

Exercise-I

1. A 2. C 3. B 4. A 5. C 6. C 7. B 8. A 9. B 10. C 11. A 12. D 13. D 14. C
 15. A 16. D 17. D 18. B 19. D 20. C 21. C 22. A 23. D 24. D 25. A 26. C 27. A 28. B
 29. A 30. C 31. B 32. B 33. A 34. C 35. A 36. C 37. C 38. A 39. D 40. B 41. D 42. A
 43. C 44. A 45. A 46. A 47. B 48. D 49. D 50. D 51. D 52. B 53. D 54. B 55. B 56. B
 57. A, C 58. D 59. A 60. A 61. B 62. C 63. C 64. B 65. A 66. D 67. A 68. C 69. A 70. C
 71. A 72. B 73. A 74. A 75. D 76. B 77. D 78. C 79. C 80. C 81. A 82. A, D 83. D 84. B
 85. D 86. A 87. D 88. A

Exercise-II

1. D 2. C 3. CD 4. B 5. ABC 6. AB 7. C 8. AD
 9. B, D 10. ACD 11. D 12. BD 13. D 14. D 15. A 16. ABD
 17. AB 18. AB 19. AD 20. B 21. B 22. CD 23. CD 24. BC

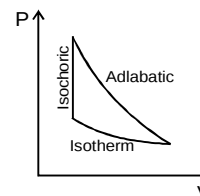
Exercise-III

1. $28.7236 \times 10^3 \text{ sec.}$ 2. $\sqrt{\frac{20012.428}{\pi}} \times 10^{-25} \text{ kg-m/s}$ 3. 1 : 2 4. $\sqrt{14}$ 5. 11 RT 6. 196°C
 7. PROOF 8. 3.3×10^3 9. $\sqrt{2} T$ 10. 1 : $\sqrt{2}$ 11. 27 : 4 12. $\frac{3}{2} p_0$
 13. $1.25 \times 10^4 \text{ N/m}^2$ 14. (i) $P_1 < P_2, T_1 < T_2$; (ii) $T_1 = T_2 < T_3$; (iii) $V_2 > V_1$; (iv) $P_2 > P_1$
 15. 74.9 cm 16. 120 R 17. 1500 J 18. 0.0091 J 19. PV 20. $-100\pi\text{J}$
 21. $3P_1 V_1$ 22. $\pi/2 \text{ atm-lt}$ 23. Q – W 24. 24 J 25. $(33600 + 0.02) \text{ J}$ 26. $\frac{25}{6} \text{ J/cal}$
 27. $\frac{88}{21} \text{ J/cal}$ 28. 100 J 29. 3600 R 30. (i) 765 J (ii) $\frac{208}{1921}$ 31. 3R 32. PROOF
 33. $-\gamma$ 34. γ 35. 3R, 2R, 1.5 36. 47/29 37. 1.5 38. $C_v + \frac{R}{\alpha V}$
 39. $\frac{R}{2}$ 40. 12600 J 41. 50 calorie 42. $R\Delta T \left(\frac{3-2\gamma}{\gamma-1} \right)$
 43. the molar mass of the gas is 40 gm, the number of degrees of freedom of the gas molecules is 6
 44. 8 atmosphere 45. $1 - \frac{3\left(1 - \frac{1}{2^{1/3}}\right)}{\ln 2}$ 46. 1.5 47. 5R 48. P/n 49. 300 K

Exercise-IV

1. 750 K 2. $31P_0V_0$; $-5P_0V_0$ 3. (ii) $P_b = P_c = 2 \text{ atm}$, (iii) $T_b = 300 \text{ K}$, $T_c = 600 \text{ K}$, (iv) $V_c = 8 \text{ litre}$

4. 1.6 m, 364 K 5. 1.63 6. $\frac{3-2\ln 2}{3}$ 7. 8000 cal.



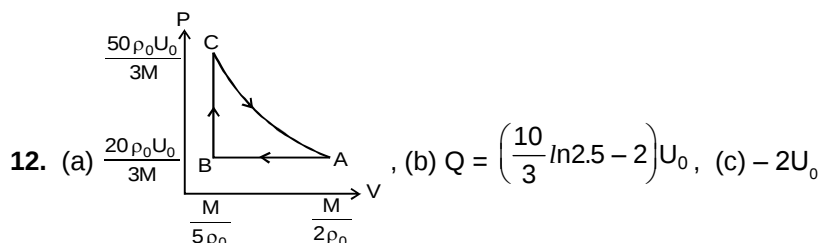
8. $2mnv^2\cos^2\theta$ 9. (a) $W_{AD} = 88 \text{ J}$, (b) $V_C = 1.223 \text{ litre}$, (c) $W_{CDA} = -85 \text{ J}$

10. (a) Final pressure in A = $\frac{27}{8}P_0$ = Final pressure in C, Final pressure in B = $\frac{21}{4}P_0$

- (b) Final temperature in A (and B) = $\frac{21}{4}T_0$, Final temperature in C = $\frac{3}{2}T_0$,

- (c) $18P_0V_0$, (d) work done by gas in A = $+P_0V_0$, work done by gas in B = 0

- (e) $\frac{17}{2}P_0V_0$ 11. four



12. (a) $\frac{20\rho_0U_0}{3M}$, (b) $Q = \left(\frac{10}{3}\ln 2.5 - 2\right)U_0$, (c) $-2U_0$

13. $\frac{7R}{2M}$, $4R(T_2 - T_1)$ 14. (a) 80 J, 180 J, (b) 4.5 R 15. $T_1 = (207/16)T_0$; $T_2 = \frac{9}{4}T_0$, $-\frac{15}{8}P_0V_0$

16. (a) $2 \times 10^5 \text{ N/m}^2$; (b) 6 rad/s, (c) 75 J 17. $C = 2R$

Exercise-V

1. B 2. D 3. C 4. C 5. D 6. C 7. A
 8. C,D 9. B 10. B,C 11. C 12. D 13. 400 J, $2T_0$
 14. (a) 1200 R, (b) $Q_{AB} = -2100 \text{ R}$, $Q_{BC} = 1500 \text{ R}$, $Q_{CA} = 1200 \text{ R}$ $\ln 2$
 15. B 16. A 17. A 18. A 19. 160 K, $3.3 \times 10^{-21} \text{ J}$, 0.3 gm 20. A

21. $\Delta T = \frac{mv_0^2}{3R}$ 22. C 23. $T_3 = 400\left(\frac{4}{3}\right)^{0.4} \text{ K}$ 24. C 25. A

26. (a) $T_{\text{final}} = 70^\circ\text{C}$, (b) 0.05 J, (c) 19999.95 J 27. (A) $\rightarrow S$; (B) $\rightarrow P$ and R; (C) $\rightarrow (R)$; (D) $\rightarrow Q$ and S
 28. A 29. D 30. C 31. B 32. C

33. (A) $\rightarrow q$, (B) $\rightarrow p$ & r, (C) $\rightarrow p$ & s, (D) $\rightarrow q$ & s

34. B,D 35. B,D 36. (A) $\rightarrow (PQST)$, (B) $\rightarrow (Q)$, (C) $\rightarrow (S)$, (D) $\rightarrow (S)$ 37. D

38. A,B

39. 4 40. A 41. (A) $\rightarrow p,t,r$; (B) $\rightarrow p,r$; (C) $\rightarrow q,s$; (D) $\rightarrow r,t$ 42. D

43. D