Savitribai Phule Pune University
(Formerly S.P.Pune University)

Department of Technology

STRUCTURE OF ONE YEAR FULL TIME POST GRADUATE DIPLOMA In Infrastructure Development (PGDID)
(A Programme under Department of Technology, SP Pune University)

Semester I

S. NO	COURSE CODE	NAME OF THE SUBJECT	TEACHING SCHEME		
			L	T	P
1	**PGDIDC1**	Introduction of Infrastructure Planning	4		
2	**PGDIDC2**	Road Infrastructure and Bridge construction	4		
3	**PGDIDC3**	Airport Infrastructure	4		
4	**PGDIDC4**	Architecture and Town Planning	3		
5	**PGDIDC5**	Audit Course 1 Awareness to civil Engineering Practices / Road Safety Management / Foreign Language	3		
6	**PGDIDRM**	Research Methodology	4		
		Total	**22**		
		Total Academic Engagement & Credits	**22**		

Semester II

S.NO	COURSE CODE	NAME OF THE SUBJECT	TEACHING SCHEME		
			L	T	P
1	**PGDIDC6**	Infrastructure Engineering and Construction Techniques	2		
2	**PGDIDC7**	Quantity Surveying, Contract and Tenders	2		
3	**PGDIDC8**	Coastal Engineering	2		
4	**PGDIDC9**	Integrated Water Resources Planning and Management	2		
5	**PGDIDC10**	City and Metropolitan Infrastructural planning	2		
6	**PGDIDIntProj**	Internship and Project Work	12		
		Total	**22**		
		Total Academic Engagement& Credits	**22**		

Eligibility Criteria:

- Graduates from Civil Engineering/Railway Engineering/Town planning/ Architectural Engineering Management and Construction Engineering/Structural Engineering/Transportation Engineering/Water Engineering/Geotechnical Engineering/Environmental Engineering/Coastal Engineering/Earthquake Engineering// Highway Engineering and allied branches are eligible to apply.
- Those appearing for their final year degree examination may also apply.

Semester I

Introduction of Infrastructure Planning

PGDIDC1 **Credit: 4**

Planning for Urban Infrastructure: Urban Infrastructure , Role of Planner in provision of urban networks and services, feasibility studies for infrastructure projects, Planning for major infrastructure projects, Various Infrastructure Programmes and policies by MOUD, PPP in infrastructure projects.
Water Supply: Urban Infrastructure, Role of Planner in provision of urban networks and services, feasibility studies for infrastructure projects, Planning for major infrastructure projects, Various Infrastructure Programmes and policies by MOUD, PPP in infrastructure projects.
Sewage &Sanitation: Collection, transportation and treatment of sewage, Different methods of sewage treatments.
Biological/ Environmental/ Cultural concepts in environmental sanitation, low cost sanitation technologies and concepts as related to Indian context.
Electricity & Fire services: Planning for fire protection services and space standards, Planning for electrification, general scenario, services and space standards of Transformers space standards for electricity networks, space standards for burial around cemetery etc.
Solid waste management Infrastructure Planning: Planning for solid waste; Types of solid waste- organic & inorganic; Solid waste generation, collection and transportation; Methods of treatment and disposal of solid waste - composting, incineration, landfills and biogas plants; Consideration for location of these sites, conversion of garbage into usable forms.
Urban Energy systems: Energy Management, energy requirement, non-conventional energy systems, management of solar energy, wind energy, tidal energy, biomass energy, energy from waste.

Reference:

1. Infrastructure Planning Handbook by Alvin S. Goodman & Makarand Hastak
2. Infrastructure Management by W.R. Hudson ,R.C.G. Hass, W. Uddin
3. Water Supply and waste water Engg. By B S N Raju
4. Central Public Health and Environmental Engineering Organization (CPHEEO) Manual

5. URDPFI Guidelines

Road Infrastructure and Bridge construction

PGDIDC2 **Credits: 4**

Highway Introduction, Planning & Development: Highway planning in India, Development, Rural and urban roads, Road departments in India, Road classification, Road authorities i.e. IRC, CRRI, NHAI, NHDP etc.

