2. REVIEW OF LITERATURE

2.1 INTRODUCTION

Selective related studies reported in the journals, books and other publications, including the web sites are presented in this section.

2.2 REVIEW OF LITERATURE ON DRIVER PERFORMANCE

Dr. P.S. Pasricha [47] in his report stated that the following are the causes of accidents (1) Growth of Road Transport in India from 6 billion tone km freight movements in 1950-51 to about 400 billion tone km in 1994-95 and from 23 billion passenger km to about 1600 billion passenger km during the same period. (2) increase in vehicle population from 3,06,000 in 1951 to about 300,00,000 in 1995. (3) inadequate road infrastructure, absence of flyovers and subways to eliminate conflict, absence of motorways and expressways, heterogeneity of vehicle-mix, poor road surface due to paucity of fund and lack of traffic education.

He also suggests the remedial measures named as 3E's such as Education, Enforcement and Engineering.

In Trauma Care Management the author stated that 60% accident victims could be saved if treated within 2 hours of the accident. The Government should upgrade the facilities at all the primary health centers located along the highways.
The National Road Safety Council, State Road Safety Councils and unified Transportation Authority for Metropolitan Towns are recommended to plan and organize road safety measures.

S.S.Jayachandran [33] in his paper, considered 22 variables relating to the physical conditions of the road, traffic flow, environmental condition and human behaviour. For Model building these 22 variables are considered under the following categories (1) volume related variables (2) variables related to interaction among different modes (3) variables related to road condition and management measures.

He developed a more realistic model to estimate traffic volume, both intercity and intracity traffic. He compared the characteristics of different models, based on the following characteristics such as $R^2$; $R^2$ (adjusted) standard Error, Chi square test for differences, T-test U-statistic, F-test (calculated), F-value (tabulated)

He concluded that the introduction of handrails and bicycle track would result in an appreciable reduction in accidents. Estimations using the model will give appropriate measures for effective transportation, road safety, enforcement and introduction of traffic segregation measures, pedestrian facilities and planning short and long-term improvements.

As per M.L.Gore, [19] there is an accident in every second minute and a fatality on road in every ninth minute in India.

It is extremely pathetic to note that as many as $2/3^{rd}$ of these accidents could be avoided, since they are attributed to human failure and 75% fault lies with drivers.
World statistics shows that over 2,53,000 persons die annually and over 7,50,000 persons are injured every year. The death in road accidents is the third largest killer in the world after heart failure and cancer. On an average over 800 road accidents take place every day killing 175 persons. Approximately 6 lives are lost for 1000 vehicles in the major cities of our country.

The total economic loss to the society on account of road accidents is estimated as over Rs.5000 Crores.

Since the vehicle driver is the single and most important factor in a road accident, his selection and training are of vital importance from the point of view of ROAD SAFETY. Though the driver is the most important component of the overall Road Transport System there is no system to ensure that only a safe driver drives the vehicles. The quality of a driver has, therefore, gained special significance today. Proper training and effective licensing are the prerequisites of a qualified driver.

Studies have revealed that nearly 70% of accidents are caused due to the fault of drivers and most victims are pedestrians. It is therefore imperative that traffic education has to be imparted to all road users.

S.B. Baviskar [1] in his report stated that drivers are responsible for 55 to 60% of road accident in the country. In this paper an attempt had been made to deal with the ways in which understanding gained from drivers behavior and environment. The occurrence of accidents depends upon road traffic, time of the day and weather condition etc. Accidents are higher in areas of poor visibility and accident black spot (mishaps are quite frequent). He suggested following measures to improve driving quality (1) minimum
educational qualification (2) standardization of driver license examination (3) formalized procedures for certifying commercial driving school (4) Driver must have primary knowledge of the geography to understand the role of physical features and climatic change in accident occurrence.

K.T.Pillai [49] in his report stated that man behind the wheel is the real problem and about 60% of the accidents are due to the personal human factor. The system of testing a candidate for competency in driving includes the following areas (a) Expertise in driver mechanism (b) Physical fitness (c) Mental fitness. He identified some of the personality factors causing accidents, which are as follows. Mania for speed, lack of concern for risk, over confidence, lack of presence of mind, lack of alertness, accident prone-ness, aggressiveness, criminalism and misconduct, loss of reflex action, error in judgment, alcoholism and fatigue. In our system, while testing a candidate's competency in driving, less importance is given to physical fitness and least consideration is given for mental fitness. This in turn is the reason for increase in accidents.

