CURRICULUM

For

MASTERS OF SCIENCE

In

POWER SYSTEM ENGINEERING

[M.Sc. in (Power System Engineering)]

(Two Years Program – Semester System)

MANMOHAN TECHNICAL UNIVERSITY

Budhiganga-4, Morang, Koshi Province, Nepal

MANMOHAN TECHNICAL UNIVERSITY
Master of Science in Power System Engineering, Course Structure

1. INTRODUCTION

A. BACKGROUND

The 2015 constitution of Nepal established a federal system of governance giving legal authority to the provincial/state governments to establish and operate need-based higher education institutions in their provinces. Manmohan Technical University (MTU) was thus created by the State Government of Koshi Province (the then Province 1) in 2019. In the background, there has been Manmohan Memorial Polytechnic Institute which provides foundations and has already been in successful operation for about one and a half decades with a well-known public image and branding for high-quality engineering technical Diplomas and other relevant vocational/occupational training courses. MTU has been established to produce higher level skilled technical human resources required for the economic progress and prosperity of the nation and to contribute globally. This institution is the first Technical University in Nepal to provide need-based high-quality technical and vocational education at the local regional, national and international levels.

The university is moving forward with the belief that it will move towards becoming a model technical university in South Asia. The university has three schools namely the School of Engineering, the School of Applied Science and Technology and the School of Medicine and Allied Health Sciences. The Manmohan Memorial Polytechnic is a constitute institute of this university. This university is situated in Budhiganga Rural Municipality 4. Morang district in Koshi Province of Nepal. Now, this university has planned to offer Master of Science in Power System Engineering. course under the School of Engineering.

B. RATIONALE

The Master of Science in Power System Engineering is a specialized graduate program designed to provide students with advanced knowledge and skills in the design, operation, management and optimization of electrical power systems. The program focuses on the integration of modern technologies, including renewable energy sources, smart grids and energy storage, into power system infrastructure. As the global energy landscape continues to evolve, this program equips graduates to address emerging challenges and innovations in the power sector, ensuring the sustainability, efficiency and reliability of electrical grids worldwide.

The program provides a deep understanding of power system and the application of modern engineering principles to meet the growing demands of the energy industry. The program combines theoretical coursework, practical training and research opportunities, allowing students to develop expertise in power generation, transmission, distribution and grid management. With the increasing importance of renewable energy and smart grid technologies, the curriculum emphasizes both traditional power system and cutting-edge advancements in the field.

2. TITLE OF THE COURSE

Master of Science in Power System Engineering (M.Sc. in Power System Engineering)

3. COURSE DESCRIPTION

The features of the program are competitive learning environment. Research-oriented concentrations and program certainty. The M.Sc. in Power System Engineering is a two-year program spread over four semesters. Each student needs to successfully complete 45 credit hours of course work inclusive of Research project and power system design project and 15 credit hours of thesis.

The program will use a range of pedagogical inputs that includes on-campus learning through classroom lectures. Presentations, Group work and guest lecture series and off campus learning through project work, On-line Lectures.

4. AIM OF THE COURSE

The Master of Science in Power System Engineering (MSPSE) program aims to provide advanced education and training in the design, analysis, operation and optimization of power system. The program focuses on equipping students with the necessary skills and knowledge to address the growing complexities and challenges of modern power system, including the integration of renewable energy, the development of smart grids and the application of advanced technologies for improving grid efficiency, reliability and sustainability.

The curriculum is tailored to give students the abilities, know-how, aptitudes and dispositions required for success in technical jobs. The course offers students a comprehensive and wide-ranging perspective on the intricacy of technologies with regard to various power system analysis and design in the modern world.

5. OBJECTIVE

The Master of Science in Power System Engineering program focuses in providing students adequate knowledge and skills that allow them to have a meaningful career in Professional and academic career. The course modules offer hands-on experience with mathematical modelling, mathematical problem formulation in software environment simulation and analysis. Besides, the design-based course also allows them to work directly with the hardware system equipment. The specific objectives of the program are to provide high skilled human resources capable to perform following tasks.

- Acquiring depth knowledge and understanding of the power system behavior, students will be able to model, solve and analyze power system.
- Acquiring adequate skills, students will be able to perform independently planning and implementation tasks at professional level in power system engineering including the use of appropriate software.
- Students will able to conduct independent research in topics related to power system engineering.