Highway Alignment & Surveys: Reconnaissance, Aerial surveys, Location surveys, Location of bridges, Problems in rural and urban areas. Highway drawings & reports Highway project preparation .

Highway Geometric Design: Topography and physical features, Cross section elements like carriageway width, formation width, right of way, etc., friction, Light reflecting characteristics, roughness, camber, sight distances, horizontal alignment, design speed, minimum radius, super-elevation, transition curve, gradients, design of summit and valley curves.

Highway Economics & Finance: Financing of road projects, administration of roads, PPP models, Road safety audit, Methods of economic evaluation of highway projects.

Bridge engineering: Introduction: Classification of bridges, components of bridges, preliminary data to be collected during investigation of site for bridges, determination of discharge – empirical formula, direct methods, economical span, afflux, HFL, scour depth and clearance, locations of piers and abutments, factors influencing the choice of bridge super structure, approach roads.

Loads on bridges: Brief specifications of different loads, forces, stresses coming on bridges, IRC load specification, requirements of traffic in the design of highway bridges. Substructure: Abutment, Piers, and wing walls with their types based on requirement and suitability.

Types of bridges Various types of bridges: Culvert: Definition, waterway of culvert and types.

Temporary bridges: Definition, materials used brief general ideas about timber, floating and pantoon bridges. Movable Bridges: Bascule, cut boat, flying, swing, lift, transporter and transverse bridges, their requirement and suitability.

Fixed span bridges: Simple, continuous, cantilever, arch, suspension, bowstring girder type and rigid frame and cable stayed bridges, materials for super structure.

Bearing: Definition, purpose and importance, Types of bearings with their suitability.

Erection of bridge super structure and maintenance: Introduction to different techniques of erection of bridge super structure and maintenance of bridges.

Reference:

1. Khanna, S.K. & Justo, C.E.G., Highway Engineering, NemChand & Bros, Roorkee (U.A).
2. Kadiyali, L.R., Traffic Engineering & Transport Planning, Khanna Publishers, New Delhi.
3. Kadiyali, L.R. & Lal, N.B., Principles & Practices of Highway Engineering, Khanna Publishers, New Delhi.
4. Sharma, S.K., Principles, Practice and Design of Highway Engineering, S. Chand & Co., New Delhi.
5. IRC – 37 "Guidelines for Design of flexible Pavements", IRC, New Delhi, 2001.
6. IRC – 67 "Code of Practice for Road Signs", IRC, New Delhi – 2001. 30
7. IRC: 58, 2002: "Guidelines for the Design of Plain Jointed Rigid Pavements for Highways", IRC, N. Delhi, December 2002.
8. IRC:70, 1977: "Guidelines on Regulation and Control of Mixed Traffic in Urban Areas"
9. IRC:106, 1990: "Guidelines for Capacity of Urban Roads in Plain Areas"

10. IRC-73, IRC-12
11. Bridge engineering – S. Ponnuswamy, Tata Mc Graw – Hill publishing co. Ltd. New Delhi.
12. Airport planning and design – S.K. Khanna , M.G. Arora , S.S. Jain, Nem Chand and Brothers, Roorkee.
13. Airport Engineering - Rangawala, Charotar publishing House, Anand 388001 (Gujrat)
14. Essentials of Bridge Engineering – D. Johnson and Victor, Oxford and IBH publishing Co. Pvt. Ltd. , New Delhi.
15. Bridge engineering – Rangawala, Charotar Publishing House, Anand –388 001.
16. Principles and practice of Bridge Engineering – S.P. Bindra, Dhanpatrai and Sons, Delhi

Airport Infrastructure Engineering

PGDIDC3 **Credits: 4**

Introduction: Advantages and limitations of air transportation. Aeroplane component parts and important technical terms, Organizations related to Air Transportation (ICAO, FAA, AAI) Roles and Responsibilities.

Airport planning: Aircraft characteristics, which influence judicious and scientific planning of airports, Selection of sites, survey and drawings to be prepared for airport planning, Air Travel Demand forecasting, Airport classification by ICAO.

Design of Runways and taxiways: Runway orientation, wind coverage, use of wind rose diagram, basic runway length, corrections for elevation, temperature and gradient as per ICAO and FAA recommendation, Taxiways – Concept, types, design criteria.