Driving is a combination of art and engineering. Defensive driving is essential to reduce accident. Unless these drivers develop sufficient awareness of safe driving, the situation would not improve.

Munisha Mitra states in his article “The Defensive Driving” appeared in Road Safety Digest Vol 10 no 2, 2000 that a defensive driver develops driving skills and acquires road safety knowledge that help him (her) manoeuvre his vehicle in a manner calculated to keep him out of harm's way. He also states that a defensive driver solves problems on the road without detrimental effect on himself or other road users.
T. Rangaprasad [50] in his report stated that the driver training programme causes substantial reduction in diesel consumption and increase in tyre life. This also resulted in considerable monetary savings to the corporation.

Due to this training programme, the KMPL has now considerably improved in Tamilnadu Corporations.

P.J. Manuel [40] in his paper stated that signals are the road language of drivers. It was observed that road courtesies by over 80% of hill drivers four decades ago, shrunk to around 10%. Road courtesies in the plains are perhaps only about 1%. The major cause of shrinking road courtesies is reluctance of drivers to acknowledge courtesies.

James E Aaron & Mar land K Strasser [32] in his book on Driver and Traffic safety education, state that the driver contributes substantially to the traffic accident problem; the driver or the human element is estimated to be responsible for approximately 95 percent of all traffic accidents.

S.B. Baviskar [2] in his report stated “No discussion on road safety would be complete, unless the nut behind the wheel (i.e.) driver is taken into consideration.” Analysis reveals that more than 60% accidents are attributed to the faults of drivers. Driving error is considered the major cause of road accidents all over the world. Age is the major factor when considering driving characteristics. In Indian roads, traffic contains new generation motor vehicles, old vehicle, handcarts, bullock carts and pedestrians all in the same traffic stream. It is indeed hazardous driving, requiring great skill and competence.
The occurrence of accidents depends on road traffic, weather condition, time of the day and so on. The properties of the road surface have much relevance to motor vehicle skids. Lack of response to this environment by a driver is generally responsible for creating accident situation. From correlation Analysis the author states that drivers below 40 age group have contributed 91% of the accidents. The drivers with the age of 50 and above have committed only 1.65% of accidents.

He states that 2/3rd accidents are caused due to rash and negligent driving by a large number of drivers.

He concludes that strict implementation of the existing traffic rules may improve the situation to some extent along with careful screening of drivers before issuing driving license.

Sudarsanam Padam [54] in his paper stated that safe, convenient and accessible public transport can play a major role in preventing deaths on the road. From past record there has been a decline of public transport in urban areas, reason for this is not only of private ownership but also the inability of the Government to finance deficits and raise fares to economic levels. The proliferation of personalized modes of transport and the decline of public transport – resulted in an environment where accidents were waiting to happen.

The answer by and large will depend upon the success with which we can build a public transport network. In countryside public transport can prevent the conflict between smaller vehicles and bigger vehicles. The road safety policy evolved and adopted by the Government should include
promotion of public transport as a major ingredient in the process of preventing road accidents.

Sudarsanam Padam states in his article “Training the Transport Worker” as follows:

The driver is the most important cog in the transport wheel. His perception of safety, punctuality and costs are crucial not only for the success but even for the survival of any transport corporation. In view of the fact that it is mostly the semi literate whom the trade attracts, there is massive need for ‘training’ as an on going experience. If one scans the state of affairs in the country, training of the driver is not just inadequate but is non-existent. There is no point in blaming the driver for rash driving resulting in accidents or his rude behavior and insensitivity. The industry will continue to be treated as unworthy of the economy unless new initiatives are taken to design and conduct training programmes both to improve skills and to change attitudes towards public and environment.

A.C.J.Bethel [3] in his report stated that accidents are caused due to multiple factors-vehicle, road and drivers are the major components in all accidents. Among them drivers are responsible for 80% of traffic accidents. National Road Transport council and Trauma Care Association in India report that “One accident occurs for every 4 minutes, accident is increasing at the rate of 15% to 20% annually.”

