OR

A 50Hz over head line has the line to ground capacitance of $1.2\mu F$. It is decided to use a ground - fault neutralizer. Determine the reactance to neutralize the capacitance of

i)   100% of the length of line and

ii) 95% of the line.

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EX - 603

B.E. VI Semester

Examination, June 2015

Switch gear and Protection

Time : Three Hours

Maximum Marks : 70

Note: i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.

ii) All parts of each questions are to be attempted at one place.

iii) All questions carry equal marks, out of which part A and B (Max.50 words) carry 2 marks, part C (Max.100 words) carry 3 marks, part D (Max.400 words) carry 7 marks.

iv) Except numericals, Derivation, Design and Drawing etc.

1. a) Describe the principle of current limiting reactors.

b) Convert 2 ohms into per unit. Base kV 11, Base kVA 1000.

c) Explain what is the difference between symmetrical components of positive, negative and zero phase sequence.

d) Distinguish between symmetrical and unsymmetrical faults occurring in power system. Draw the sequence network diagram for the following types of faults at the terminal of an unloaded generator:

i)   Three phase short circuit fault.

ii) Single line to ground fault.

OR

A Single phase load of 100 kVA is connected across lines **bc** of a 3 - phase supply of 3.3 kV. Determine symmetrical components of line current

2. a) What are the essential qualities of protection in a protective system? Discuss various zones of protection.

   b) State merits and demerit of static relays.

   c) What is an impedance relay? Explain its operating principal and characteristic on R-X diagram.

   d) Describe the operating principal and constructional features of a directional relay. Draw 30° and 90° connection of directional relay.

OR

The current setting of a relay is 5 Amp, PSM = 1.5, TMS = 0.2, C.T. ratio = 400/5, fault current = 6000 Amp. Determine the operating time of relay. At TMS = 1, operating time at various PSM are:

PSM	2	4	5	8	10	20
Operating Time (sec)	10	5	4	3	2.8	2.4

3. a) Discuss the recovery rate theory and energy balance theory of arc interruption in a circuit breaker.

   b) Explain the HRC cartridge fuse, what are its advantages and disadvantages?

   c) Explain the terms: Restriking voltage, recovery voltage and RRRV.

   d) Explain the construction and working of SF_6 Circuit breaker. What are the physical, chemical and dielectric properties of SF_6 gas.

OR

Describe the vacuum circuit breaker in detail with neat sketches.

4. a) Describe the following;

      i) Protection of Parallel feeder

      ii) Earth fault protection.

   b) What are the problems arises in differential protection applied to transformers.

   c) Explain the Buchholz relay in detail.

   d) What is percentage differential protection scheme? How it is used for protection of generators.

OR

The neutral point of a three phase 20 MVA, 11kV alternator is earthed through a resistance of 5 ohms. The relay is set to operate when there is out of balance current of 1.5 Amp. The CTs have a ratio of 1000/5. Calculate what percentage of winding is protected against an earth fault.

5. a) What are the causes of over voltages arising on a power system, mention them briefly.

   b) What is a Peterson coil? What protective functions are performed by this device.

   c) Enumerate the types of lightning arresters with suitable diagrams.

   d) Explain the term insulation co-ordination. Describe the construction of volt time curve.