

Unit **UEPOP349B Operate Local HV switch Gears** Test Number 2/2

Total Marks 100 Time allowed 3HR

Instruction to assessors

- Please provide the blank A4 sheets to students to write the answers on them
- Please tell the students not to write on the question papers
- Online test can also be supplemented.
- The marking can be done by referring the attached marking guide
- Giving the marks based on students' effort & demonstration of the absorbed study & competency rather than the final answer is to made
- The necessary formulas can be provided on the white board.
- The formula which can be provided will be advised separately.
- No notes, digital storage devices, programmable calculators are allowed.
- Page 1 = Instruction to assessors & students
- Page 2+3= Question Paper
- Page 4 and the remaining pages= Marking Guide

Instruction to students

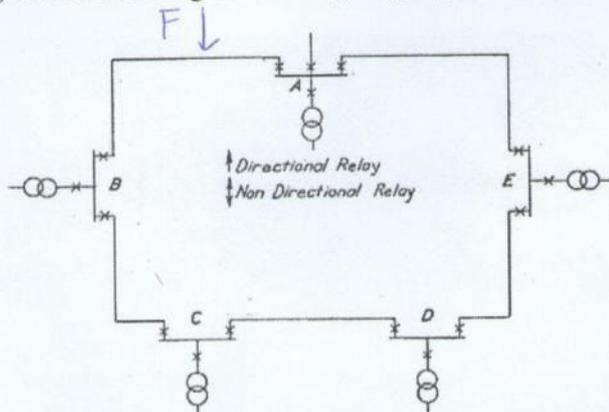
- Write the answers on provided A4 blank sheets
- Do not write the answers on the question papers
- Online test can also be supplemented.
- The marking can be done by referring the attached marking guide
- The necessary formulas can be provided on the white board on request..
- The formula which can be provided will be advised separately.
- No notes, digital storage devices, programmable calculators are allowed.

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Instruction

- Non programmable calculators are allowed.
- Answer all questions

- (1) What equipments are included in power system protection scheme?
- (2) Explain the functions of the following devices included in a power system protection Scheme.
- CT, PT, Fault Detector, Tripping Circuit
- (3) Sketch the construction of
- Balanced Beam Relay
- (4) Connection Diagram of Relay Tripping Circuit



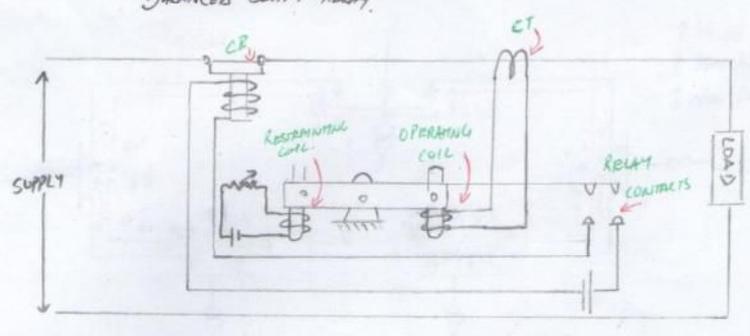
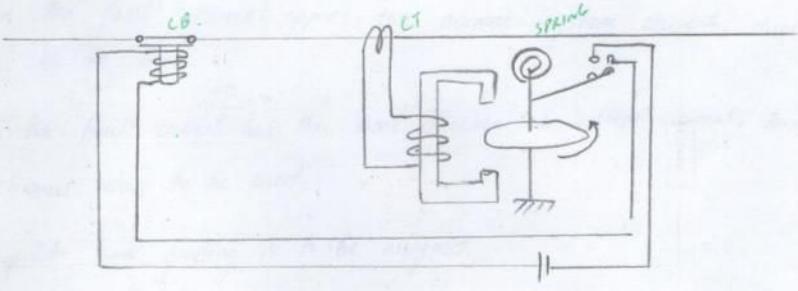
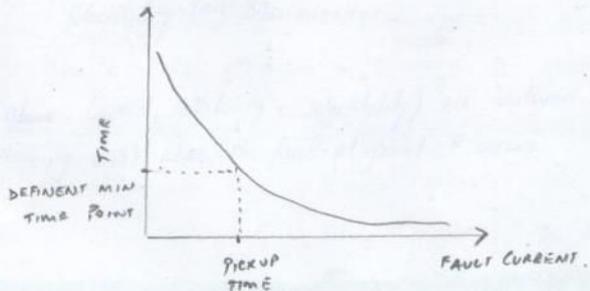
- (5-a) Locate relay protection scheme for given system when fault occurs at point F.
- (5-b) What is "Pick Up" of relay?

