Topic	Description
Module	Electrodynamics
Module Code	MECH-M-1-EDY-EDY-VO
Semester	WS 2025
Lecturer	Daniel T. McGuiness, Ph.D
ECTS	3
SWS	2
Lecture Type	ILV
Coursework Name	Individual Assignment
Work	Individual
Suggested Private Study	10 hours
Submission Format	Submission via SAKAI
Submission Deadline	01.02.26 23:59
Late Submission	Not accepted
Resubmitting Opportunity	No re submission opportunity

> No lecture time is exclusively devoted to the aforementioned assignment.

A portion of the mark for every assignment will be, where applicable, based on style. Style, in this context, refers to organisation, flow, sentence and paragraph structure, typographical accuracy, grammar, spelling, clarity of expression and use of correct IEEE style for citations and references. Students will find *The Elements of Style (3rd ed.)* (1979) by Strunk & White, published by Macmillan, useful with an alternative recommendation being *Economist Style Guide (12th ed.)* by Ann Wroe.

Question	Maximum Point	Received Point
Electric Potential Between Plates	30	
The Inductance of a Co-Axial Cable	30	
Rotating a Coil in a Changing Magnetic Field	40	
Sum	100	

[Q1] Electric Potential Between Plates — 30

Two grounded, semi-infinite, parallel-plane electrodes are separated by a distance of h. A third electrode perpendicular to both is maintained at a constant potential V_0.

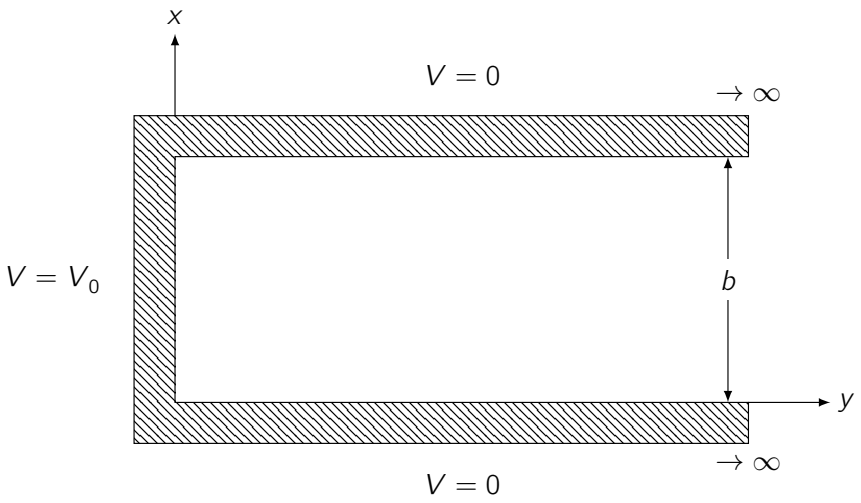

Figure 1: The cross-sectional figure for "Electric Potential Between Plates". The plate electrodes are infinite in z direction.

Based on this information, please determine the potential distribution in the region enclosed by the electrodes.

[Q2] The Inductance of a Co-Axial Cable — 30

An air co-axial transmission line has a solid inner conductor of radius a and a very thin outer conductor of radius b.

Using this information, please determine the inductance per unit length of the line.

[Q3] Rotating a Coil in a Changing Magnetic Field — 40

An h by w rectangular conducting loop is situated in a changing magnetic field:

$$\boldsymbol{B} = \boldsymbol{a}_{\mathrm{y}} B_0 \sin \omega t$$

The normal of the loop initially makes an angle α with $\boldsymbol{a}_{\mathrm{y}}$, as shown below. Based on this information, please fin the induced emf in the loop:

i. When loop is at rest (20)

ii. When the loop rotates with an angular velocity ω about the x-axis. (20)