

## 1.2 ROAD USER CHARACTERISTICS

### HUMAN FACTORS AFFECTING TRANSPORTATION

Road users can be defined as drivers, passengers, pedestrians etc. who use the streets and highways. The physical, mental and emotional characteristics of human beings affect their ability to operate motor vehicle safely or to service as a pedestrian.

The various factors which affect road user characteristics may broadly be classified into four heads:

1. Physical
2. Mental
3. Psychological and
4. Environmental

#### 1. Physical characteristics

The physical characteristics of the road users may be either permanent or temporary. The physical characteristics are the vision, hearing, strength and the general reaction to traffic situations.

**Vision:** The perception-reaction time depends greatly on the effectiveness of drivers vision in perceiving the objects and traffic control measures. The PIEV time will be decreased if the vision is clear and accurate. Visual acuity relates to the field of clearest vision. The most **acute vision (visual acuity or cone of vision)** is within a cone of **3 to 5** degrees, **fairly clear vision within 10 to 12 degrees** and the **peripheral vision will be within 120 to 180** degrees. This is important when **traffic signs and signals are placed**, but other factors like dynamic visual acuity, depth perception etc. should also be considered for accurate design. Glare vision and color vision are also equally important. **Glare vision** is greatly affected by age. Glare recovery time is the time required to recover from the effect of glare after the light source is passed, and will be higher for elderly persons. **Color vision** is important as it can come into picture in case of sign and signal recognition.

**Hearing:** Hearing is required for **detecting sounds**, but lack of hearing acuity can be

compensated by usage of hearing aids. Lot of experiments were carried out to test the drive vigilance which is the ability of a driver to discern environmental signs over a prolonged period. The results showed that the drivers who did not undergo any type of fatiguing conditions performed significantly better than those who were subjected to fatiguing conditions. But the mental fatigue is more dangerous than skill fatigue. The variability of attitude of drivers with respect to age, sex, knowledge and skill in driving etc. are also important.

**The temporary physical characteristics of the road users affecting their efficiency are fatigue, alcohol or drugs and illness. All these reduce alertness and increase the reaction and also affect the quality of judgement in some situations.**

## **2. Mental characteristics**

Knowledge, skill, intelligence experience and literacy can affect the road user characteristics. knowledge of vehicle characteristics, traffic behavior, driving practice, rules of road and psychology of road users will be quite useful for safe traffic operation.

Understanding the traffic regulations and special instruction and timely action depends on intelligence and literacy.

Reactions to certain traffic situations become more spontaneous with experience.

### **1. Psychological Characteristics**

These affect reaction to traffic situations of road users to a great extent. The emotional factors such as attentiveness, fear anger, superstition impatience, general attitude towards traffic and regulations and maturity also come under this.

### 1.2.1 PIEV THEORY

According to this theory total reaction time of the driver is split into four parts, viz., time taken by the driver for:

**Perception:** it is the time required for the sensations received by the eyes or ears to be transmitted to the brain through the nervous system and spinal chord. In other words it is the time required to perceive an object or situation.

**Intellection:** It is the time required for understanding the situation. It is also time required for comparing the different thoughts, regrouping and registering new sensations.

**Emotion:** This stage involves the judgment of the appropriate response to be made on the stimuli like to stop, pass, move laterally etc.

**Volition:** Volition is the time taken for the final action.

## 2. Environmental Factors

The environmental factors like weather, visibility and other atmospheric conditions. The various environmental conditions affecting the behavior of road user are traffic stream characteristics, facilities to the traffic, atmospheric conditions and the locality.

## COMPONENTS OF TRAFFIC ENGINEERING

The components of traffic engineering classified into three types.

1. Road users including drivers, cyclists and pedestrians
2. Vehicle
3. Roads and Highways
4. Control devices
5. Land use characteristics