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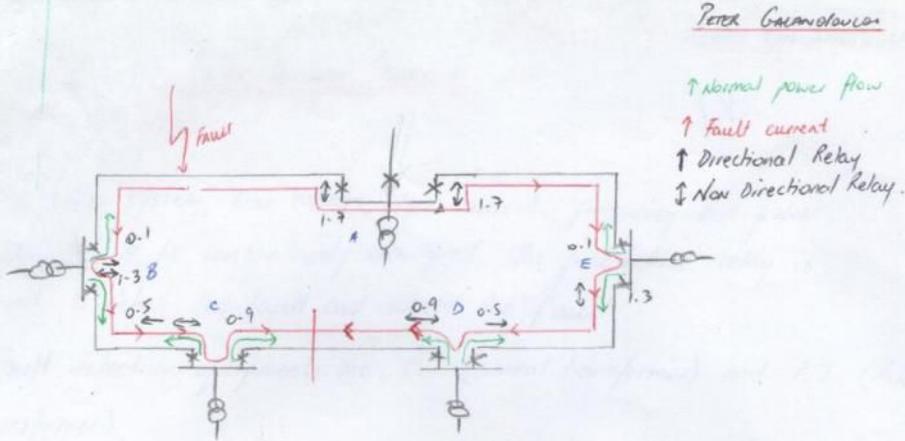
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Marking Guide	Mark
<p style="text-align: center;">7762AE - G01S-6 <u>PETER GALANDIBULOS</u></p> <p style="text-align: center;"><u>POWER SYSTEMS PROTECTION.</u> 18</p> <p>Q1) - In power system, line voltage, line current, frequency and power flow are to be continuously monitored. The protective relay is used to detect the fault and isolate the fault.</p> <p>Fault detection equipments are C.T. (current transformer) and P.T. (Potential transformer).</p> <p>Fault isolation equipments consists of circuit breaker, trip circuit and relay</p> <p>Q2) - <u>CT - current transformer</u> :- CT is utilized to step down the system current level to instrument current level.</p> <p><u>P.T. - Potential Transformer</u> :- P.T. is utilised to step down the system voltage level to instrument voltage level.</p> <p><u>Fault detector</u> :- Fault detector consists of the comparator, for example, magnetization (operating mechanism) and spring (restraining magnetization). When the system fault causes the operating quantity to be greater than the restraining quantity, the relay will trip.</p> <p><u>Tripping Circuit</u> :- Tripping circuit consists of battery, relay contact, wire connection and circuit breaker coil.</p> <p>The tripping circuit will cut off the circuit when the relay contact is closed.</p> <p style="text-align: center;">Page 11</p>	<p>20</p> <p>20</p>

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<p>PETER GALANOPoulos.</p> <p>BALANCED BEAM RELAY.</p> <p>Q3)</p> 	20
<p>Q4)</p> 	20
<p>Q5) (see note.)</p> <p><u>Pickup</u> :- The minimum current required to operate the relay.</p> 	
<p>Page 2</p>	

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<p>5)</p>  <p>↑ Normal power flow ↑ Fault current ↑ Directional Relay ↓ Non Directional Relay.</p> <p>(a) Near the main power point, non directional relays to be used</p> <p>(b) When the fault current opposes the normal system current, directional relay to be used.</p> <p>(c) When the fault current has the same direction as system current, non directional relay to be used.</p> <p>(d) Appropriate time grading is to be assigned.</p> <p>3 qualities of power system protection scheme, are as follows:-</p> <ul style="list-style-type: none"> - Speed - Reliability - Selectivity (or) Discrimination. <p>The above (speed, reliability + selectivity) are outlined and proven in the above drawing (as) when the fault at point F occurs.</p> <p>[Note: Q6 is on previous page (Page 2) due to lack space here.]</p> <p>Page 3.//</p>	<p>10</p> <p>10</p>