6. TEACHING LEARNING METHOLOGY

The methods of teachings for this curricular program will be a combination of several approaches; such as: Illustrated Lecture, Tutorial, Group Discussion, Demonstration, Simulation, Guided Practice, Practical experiences, Fieldwork, Report writing, Term Paper Presentation, Tutoring, Project work and Other Independent Research works.

- **Theory:** Lecture, Discussion, Seminar, Interaction, Assignment, Group Work.
- **Project and Research works:** Independent project and research', thesis research projects.

7. DURATION OF COURSE

The duration of the course is full time two academic years (four semesters) and each year is divided into two semesters. The student, upon successful completion of the course, will be awarded Master of Science in Power System Engineering.

Semester	I	II	III	IV	Total
Credits	16	16	13	15	60
Full Marks	500	500	400	300	1700

8. ENTRY REQUIREMENT AND ADMISSION PROCESS

Eligibility

Candidates with Bachelor's Degree in Electrical Engineering (4 years course) or equivalent recognized by the government of Nepal are eligible to join the program. The applicants must have along with the above requirements a minimum of 16 years formal education (12 years of schooling plus four years of undergraduate studies). The applicants must have secured a minimum CGPA of 2.0 out of 4.0 or at least second division marks at the Bachelor's degree.

Documents Required

Applicants are required to submit the following documents with the application form made available by the University by paying a predetermined fee:

- Completed and signed application form.
- Attested transcripts from all the academic institutions attended.

Enrolment is conditional upon completion of all admission formalities including payment of fees as determined by the University. Incomplete applications shall not be processed.

Admission Procedures

A notice inviting applications for admission is publicly announced. Application forms and information brochures are provided, on request, after the payment of the prescribed fee. The University scrutinizes the application. The eligible candidates are informed to take the entrance test. The date and time for the entrance test are informed to the applicants by the concerned University.

Final selection of students will be made on the basis of their aggregate scores in the entrance test.

9. MEDIUM OF INSTRUCTION

The medium of instruction will be in English except stated otherwise.

10. ATTENDANCE REQUIREMENT

The students must attain every lecture, tutorial and courses offered. However, to accommodate for late registration, sickness and other such contingencies, the attendance requirements will be a minimum of 80% of the classes actually held. Students will get NOT QUALIFIED (NQ) status in a course if s/he fails at maintaining 80% attendance in the course.

11. TEACHER AND STUDENT RATIO

For theory: As per the nature of the course
For Research and Thesis: 1:5
For Lecture 1: 20

12. EXAMINATION AND MARKING SCHEME

The subject teacher will internally assess the students' achievement in each subject during the course followed by a final examination conducted by the Controller of Examination of the university at the end of each semester (or by the Department). The End-Semester Examination (final semester examinations) of all theory components will be administered through written tests conducted by the Controller of Examination of the University (or by the Department).

The students must secure minimum of 50% marks in any form of examinations. The students must secure minimum of 50% marks in the In-Semester- Assessment Examination and 50% in the End-Semester-Examination of each subject to pass all subjects offered in each semester. To be eligible for End-Semester Examination, a student must secure at least 50% marks in the In-Semester Assessment Examination of the respective subjects.

13. GRADING SYSTEM

The student's achievement in each subject is evaluated by In-Semester Assessment and End Semester Examination. The grading system shall be as per the University regulation from the office of the controller of examinations.

14. EVALUATION AND MARKING SCHEME

The student's achievement in each subject is evaluated by In- Semester Assessment and End semester Examination. The course-wise weights for the continuous In- semester assessment and End- Semester Examination shall be below

Evaluation scheme

Evaluation Mode	Theory Marks (Percent)
In-Semester Assessment	50
End-Semester Examination	50
Total	**100**

For Project work, Seminar and research works, the evaluation will be as per prescribed in detail syllabus or rules of university. A student's performance in a course is evaluated in two phases:

(a) Internal Assessment Examination: Internally conducted by the concerned faculty member through class participation, presentation, tutorials, laboratory works (if applied course), home assignments, class tests, discipline, honesty, term papers, etc.

