PHYSICS

BOOKS - CHETANA PHYSICS (MARATHI ENGLISH)

ELECTROMAGNETIC WAVES AND COMMUNICATON SYSTEM

Exercise

1. Which types of waves are used in different Electronic gadgets?

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2. How does energy from the sun, which is an essential requirement for life on earth, reach us ?

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3. What are the different sources from which we get EM waves in day to day life?

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4. What is displacement current?

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5. What is the achievement of H. Hertz regarding EM waves?

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6. What was Sir Jagdish Chandra Bose contribution towards EM waves?

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7. For what work was Nobel prize in 1909 in Physics awarded to G. Marconi?

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8. State few laws relating electric and magnetic fields.

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9. What are EM waves?

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10. What are the direction of electric field, magnetic field and direction of EM waves?

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11. What is the source of EM waves?

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12. Can we produce a pure electric or magnetic waves in space? Why?

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13. How are EM waves produced?

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14. Does an ordinary electric lamp emit EM waves?

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15. State the mathematical expression for electric field and magnetic field varying with

time in EM waves?

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16. State characteristics of an EM wave.

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17. Write the formula for velocity of EM waves in vacuum and in given medium?

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18. Write the formula for intensity of a wave in EM waves.

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19. Calculate the frequency in MHz of a radio wave of wavelength 250 m. Remember that the speed of all EM wavesin vacum is $B_0 = 5 \times 10^{-7}$ T What is the amplitude of the electric field part of the wave?

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20. Calculate the wavelength in nm of an X-ray wave of frequency 2×10^{18}Hz

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21. The speed of light is $3 \times 10^{8} m / \sec.$ Calculate the frequency of red light of wavelength of 6.5×10^{-7} m.

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22. Calculate the wavelength of a microwave of frequency 8 GHz

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23. In a EM wave the electric field oscillates sinusoidally at a frequency of 2×10^{10}Hz. What is the wavelength of the wave?

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24. The amplitude of the magnetic field part of a harmonic EM wave in vacuum is $B_0 = 5 \times 10^{-7}$ T What is the amplitude of the electric field part of the wave?

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25. Calculate the velocity of EM waves in vaccum.

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26. In free space, an EM wave of frequency 28 MHz travels along the x-direction. The amplitude of the electric field E = 9.6 V/m and its direction is along the y-axis. What is amplitude and direction of magnetic field B?

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27. A beam of red light has an amplitude 2.5 times the amplitude of second beam of the same colour. Calculate the ratio of the intensities of the two waves?

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28. The magnetic field of an EM wave travelling along X-axis is $\vec{B} = 4 \times 10^{-4}$ sin (wt - kx) $\vec{K}$ in tesla, Calculate the peak value of electric force acting on a particle of charge $5\mu c$ travelling with a velocity of 5×10^5 m/sec along the y axis.

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29. For an EM wave propagations along x direction, the magnetic field oscillates along the z-direction at a frequency of 3×10^{10} Hz and has amplitude of 10^{-9} T.

What is the wavelength of the wave?

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30. For an EM wave propagations along x direction, the magnetic field oscillates along the z-direction at a frequency of 3×10^{10} Hz

and has amplitude of 10^{-10} T.

Write the expression representing the corresponding elecrtic field.

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31. What do you mean by EM spectrum?

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32. State the different types of EM waves in the order of decreasing wavelength (or

increasing frequency)?

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33. Why are microwaves used in radar?

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34. Why can light waves travel in vacuum whereas sound wave cannot?

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35. Name the most harmful radiation entering the earth's atmosphere from the outer space.?

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36. What are radio waves? Give its two uses

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37. What are ultraviolet rays? Give its two uses.

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38. State a few properties and uses of $\gamma - rays$?

Watch Video Solution

39. State a few properties and uses of X-rays?

Watch Video Solution

40. State a few properties and uses of the ultraviolet rays.

Watch Video Solution

41. State a few properties and uses of Infrared rays

Watch Video Solution

42. State a few properties of visible light.

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43. State a few properties and uses of Microwaves?

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44. State a few properties and uses of Radiowaves?

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45. Explain wavelength and frequencies ranges of different regionsin the spectrum?

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46. Write a short note on Earth's atmosphere?

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47. Write notes on: Ground wave propagation

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48. Write notes on: Sky wave propagation

Watch Video Solution

49. Write notes on: Space wave propagation

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50. Explain the term Critical frequency

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51. Explain the term Skip distance (zone)

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52. Derive an expression for total range of the signal transmitted through space wave.

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53. A TV tower has a height of 200 M. How much population is covered by TV transmission if the average population density around the tower is $1000 / km^2$?

