7th **Semester Regular / Back Examination 2019-20**
SWITCH GEAR & PROTECTIVE DEVICES
BRANCH : ELECTRICAL
Max Marks : 100
Time : 3 Hours
Q.CODE : HRB024
Answer Question No.1 (Part-1) which is compulsory, any EIGHT from Part-II and any TWO from Part-III.
The figures in the right hand margin indicate marks.

Part- I

Q1   Only Short Answer Type Questions (Answer All-10)   **(2 x 10)**

a) What is the basic difference between unit protection and non-unit protection?

b) What is the physical significance of RRRV?

c) What is the limitation of Merz-Price protection?

d) How mal-operation due to power swings can be prevented?

e) Write the universal relay equation?

f) A 3-phase 11/66 kV, Delta-star transformer is protected by Merz-price scheme has CT ratio of 400/5 on LT side. What is the ratio of CT on HT side?

g) What is the physical significance of sequence components?

h) Which relay is most likely to operate undesirable on power swing?

i) The zero sequence current of a generator from L-G fault is j2.4p.u.. What is the current flow through the neutral during the fault?

j) What are the advantages of translay relay?

Part- II

Q2   Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)   **(6 x 8)**

a) A single phase transformer is rated as 2.5KVA,11/0.4KV. If the leakage reactance is 0.96 ohm when referred to low voltage side then determine its leakage reactance in p.u. system?

b) Discuss the method of discrimination of fault?

c) Discuss the current chopping phenomenon with neat diagram?

d) Pilot wire protection with neat diagram?

e) Differentiate time graded system and current graded system in over current protection?

f) Discuss the impedance and offset Mho relay with R-X diagram?

g) Derive the equation of current in double line to ground fault with fault impedance (Z_f)?

h) Write a short note on ring main feeder with neat sketch?

i) Differentiate time graded system and current graded system used in over current protection?

j) Draw the schematic diagram of SF6 circuit breaker and its principle?

k) Write the different characteristics of over current relay and characterized it with neat diagram?

l) Draw the connection diagram for restricted earth fault protection of a generator?

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3   An alternator and synchronous motor each rated for 50MVA,13.2KV having sub **(16)**
transient reactance of 20% are connected through a transmission of reactance 10% on
the base of machine rated the motor acts as a load of 30MW at 0.8 p.f. lead and
terminal voltage 12.5KV when a three phase fault takes place at the motor terminals.
Determine the sub transient current in the alternator, the motor and the fault.

Q4   A 132Kv,50Hz system having inductance 10mH and capacitance 0.002F respectively. A **(16)**
resistance of 600 ohm is connected across the contact of Circuit breaker. Calculate
natural frequency of oscillations, damped oscillations and critical value of resistance?

Q5 a) With neat sketch, explain the principle of operation of „Induction disc type" Over Current **(8)**
(O.C) relay. How the time delay mechanism is adjusted in the O.C. IDMT relay
characteristics? Explain in brief.

b) Describe various zones of protection with neat circuit diagram? **(8)**

Q6   A star connected 3 phase, 12 MVA, 11 kV alternator has a phase reactance of 10%. It is **(16)**
protected by Merz-Price circulating current scheme which is set to operate for fault
current not less than 200 A. Calculate the value of earthing resistance to be provided in
order to ensure that only 15% of the alternator winding remains unprotected.