Vellore Institute of Technology
CHENNAI

Continuous Assessment Test (CAT) – I - August 2024

Programme	:	B. Tech.	Semester	:	Fall 2024-25
Course Code & Course Title	:	BPHY101L & Engineering Physics	Slot		D1+TD1
Faculty	:	Kalai Priya. A Rishabh. B Caroline P John Kennedy L Justin Raj C Ramkumar M C Punithavelan N. Rajasekarakumar V Sanjit Das Uthiram C	Class Number(s)	:	CH2024250103527 CH2024250103541 CH2024250103980 CH2024250103533 CH2024250103529 CH2024250103539 CH2024250103537 CH2024250103535 CH2024250103531 CH2024250103543
Duration	:	90 Minutes	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

Part - A (Answer any two questions (2 x 10 = 20 Marks))

1	From the given wave function, $y(x,t) = 6\,Sin(6\,\pi t - 3x)$ find i) frequency, ii) wavelength, iii) velocity, iv) tension and v) maximum velocity of the particle in the string, if the mass per unit length of the string is 0.6 kg/m.	10
2	Explain the aim, principle, experimental setup and working of Hertz experiment in detail with suitable figures.	10
3	(a) Show that $y(x,t) = f(x + vt)$ will be a solution of a standard wave equation, where v is the velocity of the wave. (b) Write the physical significance of gradient and curl.	6 4

Part - B (Answer any 2 questions (2 x 15 = 30 Marks))

4	Derive the equation for standing wave and their Eigen frequencies.	15
5	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
6	(a) Compute the divergence and curl of the following vector field, $\vec{F} = 3x^3z^4\,\hat{i} + 12\,xyz^3\,\hat{j} + 5\,xy^2z\,\hat{k}$ (b) Define surface and volume integrals. (c) For two strings smoothly connected at a boundary, following are the parameters, $\rho_1 = 0.2\frac{kg}{m}, \rho_2 = 0.8\frac{kg}{m}$ and $v_1 = 5\frac{m}{s}$ with usual meanings. Find the values of the following parameters (i) v_2 (ii) Z_1 (iii) Z_2 (iv) reflection coefficient.	6 4 5

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