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54. $h_1 = 600$ m, $R = 6.4 \times 10^6$ m. $d_1 = ? h_1 = ?$

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55. A transmitting antenna at the top of a tower has a height 32m and that of the receiving antenna is 50m. What is the maximum distance between then for satisfactory communication in line of sight made ? $R = 6.4 \times 10^6$m

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56. A radar has a power of 10 kW and is operating at a frequency of 20 GHz. If islocated on the top of a hill of height 500m.Calculate

the maximum distance upto which it can detect object located on the surface of the earth ? $R = 6.4 \times 10^6$m.

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57. If the height of a TV transmitting antenna is 128 m, how much square area can be covered by the transmitted signal if the receiving antenna is at the ground level? R = 6400 km.

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58. The height of a transmitting antenna is 68 m and the receiving antenna is at the top of a tower of height 34m. Calculate the maximum distance between them for satisfactory transmission in line of sight mode, R = 6400 km

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59. What do you mean by the word 'communication'?

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60. In ancident times, what were the methods of communication?

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61. In modem times now what are the methods of communication?

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62. What is communication system?

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63. What are the basic elements in communication system?

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64. Name the three basic units of any communication system.

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65. Draw the labelled block diagram of the basic elements of a communication system

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66. What are the different modesof communication?

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67. Explain the terms: transmiter and receiver

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68. What is signal? Explain different types of signals.

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69. Explain the following terms Transducer

Watch Video Solution

70. Explain the following terms Amplication and Repeater.

Watch Video Solution

71. Define the following terms Attenuation

Watch Video Solution

72. Define the following terms Range

Watch Video Solution

73. Define the following term :

Modulation

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74. Define the following terms Demodulation and Carrier wave.

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75. What is meant by noise?

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76. What is meant by bandwidth?

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77. Give reasons for the following. Long distance radio broadcast uses short wave bands

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78. Give reason for the following, satellite are used for long distance TV transmission

Watch Video Solution

79. How does the effective power radiated by an antenna vary with wavelength?

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80. Why should broadcasting programs use different frequencies?

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81. Define modulation

Watch Video Solution

82. What is demodulation?

Watch Video Solution

83. Explain why is modulation needed.

Watch Video Solution

84. State the different types of modulation.

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85. What type of modulation is required for television broadcast?

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86. Why does amplitude modulation give noisy reception?

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87. Why are high frequency carrier waves used for transmission of audio signals?

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88. The EM wave emitted by theSun and responsible for heating the Earth's atmosphare due to green house effect is

A. Infra-red radiation

B. X-ray

C. Microwave

D. Visible light

Answer:

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89. Choose the correct options.

Earth's atmosphere is rechest in

A. UV

B. IR

C. X-ray

D. Microwaves

Answer:

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90. How does the frequency of a beam of ultraviolet light change when it travelsfrom air into glass?

A. No change

B. increases

C. decreases

D. remains same

Answer:

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91. The direction of EM wave is given by

A. $\vec{E} \times \vec{B}$

B. $\vec{E} - \vec{B}$

C. along $\vec{E}$

D. along $\vec{B}$

Answer:

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92. The maximum distance upto which TV transmission from a TV tower of height h can be received is proportional to

A. $h^{1/2}$

B. h

C. $h^{3/2}$

D. h^2

Answer:

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93. The waves used by artificial satellites for communication purposes are

A. Microwaves

B. AM radio waves

C. FM radio waves

D. X-rays

Answer:

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94. If a TV telecast isto cover a radius of 640 km, what should be the height of transmitting antenna?

A. 32000 m

B. 53000 m

C. 42000 m

D. 55000 m

Answer:

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95. In a communication system, noise is most likely to affect the signal.

A. at the transmitter

B. in the channel

C. in the information

D. at the destination

Answer:

Watch Video Solution

96. For television broadcasting , the frequency employed is normally

A. 30 - 300 MHz

B. 30 - 300 GHz

C. 30 - 300 kHz

D. 30 - 300 Hz

Answer:

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97. A device that converts one form of energy into another form is termed as.....

A. transducer

B. transmitter

C. amplifier

D. receiver

Answer:

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98. The process of regaining the information from carrier wavesis called.....

A. transmission

B. demodulation

C. propagation

D. modulation

Answer:

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99. The outermost layer of the earth's atmosphere is.....

A. stratosphere

B. ionosphere

C. troposphere

D. mesosphere

Answer:

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100. The antenna behaves as resonant circuit only when its length is.....

A. $\lambda/2$

B. $\lambda/4$

C. λ

D. integral multiple of $\lambda/2$

Answer:

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101. The difference between the upper and lower frequency limits of the signal is called the.....

