

PART 1 - PHYSICS

Topic : Electromagnetic waves

SECTION-1 : (Maximum Marks : 4)

- This section contains **ONE** question.
- Each question has **FOUR** options (A), (B), (C) and (D). **ONE OR MORE THAN ONE** of these four option(s) is(are) correct answer(s).
- For each question, choose the option(s) corresponding to (all) the correct answer(s).
- Answer to each question will be evaluated according to the following marking scheme :

Full Marks	: +4	ONLY if (all) the correct option(s) is(are) chosen;
Partial Marks	: +3	If all the four options are correct but ONLY three options are chosen;
Partial Marks	: +2	If three or more options are correct but ONLY two options are chosen, both of which are correct;
Partial Marks	: +1	If two or more options are correct but ONLY one option is chosen and it is a correct option;
Zero Marks	: 0	If none of the options is chosen (i.e. the question is unanswered);
Negative Marks	: -2	In all other cases.
- For example, in a question, if **(A), (B) and (D)** are the ONLY three options corresponding to correct answers, then choosing ONLY (A), (B) and (D) will get +4 marks; choosing ONLY (A) and (B) will get +2 marks; choosing ONLY (A) and (D) will get +2 marks; choosing ONLY (B) and (D) will get +2 marks; choosing ONLY (A) will get +1 mark; choosing ONLY (B) will get +1 mark; choosing ONLY (D) will get +1 mark; choosing no option (i.e. the question is unanswered) will get 0 marks; and choosing any other combination of options will get -2 marks.

1. The electric field associated with an electromagnetic wave travelling in vacuum is given by $E_0 \sin(3y + 4z + \omega t) \hat{i}$, where ω is the angular frequency. All quantities are in SI units. The correct statement(s) about this wave is/are:

[Given: speed of light in vacuum $c = 3 \times 10^8 \text{ ms}^{-1}$.]

[JEE Advanced 2026 Paper 1]

(A) The wave is travelling in $-\frac{1}{5}(3\hat{j} + 4\hat{k})$ direction.

(B) The magnitude of the wave vector is 0.5 m^{-1} .

(C) The value of ω is $1.5 \times 10^9 \text{ rad s}^{-1}$.

(D) The magnetic field associated with this wave is given by $\frac{E_0}{c} \sin(3y + 4z + \omega t) (4\hat{j} - 3\hat{k})$.



Solution

Space for Rough Work

SECTION-2 : (Maximum Marks : 4)

- This section contains **ONE** question.
- The answer to each question is a **NUMERICAL VALUE**.
- For each question, enter the correct numerical value of the answer (in decimal notation, truncated / rounded-off to the **SECOND DECIMAL PLACE**; e.g. 6.25, 7.00, -0.33, -.30, 30.27, -127.30) in the place designated to enter the answer.
- Answer to each question will be evaluated according to the following marking scheme :
Full Marks : +4 If **ONLY** the correct answer is entered;
Zero Marks : 0 In all other cases.

2. A cube of unit volume contains 35×10^7 photons of frequency 10^{15} Hz. If the energy of all the photons is viewed as the average energy being contained in the electromagnetic waves within the same volume, then the amplitude of the magnetic field is $\alpha \times 10^{-9}$ T. Taking permeability of free space $\mu_0 = 4\pi \times 10^{-7}$ Tm/A, Planck's constant $h = 6 \times 10^{-34}$ Js and $\pi = \frac{22}{7}$, the value of α is ____ [JEE Advanced 2025 Paper 1]

Scan or tap for the
full solution



Space for Rough Work

Test Pattern : **JEE (Advanced)**

[illegible]