Structural Design of Runways and taxiways: Runway pavement design criteria, aircraft loading, Design methods for flexible and rigid runways, Airport drainage.

Airport Marking and Lighting- Heliports: Helicoptor characteristics, planning of heliports - site selection, size of landing area, orientation of landing area, Heliport marking and lighting, Vertical Takeoff and Landing (VTOL).

Reference:

1. Airport planning and design – S.K. Khanna , M.G. Arora , S.S. Jain, Nem Chand and Brothers, Roorkee.
2. Airport Engineering - Rangawala, Charotar publishing House, Anand 388001 (Gujrat).

Architecture and Town Planning

PGDIDC4 **Credits: 3**

Introduction: Principles and elements of Architectural Composition.
Qualities of Architecture: user friendly, contextual, ecofriendly, utility of spaces, future growth etc.
Role of ―Urban Planner and Architect‖ in planning and designing in relation with spatial organization, utility, demand of the area and supply.
Landscaping: importance , objectives, principles, elements, material (soft and hard),Urban renewal for quality of life and livability, Importance of sustainable architecture with case study. Goals and Objectives of planning; components of planning; benefits of planning.
Levels of planning: Regional plan, Development Plan, Town Planning Scheme. Neighborhood plan; Types

of Development plans: Master Plan, City Development Plan, Structure Plan.
Various types of civic surveys for DP: demographic, housing, land use, Water Supply & sanitation, etc. Planning agencies for various levels of planning. Their organization and purpose (CIDCOMHADA-MIDC, MMRDA/ PMRDA etc). Traffic transportation systems: urban road, hierarchy, traffic management, Intelligent Transport Systems.
Legislative mechanism for preparation of DP: MRTP Act 1966. UDPFI guidelines (for land use, infrastructure etc.), SEZ, CRZ, Smart City Guidelines. Special townships, Land Acquisition Rehabilitation and Resettlement Act 2013. Application of GIS, GPS, remote sensing in planning.

References:

1. Town Planning By G K Hiraskar --Town Planning by S Rangwala.
2. Building Drawing and Built Environment- 5th Edition – Shah, Kale, Patki--Planning Legislation by Koperdekar and Diwan.
3. G. K. Bandopadhyaya, ―Text Book of Town Planning‖.
4. Climate Responsive Architecture – Arvind Krishnan.
5. Introduction to Landscape Architecture by Michael Laurie.
6. MRTP Act 1966.
7. UDPFI Guidelines.
8. LARR Act 2013.

Audit - Awareness to civil Engineering Practices

PGDIDC5 **Credits: 3**

Sectors in Civil Engineering: Details of different Sectors/sub-disciplines in Civil Engineering along with the following details: description, eminent institutes in India & abroad, related research institutes, noteworthy projects, higher education, latest & ongoing research in the domain, jobs opportunities in government as well as private sector. Suggestion for effective content delivery: Lecture cum interaction by alumni of your college working in different sectors of Civil Engineering.

Drawings and Documents: Types of drawings in different construction projects. Contract agreement & other documents in different construction projects.

Suggestion for effective content delivery: Visit to various construction sites/ architectural firms/ structural engineering firms etc. to understand drawings, documents & working culture. Lecture by professional practitioner.
Engineering Ethics, Introduction, moral issues and moral dilemmas. Code of ethics in Civil Engineering followed by Construction Industry Development Council (CIDC) of India, national & international associations and institutes. Effective case studies (Minimum 2 case studies).

Suggestion for effective content delivery: Case study based content delivery menthod, Lecture by professional practitioner, **Construction Site Safety,** Importance of site safety. Different health and safety parameters during actual execution of Civil Engineering constructions. Safety measures: conventional and modern.

Suggestion for effective content delivery: On site visit & lecture by professional practicing Safety Engineer.

Audit - Road Safety Management

Existing Road Transport Scenario: Introduction, national & international statistics related to road transport. Factors responsible for increase in vehicle growth. Share of public transport: importance and current scenario (national & international) Suggestion for effective content delivery: Displaying updated and authentic statistics & real time scenario images during the session.

