

Solving Problems Involving – Mechanics of Rigid Bodies

*Mechanics elaborated in earlier sections was considering point objects, of infinitesimal size, and is therefore also called Particle Mechanics. This is a theoretical simplification of reality where objects have a shape with mass distributed across it. There are objects in which, distance of each particle with respect to rest of the particles constituting the object remains fixed either in motion or under application of force. Such objects are called **rigid bodies** and involve integration of the effect of motion or force on each of the particle constituting the object. This has led to evolution of **Mechanics of Rigid Bodies (MRB)**. This concept of fixed relative distance in rigid bodies is again a theoretical consideration. But, there are materials and objects which under motion or application of force experience very small change in relative distance between the particles constituting the mass. Such objects, for all practical purposes are fit for study and analysis on the principles of MRB which has evolved concepts mainly Centre of Mass (CM), Centre of Gravity (CG) and Moment of Inertia (MI). These concepts go a long way in analysis of various phenomenon that are experienced around, and inventions of tools and appliances that have made life easy.*

In our endeavour to groom competence to compete through Interactive Online Mentoring Sessions (IOMS) we are supplementing it with Mentors' Manual progressively in our monthly e-Bulletin and posting them on the web in Publication Section. Problem solving, after understanding of concepts, is an essential requirement for gaining proficiency. In this section, objective questions in Concepts of Physics, Volume-I, by H.C. Verma are considered excellent collection involving whirling around basic concepts being addressed. Illustrations have been framed to help students not connected to us through IOMS, or otherwise, in developing clarity of concepts and their application in problem solving. This is aimed at laying a foundation necessary for competence to solve question encountered in IIT-JEE, which involve integration of concepts and have a history of never asked before.

Answering objective questions, large in number with much shorter time, if not found easy, are generally attempted by students either by guess or imperfect intuition. Nevertheless, these objective questions unless handled analytically, choice of answer goes wrong and it costs heavily in terms of negative marks.

Answering maximum number of objective questions correctly requires refined intuition, backed by rapid analysis involving dissection of the problem, not encountered anytime before, then apply related concept to each section and lastly integrate the analysis into a solution by negating options, out of the provided ones, not valid. It is practice with clarity of concepts, patience and perseverance that is needed to develop an ability to analyze complex problems mentally and offer extempore solution. This ability is regarded as high and refined the intuitive power. This endeavour is to groom competence in students through systematic-analysis, without resorting to shortcuts, in their formative stage. This bound to lead speed of analytical visualization tending to be speed on imagination. In this connection Albert Einstein, who is known for his extraordinary ability of thought experiments, his quote "*I have perspired more than inspired*" is highly inspiring.

Another, important method of developing high intuitive skill is *group dynamics*, where students discuss, problems and solutions attempted individually, in groups and try to clarify concepts. Only in case of disagreement they consult their mentor. It not only enhances collective wisdom but also helps to evolve individual ability and group synergy; both the traits are important attribute of a good personality. This group dynamics is being integrated in learning and mentoring methodology of IOMS.

Possibility of inadvertent typographical errors is not ruled out. We would gratefully welcome suggestions for value addition and corrections, if needed.