The author has stated that lack of skill, age, experience, accident proneness, fatigue, emotional disturbance and alcoholism are the major causes of accidents. He has suggested the steps to reduce accident. (1) Proper and adequate training in driving (2) age restriction for entering into
passenger road transport (3) accident prone drivers should be screened out (4) treatment of alcoholism (5) psychosocial aspects of drivers should be explored (6) provision of good rest rooms for drivers for stay overnight (7) periodical treatments to drivers (8) efficient method should be adopted for modifying or correcting drivers and driving habits (9) safe driving prizes and incentive schemes have to be introduced.

N.S. Srinivasan [53] in his paper has given that road safety measures are generally considered under three groups viz. engineering, education and enforcement. Accident occurs due to faults of roads and road users. To avoid accident the driver should be physically fit, mentally alert, temperamentally sound and morally stable. Studies conducted by NATPAC shows that 80 percent of drivers tested, have poor eyesight. Drivers through proper training in the case of critical situations should develop defensive driving technique.

In the case of road improvements in urban areas the authorities have neither technical know-how for scientific planning nor funds available for implementing long range proposals. Therefore “Low cost Traffic Solutions” (LCTS) should be developed through Transportation System Management (TSM) and techniques are found to be the best short-term cost effective option.

He concluded that any approach regarding road safety should be positive and constructive.

Vaishali Gijri and S. Rama Krishna [59] in their paper mention that India’s Motor Vehicle population is hardly 1% of the world’s; her share of world road traffic accidents is nearly 6%. In India 60% of the total road
accidents take place during the night though the night traffic is hardly 15% of the 24 hours volume.

They have suggested the potential solution/Remedial measures for road safety, through

(i) Education

(ii) Enforcement

(iii) Engineering.

In Interaction Experience the following practices are undertaken for road safety. (1) Traffic education for children (2) Safety programmes for Elderly (3) Drinking and Driving campaigns (4) Seat belt Campaigns (5) Campaign against speeding.

Janes E Aaron and Strasser [31] have stated, “without question the human element is the single most important factor in the cause of traffic crashes. Basically such accidents are caused by driver failure, carelessness or violation of man made laws or forces of nature. Estimates from several studies indicate that the human element is responsible for 80 to 85% of all traffic crashes. Traffic violations, driving while intoxicated and lack of driving courtesy are the results of human actions. The very fact that 80% of all traffic accidents occur within a relatively few miles of the victim’s residence suggest that he was personally unaware of the accident potential. Moreover the fact that people commit unsafe acts while performing the driving task, suggests that they lack proper knowledge, attitudes, or skills to operate a motor vehicle safely.
The prudent driver conducts himself in such a manner that there is small margins for error on his part while he is behind the wheel of an automobile.”

P.G. Patankar [48] had said that driver is the captain of the carrier and there should be no doubt that only trained drivers should be at every steering. He further stated, “it is unfortunate that driving in India is considered a menial’s job. Driving has to be recognized as a trade and a driver must possess the minimum education, atleast upto 7th standard if not upto the 10th. It has been amply proved that drivers with basic education are safer than persons who took to driving without any educational background. It is also necessary that drivers be trained not only for driving as at present but also for the art of defensive driving. Driver is the kingpin of the system and training him adequately has become extremely important. It is only then that the road safety scenario would change. At a time when the transport is being deregulated, much stronger regulatory machinery would be required to enforce safety rules.”

Gawhane [15] in his paper had stated that, “Driver is probably the single most, yet neglected factor, responsible for majority of accidents of Indian-Roads. Various accident analysis have proved that 30% of the accidents are caused due to driver’s fault. A driver does not like to involve in an accident. Then why accidents do take place due to drivers.

The answer is:

- A driver is tempted for over speeding the vehicles
- He may not be conversant with traffic signals
- He may be habituated to tail chasing of other vehicles
- He may not be mentally and physically fit-having the defects of hearing and vision. He may also have colour blindness
- He may be driving under intoxication
- He could indulge in undue competition resulting into rash driving
- Ignorance about rules for overtaking
- He may not have had sufficient driving experience or the skill of driving especially during the night.
- He may not be trained in driving during rainy season which contributes for skidding accidents in large scale and,
- He is ignorant about driving through fog, ice and snow.