A. range

B. repeater

C. bandwith

D. noise

Answer:

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102. The layer that adsorbs largest proportion of UV rays is

A. Ozone layer

B. troposphere

C. ionosphere

D. neosphere

Answer:

Watch Video Solution

103. Speed of electromagnetic waves is given

A. $C = \frac{1}{\sqrt{\mu_0 \varepsilon_0}}$

B. $C = \sqrt{\mu_0 \varepsilon_0}$

C. $C = \frac{1}{\mu_0 \varepsilon_0}$

D. $C = \mu_0 \varepsilon_0$

Answer:

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104. The lower layer of the earth's atmosphere is called.

A. stratosphere

B. mesosphere

C. ionosphere

D. troposphere

Answer:

Watch Video Solution

105. Which of the following is NOT a part of electromagnetic spectrum?

A. visible light

B. infrared rays

C. ultraviolet rays

D. cosmic rays

Answer:

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106. Operators working on X-ray equipment have a chance of getting skin disease due to

A. gas generated by X-rays

B. chemicals used in X-ray machine

C. skin tissues getting affected

D. darkness in room

Answer:

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107. The electromagnetic spectrum contains different electromagnetic waves that

A. differ from one another in frequency not in wavelength, have same source.

B. differ from one another in frequency, and wavelength, have same source.

C. have same frequency and wavelength but different source

D. differ from one another in frequency and wavelength

Answer:

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108. In T.V. and V.C.R. remote control uses

A. ultra violet rays

B. visible light

C. infrared rays

D. Microwaves

Answer:

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109. The natural source of Ultraviolet rays is

A. moon

B. sun

C. ozone layer

D. Uranus

Answer:

Watch Video Solution

110. Radio waves and visible light in vacuum have

A. same velocity and different wavelength

B. same velocity and same wavelength

C. different velocity and same wavelength

D. different velocity and different wavelength

Answer:

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111. To induce an e.m.f. in the coil

A. high temperature is required

B. string winding is required

C. constant electromagnetic field only is chosen

D. varying electromagnetic field is required

Answer:

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112. Which of the following waves are not electromagnetic waves?

A. water waves

B. U.V. rays

C. X.ray

D. microwaves

Answer:

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113. Electromagnetic waves were first produced in the laboratory by

A. Marconi

B. J. C. Bose

C. Maxwell

D. Hertz

Answer:

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114. The.....% of the solar radians are infrared in nature.

A. 25

B. 30

C. 60

D. 80

Answer:

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115. Ultraviolet rays can NOT pass through

A. quartz

B. fluorite

C. glass

D. rock salt

Answer:

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116. The air in the stratosphere contains

A. dust and little moisture

B. smoke

C. high moisture and dust

D. pollen grains and organic materials

Answer:

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117. Which of the following statements is NOT CORRECT?

A. Infrared rays are invisible but can cast shadows like visible light

B. Photographic plates are sensitive to ultraviolet rays

C. Photographic plates are sensitive to X-rays.

D. Infrared photons have more energy than photons of visible light

Answer:

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118. The radio waves reflected from.....are called space wave.

A. troposphere

B. ionosphere

C. stratosphere

D. ozone layer

Answer:

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119. The special infrared photograph of the body to see diseased parts is called

A. Thermogram

B. Videograph

C. Cardiograph

D. Cardiograph

Answer:

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120. In the diagnosis of superficial tumours and varicose veins which of the following rays are used?

A. Infrared rays

B. Ultraviolet rays

C. Gamma rays

D. Radio waves

Answer:

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121. The sound waves after being converted into electrical waves are not transmitted because

A. they travel with the speed of the sound

B. the frequency is not constant

C. they are heavily absorbed by the atmosphere

D. they have different frequencies

Answer:

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122. Choose the correct options.

Earth's atmosphere is rechest in

A. UV

B. IR

C. X-ray

D. Microwaves

Answer:

Watch Video Solution

123. Choose the correct options.

A device that converts one form of energy into another form is termed as....

A. transuducer

B. transmitter

C. amplifier

D. receiver

Answer:

 Watch Video Solution

124. Choose the correct options.

Ultraviolet rays can NOT pass through

A. quartz

B. fluorite

C. glass

D. Brock salt

A. quartz

B. fluorite

C. glass

D. rock salt

Answer:

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125. Choose the correct options.

The radio waves from..... are called space wave.

A. troposphere

B. ionosphere

C. stratosphere

D. ozone layer

Answer:

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126. What is modulation?

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134. What are radio waves? Give its two uses

Watch Video Solution

135. What are micro wave? Give its two uses.

Watch Video Solution

136. Explain why is modulation needed.

Watch Video Solution

137. Define : Signal

Watch Video Solution

138. Define : Transmitter

Watch Video Solution

139. Define : Attennuation in communication

Watch Video Solution

140. Explain ground waves, space waves and sky waves propogation

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141. The height of a transmitting antenna is 68 m and the receiving antenna is at the top of a tower of height 34m. Calculate the maximum distance between them for satisfactory transmission in line of sight mode, R = 6400 km

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