Road Accidents & its Investigation: Definition of road accident. National & international statistics related to road accidents. Causes of road accident. Remedies / Measures for control road accidents. Methods for accident investigation. Condition diagram & collision diagram. Black spots & its identification based on accident data. Suggestion for effective content delivery:

i.] Activity related to drawing condition & collision diagram based on actual accident data.

ii.] Activity related to identification of black spots based on actual accident data.

Motor Vehicle Act & Central Motor Vehicle Rules: The Motor Vehicle Act of 1988. Central Motor Vehicle Rules (CMVR) of 1989. Amendments to CMVR – 2017 & 2019. Suggestion for effective content delivery:

i.] Guest lecture by RTO Officer / Traffic Police Officer. ii.] Public awareness campaign.

Road Safety Audit (RSA) Introduction & importance of RSA. Methodology, phases and checklists for Road Safety Audit as per IRC SP: 88 – 2010 (Manual on Road Safety Audit)

Suggestion for effective content delivery:

Mini project – Conducting Road Safety Audit on minimum 2 km (both directions included) road stretch in the nearby vicinity.

Audit - Foreign Language

The institute can offer any foreign language as audit course as per the teaching scheme depending upon the demand of the students and availability of the faculty

Research Methodology

PGDMRTRM **Credits: 4**

II Semester

Infrastructure Engineering and Construction Techniques

PGDIDC6 **Credits: 2**

Infrastructure Engineering: Meaning and scope of Infrastructure Engineering: Scope of infrastructure engineering in national and global development, Forthcoming infrastructure projects at national and global level, Necessity, advantages and disadvantages of PPP (Public Private Partnership), Salient features of smart city , Bus rapid transit system. b) Railways: Permanent way, Track structure of BG, Functions of rail, Standard rail, Tilting of rail, Coning of wheels, Types of sleepers, Fastenings, Ballast, Modern development in railways- metro rails, mono rails, bullet train.

Railways: Rail joints, types, evil effects, remedial measures, Welding of rails, Short and long welded rails, Types of gradients, Curves, Grade compensation on curves, Alignment, Super elevation, Equilibrium cant, Equilibrium speed, Maximum permissible limits for cant, Cant deficiency, Cant excess, Speed on curves, Safe speed on curves using Indian railways formula only for fully transition curves, Concept of negative cant, Points, crossings and turnouts- functions, Components, elements of points, Types of crossings and turnouts, Track maintenance: Regular and Periodic. (Site visit is recommended to learn this topic).

Construction Techniques: Necessity of mechanization, Dredging techniques, Use of barges, Dewatering techniques- Well Point system, Vacuum dewatering, Electro osmosis, Underwater drilling and blasting, Grouting methods in soft and hard soil, Diaphragm walls- purpose and construction methods, Prefabrication – applications, advantages and disadvantages.

Tunneling: Tunneling, functions & types of tunnel, Criteria for selection of size & shape of tunnels. Pilot tunnel, shaft, addit and portal, Needle beam, NATM, TBM & earth pressure balance method of tunneling in soft soil, Drilling & blasting method of tunneling including various operations like mucking, Drainage in tunneling- Pre drainage and permanent drainage, Ventilation in tunneling-temporary and permanent, Micro tunneling and trenchless tunneling.

Docks & Harbors: Introduction, Requirements of harbors and ports, Classification of harbors with examples, Selection of site for harbor, Various components of ports, Break waters- types, comparison, design criteria , methods of construction, Tetra pod, Tri bar, Hexapod, Quay wall, Wet & dry dock, Floating dock, Wharves, Jetties, Types of fenders, Dolphins, Marin railway.

Construction Equipments: Dozers, Power shovels, Excavators, Loaders, Scrapers, Dumpers, Drag line, Clamp shell, Compactors, Pavers, Factors affecting performance, selection of equipment, Various types of hoists and cranes and selection, Boom placers, Simple numerical problems on cycle time and production rate, Economic maintenance & repair of construction equipment.

