Kadi Sarva Vishvavidyalaya, Gandhinagar
Bachelor of Engineering (Electrical Engineering Syllabus)
B.E Semester: VIth (EE)
Subject Name & Subject Code: Switchgear (EE-601)

Course Objective:

- To present a problem oriented introductory knowledge of protection of Electrical Engineering systems.
- To understand basic concepts of Electrical protection of any system.

A. **Teaching / Examination Scheme**

SUBJECT		Teaching Scheme				Total Credit	Examination Scheme					Total Marks
		L	T	P	Total		THEORY		IE	CIA	PR. / VIVO	
CODE	NAME	Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	
EE-601	Switchgear	3	0	0	3	3	3	70	30	20	00	120

Theory of Circuit Interruption:

Introduction, Physics of arc phenomena , Maintenance of the arc, Losses from plasma, Essential properties of arc, Arc interruption theories

Circuit Constants in Relation to Circuit Breaking:

Introduction, Circuit breaker rating, Circuit constants and circuit conditions Restriking voltage transient Characteristics of restriking voltage, Interaction between the breaker and circuit, Current chopping, The duties of switchgear.

Theory and Practice of Conventional Circuit Breakers:

Automatic switch, Air-break circuit breakers, Oil circuit breakers, Single and multi break construction, Air-blast circuit breaker, Performance of circuit breakers and system\ requirements, Modification of circuit breaker duty by shunt resistors, Power factor correction by series resistance, Comparative merits of different types of conventional circuit breakers.

Recent Developments in Circuit Breakers:

Modern trends, Vacuum circuit breakers, Sulphur hexafluoride (SF6) circuit breakers D.C. circuit breaker. Gas insulated Substation (GIS).

Testing of Circuit Breakers:

Introduction, Classification, Description of a simple testing station, Equipments used in the station, Testing procedure, Direct testing, Test report, Indirect testing.

INSTRUCTIONAL METHOD AND PEDAGOGY (Continuous Internal Assessment (CIA) Scheme)

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures, practical's and Tutorial which carries 05 Marks.
- At regular intervals assignments is given. In all, a student should submit all assignments of 05 marks each.
- Classroom participation and involvement in solving the problems in Tutorial rooms carries 05 Marks.
- Viva Voce will be conducted at the end of the semester of 05 Marks.
- One internal exam of 30 marks is conducted as a part of mid semester evaluation.
- Experiments shall be performed in the laboratory related to course contents.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures.

B. **Lesson Planning**

SR No.	Lectures (Hours)	Weightage in % in Exam	Topic
1	08	30	Introduction, Physics of arc phenomena , Maintenance of the arc, Losses from plasma, Essential properties of arc, Arc interruption theories
2	10		Introduction, Circuit breaker rating, Circuit constants and circuit conditions Restriking voltage transient Characteristics of restriking voltage, Interaction between the breaker and circuit, Current chopping, The duties of switchgear.
3	10	25	Automatic switch, Air-break circuit breakers, Oil circuit breakers, Single and multi break construction, Air-blast circuit breaker, Performance of circuit breakers and system\ requirements, Modification of circuit breaker duty by shunt resistors, Power factor correction by series resistance, Comparative merits of different types of conventional circuit breakers.
4	08	20	Modern trends, Vacuum circuit breakers, Sulphur hexafluoride (SF6) circuit breakers D.C. circuit breaker. Gas insulated Substation (GIS).
5	09	25	Introduction, Classification, Description of a simple testing station, Equipments used in the station, Testing procedure, Direct testing, Test report, Indirect testing.
	45	100	

C. **Instructional Method & Pedagogy**

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
- Attendance is compulsory in lectures, which may carries five marks in overall evaluation.

Students Learning Outcomes

On successful completion of the course

- The student can be acquired the basic knowledge of protection of electrical Engineering systems.
- The students will be able to effectively employ electrical systems and lead the exploration of new applications and techniques for their use**.**

Suggested Books:

1. Power System Protection and Switchgear by B Ravindranath and M Chander, New Age International.
2. Switchgear and Protection: Sunil S Rao, Khanna Publishers.
3. Power System Protection and Switchgear by Bhuvanesh Oza, Nirmal Nair, Rashesh Mehta and Vijay Makwana, Tata McGraw Hill .
4. High Voltage Circuit Breakers: Design and Applications by Ruben D. Garzon, CRC Press.