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Exam Type: Unit Test
Paper Type: subjectwise
Duration: 90 mins
Total Marks: 60
Total Questions: 15

Instructions:
Read all questions carefully before answering.

Attempt all questions. Every question is compulsory unless specified.

Write your answers clearly and neatly in the provided space.

Maintain proper question numbering as given in the paper.

Do not spend too much time on a single question. Manage your time wisely.

Use only blue or black ink. Pencil should be used only for diagrams (if required).

Do not write your name on the answer sheet. Write only your roll number and other required details.

Mobile phones, smartwatches, calculators, or any electronic gadgets are strictly not allowed.

Follow the marks distribution given for each question.

Keep the answer sheet clean. Avoid overwriting and cutting unless necessary.

Remain in your seat until all papers are collected.

In case of any doubt, raise your hand and ask the invigilator.

Any attempt at unfair means will lead to cancellation of the paper.

Subject: Physics
Chapter: Electromagnetic wave
School: atul public school

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****Chapter Name: Electromagnetic Waves****

****SECTION A (Easy) (20 Marks)****

1. What is an electromagnetic wave? (2 Marks)
2. Name two characteristics of electromagnetic waves. (2 Marks)
3. List two applications of microwaves. (2 Marks)
4. What is the relationship between the speed of light (c), electric field (E), and magnetic field (B) in an electromagnetic wave? (2 Marks)
5. Which electromagnetic wave is used in radar systems? (2 Marks)
6. Arrange the following electromagnetic waves in increasing order of their wavelength: Radio waves, Gamma rays, Visible light, X-rays. (4 Marks)
7. State the range of frequencies for visible light. (2 Marks)
8. What physical quantity is the same for X-rays of wavelength 10^{-11} m and red light of wavelength 6800 \AA ? (4 Marks)

****SECTION B (Medium) (25 Marks)****

9. Explain how electromagnetic waves are produced. (5 Marks)
10. Describe the properties of infrared radiation and give two of its applications. (5 Marks)
11. What is displacement current? Explain its significance in Maxwell's equations. (5 Marks)
12. The amplitude of the magnetic field part of a harmonic electromagnetic wave in vacuum is $B_m = 510 \text{ nT}$. What is the amplitude of the electric field part of the wave? (Speed of light $c = 3 \times 10^8 \text{ m/s}$). (5 Marks)
13. What is the greenhouse effect? How are electromagnetic waves involved in this phenomenon? (5 Marks)

****SECTION C (Hard) (15 Marks)****

14. Derive an expression for the energy density of an electromagnetic wave. (8 Marks)
15. A plane electromagnetic wave travels in vacuum along the z-direction.
- (a) Sketch the shape of the wave. (3 Marks)
 - (b) What can you say about the directions of its electric and magnetic field vectors? (4 Marks)