CLASSICAL MECHANICS

ERRATA

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CHAPTER 1

- **Problem 1.1** First **answer** in part (i) should be $8\boldsymbol{i} + 17\boldsymbol{j} - 26\boldsymbol{k}$.

CHAPTER 2

- **Problem 2.18** **Answers** should be:
  $\omega = \Omega b \cos\Omega t \left(a^2 - b^2 \sin^2 \Omega t\right)^{-1/2}$, speed of C is $\frac{1}{2}\Omega ab|\cos\Omega t|\left(a^2 - b^2 \sin^2 \Omega t\right)^{-1/2}$.

CHAPTER 4

- **Page 79** Both M and m are present. They should all be m.

CHAPTER 5

- **Page 107** The relation between α and Ω should be $\alpha = m\Omega^2$.
- **Problem 5.8** **Answer** should be: Lower block leaves the floor after time $(a/g)^{1/2}\cos^{-1}(-5/6)$.
- **Problem 5.9** **Question** should have said to take $g = 10\ \mathrm{m\,s^{-2}}$.

CHAPTER 6

- **Problem 6.11** **Question** should have said that "The block is now lifted so that its *underside* is at height $3a/2$ above the floor ...."
- **Problem 6.16** **Question** should read:

  A bead of mass m can slide on a smooth circular wire of radius a, which is fixed in a vertical plane. The bead is connected to the highest point of the wire by a light spring of natural length $3a/2$ and strength α. Determine the stability of the equilibrium position at the lowest point of the wire in the cases (i) $\alpha = 2mg/a$, and (ii) $\alpha = 5mg/a$.
- **Problem 6.20** **Question** should have stated that the initial speed of the particle is u. The hint is irrelevant! **Answer** should be: Time taken to hit post is $b^2/2au$.

CHAPTER 7

- **Problem 7.6** **Answer** for the distance of closest approach should be $\left((p^2V^4 + \gamma^2)^{1/2} - \gamma\right)/V^2$.

- **Problem 7.9** **Answer** for the time taken should be $\pi a^2/(2\sqrt{2}\gamma)$.
- **Problem 7.23** **Answer**: Velocity boost should be given at the perigee.
- **Problem 7.25** **Answers** should be: $\Delta v = 2.77$ km per second and apogee is 71,340 km from the Earth's surface.

CHAPTER 8

1. **Problem 8.13** **Answer** should be
$$x(t) = -\frac{\cos pt}{p^2-1} + \left(\frac{3p^3 \sin pt}{4(p^2-1)^4} - \frac{p^3 \sin 3pt}{4(p^2-1)^3(9p^2-1)}\right)\epsilon + O\left(\epsilon^2\right),$$
valid when $p \neq 1, 1/3, 1/5, \ldots$.
2. **Problem 8.14** This is actually a **computer assisted** problem.

CHAPTER 10

- **Problem 10.7** Answers given in the **question** refer to the case of zero gravity. With gravity included these become $u \ln\gamma - g\tau$ and
$$u\tau\left(1 - \frac{\ln\gamma}{\gamma-1}\right) - \tfrac{1}{2}g\tau^2.$$
- **Problem 10.12** **Answer** is missing. It should read: The proportions are $2/5$, $2/5$ and $1/5$.
- **Problem 10.14** **Answer** is wrongly numbered as 10.13.
- **Problem 10.15** **Answer** for the recoil angle should be 62°.

CHAPTER 11

- **Problem 11.17** **Answer** for the reaction at the floor should be $-\frac{1}{6}Mg\boldsymbol{i} - \frac{1}{6}Mg\boldsymbol{j} + Mg\boldsymbol{k}$.

CHAPTER 13

- **Problem 13.2** In the **question**, $J[y]$ should be $J[x]$.

CHAPTER 14

- **Problem 14.1** **Answer** should be: $G = -v_1^2 - 3v_1v_2 - 2v_2^2 + 6wv_1 + 9wv_2 - 9w^2$.

- **Problem 14.9** In the **question**, the integrand should be $H(\boldsymbol{q}, \boldsymbol{p}, t) - \dot{\boldsymbol{q}} \cdot \boldsymbol{p}$.

CHAPTER 16

- **Problem 16.5** **Answer** for the maximum speed should be $2h \cos\alpha\,|\dot{\theta}|$.

CHAPTER 17

- **Problem 17.7** The **question** should read: "Show that the effect of the Earth's rotation is to deflect the shell to the west by a distance . . . ".

CHAPTER 18

- **Problem 18.3** **Answer** for $\mathbf{v}$ should be $(1, 1, -1)$.

CHAPTER 19

- **Problem 19.11** **Answer** should be $Cn\Omega$, where $C = Ma^2$.