



GUJARAT TECHNOLOGICAL UNIVERSITY

Master of Engineering Syllabus

Subject Code : 3726502

Subject Name : INFRASTRUCTURE DEVELOPMENT ENGINEERING

WEF Academic Year:	2023-24
Semester:	II
Category of the Course:	CORE

Prerequisite :	Civil Engineering core subjects like transportation, Water resources Heavy construction
Rationale :	As the Infrastructure development is needed to boom the economy of any country. Civil Engineering is the main area where almost all infrastructure activities are carried out like transportation, water resources projects needs to be considered for prime development.

Course Scheme:

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

Course Content:

Sr. No.	Course Content	No. of Hours	% of Weightage
1	<p>Introduction</p> <p>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.</p>	9	25



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2	<p>Infrastructure Development through PPP A Historical Overview of Infrastructure Privatization. The Benefits of Infrastructure Privatization. Problems with Infrastructure Privatization. Challenges in Privatization of Infrastructure.</p> <p>Privatization of Infrastructures in India. Introduction to infrastructure development through PPP route; Benefits of PPP Mode of procurement; Types of PPP Model and 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; Life cycle of PPP projects, Contractual package of PPP project; Bankable concession agreement, Case study – Procurement process of Indian PPP projects.</p>	10	25
3	<p>Risk Mitigation and Challenges to Successful Infrastructure projects Mapping and Facing the Landscape of Risks in 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</p>	10	25
4	<p>Strategies for Successful Infrastructure Project Implementation Shaping the Planning Phase of Infrastructure Projects to mitigate risks. Designing Sustainable Contracts. Introduction to Fair Process and Negotiation. Negotiating with multiple Stakeholders on Infrastructure Projects. Sustainable Development of Infrastructure. Information Technology and Systems for Successful Infrastructure Management. Innovative Design and Maintenance of Infrastructure Facilities. Infrastructure Modeling and Life Cycle Analysis Techniques. Capacity Building and Improving the Governments Role in Infrastructure Implementation. An Integrated Framework for Successful Infrastructure Planning and Management</p>	8	20
5	Maintenance, rehabilitation and reconstruction strategies	5	5
Total		42	100



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Reference Book:

1. Akintoye, A., Beck, M., & Hardcastle, C. (Eds.). (2003). Public-Private Partnerships-Managing risks and opportunities. Oxford: Blackwell Science Limited.
2. Alvin Goodman, Makar and Hastak, Infrastructure Planning Handbook: Planning, Engineering, and Economics 1st Edition, MH/ASCE press.
3. Raghuram G (2001) Infrastructure Development And Financing Towards A Public Private Partnership, Macmillan Publishers, New Delhi
4. Alagiri, Infrastructure Development, ICFAI University press, Hyderabad
5. Marcel Hertogh, Stuart Baker, Pau Lian Staal-Ong, Eddy Westerveld Managing Large Infrastructure Projects, ISBN/EAN 978-90-810025-2-3, NUR-code 801.
6. Finnerty, J.D. (1996). Project financing-Asset-based financial engineering. New York: John Wiley & Sons, Inc.
7. Merna, T., & Njiru, C. (2002). Financing infrastructure projects (First ed.). London: Thomas Telford.
8. Nevitt, P.K., & Fabozzi, F.J. (2000). Project financing (7ed.). London, UK: Euromoney 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). Project Finance in Asia Pacific: Practical Case Studies. London, UK: Euromoney Books.
11. UNIDO. (1996). Guidelines for infrastructure development through Build-Operate-Transfer (BOT) projects. Vienna: UNIDO.
12. Walker, C., & Smith, A.J. (1995). Privatized infrastructure: the Build Operate Transfer approach. London: Thomas Telford.
13. Yescombe, E.R. (2002). Principles of Project Finance. California: Academic Press.
14. Kurowski, L., & Sussman, D. (2011). Investment project design-A guide to financial and economic analysis with constraints. New Jersey: John Wiley & 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: John Wiley & Sons
17. FAIR, G.M., GAYER, J.C. AND OKUN, D.A., "Elements of water supply and Wastewater Disposal", John Wiley & Sons, New York.
18. T. M. VINODKUMAR, "Networks and services", ITPI Reading Manuals.
19. TCPO AND MINISTRY OF WORKS AND HOUSING, "Norms and Standards for Urban Water Supply and Sewerage Services", New Delhi.



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Course Outcome:

After Completion of the Course, Student will able to:

No.	Course Outcomes	RBT Level*
01	Analyses Infrastructure projects Implementation	AN
02	Carryout Infrastructure life cycle analysis	EL
03	Analyses challenges to successful Infrastructure PROJECT	AN
04	To device strategies for infrastructure projects	CR

*RM: Remember, UN: Understand, AP: Apply, AN: Analyze, EL: Evaluate, CR: Create

List of Practical's based on:

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

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