

Exercise-I

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|-------|-------|-------|-------|-------|-------|-------|
| 1. B | 2. D | 3. B | 4. B | 5. D | 6. A | 7. A |
| 8. D | 9. A | 10. D | 11. C | 12. C | 13. A | 14. C |
| 15. B | 16. D | 17. B | 18. D | 19. D | 20. A | 21. D |
| 22. C | 23. C | 24. A | 25. D | 26. C | 27. B | 28. A |
| 29. B | 30. A | 31. B | 32. C | 33. D | 34. B | 35. C |
| 36. A | | | | | | |

Exercise-II

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| 1. A,B,C,D | 2. B,C,D | 3. C | 4. B | 5. A,B,D | 6. C,D | 7. A,D |
| 8. C | 9. B,C | 10. C,D | 11. B,D | 12. B,C | 13. A,D | 14. C,D |
| 15. A,B | 16. A,C | 17. D | 18. C,D | 19. B | 20. A,C | 21. C |
| 22. C | 23. C,D | | | | | |

Exercise-III

1. (a) amplitude $A = 5 \text{ mm}$ (b) wave number $k = 1 \text{ cm}^{-1}$
 (c) wavelength $\lambda = \frac{2\pi}{k} = 2\pi \text{ cm}$ (d) frequency $\nu = \frac{\omega}{2\pi} = \frac{60}{2\pi} \text{ Hz}$
 (e) time period $T = \frac{1}{\nu} = \frac{\pi}{30} \text{ s}$ (f) wave velocity $u = n\lambda = 60 \text{ cm/s}$
2. (a) $\frac{10}{3} \hat{i} \text{ m/s}$ (b) -5.48 cm (c) $0.667 \text{ m}, 5.00 \text{ Hz}$ (d) 11.0 m/s
3. (a) $10\pi \text{ rad/s}$ (b) $\pi/2 \text{ rad/m}$ (c) $y = (0.120 \text{ m}) \sin(1.57x - 31.4t)$ (d) $1.2\pi \text{ m/s}$ (e) 118 m/s^2
4. $A_r = -\frac{1}{3} \text{ cm}, A_t = \frac{2}{3} \text{ cm}$ 5. 0.2 cm 6. 0.02 s 7. 0.12 m 8. $50 \text{ Hz}, 4.0 \text{ cm}, 2.0 \text{ m/s}$
9. (a) $y = (7.50 \text{ cm}) \sin(4.19x - 314t)$ (b) 625 W 10. (a) 0.47 W , (b) 9.4 mJ
11. $y' = 0.8 a \sin \frac{2\pi}{\lambda}(vt + x + \frac{\lambda}{2})$ 12. $2 \text{ A}, 8 \text{ A}$ 13. (a) 0.52 m ; (b) 40 m/s ; (c) 0.40 m
14. (a) $\frac{5\sqrt{10}}{2} \text{ Hz}$; (b) $5\sqrt{10} \text{ Hz}$; (c) $\frac{5\sqrt{10}}{2} \text{ Hz}$ 15. (a) 144 m/s ; (b) 60.0 cm ; (c) 241 Hz
16. (a) 105 Hz ; (b) 158 m/s 17. (a) 0.25 cm (b) $1.2 \times 10^2 \text{ cm/s}$; (c) 3.0 cm ; (d) 0
18. 36 N 19. (a) 100 Hz (b) 700 Hz 20. 300 Hz 21. 60 cm from an end.
22. (a) $10 \text{ Hz}, 30 \text{ Hz}, 50 \text{ Hz}$
 (b) $8.00 \text{ m}, 1.60 \text{ m}$
23. 1% 24. 25 kg 25. $1 \times 10^9 \text{ Nm}^2$ 26. $2.5 \text{ kHz}, 7.5 \text{ kHz}$

Exercise-IV

1. (a) negative x; (b) $y = 4 \times 10^{-3} \sin 100\pi \left(3t + 0.5x + \frac{1}{400} \right)$ (x, y in meter) ; (c) $144 \pi^2 \times 10^{-5} \text{ J}$ 2. $\frac{\pi}{\sqrt{2}\omega}$



Exercise-V

1. $y = 2 \times 10^{-6} \sin(0.1\pi) \cos(25000 \pi t + \theta)$, for $\theta = 0$: $y_1 = 10^{-6} \sin(5\pi x - 25000\pi t)$, $y_2 = 10^{-6} \sin(5\pi x + 25000\pi t)$
 2. (i) A, (ii) A 3. $\pi \text{ rad}$, 0 m 4. A
 5. (i) B,C, (ii) B, (iii) A,C
 6. (a) Time = 140 ms, (b) $A_r = \frac{V_2 - V_1}{V_2 + V_1} A_i = 15 \text{ cm}$; $A_t = \frac{2V_2}{V_1 + V_2} A_i = 2 \text{ cm}$
 7. A,C,D 8. B,C,D 9. A,B,C 10. A,B,C 11. D 12. C 13. B
 14. A 15. $E = \frac{A^2 \pi^2 T}{4l}$ 16. C 17. $y = (10 \text{ cm}) \sin(30 t \pm \frac{3}{2} x + \phi)$
 18. A 19. A 20. 5