

Exercise-I

LINEAR S.H.M

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|-------|-------|-------|-------|-------|-------|-------|
| 1. A | 2. C | 3. B | 4. C | 5. A | 6. A | 7. C |
| 8. C | 9. D | 10. A | 11. D | 12. B | 13. B | 14. B |
| 15. A | 16. D | 17. D | 18. C | 19. D | 20. C | 21. B |
| 22. B | 23. C | 24. D | 25. C | 26. C | 27. C | 28. C |
| 29. B | 30. C | 31. A | 32. D | 33. D | 34. C | 35. D |
| 36. B | 37. B | 38. A | 39. B | 40. B | 41. A | 42. C |
| 43. A | 44. C | 45. A | 46. A | 47. C | 48. B | 49. C |
| 50. C | 51. B | | | | | |

ANGULAR S.H.M

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|-------|-------|-------|-------|-------|-------|
| 52. C | 53. B | 54. C | 55. A | 56. A | 57. A |
| 58. C | 59. B | 60. C | 61. A | 62. A | |
| 63. D | | | | | |

Exercise-II

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|-----------|---------|------------|-----------|-----------|-----------|
| 1. B,C,D | 2. A | 3. B | 4. B,C | 5. A | 6. A,B,C |
| 7. C | 8. B | 9. A,B,C,D | 10. B,C,D | 11. A,B | |
| 12. A,B,C | 13. B,D | 14. A | 15. C,D | 16. B,C,D | 17. A,B,C |
| 19. B,D | 20. B | 21. B,D | 22. A,C | 23. B,C | 18. A,C |
| 25. B | | | | | |

Exercise-III

LINEAR S.H.M

1. Amplitude = 5 m
Initial Phase = $\pi/6$
Maximum speed = 5π m/sec
2. (a) 2.0 cm, $\pi/50$ sec, 100 N/m
(b) 1 cm, $\sqrt{3}$ m/sec, 100 m/sec⁻¹
3. (a) $\frac{\pi}{120}$ sec., (b) $\frac{\pi}{30}$ sec. (c) $\frac{\pi}{30}$ sec. 4. $\frac{1}{\sqrt{3}}$ 5. (a) $\frac{\pi}{10}$ sec, (b) 4 cm, (c) 2.40 kg m/sec
6. 2m/sec 7. $\frac{1}{2\pi} \sqrt{\frac{\beta}{\alpha}}$ 8. 100 Nm⁻² 9. (a) $\frac{11}{5}$ m (b) $\frac{\pi}{5}$ sec (c) $x = 0.2 - \frac{11}{5} \cos \omega t$
10. (i) $x_0 = 2$ m (ii) $T = \sqrt{2}\pi$ sec (iii) $2\sqrt{3}$ 11. $\frac{3\sqrt{5}}{8}$ A, $\tan^{-1}\left(\frac{1}{2}\right)$ 12. $25\sqrt{2}$ N
13. $\frac{5}{2\pi}$ Hz, 5 cm 14. $\frac{F(K_2 + K_3)}{K_1K_2 + K_2K_3 + K_3K_1}$, $\frac{1}{2\pi} \sqrt{\frac{K_1K_2 + K_2K_3 + K_3K_1}{M(K_2 + K_3)}}$ 15. $\frac{\pi}{7}$

16. $X = 10 \sin(\pi t + \pi/6)$ 17. 1.8 a 18. (a) 25 cm, (b) $\frac{3\pi}{56}$ seconds
19. $10\sqrt{6}$ cm, $\frac{1}{\pi} \sin^{-1} \sqrt{\frac{2}{3}} - \frac{1}{6}$ sec 20. $2 - 4 \cos 2\pi t$ 21. (a) 2 sec. (b) $T = \frac{2}{5^{1/4}}$ sec.
22. 0.06 m 23. $\frac{10}{\pi}$ Hz, $\frac{5\sqrt{37}}{6}$ cm 24. 2 cm 25. $2\sqrt{\frac{a}{m}}$

ANGULAR S.H.M

26. 1 m 27. 1 m 28. (i) $2T_0$, (ii) 3 g up wards 29. (a) $2\pi\sqrt{\frac{\ell}{a_0 + g}}$, (b) $2\pi\sqrt{\frac{\ell}{g - a_0}}$, (c) $2\pi\sqrt{\frac{\ell}{g}}$
30. $\frac{g}{10}$ 31. $2\pi\sqrt{\frac{17L}{18g}}$ 32. $\frac{3}{2}$ sec

Exercise-IV

1. $y = 0.1 \sin(4t + \pi/4)$ 2. $\sqrt{65}$ m/s 3. 3 cm, $x = 10 - 3 \sin 5t$; $\Delta E = 0.135$ J
4. (a) $K = \frac{2mg}{b-a}$; (c) $\left(\frac{M+m}{m}\right) \frac{ab}{b-a}$, $\frac{1}{2\pi} \sqrt{\frac{2mg}{(b-a)(M+m)}}$ 5. $f = \frac{1}{\pi}$; $E = 4\pi^2 \times 10^{-5}$ J; $v = 2\pi \times 10^{-2}$ m/s
6. $f = \frac{1}{2\pi} \sqrt{\frac{\gamma(P_0 + mg/A)A}{mh}}$ 7. $(2\pi a/b)(m/k)^{1/2}$ 8. $0.8t + 0.12 \sin 10t$ 9. $\sqrt{\frac{2\pi R^2}{G\rho}}$

Exercise-V

1. A 2. D 3. A, C 4. A 5. $\frac{1}{2\pi} \sqrt{\frac{YA}{ML}}$ 6. A
7. $\frac{1}{f} = 2\pi \sqrt{\frac{m_1 m_2}{2B(m_1 + m_2)}}$ 8. A 9. (a) $x_2 = v_0 t + \frac{m_1}{m_2} A (1 - \cos \omega t)$, (b) $l_0 = \left(\frac{m_1}{m_2} + 1\right) A$
10. B 11. C 12. $y^* = \frac{mg}{k} = \frac{g}{\omega^2} < a$ 13. A, B, D 14. D
15. (A) P; (B) Q, R; (C) P; (D) Q, R or (A) P; (B) Q, R; (C) P; (D) R
16. C 17. D 18. D 19. C 20. A, D 21. D 22. C 23. B