Name: **Enrolment No:**	UPES UNIVERSITY OF TOMORROW

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2022

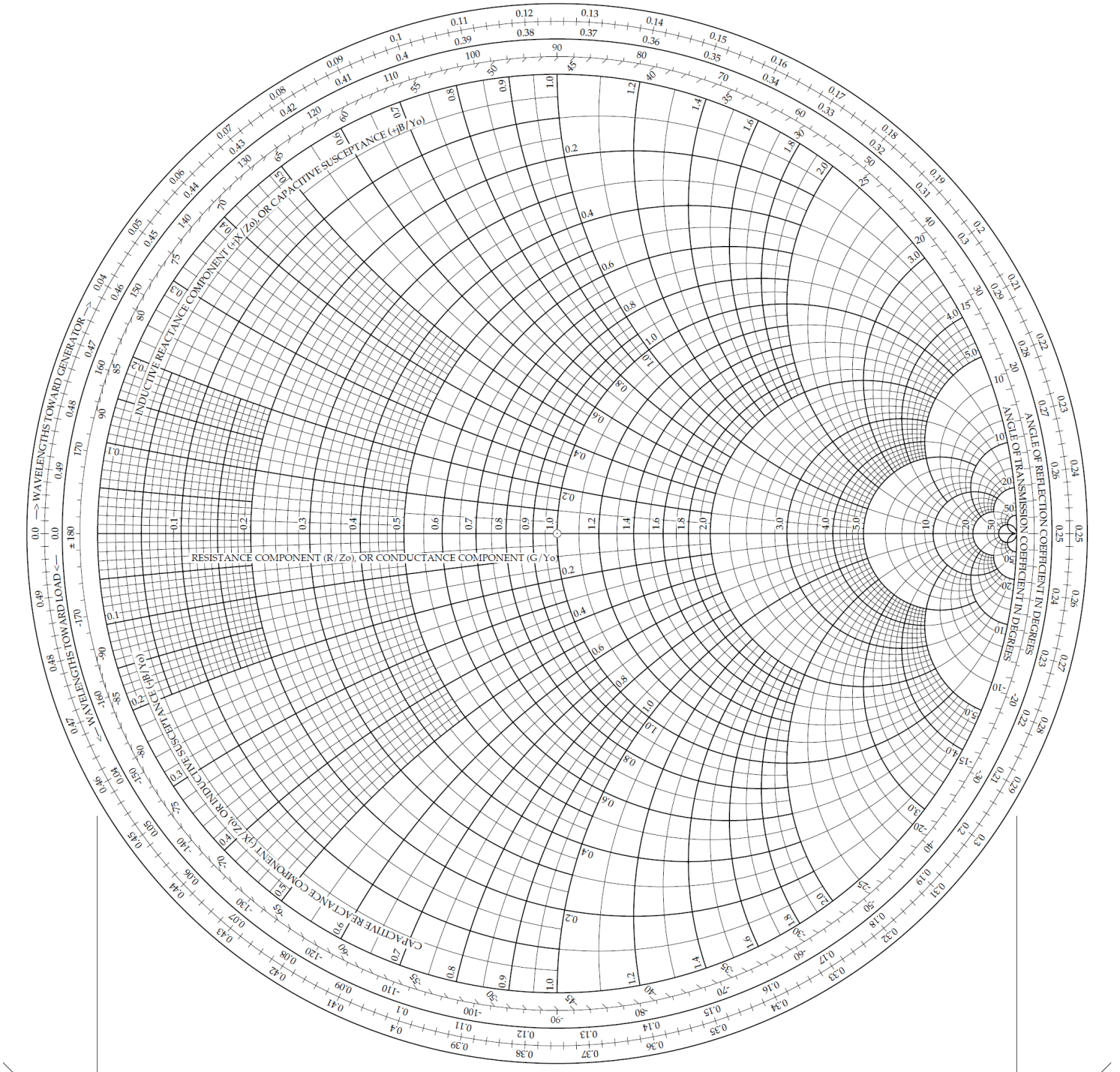
Course: Electromagnetic Waves **Semester: IV**
Program: B.Tech (Electronics and Communication Eng) **Time: 03 hrs.**
Course Code: ECEG-2035 **Max. Marks: 100**

Instructions:

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	State Gauss Divergence theorem.	**4**	**CO1**
Q 2	What is a transmission line? State various types of transmission line and their application.	**4**	**CO3**
Q 3	Explain TEM, TE, and TM modes of wave propagation.	**4**	**CO4**
Q 4	Deduce continuity equation for time-varying fields.	**4**	**CO1**
Q 5	Write a short note on the microstrip line.	**4**	**CO4**
	SECTION B **(4Qx10M= 40 Marks)**		
Q 6	State Maxwell's equation in differential and integral form. Write their statement and explain the physical significance of each equation.	**10**	**CO1**
Q 7	State and derive the Poynting theorem.	**10**	**CO2**
Q 8	A uniform wave with a frequency of 100 MHz is traveling in a medium with $\mu_r = 1 \wedge \varepsilon_r = 16$. Determine (a) phase velocity, (b) wavenumber, (c) wavelength in medium, and (d) intrinsic impedance of the medium.	**10**	**CO2**
Q 9	Determine the reflection coefficient (Γ) of a transmission line ($Z_0 = 50\,\Omega$) terminated with following load impedances using Smith Chart: (a) Z_L= 0 Ω, (b) Z_L= ∞, (c) Z_L= 50 Ω and (d) Z_L= 100+j0 Ω.	**10**	**CO3**
	SECTION-C **(2Qx20M=40 Marks)**		
Q 10	Derive the general form of a transmission line equation. **OR** Derive the expression of the input impedance of the lossless transmission line terminated with load impedance Z_L.	**20** **20**	**CO3** **CO3**
Q 11	(a) Derive wave equation starting from Maxwell's equation for free space.	**10**	**CO2**

	(b) What is a uniform plane wave? Describe its properties, both physically and mathematically.	**10**	



RADIALLY SCALED PARAMETERS

TOWARD LOAD —> <— TOWARD GENERATOR

SWR
RTN. LOSS [dB]
RFL. COEFF. P
RFL. COEFF. E or I

dB
S.W. LOSS [dB]
S.W. PEAK (CONST. P)
TRANSM. COEFF. E or I

ATTEN. [dB]
S.W. LOSS COEFF
RFL. LOSS [dB]
TRANSM. COEFF. P

CENTER

ORIGIN