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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belgaum)

Sixth Semester, B.E. – Electrical and Electronics Engineering

Semester End Examination; June - 2016

Switchgear and Protections

Time: 3 hrs *Max. Marks: 100*

***Note**: Answer **FIVE** full questions, selecting **ONE** full question from each unit.*

UNIT - I

1 a. Define Fusing Factor. Illustrate the cut-off action of HRC fuse with characteristic curve. 8

b. Describe the Slepian's theory of arc extinction process. 5

c. Derive the expression of maximum rate of rise of restriking voltage. 7

2 a. Explain the effect of natural frequency and power factor on Transient recovery voltage (TRV). 10

b. A 3ϕ alternator has the line voltage of 11 kV. The generator is connected to a CB. The inductive reactance up to CB is 5 Ω/phase the distributed capacitance up to circuit breaker between phase and neutral is 0.01μF, determine the following, 10

i) Peak restriking voltage across circuit breaker.

ii) Frequency of restriking voltage restored.

iii) Average rate of restriking voltage up to peak restriking voltage.

iv) Maximum RRRV.

UNIT - II

3 a. Explain the principle of Arc quenching in Air blast circuit breaker. 7

b. List the merits and demerits of SF_6 circuit breaker. 5

c. With a neat circuit diagram explain procedure of synthetic testing of circuit breaker. 8

4 a. Explain the construction and working of minimum oil circuit breaker. 10

b. What are the different interrupting ability limits of each vacuum interrupter? Briefly explain. 6

c. List the merits and demerits of vacuum circuit breaker. 4

UNIT - III

5 a. What are important functions of protective relaying? Explain the significance of protective relaying. 8

b. What are the desirable qualities of protective relaying? Briefly explain. 12

6 a. Explain impedance relay and reactance relay protection with relevant characteristics. 10

b. With a neat diagram explain the three step distance relay time characteristics. 8

c. List applications of distance protection. 2

Contd…2

UNIT - IV

7	a.	Briefly discuss the over current and earth fault protection for generator back-up with relevant diagram.	10
	b.	Explain the negative sequence protection of generators against unbalanced loads.	10
8	a.	Explain the protection against Turn-to Turn fault on stator winding.	12
	b.	A generator is provided with restricted earth fault protection. The ratings are 11 kV, 5000 kVA the percentage of winding protected against the phase to ground fault is 80%. The relay setting such that it trips for 25% out of balance calculate the resistance to be added in neutral to ground connection.	8

UNIT - V

9	a.	With necessary diagram, explain the working principle of Buchholz relay and mention its limitations.	10
	b.	Describe the principles of differential system of protection applied to a power transformer. What are the difficulties experienced?	10
10	a.	What are abnormal conditions in induction motor and explain the protection against single phasing or phase failure.	10
	b.	Starting with characteristics of squirrel case induction motor co-ordinated with over current relay, explain the phase to phase fault protection.	10

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