GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Master of Engineering

Level: PG

Branch: Civil Engineering

Subject Code: ME02065111

Subject Name: Road Safety Audit

w. e. f. Academic Year:	2024-2025
Semester:	2
Category of the Course:	Professional Elective Course

Prerequisite:	Traffic Engineering.
Rationale:	With the growth in population and vehicular ownership, the undesirable outcome of the transportation system is increase in the number of accidents. Loss of lives is detrimental for the economy and progress of the nation. It is prime consideration to provide maximum safety to the people during and after construction of highways. It is necessary for the transportation engineer to know about the causes of accidents and environmental pollution due to highway or other transportation facility construction activities. The mitigation measures shall be taken properly to minimize the accidents and environmental pollution. The road safety audit includes all these aspects in systematic way. Therefore, the study of this subject will enable to provide all necessary features regarding road safety to the students.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Impart basic knowledge in technical areas of road safety engineering, traffic engineering and road design.	R,U
02	Illustrate importance of road safety aspects and environmental impacts for commissioning the highway project.	U,A,N
03	Carry out RSA of Highway projects.	A,N
04	Suggest an idea/ a solution for mitigation measures for improving traffic safety and environment.	A,N
05	Conversant with major elements for safe road environment, Consequently for, designing each module to enhance skills, and should understand and aware about their application in an audit context.	A,N,E

**Revised Bloom's Taxonomy (RBT)*

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Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	PR	C	ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
3	0	2	4	70	30	20	30	150

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	**Introduction**: Road traffic accidents scenario in India, Characteristics of accidents, accidents vs. crash, land use and road environment for safety, Multidisciplinary approach to planning for traffic safety and injury control; pre-crash and post-crash models; roles of vehicle, roadway traffic, driver, and environment, crash and injury causations; accident analysis, conflict points at intersections, pedestrian safety, road safety improvement strategies. vehicle design factors & Driver characteristics influencing road safety. The empirical Bayes method Identification of Hazards road location. Application of computer analysis of accident data.	10	20
2.	**Road safety audit and analysis**: Stages, aim and objectives, principles, process, roles and responsibility, Specific parameters, design standards, various stages of road safety audit, RSA for rural roads, Checklists, Structuring of report. Steps in treatment of crash locations, diagnosing crash problem and solutions, accident report form, storing of data, using and interpreting crash data, identifying and prioritizing hazardous locations, condition and collision diagrams; Vulnerable road users: crashes related to pedestrian and bicyclists, their safety, provision for disabled; Crash reconstruction: understanding basic physics, calculation of speed for various skid, friction, drag, and acceleration scenarios.	12	30
3.	**Engineering measures**: Speed humps, speed bumps, speed tables, speed cushions; Community awareness and education (Speed limits); Enforcement- Non-physical measures- physical measures, Characteristics of Traffic Incidents, Types of Incidents, Impacts, Incident management process, Incident traffic management; Applications of ITS: Road Signs, Marking and Traffic Signals	10	25

4.	**Energy related aspects of different transport technologies**: Traffic calming measures, road transport related air pollution, sources of air pollution, effects of weather conditions, vehicular emission parameters, pollution standards, measurement and analysis of vehicular emission; imitative measures, urban and non-urban traffic noise sources, noise pollution, technology vision-2020	**10**	**25**
	Total	**45**	**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
10	20	30	20	10	10

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

1. Evans S.K., Traffic Engineering Handbook, Institute of Traffic Engineers, USA
2. Wohl M., Martin B.V., Traffic system analysis of Engineers & Planners, McGraw Hill, New York.
3. Babkov V.F., Road conditions & Traffic Safety, MIR Publishers, Moscow, 1975
4. Kadiyali L.R., Traffic Engineering & Transport Planning, Khanna Publishers, 2003
5. Little A.D., The state of art of Traffic Safety, Paraeger Publishers, New York, 1970
6. Relevant IRC codes,
7. Indian Roads Congress, Highway Safety Code, IRC: SP-44:1996
8. Indian Roads Congress, Road Safety Audit Manual, IRC:SP-88-2010
9. Limpert, Rudolf. Motor Vehicle Accident Reconstruction and Cause Analysis, 5th Edition, Lexas Publishing,
10. Charlottesville, VA. American Association of State Highway and Transportation Officials (AASHTO),
11. H.N.Atkins Highway Safety Manual, 1st Edition, AASHTO,
12. Highway Construction and Maintenance, Soils, and Concretes, Reston Publishing Company, Reston VA, 1983.
13. Guidelines on Design and Installation of Road Traffic Signals,IRC:93.
14. Specification for Road Traffic Signals, IS: 7537-1974.
15. Myer Kutz, Hand book of T.E., Editor McGraw Hill, 2004.

(b) Open source software and website:

https://nptel.ac.in/courses/105102206
https://highways.dot.gov/safety/data-analysis-tools/rsa/road-safety-audits-

Suggested Course Practical/Tutorials List:

1. Collection of road accident data.
2. Accident analysis of collected data.
3. Collection of data regarding black spots on major highways including geometric details.
4. Analysis of black spots data and suggest mitigation measures.
5. Collection of air quality data (emission level) and noise level data on problematic spots of highway.
6. Analysis of collected data and suggest improvement measures.

Suggested Course Tutorials List:

Below mentioned problems are for reference only. Similar problems may be developed by individual teachers.

1. Carryout RSA of existing problematic road stretch
2. Carryout RSA of proposed Overbridge construction or Highway improvement.

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