DEPARTMENT OF ELECTRICAL ENGINEERING, IIT DELHI

ELL303 – MINOR TEST 1

Maximum marks: 20

Instructions:

- This question paper consists of two parts.
- Part A consists of long answer type questions which needs to be answered in the answer scripts provided.
- Part B consists of multi choice / short answer type questions. Mark correct answers only in the space provided in the question sheet. Do not use any additional answer script for these questions.
- Part B may have one or more answers, marks will provided only if all correct options are selected.
- Students are required to submit all the answer scripts used to answer part A and question sheet containing part B before leaving the examination hall.
- Students are allowed only to take question part A with them.
- Students are advised to write their name and entry number on all the answer scripts used and also on the question part B which is to be attached with the answer scripts.

PART A

1. A generating station has a maximum demand of 1000 MW. The annual load factor is 75% and plant capacity factor is 60%. What is the reserve capacity? [1.0]

2. The diameter of each strand of an ACSR conductor having 7 strands is 1.68 cm. Determine the loop reactance in ohms/km for a 50Hz single phase AC system if the spacing between the conductors is 5 ft. [2.5]

3. A three phase un-transposed transmission line has conductors of diameter 1.68 cm spaced at 3 m apart as shown in Fig below in a horizontal plane. The charge on conductor 'a', 'b' and 'c' at any instant is 60 μC/km, -25 μC/km and -35 μC/km respectively. Compute the voltage drop V_{ac}. If the line is transposed; what is the capacitance of each phase with respect to neutral? [2.5]

4. Draw and explain circle diagram of a short transmission line. [2.0]

5. Find the A, B, C, and D parameters of a 50 Hz, 150 km three phase transmission line represented by π model having inductance per phase of 1.24 mH/km and capacitance per phase of 0.0094 μF/km. The per phase resistance of the conductor is 0.11 ohm/km. If the line is delivering 25 MVA at 0.8 lagging power factor to a load at 132 kV; find the receiving end current, sending end voltage, sending end current and the shunt currents. Represent these quantities in a phasor diagram. Neglecting the line resistance calculate the surge impedance loading of this line. [5.0]