



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Master of Engineering

Level: PG

Branch: Civil Engineering (Transportation Engineering)

Subject Code: ME02069081

Subject Name: Economical Evaluation of Transportation Projects

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

Prerequisite:	Transportation Engineering
Rationale:	Expanding investment in infrastructure can play an important counter cyclical role. Indian's rate of urbanization is very high. There is a need for sound infrastructure becomes paramount. The aim of a good transportation system is to provide efficient, quick and safe transportation for its users. These parameters are counted as the benefit of transportation. The subject includes the study of laws of demand and supply. It also includes the study of various methods of estimating National Income. In the study, various methods of economic evaluations are covered. It also discusses the present road scenario, its future growth and financing strategies for highway projects with reference to Indian context.

Program Outcomes

No	Program Outcomes
01	Engage in critical thinking and research to develop solutions to multifold real-world problems.
02	Communicate effectively with the engineering community at large level on complex design tasks & write and present technical reports.
03	Demonstrate a high level of professionalism in handling multidisciplinary and complex engineering problems.
04	Plan, assess, create, integrate, carry out, and oversee complex engineering projects in a sustainable local and global context.
05	Address societal issues by offering technologically advanced, reasonably priced solutions while upholding high standards of ethics and professionalism.



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Course Outcome:

After Completion of the Course, Student will be able to:

No	Course Outcomes	RBT Level
01	Identify and evaluate the demand, supply and utility for transportation projects.	U
02	Prepare an alternative strategy for stage construction or full construction;	N
03	Analyze future cash flows by aligning them to a common time frame, ensuring the period remains within reliable forecasting limits.	N
04	Evaluate the project economics strength using different methods for Economic evaluation.	E
05	Examine the viability of transportation project through economic and financial analysis along with sensitivity analysis of transportation projects.	N

*Revised Bloom's Taxonomy (RBT)

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR	C	Theory		Tutorial / Practical		
				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.	Introductions –Need and purposes of Economic Evaluation; Project Appraisal, Economic cost, Financial cost, Economic Analysis, Financial Analysis, Basic concepts of economic analysis, Principles of economic evaluation; Welfare economics; Social costs, Discount rate, Interest rate, Present worth, Future worth, Rate of return, Inflation, Repo rate, Fiscal Policy, Cash flow in, Cash flow out, Concept of Time value of money, Shadow pricing. Value of Travel time Savings; Economic concept of evaluation of travel time savings, Vehicle operating costs; Components of VOC, Road User Cost, Accident costs; Methodologies for economic evaluation of an accident	5	15
2.	Demand, Supply and Utility: Factors affecting supply and demand,	5	10



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	Laws of Demand & supply, Demand and supply curves, Utility analysis, Ordinal analysis, Cardinal analysis, Income effect, Price effect, Elasticity of supply, Elasticity of demand.		
3.	National Income, GNP, GDP, NNP, Methods of Estimating National Income	5	10
4.	Project Appraisal – Total Cost, Principles of analysis, Do-nothing alternative, Stages of economic evaluation, Factors affecting Road Users Cost. Project appraisal, Benefits from highway projects. Time and Distance related congestion effects on VOC. Types of traffic receiving benefits due to highway projects.	5	15
5.	Economic Evaluation–Different Methods-Net Present Value (NPV), Internal Rate of Return (IRR) and Benefit by Cost Ratio (B/C), Advantages and limitations of methods. Sensitivity analysis. Marginal and Incremental Analysis, Highway Maintenance Cost, Vehicle Maintenance Cost, Labour cost, Crew cost, Types of traffic receiving benefits, Traffic System Evaluation. Benefits from low volume roads, Benefits of Rail/Road Over Bridge (ROB)	10	20
6.	Financing Mechanism-Taxes, Tolls, Road pricing, Private Financing, Public financing, Modes of highway implementation, highway finance and taxation Financing transportation projects-PPP, HAM, TOT, EPC, BOT, BOOT, BOLT	5	10
7.	Transport Cost–Types, Factors, Cost analysis for Mass Transit System, Marginal cost, Incremental analysis. Wholesale Price Index (WPI), National Policy, Fares, Subsidy.	5	10
8.	Economic analysis of transportation projects ownership and financing of transport, economic function of transportation road user and transportation costs, Basic concepts, Objectives, Transportation related Environmental Impacts- Vehicular Impacts–Safety and Capacity Impacts- Roadway Impacts–Construction Impacts, Environmental Impact Assessment-Environmental Impact Statement, Environment Audit.	5	10
	Total	45	100

Suggested Specification Table with Marks (Theory):



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Distribution of Theory Marks (in %)					
R Level	U Level	A Level	N Level	E Level	C Level
10	15	30	20	15	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) D. M. Mithani, Economic Analysis–(Himalaya)
- 2) IRC–SP:30-2019, Manual on Economic Evaluation of Highways in India. Third Revision, Indian Road Congress.
- 3) Fair and Williams, Economics of Transportation, Harper and Brothers Publishers, New York, 1959.
- 4) R. Winfrey, Economic Analysis for Highway International Textbook Co., Pennsylvania. USA, 1969
- 5) Heggie. I. G, Transportation Engineering Economics, McGraw Hill Publishers.
- 6) L. R. Kadiyali, Traffic Engineering and Transport Planning-, Khanna Publishers.
- 7) Road User Cost Study, CRRI, New Delhi.
- 8) J.W. Dickey, Road Project Appraisal for Developing Countries, John Wiley & Sons.
- 9) B. Sengupta, H. Guha, Construction Management & Planning, Tata McGraw Hill, New Delhi
- 10) Maitri, V., Sarkar, P. K., Theory and Applications of Economics in Highway and Transport Planning, Standard Publishers Distributors, 2010, First Edition.
- 11) Sarkar, P.K., Maitri, V., Joshi, G. J., Transportation Planning: Principles, Practices and Policies, PHI Learning, 2017, Second Edition.

(b) Open resources on web site:

1. <https://dspace.mit.edu/bitstream/handle/1721.1/107706/11-540j-fall-2006/contents/lecture-notes/index.htm>
2. <https://nptel.ac.in/courses/105/107/105107067/>

(c) List of Course Laboratory work and Tutorials:

1. Problems based on demand and supply, elasticity analysis.
2. Problems based on estimation of National Income.
3. Problems based on methods for economic evaluation- B/C ratio, NPV, IRR
4. Deriving transport cost for two- and four-wheel users.
5. Cost analysis for mass transit system.
6. Problems based on toll roads and toll fixation.



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7. Accident cost analysis.
8. Cost and benefit analysis for flyover project and Rail over bridge project.
9. Cost and benefit analysis for foot over bridge and underpass facilities for pedestrians.

Suggested Activities for Students: Explore software which is used for economic analysis in field practices.

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