3.1. Establish the correlation between the courses and the Program Outcomes (POs) and Program Specific Outcomes (PSOs) (20)

POs	Program Outcomes
PO1	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	**Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	**Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	**The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	**Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	**Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	**Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PSO	PROGRAM SPECIFIC OUTCOMES (PSO)
PSO1	Ability to model design, Electrical and Electronics Engineering systems to meet specified requirements
PSO2	Ability to implement and operate Electrical and Electronics Engineering Systems of varying complexity

3.1.1. Course Outcomes (COs) (SAR should include course outcomes of one course from each semester of study, however, should be prepared for all courses and made available as evidence, if asked) (05)

At the end of the Courses, Students are able to

Course Name: Transformers and Generators (18EE33) Year of Study: 2019-20

C203.1	Demonstrate the construction, operation and performance of single phase and three phase transformers.
C203.2	Explain the use of autotransformer, tap changing and tertiary winding transformer of operating transformer in parallel.
C203.3	Discuss the armature reaction and commutation and their efficiency in a DC generator.
C203.4	Analyze the construction, performance of synchronous machines.

Table B.3.1.1.A Course Outcomes of Transformers and Generators (18EE33)

Course Name: Power Generation & Economics (18EE42) Year of Study: 2019-20

C210.1	Describe the working of hydroelectric, steam, nuclear power plants.
C210.2	Explain types of substations and equipments involved in it.
C210.3	Apply economic aspects of power system.
C210.4	Explain the importance of earthing and power factor improvement.

Table B.3.1.1.B Course Outcomes of Power Generation & Economics(18EE42)

Course Name: Management and Entrepreneurship (18EE51) Year of Study: 2020-21

C301.1	Understand the fundamental concept of management and describe the functions of managers
C301.2	Describe the functions of entrepreneurs and their social responsibilities
C301.3	Analyze institutional support by various state and central government agencies
C301.4	Apply concepts of project Management and design various stages of product development process

Table B.3.1.1.C Course Outcomes of Management and Entrepreneurship(18EE51)

Course Name: Computer Aided Electrical Drawing (18EE643) Year of Study:2020-21

C407.1	Sketch the armature winding diagram for DC and AC machines
C407.2	Illustrate a Single Line Diagram of Generating Stations and substation using the standard symbols.
C407.3	Construct the sectional views of core and shell types transformers
C407.4	Analyze the sectional views of assembled DC and AC machine

Table B.3.1.1.D Course Outcomes of Computer Aided Electrical Drawing (18EE643)

Course Name: Power System Protection**(18EE72)** Year of Study: 2021-22

C402.1	state the performance of protective relays, components of protection scheme and relay terminology over current protection.
C402.2	Discuss the pilot protection ,wire pilot relaying and carrier pilot relaying
C402.3	Identify the protection of generators, motors, transformer and bus zone protection, protection against over voltages, Gas insulated substation.
C402.4	Explain the principle of circuit interruption in different types of circuit breakers, Fuse and its definitions

Table B.3.1.1. E Course Outcomes of Power System Protection**(18EE72)**

Course Name: Power System Operation & Control(18EE81) Year of Study: 2021-22

C410.1	Able to understand the operating status of power system, analyze the generator control loop and modeling of AVR & ALFC loops.
C410.2	Able to understand the besics of unit commitment problem, analyze different unit commitment solution methods, and explain methods of voltage and reactive power control techniques.
C410.3	Able to analyze the different techniques of contingency evaluation, explain the basics of power system state estimation and various minimization technics of PSSE
C410.4	Able to understand besics of power system reliability and analyze varios reliability index.

Table B.3.1.1.F Course Outcomes of Power System Operation & Control(18EE81)

3.1.2. CO-PO matrices of courses selected in 3.1.1 (six matrices to be mentioned; one per semester from 3rd to 8th semester) (05)

Course Name: Transformers and Generators (18EE33) Year of Study: 2019-20

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
C203.1	3	3	2											2
C203.2	2	3	2											2
C203.3	3	2												2
C203.4	3	3	2											2
C203	2.75	2.75	2											2

Table B.3.1.2.A CO PO/PSO Mapping of Transformers and Generators (18EE33)

Course Name: Power Generation & Economics(18EE42) Year of Study: 2019-20

PO / CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
C210.1	**3**	**2**	**2**				**3**			**2**			**2**	
C210.2	**3**	**2**	**1**							**2**			**2**	
C210.3	**3**	**2**	**2**							**2**			**2**	
C210.4	**3**	**2**								**2**			**2**	
C210	**3**	**2**	**1.667**				**3**			**2**			**2**	

Table B.3.1.2.B CO PO/PSO Mapping of Power Generation & Economics(18EE42)

Course Name: Management and Entrepreneurship (18EE51) Year of Study: 2020-21

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
C301.1						3	3	3	3	3	3	3		
C301.2						3	3	2	3	2	3	3		
C301.3						1	1	1	2	2	3	2		
C301.4							2	2	2	2	3	3		
C301						2.333333333	2.25	2	2.5	2.25	3	2.75		

Table B.3.1.2.C CO PO/PSO Mapping of Management and Entrepreneurship (18EE51)

Course Name: Computer Aided Electrical Drawing (18EE643) Year of Study: 2020-21

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
C407.1	**3**	**3**	**3**		**2**	**1**			**1**	**2**			**2**	
C407.2	**3**	**2**	**2**		**2**	**1**			**1**	**2**			**2**	
C407.3	**3**	**3**	**2**		**2**	**1**			**1**	**2**			**2**	
C407.4	**3**	**3**	**2**		**2**	**1**			**1**	**2**			**2**	
C407	3	2.75	2.25		2	1			1	2			2	

Table B.3.1.2. D CO PO/PSO Mapping of Computer Aided Electrical Drawing (18EE643)

Course Name: Power System Protection**(18EE72)** Year of Study: 2021-22

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
C402.1	**3**									**2**		**2**		
C402.2	**2**		**2**							**2**		**2**	**2**	
C402.3	**3**	**3**	**2**							**2**		**2**	**2**	
C402.4	**3**	**3**								**2**		**2**		
C402	**2.75**	**3**	**2**							**2**		**2**	**2**	

Table B.3.1.2. D CO PO/PSO Mapping of Power System Protection**(18EE72)**

Course Name: Power System Operation & Control (18EE81) Year of Study: 2021-22

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
C410.1	**3**	**2**	**1**										**1**	
C410.2	**3**	**2**												**2**
C410.3	**3**	**2**												**2**
C410.4	**3**	**2**												**2**
C410	3	2	1										1	2

Table B.3.1.2. D CO PO/PSO Mapping of Power System Operation & Control (18EE81)