

Exercise-I

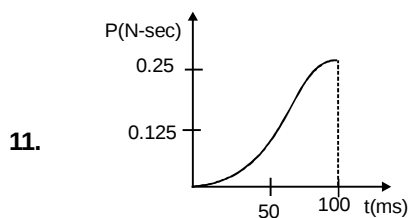
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|-------|------------------|------------------|-------|-------|-------|-------|
| 1. D | 2. C | 3. B | 4. D | 5. B | 6. C | 7. C |
| 8. C | 9. A | 10. C | 11. B | 12. D | 13. D | 14. D |
| 15. C | 16. (a) B, (b) C | 17. (a) C, (b) B | 18. A | 19. D | 20. A | 21. B |
| 22. D | 23. D | 24. A | 25. A | 26. D | 27. B | 28. B |
| 29. B | 30. B | 31. B | 32. C | 33. D | 34. B | 35. B |
| 36. D | 37. B | 38. A | 39. C | 40. C | 41. C | 42. D |
| 43. A | 44. D | 45. A | 46. A | 47. B | 48. D | 49. C |
| 50. A | 51. C | 52. B | 53. D | 54. C | 55. D | 56. C |
| 57. D | | | | | | |

Exercise-II

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

Exercise-III

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| 1. (a) $\lambda(x) = \lambda + \frac{\lambda x}{L}$, (b) $\frac{5}{9}L$ | 2. $y = \frac{4}{3\pi} \left[\frac{b^3 - a^3}{b^2 - a^2} \right]$ | 3. $\frac{3}{4}a$ | 4. 100 m |
| 5. (i) zero; (ii) right; (iii) 20 cm; (iv) 2.2 m; (v) 1.8 m | 6. g/9 downwards | 7. $v = \sqrt{\frac{2gR}{1 + \frac{m}{M}}}$ | |
| 8. 9 m/s, 9 m | 9. (a) $\sqrt{\frac{kx_0^2}{2m}}$, (b) $\frac{Kx_0^2}{4}$ | 10. (i) 20Ns, (ii) 50 N | |



12. 187.5 N, 625 kPa

13. $m \times \sqrt{u^2 - uv + v^2}$

14. (a) $\frac{p_1 + p_2}{m_p} = 12.3 \text{ m/sec}$, (b) $\frac{\sqrt{p_1^2 + p_2^2}}{m_p} = 9.4 \text{ m/s}$

15. (a) $4\sqrt{5} \text{ N}$, (b) $2000\sqrt{5} \text{ N}$

16. 1.5 m/s, 3.6 Ns

17. (a) $u/2, \mu u/2$; (b) $u\sqrt{13}/8, \mu u\sqrt{13}/8$ (c) $u\sqrt{3}/4, \mu u\sqrt{3}/4$

18. $W = -3\mu u^2$; $J = 6 \mu u$, $K = \mu u$

19. $\frac{mv}{(m + \rho Ax)}$

20. 6 m/s in the direction of football's velocity

21. (a) 3J, (b) $\frac{12}{5}$ Ns
22. 2 : 1
23. (a) $\frac{40}{3}$ m, (b) $t_e = 3.25$ s
24. (a) $v = 3\sqrt{gl}$, (b) $v' = \frac{\sqrt{gl}}{2}$
25. (a) $10\sqrt{3}$, (b) $\tan^{-1}\sqrt{2}$, (c) 45° , (d) 20 m
26. (a) $e = \cot^2\alpha + \frac{m}{M} = \frac{3}{4}$, (g) $t = 3$ sec.
27. $v_A = \sqrt{g/12}$ m/s, $S_{\max} = 49/48$ m
28. (a) $v_0/3$, (b) $3\sqrt{5gR}$
29. $v = (u\cos\theta - \mu u \sin\theta) \ln\left(\frac{M_0}{M_0 - \lambda t}\right) - \mu gt$

Exercise-IV

1. $(5/\sqrt{17})$ cm, 153L / 80u
2. $\frac{m}{\ell} v(v + gt)$
3. (a) 360 m, (b) 10800 J
4. (a) 50 m, (b) 10 m, (c) 30 m
5. 13/3 m/s
6. (a) $v/2$, $v/2$, 0; (b) $2mv^2/9$, (c) $mv^2/72$, (d) $x = \sqrt{m/6k} v$
7. $2mv^2/3l$
8. $v_B = \frac{m_A}{m_B} \sqrt{\frac{2gl}{1 + m_A/m_B}}$; $T = 3m_A g + \frac{2m_A^2 g}{m_B}$
9. -2m/s, 6.93 m/s $\angle 30^\circ$
10. (a) $v_0/3$, (b) $mv_0 = 2mv_2 \cos\theta$, $0 = 2mv_2 \sin\theta - \frac{mv_0}{2}$, (c) $\frac{1}{2}$, $\frac{\sqrt{5}}{4} v_0$, (d) $\frac{mv_0^2}{16}$
11. 2.5 m/sec, 0.312 m
12. $v = \frac{2\sqrt{3}u}{7}$, $u' = \frac{5u}{7}$, $T = \frac{6}{7}mv$

Exercise-V

1. 2 in case I
2. C
3. C
4. $t_0 = 12$ sec, $v = 100\sqrt{3}/11$
5. C
6. B
7. A, D
8. B
9. B
10. C
11. a/10
12. C
13. 4
14. A,C
15. D