Roll No.:.....

# National Institute of Technology Delhi

## B. Tech Examination March 2023

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| **Branch** | **: Electrical Engineering** | **Semester** | **:IV** |
| **Title of the Course** | **: Power Systems** | **Course Code** | **: EEL 253** |
| **Maximum Marks** | **: 25** | **Time** | **: 1.5 Hours** |

Note : **Attempt all questions.** Symbols used in the questions are having their usual meaning. Assume if any data is missing.

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**Q.1** **Attempt all questions.**

(a) Why the transmission lines 3 phase 3 wire circuits while distribution lines are 3φ, 4 wire circuits? **(1)**

(b) Write the primary distribution voltages in India. **(1)**

(c) What is the difference between nominal T method and nominal π method? **(1)**

(d) What are the factors to be considered while selecting a cable for a particular service? **(1)**

(e) What is the use of power circle diagram? **(1)**

**Q.2** Why the transmission voltages are in terms of kV? **(2)**

**Q.3** An electric train runs between two two substations 6 km. apart maintained at voltages 600 V and 590 V respectively and draws a constant current of 300 A while ion motion. The track resistance of go and return path is 0.04 ohm/km. Determine **(4)**

a) the point of minimum potential along the track

b) currents supplied by the two substations when the train is at the point of minimum potential

**Q.4** Deduce an expression for inductance of 3-phase transposed unsymmetrically spaced transmission line. **(4)**

**Q.5** Derive the expression for voltage regulation and transmission efficiency of short transmission line. **(5)**

**Q.6** A balanced 3-ϕ load of 30 MW is supplied at 132 kV, 50 Hz and 0.85 p.f. lagging by means of a transmission line. The series impedance of a single conductor is (20 + j52) Ω and the total phase-neutral admittance is $315\times10^{-6}$ S. Using Nominal T method, determine **(5)**

i) Characteristic Parameters ii) sending end voltage iii) regulation of the line

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