AMERICAN INTERNATIONAL UNIVERSITY – BANGLADESH (AIUB)
Faculty of Engineering
Bachelor of Science in Electrical and Electronic Engineering
EEE4227: Power System Protection (Section: D)

Summer 2020-2021 **Total Marks: 40**
Total time: 2 Hrs. + 10 Min (for pdf preparation + upload)

Final Assessment

Instructions:

- **Write answers of all the questions in A4 paper/exercise book with Pen only.**
- **All the Questions corresponds to CO2.**
- **Upon completing this 'Take Home Exam', create a PDF having all of your answers.**
- **Rename the PDF file according to this format: "FA-ID" (Example: FA-17-32749-2.pdf)**
- **Upload the PDF file in the specific link on/before the deadline.**
  (find the link in MS Teams during exam period)

1. Evaluate the time-current grading scheme for the following power system model. The CT ratio is given as 200/5A. The load margin for the relay at different bus is considered to be 25%. (Use logical assumption if needed) **[10]**

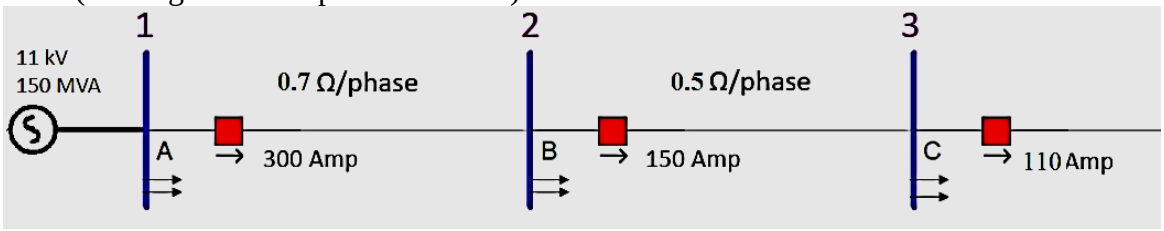

Figure for question no 1

2. (**a**) From the question given in 1, determine the numerical values of TCC curve of relay B. **[5]**

(**b**) In a biased differential protection scheme as shown in figure 2(b), the current I_1 and I_2 is given as 300A and 290A respectively during a fault inside the winding under protection. CT ratio is given as K=0.1. The relay pick-up current is 2.5A. The slope of this relay system is given as 0.05. Identify whether the relay will operate or not? Justify your answer. **[5]**

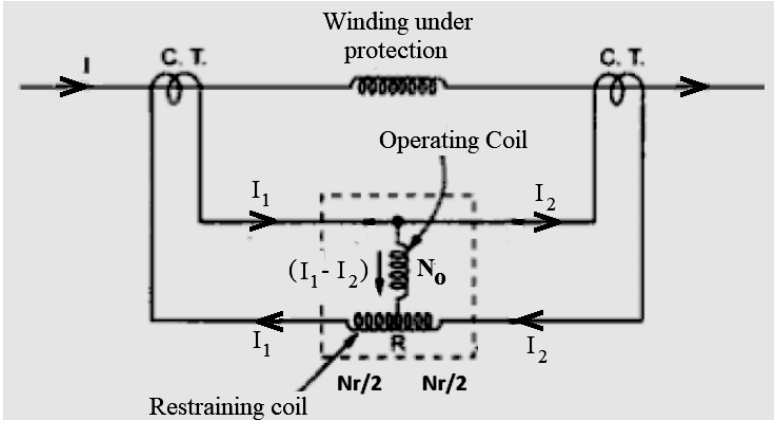

Figure for question no 2(b)

3. **(a)** The neutral point of an alternator of an 11 kV alternator is earthed through 15Ω resistance. The current transformers have ratio of 1000/5A. The relay is set to operate when there is an out of balance of current of 1.8 A. **[5]**

(i) What percentage of winding is protected against L-G fault?

(ii) What must be the minimum value of earthing resistance to ensure 95% protection to each phase winding of the alternator?

(b) How does the driving torque of an induction type directional relay change in proportional to the instantaneous active power value? (draw proper figure/vector if needed) **[5]**

4. **(a)** A 3-phase transformer of 0.44/11kV line voltage is connected in Y-Δ combination. The current transformers on 0.44kV side have current ratio of 800/5A. Identify the CT current ratio on 11 kV side of the main transformer? Given that, the line current of Y connected side of the main transformer is 400A. **[5]**

(b) With proper circuit diagrams, describe the operating principle of distance protection using impedance relay. **[5]**