Marks Allocation for Internal Evaluation

Theory		Research/Project		Thesis	
FM	PM	FM	PM	FM	PM
50	25	50	25	150	75

FM: Full Mark, PM: Pass Mark

Internal evaluation scheme

A. Theory			
S.N.	**Particular**	**Percentage (%)**	**Marks (FM=50)**
1.	Minimum Two Assessments	70	35
2.	Attendance	5	2.5
3.	Class Performance – Unit Test, Assignment, Presentation, Teaching Learning & Group Discussion	20	10
4.	Discipline	5	2.5
	Total	**100**	**50**

B. Research Methodology			
	Title	**Percentage (%)**	**Marks**
Mid-Term presentation	Review paper	40	10
	Defense	40	10
	Presentation skills	20	5
	Total	**100**	**25**
Final Presentation	Review paper	40	10
	Defense	40	10
	Presentation skills	20	5
	Total	**100**	**25**
	Total marks		**50**

C. Research Project – Leading to Thesis			
S.N.	**Title**	**Percentage (%)**	**Marks**
1.	Initial Presentation	30	15
2.	Mid Term Presentation	30	15
3.	Report	40	20
	Total	**100**	**50**

D. Thesis			
S.N.	**Particular**	**Percentage (%)**	**Marks**
1.	Research question and idea	10	15
2.	Literature review	10	15
3.	Research methodology	20	30
4.	Results and analysis	20	30
5.	Discussion and conclusion	20	30
6.	References	10	15
7.	Presentation skills and communication	10	15
	Total	**100**	**150**

(b) End Semester Examination: Conducted by the office of the Controller of Examinations of University (or by the Department). Student must pass both the In-Semester Assessment Examination and End- Semester Examination separately.

Theory		Research/Project		Thesis	
FM	PM	FM	PM	FM	PM
50	25	50	25	150	75

Marks Allocation for In-Semester Assessment Examination

End Semester evaluation criteria

A. Theory

End Semester examination of theoretical subject will be conducted for three hours for the total of 50 marks in written paper test

B. Research Methodology		
Title	**Percentage (%)**	**Marks**
Review paper	40	20
Defense	40	20
Presentation skills	20	10
Total	**100**	**50**

C. Research Project – Leading to Thesis		
S.N.	**Title**	**Marks**
1.	Presentation skills and communication	10
2.	Defense	20
3.	Report	20
	Total	**50**

D. Thesis

S.N.	Particular	Percentage (%)	Marks
1.	Report	50	75
2.	Thesis defense	40	60
3.	Presentation skills and communication	10	15
	Total	**100**	**150**

14. PROVISION FOR COMPARTMENT/BACK PAPER EXAMINATION

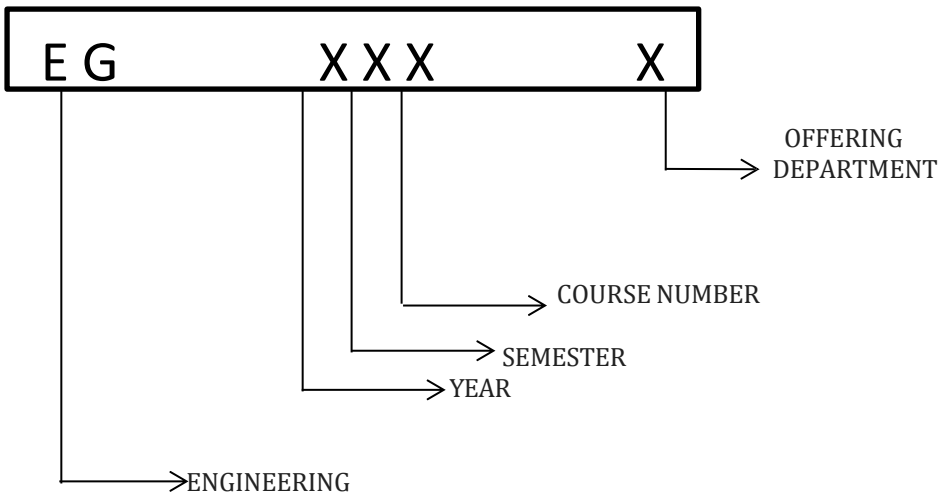
The failed student shall be allowed to appear in the subsequent examinations arranged by the office of the Controller of Examination of University.

15. CURRICULUM AND CREDITS

Each subject has been designated with its code, full marks and credit hours both in the case of theory and practical subjects. Each course is assigned a certain number of credits generally depending upon its lecture, tutorial and practical work hours in a week. In theory subjects, one lecture hour per week is assigned one credit whereas in practical subjects, three practical hours per week is equivalent to one credit hour as a general rule.

