

## Exercise-I

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

## Exercise-II

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

## Exercise-III

1. (a)  $\frac{\pi}{2}$  (b)  $\frac{2\pi}{35}$  2. (a)  $1.7 \times 10^{-5}$  (b)  $1.08 \times 10^{-4}$  3. 333 m/s 4. 310 m/s 5.  $2c/3$  6.  $\frac{\pi^2 \times 10^{-9}}{4} \text{ W/m}^2$   
 7. 6 8. 30 dB,  $10\sqrt{10} \text{ mm}$  9. (a) p (b)  $I = (\sqrt{I_A} - \sqrt{I_B})^2 = (25/312)^2$  10. 83 Hz 11. 420 Hz 12.  $\lambda/8$   
 13. a  $[\sin(kx + \omega t) + 2 \sin(kx - \omega t)]$  14. (a)  $f = 50 \text{ Hz}$ ,  $\lambda = 0.2 \text{ m}$ ,  $v = 10 \text{ ms}^{-1}$  (b)  $P_m = 62.8 \text{ Nm}^{-2} = 20\pi \text{ Nm}^{-2}$ ,  $B = 100 \text{ Nm}^{-2}$   
 (c)  $\lambda/4 = 0.05 \text{ m}$  (d)  $I = 20 \pi^2 \approx 200 \text{ Wm}^{-2}$   
 15. 735 N 16. 20, 80 cm, 200 Hz  
 17. (a)  $v_n = \frac{v}{4\ell} (2n + 1)$ ; six oscillations (b)  $v_n = \frac{v}{2\ell} (n + 1)$ , also six oscillations; Here  $n = 0, 1, 2, \dots$   
 18. 1 : 1 19. 3 cm 20. 33 cm and 13.2 cm 21. 2 %  
 22. (a) 95% (b)  $\frac{40}{\pi} \times 10^3 \text{ kg/m}^3$  23.  $2.5 \text{ ms}^{-1}$  24. 485 Hz 25. 345, 341 or 349 Hz  
 26. (i)  $(V - V_w + V_s) / f$  (ii)  $(V + V_w - V_s) / f$   
 (iii)  $(V - V_w - V_D) / f_r$ ; where  $f_r = (V + V_w + V_0/v + V_w - V_s) f$  (iv)  $(V - V_w - V_0/V - V_w - V_D) f_r$   
 27.  $f_b = \frac{2uf}{v+u}$  28. 1 : 5 29. 30 dB,  $10\sqrt{10} \text{ mm}$  30.  $\frac{f_r + f_a}{2}$  31.  $L_c = 0.75 \text{ m}$ ,  $L_o = \frac{150}{151} \text{ m}$ , 1.006 m

## Exercise-IV

1. (a)  $2\pi/a$ ,  $b/2\pi$ , (b)  $y_2 = \pm 0.8 \text{ A} \cos(ax - bt)$ , (c) max. = 1.8 bA, min = 0, 2. (a)  $l/6$ ; (b) 150 Hz; (c) 1.28  
 3. (a) 2; (b) 9.28 m and 1.99 m 4. 1650 Hz, 1500 Hz 5. (a) 0.3 m, (b) 1320, (c) 332 m/s, (d) 0.2 m  
 6. 5.9 sec 7. f 8. 9.7 m

## Exercise-V

1.  $f_{\max} = 484 \text{ Hz}$ ,  $f_{\min} = 403.3 \text{ Hz}$  2. D 3.  $L_c = 0.75 \text{ m}$ ;  $L_o = 0.99 \text{ m}$  or 1.006 m 4.  $\frac{2v_b(v + v_m)f}{v^2 - v_b^2}$   
 5. (i)  $L = \frac{15}{16} \text{ m}$ , (ii)  $\frac{\Delta P_0}{\sqrt{2}}$ , (iii)  $P_{\max} = P_{\min} = P_0$ , (iv)  $P_{\max} = P_0 + DP_0$ ,  $P_{\min} = P_0 - DP_0$  6. B 7. D 8. B  
 9.  $h = 3.2, 2.4, 1.6, 0.8, 0$ ;  $v = 5 \times 10^{-3} \sqrt{5H}$ ;  $Dt = 80(4 - 2\sqrt{3})$  10. (a) 100696 Hz (b) 103038 Hz 11. B  
 12. (a) 2.116, (b)  $3/4$  13. A 14. A 15. 336 m/s 16. C 17. D 18. D 19.  $V_s = 30 \text{ m/s}$  20. A,C,D 21. 7 22. A 23. B,D