**	**C4**	**PLO7**
CLO4	Acknowledge and value the need for teamwork, leadership, diversity of ideas and inclusion. **(CEP)**	**A3**	**PLO9**

REMARKS (if any):

Recommended by: _____ (Chairperson/Date)

Approved by: _____ (Dean/Date)