Each person who drives on the road could have all or one of the above defects. In STUs, driver is a person who has probably not been able to study much – being either a drop out or a person from the economically weaker section. In both the cases, he does not have options but to do manual jobs. He first starts his career as a cleaner on some private truck from where he will gradually learn to drive from the driver of the truck who had been brought up in this fashion addicted to alcohol and other bad habits. He carries forward his bad habits when he is recruited in an STU. The result being the famous expression used for computers “Garbage in Garbage out”.

Accidents due to road conditions are generally not in the control of STUs. Therefore, to a large extent they are uncontrollable factors. The vehicle defects are controllable but unexpected is always to be expected because of the manufacturing design defects. The other road users are not in the control of STUs even though the accidents caused by them are to the tune of 20%. Therefore the only controllable factor, which is responsible for a large chunk of the accidents, is driver.
In the article “Attention to Training” (appeared in the Journal TRANSIT – 16th September 1985 issue), the author stated that initial training is not necessarily the end of the roadwork or the classroom work for a bus operator (driver). Retraining and refresher training are an important part of regular training programmes in transit systems throughout the nation.

Dr. P.C. Rao in his article “Truck Accidents in India” states that a steadily improving standard of performance by the road user would reduce the accident toll correspondingly.

The training of truck drivers is of the greatest importance. Before being allowed to drive on public roads an accompanied by an experienced driver, the learner should have a thorough grounding, not only in the technique of handling the truck, but also in behaviour on the road and in safety.

Driver training could usefully begin with older school children (Xth passed or failed) as is done in some countries. There should be a prolonged period of training with prescribed number of hours of both theoretical and practical tuition, preferably in government controlled or licensed driving schools. All the training schools in India should improve their standards and a uniform syllabus has to be prepared and implemented.

In the book on "Urban Road Safety" the author states that the subject of particular interest is the error in motor vehicle drivers' response or lack of response to the environment, which is responsible for accidents.

In the book on "Research on Road Safety" the author states that it has been shown that experience reduces accidents and adequate training is
a rapid and reliable method of gaining experience but very little research has been done on the effect of training on performance.

A.K. Sah [52] states in his book "Systems Approach to Training and Development" that training is that part of learning which essentially improves job related knowledge, skills and attitude in a person and is concerned with work life of human beings.

The Man Power Services Commission's Glossary of Training Terms defines training as a planned process to modify attitude, knowledge or skill behaviour through learning experience to achieve effective performance in an activity or range of activities.

A.K. Sah also states that the systems approach to training provides valuable and rational means to plan, design and refine the training or learning situation leading to accomplishment of effective behaviour modification of the learner.

He also states that the training system has to receive a person as raw material having actual or potential deficiency in the job performance and process him to modify behaviour to match that specified in the training objectives.

Otto Glaser [45] in his book "The Management of Training" states that normally the training department should give the training as the training department is best equipped to perform this service for the total organisation. He also suggests that it is better to have a department head, or a member of management take over a particular subject, eventhough he is not professional in his training ability and the weight of his authority and his
practical experience with the subject may more than compensate for weaknesses in his presentation.

More common media of training are words (symbols), Graphics, Still pictures, Motion pictures, Television, Field trips, Demonstrations, Simulation and direct experience (on the job).

Otto Glaser also states that the medium of training should always be selected on the basis of its ability to economically and efficiently solve our training task and personal bias for certain equipment or format should not be the basis of the judgement. Only the training content should determine the media selection.

In the case of drivers the direct experience on the road is best suited in addition to classroom teaching.

M Turrell [57] explains in his book ‘Training Analysis’ that the assessment of the effectiveness of a training programme can be considered as a two part process. Validation is the first part and is concerned with checking that a training programme has achieved its aim that is to assess whether behaviour has been changed in a specific way.

He also explains that the evaluation is the other part and it is concerned with assessing the overall value of a total training Programme to the organisation.

Gerard Tavernier [14] in his book "Industrial Training Systems and Records" states that the performance evaluation during and after training is probably the best method for assessing training effectiveness and that
performance can be assessed based on test results during training or through regular reports from concerned departmental managers.

The above studies have clearly indicated the causes of road accidents and general measures of reducing them. The need for the training is also emphasized.

In order to substantiate the above facts, with respect to STU drivers, and to impress up on the policy makers and practitioners about the importance of improving performance of drivers by proper driver training, this study has been taken up.