GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Master of Engineering

Level: PG

Branch: Civil Engineering

Course/Subject Code: ME02065021

Subject Name: Infrastructure Development Engineering

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

Prerequisite:	Civil Engineering core subjects like transportation, Water resources Heavy construction
Rationale:	The Infrastructure development is needed to improve the economy of any country. Civil Engineering is the main area where all infrastructure activities are carried out. Infrastructure development is a part of all engineering branches therefore the study of the subject is necessary

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Analyse Infrastructure projects Implementation	**A,N**
02	Carryout Infrastructure life cycle analysis	**E,U**
03	Analyse challenges to successful Infrastructure Project .	**A,N**
04	Device strategies for infrastructure projects	**C,R**

**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
				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 Definition of infrastructure, characteristics of infrastructure projects , scope of infrastructure management. Infrastructure in India: An Overview of the Power Sector in India. Water Supply and Sanitation Sector. The Road, Rail, Air and Port Transportation Sectors. Telecommunications Sector. Challenges of managing infrastructure , life cycle cost analysis, Infrastructure need assessment, The Urban Infrastructure. The Rural Infrastructure. An Introduction to Special Economic Zones. Organizations and Players in the field of Infrastructure. The Stages of an Infrastructure Project Lifecycle. An Overview of Infrastructure Project Finance.	**11**	**25**
2.	Infrastructure Development through PPP A Historical Overview of Infrastructure Privatization. The Benefits of Infrastructure Privatization. Problems with Infrastructure Privatization. Challenges in Privatization of Infrastructure. Privatization of Infrastructures in India. Introduction to infrastructure development hrough PPP route; Benefits of PPP Mode of procurement; Types of PPP Modelsand their contractual structure, Stakeholders' perspectives: Granting authority, Funders and Concessionaire, Government's role in successful PPP projects, Financial and Economic Appraisal of BOT Projects; VFM evaluation, PPP procurement process; Lifecycle of PPP projects, Contractual package of PPP project; Bankable concession agreement, Case study – Procurement process of Indian PPP projects.	**12**	**25**

3.	Risk Mitigation and Challenges to Successful In frastructure projects Mapping and Facing the Landscape of Risksin Infrastructure Projects. Economic and Demand Risks. Political Risks. Socio-Environmental Risks. Cultural Risks in Infrastructure Projects. Legal and Contractual Issues in Infrastructure. Challenges in Construction and Maintenance of Infrastructure. Introduction to risk management concept, Risk analysis techniques, Risk Mitigation strategies.	**11**	**25**
4.	Strategies for Successful Infrastructure Project Implementation Shaping the Planning Phase of Infrastructure Projects to mitigate risks.DesigningSustainableContracts.IntroductiontoFairProcessandNegotiation. Negotiating with multiple Stakeholders on Infrastructure Projects.SustainableDevelopmentofInfrastructure.InformationTechnologyandSystemsforSuccessfulInfrastructureManagement. Innovative Design and Maintenance of Infrastructure Facilities. Infrastructure Modeling and Life Cycle Analysis Techniques. Capacity Building and Improving the Governments Rolein Infrastructure Implementation. An Integrated Framework for Successful Infrastructure Planning and Management	**11**	**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	**10**	**20**	**20**	**20**	**20**

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. Akintoye,A., Beck,M.,& Hardcastle,C.(Eds.).(2003).Public-Private Partnerships-Managing risk sand opportunities. Oxford: BlackwellScience Limited.
2. Alvin Goodman, Makar and Hastak, Infrastructure Planning Handbook: Planning, Engineering, and Economics 1stEdition , MH/ASCE press.
3. RaghuramG (2001) Infrasturcture Development And Finnancing Towards A Public Private

Partenership, Macmillan Publishers, New Delhi
4. Alagiri, Infrastructure Development, ICFAI University press, Hyderabad
5. MarcelHertogh,StuartBaker,PauLianStaal-Ong,EddyWesterveld Managing Large Infrastructure Projects, ISBN/EAN978-90-810025-2-3,NUR-code801.
6. Finnerty,J.D.(1996).Projectfinancing-Asset-based financial engineering. NewYork: JohnWiley & Sons, Inc.
7. Merna,T.,&Njiru,C.(2002).Financing infrastructure projects (Firsted.).London: Thomas Telford.
8. Nevitt, P.K.,& Fabozzi,F.J.(2000). Project financing(7ed.).London,UK: Euro money Books.
9. Raghuram,G.,Jain,R.,Sinha,S.,Pangotra,P.,&Morris,S.(2000).Infrastructure Development and Financing:Towards a Public-Private Partnership: MacMillan.
10. Tinsley,R.(2002).ProjectFinanceinAsiaPacific:PracticalCaseStudies.London,UK:EuromoneyBooks.
11. UNIDO.(1996).Guidelines for infrastructure development through Build-Operate-Transfer(BOT)projects.Vienna:UNIDO.
12. Walker,C.,&Smith,A.J.(1995).Privatizedinfrastructure:theBuildOperateTransferapproach.London:Thomas Telford.
13. Yescombe,E.R.(2002).PrinciplesofProjectFinance.California:AcademicPress.
14. Kurowski,L.,&Sussman,D.(2011).Investment project design-A guide to financial and economic analysis with constraints. New Jersey: JohnWiley &Sons.
15. Pretorius,F.,Lejot,P.,McInnis,A.,Arner,D., &Hsu,B.F.-C.(2008).Project finance for construction and infrastructure: Principles and case studies. Oxford: Blackwell Publishing.
16. Weber,B.,&Alfen,H.W.(2010).Infrastructure as an asset class-Investment strategies, project finance and PPP. West Sussex: JohnWiley & Sons

(b) Open source software and website:

https://nptel.ac.in/courses/105106115
https://nptel.ac.in/courses/105106188

Suggested Course Practical List: If any

1. Case studies of various infrastructures.
2. Life cycle analysis
3. PPP Mode implementation
4. Strategies of Implementation of Infrastructure
5. Risk Mitigation

Suggested Activities for Students: If any

Presentation on various topics

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