

ANSWER Ex-I**(OBJECTIVE PROBLEMS)**

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|-------|-------|-------|-------|-------|-------|
| 1. B | 2. C | 3. A | 4. B | 5. A | 6. B |
| 7. D | 8. A | 9. A | 10. B | 11. B | 12. B |
| 13. B | 14. B | 15. A | 16. A | 17. B | 18. C |
| 19. A | 20. C | 21. D | 22. D | 23. C | 24. B |
| 25. C | 26. A | 27. B | 28. C | 29. A | 30. C |
| 31. B | | | | | |

ANSWER Ex-II**(MULTIPLE CHOICE PROBLEMS)**

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|--------|--------|----------|---------|--------|--------|
| 1. A,D | 2. A,D | 3. B,C,D | 4. A,C | 5. A,C | 6. B,D |
| 7. A | 8. A | 9. A,B,C | 10. A,D | | |

ANSWER Ex-III**(SUBJECTIVE PROBLEMS)**

1. $-\frac{3Gm^2}{a}$ 2. $\frac{Gm^2}{3L^2}$ 3. (i) $\frac{4}{3}\sqrt{\frac{Gm}{R}}$, (ii) $\frac{2}{3}\sqrt{\frac{2Gm}{5R}}$
4. 1.6 hours if is rotating from west to east, 24/17 hours if it is rotating from west to east.
5. $1 \times 10^5 \text{ J}$ 6. $\frac{2G\lambda}{R}(\sin \alpha), (-G\lambda 2\alpha)$ 7. $\sqrt{\frac{2GM}{a}\left(1 - \frac{1}{\sqrt{2}}\right)}$ 8. $h = \frac{\sqrt{5}-1}{2}R$
9. (a) $-GmM_e/r$, (b) $-2GmM_e/r$ 10. $\frac{R_e k^2}{1-k^2}$ 11. $t = \frac{GMm}{2C}\left(\frac{1}{R_e} - \frac{1}{r}\right)$ 12. $\frac{-4GM^2}{L}\left[3 + \frac{3}{\sqrt{2}} + \frac{1}{\sqrt{3}}\right]$
13. (i) $-\frac{3Gm}{R}\left(\frac{m}{\sqrt{3}} + M\right)$, (ii) $\sqrt{\frac{G}{R}\left(\frac{m}{\sqrt{3}} + M\right)}$ 14. R
15. $\vec{g} = +\frac{\pi G \rho_0 R^3}{6} \left[\frac{1}{\left(x - \frac{R}{2}\right)^2} - \frac{8}{x^2} \right] \hat{i}$, $\vec{g} = -\frac{2\pi G \rho_0 R}{3} \hat{i}$ 16. (a) $\sqrt{\frac{Gm}{r}}$; (b) $r\sqrt{2}$; (c) $\sqrt{\frac{2GM}{r}}$
17. $2 \times \sqrt{R^3/GM}$ 18. $\left(1 - \frac{\sqrt{x^2 - R^2}}{x}\right) 4\pi R^2$

ANSWER Ex-IV**(TOUGH SUBJECTIVE PROBLEMS)**

1. $\frac{2\pi R^{3/2}(6\sqrt{6})}{\sqrt{GM}(2\sqrt{2}+3\sqrt{3})}$ 2. $\frac{4\pi r^{3/2}}{\sqrt{G(4M+m)}}$ 3. $\frac{Gm\lambda}{2d^2}$ 4. $\sqrt{\frac{2}{3}\pi G \rho R^2}$ 5. $\sqrt{6.4} \text{ km}$ 6. $\cos \theta = \frac{3}{\sqrt{10}}$
8. $\sqrt{\frac{GM}{R}} \left[\sqrt{\frac{2}{3}} - \sqrt{\frac{8}{15}} \right]$ 9. (a) $h = \left(\frac{\sqrt{7}}{2} + 1\right) R$, (b) $1.13 R$ 10. $T = \sin^{-1}\left(\frac{1}{\sqrt{3}}\right) \sqrt{\frac{R_e}{g}}$

ANSWER Ex-V**(JEE PROBLEMS)**

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|--------------|---|------|-------------------------------------|-------|
| 1. B | 2. $v_{\min} = \frac{3}{2}\sqrt{\frac{5GM}{a}}$ | 3. C | 4. $T = 3 \times 10^{-2} \text{ N}$ | 5. A |
| 6. $h = 99R$ | 7. D | 8. C | 9. A | 10. A |
| 13. B | 14. B, D | | 11. 6 | 12. 3 |