Scheme - I

Sample Question Paper

Program Name : Electrical Engineering Program Group

Program Code : EE/EP/EU

Semester : Fifth

Course Title : Switchgear and Protection

Max. Marks : 70

Time: 3 Hrs.

22524

Instructions:

(1) All questions are compulsory.

(2) Illustrate your answers with neat sketches wherever necessary.

(3) Figures to the right indicate full marks.

(4) Sub-questions in a main question carry equal marks.

(5) Assume suitable data if necessary.

(6) Preferably, write the answers in sequential order.

Q.1 Attempt any Five of the following. 10 Marks

a) Classify current limiting reactors based on location.

b) Differentiate between symmetrical and unsymmetrical faults .(any two points)

c) Define i) making capacity ii) short time rating of circuit breaker.

d) State any two disadvantages of static relays.

e) List any four faults occurs in alternator.

f) State any four abnormalities in induction motor.

g) List protection schemes used for the bus-bar.

Q.2 Attempt any Three of the following. 12 Marks

a) With the help of suitable diagram explain the importance of back-up protection.

b) Define the following terms related to current interrupting devices:

   i) arc voltage, ii) re-striking voltage, iii) recovery voltage and iv) RRRV

c) Explain PSM and TSM related to protective relays.

d) A 220V/22kV three phase transformer is connected in star/ delta. The protective transformers on 220V side have current ratio of 400/5. Calculate the CT ratio on 22kV side.

Q.3 Attempt any Three of the following. 12 Marks

a) Two 11 KV, three phase 2500 KVA generators having reactance of 12% operate in parallel. The generators supply power to a transmission line through a 6000 KVA transformer of ratio 11/22 KV and having leakage reactance of 4%. Calculate fault KVA on H.T. side of transformer.

b) Compare HRC fuse with MCCB on the following points.

   (i) size   ii) cost   (iii) reliability   iv) applications

c) With neat sketch explain working of directional over current relay.

d) The neutral point of a three phase 18MVA, 11kV alternator is earthed through a resistance of 4.5 Ω. The relay is set to operate when there is an out of balance current of 1.4A. The CTs have a ratio of 1000/5. What is the percentage of winding protected?

Q.4 Attempt any Three of the following.   **12 Marks**
   a) Compare the MCCB with ELCB on any three points. State the application of the RCBO.
   b) Explain time-current characteristics of IDMT relay.
   c) List four limitations of differential protection scheme for transformer.
   d) Explain with sketch protection of 3-phase induction motor during single phasing.
   e) Explain with neat sketch fault bus protection scheme.

Q.5 Attempt any Two of the following.   **12 Marks**
   a) With the help of neat sketches explain the construction and working of vacuum CB.
   b) With the help of block diagram explain the sequence of operation for microprocessor based over current protection.
   c) A three phase transformer having line voltage ratio of 0.4 kV/11kV is connected Star / Delta and protective transformers on the 0.4 kV side have a current ratio of 500/5. Calculate the ratio of the protective transformers on 11 kV side. Draw a neat circuit diagram and indicate the given values at appropriate places.

Q.6 Attempt any Two of the following.   **12 Marks**
   a) Explain with neat sketch pantograph type of isolator. State the sequence of operation of isolator, CB and earthing switch while opening and closing.
   b) Explain any six quality requirements for better protective relaying.
   c) With the help of neat sketch explain the operation of distance protection scheme for the transmission line.

Scheme - I

Sample Test Paper - I

Program Name : **Electrical Engineering Program Group**

Program Code : **EE/EP/EU**

Semester : **Fifth**

Course Title : **Switchgear and Protection**

Max. Marks : **20**

22524

Time: 1 Hour

Instructions:

(1) All questions are compulsory.

(2) Illustrate your answers with neat sketches wherever necessary.

(3) Figures to the right indicate full marks.

(4) Sub-questions in a main question carry equal marks.

(5) Assume suitable data if necessary.

(6) Preferably, write the answers in sequential order.

Q.1 Attempt any FOUR. **08 Marks**

   a. State any for causes of faults in power system.

   b. State the function of current limiting reactor.

   c. State the difference between normal and abnormal conditions in power system.

   d. List any two advantages and two disadvantages of vacuum circuit breaker.

   e. State the factors to be considered while selecting MCCB for motor protection.

   f. State the need of insulation coordination

Q.2 Attempt any THREE. **12 Marks**

   a. Two 11kV, 3 phase, 5000kVA generators each having reactance of 20% operate in parallel. The generators supply power to transmission line through 3000kVA transformer of ratio 22kV/33kV having leakage reactance of 6%. Calculate Fault kVA on H.T. side of transformer.

   b. Compare HRC fuse and Circuit breakers as interrupting devices on any four points.

   c. Describe with neat sketch the arc extinction in SF_6 circuit breaker.

   d. Define following terms related to CB:

     i) Rated normal current   ii) Rated breaking current:

     iii) Short time rating   iv) Symmetrical breaking current

  e. With the help of neat sketch explain the working of ELCB.

Scheme - I

Sample Test Paper - II

Program Name : **Electrical Engineering Program Group**

Program Code : **EE/EP/EU**

Semester : **Fifth**

Course Title : **Switchgear and Protection**

Max. Marks : **20**

22524

Time: 1 Hour

Instructions:
(1) All questions are compulsory.
(2) Illustrate your answers with neat sketches wherever necessary.
(3) Figures to the right indicate full marks.
(4) Sub-questions in a main question carry equal marks.
(5) Assume suitable data if necessary.
(6) Preferably, write the answers in sequential order.

Q.1 Attempt any FOUR.   **08 Marks**

    a. Define the terms related to Protective Relay :

      (i) Selectivity   (ii) Sensitivity

    b. State the principle of distance relaying.

    c. State any four advantages of static over current relay over electromagnetic relay.

    d. State the need of over voltage relay in power system.

    e. List any four faults occuring in alternators.

    f. State the difference between short circuit and overload.

Q.2 Attempt any THREE.   **12 Marks**

    a. With a neat sketch explain solenoid type over current relay.

    b. State any four salient features of microprocessor based protection relay. Draw block diagram of microprocessor based over current relay.

    c. Explain the conditions for setting up negative phase sequence currents in an alternator. Draw the protective scheme to detect them and operate the CB.

    d. A three phase 66/11 kV, star-delta connected transformer is protected by Merz-Price protection. The CTs on LT side have a ratio of 420/5. Find the ratios of the CTs on the HT side. Draw the neat labelled connection diagram of the complete scheme.

    e. Describe with neat diagram, the time graded over current protection of transmission line. State its drawbacks.