



Continuous Assessment Test (CAT) – I JAN 2025

Programme	: B.Tech.	Semester	: Winter Semester 2024-25
Course Code & Course Title	: Engineering Physics	Slot	: F1+TF1
Faculty	: Dr.Vinitha G Dr.Eithiraj R.D Dr.Punithavelan N Dr.Caroline Ponraj Dr. Ramkumar M C Dr. Karthikeyan S Dr.Shalini M.G Dr.Kalaipriya A Dr.Manikandan N Dr.Ajitha B Prof.Swathi P	Class Number	: CH2024250500278 CH2024250500286 CH2024250500290 CH2024250500296 CH2024250500304 CH2024250500320 CH2024250500314 CH2024250500316 CH2020250500282 CH2024250500310 CH2024250500300
Duration	: 1½ Hours	Max. Mark	: 50

General Instructions:

- Write only your registration number on the question paper in the box provided and do not write other information.
- Only non-programmable calculator without storage is permitted

Section-A (Answer all questions (2× 10 = 20))

Q. No	Sub Sec.	Description	Marks
1	a	A wire of length 4.35 m and mass 137 g is under a tension of 125 N. A standing wave is formed which has seven nodes including the endpoints. What is the frequency of this wave? Which harmonic is it? What is the fundamental frequency? If the maximum amplitude at the antinodes is 0.0075 m, write an equation for this standing wave.	5
	b	Why is Maxwell's modification of Ampere's law important in understanding EM waves? Explain.	5
2	a	i) Calculate the reflection and transmission coefficient if the impedance of the second string is zero. ii) Find the Gradient of the function $f(x,y,z) = 4x^2 + 24y^2 + 12z$ at a point (1,-2,1).	4
	b	Compute divergence and curl of $\mathbf{F} = x^2y\hat{i} - (z^2 - 5x)\hat{j} + 4y^2\hat{k}$	6

Section-B (Answer all questions (2×15 = 30))

3		With necessary assumptions and a diagram, derive a 1-D wave equation for a progressive wave produced by a stretched string.	15
4		Using Maxwell's equation for free space, derive the equation for plane electromagnetic waves for free space in terms of electric and magnetic field vector. Also show how these equations navigate to arrive at the velocity of the EM wave.	15

*****All the best *****