

2. The minimum spin angular velocity below which the top cannot spin stably about vertical axis when $\alpha = \frac{1}{2}$, is given by

(a) $W_{\min} = \left[\frac{2mgl I_1}{I_3^2} \right]^{1/2}$

(b) $W_{\min} = \left[\frac{4mgl I_1}{I_3^2} \right]^{1/2}$

(c) $W_{\min} = \left[\frac{2mgl I_1^2}{I_3} \right]^{1/2}$

(d) $W_{\min} = \left[\frac{4mgl I_1^2}{I_3} \right]^{1/2}$

3. Most probable speed is

(a) $\sqrt{\frac{kT}{2m}}$

(b) $\sqrt{\frac{kT}{m}}$

(c) $\sqrt{\frac{2kT}{m}}$

(d) $1.59 \sqrt{\frac{kT}{m}}$

4. Richardson-Dushman equation of thermionic emission is

(a) $J = AT^2 e^{ev/kT}$

(b) $J = AT^2 e^{-e\phi/kT}$

(c) $J = AT e^{e\phi/kT}$

(d) $J = AT e^{-e\phi/kT}$

5. According to Hamiltonian formulation of relativistic mechanics

(a) $H = T - mC^2 - q\phi$

(b) $H = T + mC^2 - q\phi$

(c) $H = T - mC^2 + q\phi$

(d) $H = T + mC^2 + q\phi$

Answer in 1 or 2 sentences :

6. What is Hamilton's principal function? *↳ S → is the generating func.*
7. What are Euler's angles? *↳ gives rise to a canonical transformation involving constant momenta & coordinates.*
8. State the law of equipartition of energy. *States that the total energy of a dynamical system consisting of a large number of particles in thermal equilibrium is equally divided among its all degrees of freedom & the average k.E. associated with each degree of freedom is $\frac{1}{2}kT$.*
9. What are Fermions? *↳ particles in thermal equilibrium*
10. What is metric tensor? *↳ degrees of freedom & the average k.E. associated with each degree of freedom is $\frac{1}{2}kT$.*

SECTION B — (5 × 4 = 20 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) What are canonical transformations? Give an example.

-Or-

(b) Define Lagrange and Poisson brackets.