Model Questions for M.Sc. (Physics) Entrance Exam

1. Answer **ALL** questions in Parts A, B, and C.

2. Each correct answer in **PART A** carries **ONE** Mark; an unanswered question carries **ZERO** Mark; **A WRONG ANSWER CARRIES '- 1/3' MARK**

3. Each correct answer in **PART B** carries **TWO** Marks; an unanswered question carries **ZERO** Mark; **A WRONG ANSWER CARRIES '- 2/3' MARK**

4. Each correct answer in **PART C** carries **THREE** Marks; an unanswered question carries **ZERO** Mark; **A WRONG ANSWER CARRIES '-1' MARK**

5. For each question, the correct choice (either "**A**" or "**B**" or "**C**" or "**D**") must be entered only in the corresponding box provided in the SEPARATE ANSWER SHEET.

NOTE: The questions in each part will be distributed in the following topics: Mathematical Physics, Mechanics and Sound, Heat and Thermodynamics, Optics, Electricity and Magnetism, Electronics and Modern Physics (up to **B.Sc.** level).

PART A (15 Questions) (15x1 = 15 Marks)

1. A vector perpendicular to any vector that lies on the plane defined by $x + y + z = 10$, is
   (A) $\hat{\imath} + \hat{\jmath}$ (B) $\hat{\jmath} + \hat{k}$ (C) $\hat{\imath} + \hat{\jmath} + \hat{k}$ (D) $\hat{\imath} + 2\hat{\jmath} + 3\hat{k}$

2. The SI unit of Planck's constant is:
   (A) J (B) J/s (C) J.s (D) J/K

PART B (20 Questions) (20x2 = 40 Marks)

1. The sum of the infinite geometric series $1 + r + r^2 + \cdots + r^{n-1}$ ..., where |r| <1 is
   (A) $\frac{1}{1-r}$ (B) $\frac{1}{1+r}$ (C) $\frac{1}{r^2}$ (D) 1

2. The maximum efficiency of an ideal reversible heat engine operating between 277^0C and 177^0 C is
   (A) 2/11 (B) 50/227 (C) 100/ 277 (D) 177/277

PART C (15 Questions) (15x3 = 45 Marks)

1. One of the complex solutions of $x^6 + 64 = 0$ is
   (A) $-i$ (B) $\sqrt{3} - i$ (C) $1 - i$ (D) 1

2. A particle travels 5 cm in the 1st second and travels 7 cm in the 2nd second at a constant acceleration. The initial velocity (in cm/s) and acceleration (in cm/s^2) are respectively
   (A) 4 and 2 (B) 2 and 4 (C) 2 and 2 (D) 4 and 4