

**EXERCISE - I**

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

**EXERCISE - II**

|        |        |        |        |      |        |
|--------|--------|--------|--------|------|--------|
| 1. D   | 2. A,C | 3. A,C | 4. B,C | 5. D | 6. A,C |
| 7. B,D | 8. B   | 9. D   |        |      |        |

**EXERCISE - III**

1.  $h = \frac{2m}{\pi}$ ,  $H = \frac{11}{32\pi} m$       2. 101.8 Kgf-m      3. 54.4 cm      4.  $45^\circ$ ,  $9600\sqrt{2}$  (gauge) N/m<sup>2</sup>
5. 100 kg      6.  $\omega = \frac{10}{\sqrt{3}} \text{ rad/s}$ ,  $\tan\alpha = \frac{5}{3}$       7. 19.6 m, 4 sec      8. 2.79 gm/cc
9. at the water surface,  $h/2$       10. 37.5 N      11. 0.75      12. (a) 5, (b)  $2/3$
- 13.(i)  $2500 \text{ kg/m}^3$ ,  $\frac{5000}{3} \text{ kg/m}^3$  (ii)  $R_D = 7.5 \text{ kg}$ ,  $R_E = 2.5 \text{ kg}$       14.  $3/5$       15.  $\ell(d_2 - d_1) \left( \frac{k}{d_2} + Ag \right)$
16.  $h_2 = 3 h_1$       17. (a)  $6\sqrt{2} \text{ m/s}$ , (b)  $9.6\sqrt{2} \times 10^{-3} \text{ M}^3/\text{sec}$ , (c)  $4.6 \times 10^4 \text{ N/m}^2$       18.  $\sqrt{3}:\sqrt{2}$
19.  $6.43 \times 10^{-4} \text{ m}^3/\text{s}$       20. 20 cm, 60 cm

## EXERCISE - IV

1. 6N      2.  $4\text{m/s}^2$ , 10%, 0, 45 kPa      3.  $h_1 = \frac{2(3+\pi)}{15\pi} = 0.26$ ;  $h_2 = \frac{3+\pi}{10\pi} = 0.195$       4.  $x = 1/3$

5.  $\frac{Y}{y-x+z}$       6.  $\rho = \frac{W}{\pi h^2 g \tan \alpha \left( R - \frac{1}{3} h \tan \alpha \right)}$       7. (a)  $\left( \frac{M-m}{M+m} \right) g - \frac{(M-m)gx}{(M+m)L}$       (b)  $t = \frac{\pi}{2} \sqrt{\frac{L}{g} \left( \frac{M+m}{M-m} \right)}$

8.  $\sqrt{\frac{18g}{19a}}$       9.  $\frac{\pi}{80} \text{m}^2$       10.  $h_1 = h_2$       11.  $80\sqrt{5}$  sec,  $40\sqrt{5}$  sec      12. 431 sec

13. (i)  $4\text{m/s}$ , (ii)  $F = 7.2 \text{ N}$ , (iii)  $F_{\min} = 0$ ,  $F_{\max} = 52.2 \text{ N}$ , (iv) both  $4 \times 10^{-3} \text{ m/s}$

14. (a)  $\frac{d^2 H^2 S}{2\rho g} = 32 \text{ Kg } f - m$ , (b)  $\frac{1}{2} S H^2 (1-d)^2 = 2 \text{ Kg } f - m$       15.  $\frac{163}{36} \text{cm}$ ,  $\frac{388}{36} \text{cm}$

16.  $t = \frac{12\sqrt{14}}{\sqrt{15} - \sqrt{14}}$       17.  $\frac{\rho g R}{2}$       18. 2 sec, 1 sec      19.  $b/3$

20. (a) (i)  $D = \frac{5}{4}d$ , (ii)  $p = P_0 + \frac{1}{4}(6H + L) dg$ ; (b) (i)  $v = \sqrt{\frac{g}{2}(3H - 4h)}$ , (ii)  $x = \sqrt{h(3H - 4h)}$  (iii)  $x_{\max} = \frac{3}{4}H$

21.  $w = \sqrt{\frac{3g}{2L} \left( \frac{d_2 - d_1}{d_1} \right)}$       22. (i)  $0.2 \text{ m/s}^2$ , (ii)  $\sqrt{2g \frac{m_0}{A\rho}}$

23.  $+29625 \text{ J/m}^3$ ,  $-30000 \text{ J/m}^3$

24.  $m_{\min} = \pi r^2 l (\sqrt{\rho\sigma - \rho})$ ; if tilted then it's axis should become vertical C.M. should be lower than centre of bouyancy.

## EXERCISE - V

1. A      2. D      3. D      4. (a) 0, (b)  $h = 0.25 \text{ cm}$ , (c)  $a = g/6$  (upward)

5.  $x = 2\text{m}$       6.  $f = \frac{1}{2\pi} \sqrt{\frac{3g}{2R}}$       7. C      8.  $H = \frac{L^2 \omega^2}{2g}$

9. C      10. B      11. A

12. A      13. B      14. D      15. B      16. B

17. 6      18.  $A \rightarrow P, T, B \rightarrow Q, S, T, C \rightarrow P, R, T, D \rightarrow Q$       19. A,B,D