16. COURSE CODE MEANING

Each subject is coded with a unique number preceded and followed by certain letters; (for example: EG XXX XX). The code for all subjects offered in engineering discipline begin with two letters 'EG', followed by three-digit numbers denoting the subject offered in the particular half yearly semester/part. The first digit denotes the year, e.g. 8 and 9; for first and second year respectively. The second digit 0 is used for the first part or semester of the year and 5 for the second part or semester of the year. The third digit is used to identify the subject. The last two letters denote the department which offers the subject.eg CE: Civil Engineering, EE: Electrical Engineering, EX: Electronics Engineering, CO: Computer, SH: Science and Humanities and so on. **Example: EG801EE** would be the code for Electrical Engineering subject offered in the second-year semester I by the Department of Electrical and Electronics Engineering



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CURRICULUM STRUCTURE

Year I Part I Semester I

Teaching Schedule			Mode					Examination Scheme			Total
S. N.	Course Code	Course Title	Credit	L	T	P	Total	Theory			
								Asst. Marks	Final		
									Time Hours	Marks	
1	EG801EE	Computer Aided Power System Analysis	3	3	1	-	4	50	3	50	100
2	EG802EE	Distribution System Design and Operation	3	3	1	-	4	50	3	50	100
3	EG803EE	Extra High Voltage AC Systems	3	3	1	-	4	50	3	50	100
4	EG804EE	Power System Dynamics and Stability	4	4	1	-	5	50	3	50	100
5	EG--EE	Elective I	3	3	1	-	4	50	3	50	100
		Total	**16**	**16**	**5**	-	**21**	**250**	**15**	**250**	**500**

Year I Part II Semester II

Teaching Schedule			Mode					Examination Scheme			Total
S. N.	Course Code	Course Title	Credit	L	T	P	Total	Theory			
								Asst. Marks	Final		
									Time Hours	Marks	
1	EG851EE	Power System Reliability and Risk Assessment	4	4	1	-	5	50	3	50	100
2	EG852EE	Power Market and Deregulation	3	3	1	-	4	50	3	50	100
3	EG853EE	Distributed Generation and Grid Integration	3	3	1	-	4	50	3	50	100
4	EG854EE	Power System Operation and Economics	3	3	1	-	4	50	3	50	100
5	EG--EE	Elective II	3	3	1	-	4	50	3	50	100
		Total	**16**	**16**	**5**	**-**	**21**	**250**	**15**	**250**	**500**

Year II Part I Semester III

Teaching Schedule			Mode					Examination Scheme			Total
S. N.	Course Code	Course Title	Credit	L	T	P	Total	Theory			
								Asst. Marks	Final		
									Time Hours	Marks	
1	EG901EE	Digital Protection of Power System	3	3	1	-	4	50	3	50	100
2	EG--EE	Elective III	3	3	1	-	4	50	3	50	100
3	EG905EE	Research Methodology	3	1	-	6	7	50		50	100
4	EG906EE	*Research Project - Leading to thesis	4	-	-	-	-	50	-	50	100
		Total	**13**	**7**	**2**	**6**	**15**	**200**	**6**	**200**	**400**

Year II Part II Semester IV

Teaching Schedule			Mode					Examination Scheme			Total
S. N.	Course Code	Course Title	Credit	L	T	P	Total	Theory			
								Asst. Marks	Final		
									Time Hours	Marks	
1	EG951EE	*Thesis	15	-	-	-	-	150	-	150	300
		Total	**15**	-	-	-	-	**150**	-	**150**	**300**
		Grand Total	**60**	**38**	**12**	**6**	**57**	**850**	**36**	**850**	**1700**

***N.B.: Students shall carry out Research Project [EG906EE] for a period of minimum 8 weeks in an industry or an academic institution. Students should manage the time schedule for themselves as part of the self-learning process and are expected to spend at least 6 hours a day on their topics. This work shall be extended to Thesis [EG951EE] which shall be for a minimum of 6 months.**

ELECTIVES

ELECTIVE I	
1	**[EG805EE] Mathematical Programming**
2	**[EG806EE] Operation Research and Optimization Techniques**
ELECTIVE II	
1	**[EG855EE] FACTS Devices**
2	**[EG856EE] Switchyard Design**
ELECTIVE III	
1	**[EG902EE] Power Quality Improvement**
2	**[EG903EE] Power Electronics for Renewable Energy Systems**
3	**[EG904EE] Condition Monitoring and Fault Diagnostics**

Note:
From each Elective category, out of the available courses, only one subject shall be offered as per the availability of faculty and resources.

FIRST YEAR (FIRST SEMESTER)
SUBJECTS

S. N.	Course Code	Course Title
1	EG801EE	Computer Aided Power System Analysis
2	EG802EE	Distribution System Design and Operation
3	EG803EE	Extra High Voltage AC Systems
4	EG804EE	Power System Dynamics and Stability
5	EG--EE	Elective-I