CONCORSO PER TITOLI ED ESAMI PER UN POSTO PER IL PROFILO DI COLLABORATORE TECNICO E.R DI VI LIVELLO PROFESSIONALE, PER ASSUNZIONE A TEMPO DETERMINATO PRESSO I LABORATORI NAZIONALI DEL SUD DELL'INFN

BANDO LNS/C6/21680

ALLEGATO 2

QUESITI PROVA ORALE

Domande da sorteggiare

1. Ci faccia un esempio di un tipico sensore adoperato per applicazioni di automazione descrivendone l'uso
2. Il candidato descriva un organo meccanico tipicamente usato per la trasmissione del moto
3. Il candidato descriva un tipico sistema utilizzato per il sollevamento meccanico illustrandone il principio generale
4. Il candidato descriva quali tecniche vengono utilizzate per la sigillatura di tenute a pressione
5. Il candidato descriva un tipico organo meccanico di collegamento illustrandone il principio generale

I.N.F.N. LABORATORI NAZIONALI DEL SUD CATANIA that are most simply explained by taking into account the noninertial character of a frame fixed to the earth. In Chapter 9 we shall examine how the laws of motion must be modified for use in noninertial frames. For the moment, however, we shall confine our discussion to inertial frames.

Validity of the First Two Laws

Since the advent of relativity and quantum mechanics, we have known that Newton's laws are not universally valid. Nevertheless, there is an immense range of phenomena — the phenomena of classical physics — where the first two laws are for all practical purposes exact. Even as the speeds of interest approach c, the speed of light, and relativity becomes important, the first law remains exactly true. (In relativity, just as in classical mechanics, an inertial frame is *defined* as one where the first law holds.)[8] As we shall see in Chapter 15, the two forms of the second law, $\mathbf{F} = m\mathbf{a}$ and $\mathbf{F} = \dot{\mathbf{p}}$, are no longer equivalent in relativity, although with $\mathbf{F}$ and $\mathbf{p}$ suitably defined the second law in the form $\mathbf{F} = \dot{\mathbf{p}}$ is still valid. In any case, the important point is this: In the classical domain, we can and shall assume that the first two laws (the second in either form) are universally and precisely valid. You can, if you wish, regard this assumption as defining a model — the classical model — of the natural world. The model is logically consistent and is such a good representation of many phenomena that it is amply worthy of our study.

1.5 The Third Law and Conservation of Momentum

Newton's first two laws concern the response of a single object to applied forces. The third law addresses a quite different issue: Every force on an object inevitably involves a second object — the object *that exerts the force*. The nail is hit *by the hammer*, the cart is pulled *by the horse*, and so on. While this much is no doubt a matter of common sense, the third law goes considerably beyond our everyday experience. Newton realized that if an object 1 exerts a force on another object 2, then object 2 always exerts a force (the "reaction" force) back on object 1. This seems quite natural: If you push hard against a wall, it is fairly easy to convince yourself that the wall is exerting a force back on you, without which you would undoubtedly fall over. The aspect of the third law which certainly goes beyond our normal perceptions is this: According to the third law, the reaction force of object 2 on object 1 is always equal and opposite to the original force of 1 on 2. If we introduce the notation $\mathbf{F}_{21}$ to denote the force exerted on object 2 by object 1, Newton's third law can be stated very compactly:

[8] However, in relativity the relationship between different inertial frames — the so-called Lorentz transformation — is different from that of classical mechanics. See Section 15.6.