Reference:

1. Construction Planning Methods & Equipment:Puerifoy –Tata MC Graw Hill
2. Construction Equipments & its Management: S.C Sharma,Khanna Publication
3. Railway Engineering, 2/E by Chandra—Oxford University Press
4. Railway Track Engineering: J.S.Mundrey,Tata McGraw Hill
5. Harbour,Dock & Tunnel Engineering:R. Srinivasan
6. Dock & Harbour Engineering:Hasmukh P.Oza & Gautam H.Oza-Charoter Book Stall

7. Construction Project Scheduling & Control, 2ed—Mubarak--Wiley

Quantity Surveying, Contract and Tenders

PGDIDC7 **Credits: 2**

Introduction and Approximate Estimates: Introduction to Estimates and Related Terms: Definitions of estimation and valuation. Significance (application) of the Course. Purpose of estimation. Type of estimates, data required for estimation as a pre requisite. Meaning of an item of work, and enlisting the items of work for different Civil Engineering projects. Units of measurement. Mode of measurement of building items/ works. Introduction to components of estimates: face sheet, abstract sheet (BOQ), measurement sheet, Rate Analysis, lead statement. Provisional sum and prime cost items, contingencies, work charge establishment, centage charges.

Introduction to D. S. R: Approximate Estimates: Meaning, purpose, methods of approximate estimation of building and other civil engineering projects like roads, irrigation/ water supply, sanitary engineering, electrical works.

Taking out quantities and Detailed estimate up to plinth: (a) Methods of Estimating: P.W.D. and center-line methods of working out quantities. Calculation of quantities for Load bearing and R.C.C framed structures up to plinth.

(b) Detailed Estimates: Factors to be considered while Preparing Detailed Estimate, Detailed estimates of Load bearing and R.C.C framed structures up to plinth only.

Detailed Estimation for Super Structure and Valuation: (a) Calculation of quantities and detailed estimate for Load bearing and framed structures above plinth (super structure).Deduction rules for different items of work as per IS: 1200. (b) Valuation: Purpose of valuation. Meaning of price, cost and value. Factors affecting 'value'. Types of value: only Fair Market Value, Book Value, Salvage/ Scrap Value, Distressed Value and Sentimental Value. Concept of free hold and lease hold property. Estimation versus valuation. Meanings of depreciation and obsolescence.

Specifications and Rate Analysis: (a) Specifications: Meaning and purpose, types. Drafting detailed specifications for materials, quality, workmanship, method of execution, mode of measurement and payment for major items like, excavation, stone/ brick masonry, plastering, ceramic tile flooring, R.C.C. work. (b) Rate Analysis: Meaning and factors affecting rate of an item of work, materials, sundries, labour, tools and plant, overheads and profit. Working out Rate Analysis for the items mentioned in specifications above. Task work or out turn, factors effecting task work**..**

Tendering and Execution of Works: (a) Tenders: Definition. Methods of inviting tenders, tender notice, tendering procedure, Pre and post qualification of contractors, tender documents. 3 bid/ 2 bid or single bid system. Qualitative and quantitative evaluation of tenders. Comparative statement, Pre-bid conference, acceptance/ rejection of tenders. Various forms of BOT and Global Tendering, E-tendering.

Methods of Executing Works: PWD procedure of work execution, administrative approval, budget provision, technical sanction. Methods of execution of minor works in PWD: Piecework, Rate List, Daily Labour. Introduction to registration as a contractor in PWD.

References:

1. "JCT Contract Administration Handbook" by Andy Atkinson.
2. "The Contractor's NEC3 ECC Handbook" by Steven C. Evans.
3. Quantity surveying, contracts and tenders by G.B. Deshpande (Author), j. P. Nayak (author)
4. Estimating and costing (17501) [print replica] by Mukesh N. Gangrade (author).

Coastal Engineering

PGDIDC8 **Credits: 2**

Basics of Ocean Waves: Introduction to wind and waves, Sea and Swell, generation, classification of ocean waves, wave measurement, introduction to small amplitude wave theory, Linear (Airy) wave theory, use of wave tables, introduction to non-linear waves.
Wave Properties and Analysis: Basic understanding of wave mechanics including wave propagation, refraction, diffraction, breaking and shoaling, waves in shallow waters, introduction to waves of unusual character: currents, giant waves, tsunami etc, hindcasting and forecasting of waves, short term wave analysis, wave spectra and its utilities, long term wave analysis, statistical analysis of grouped wave data.
Tides: Definition and basic characteristics of tide, process of generation of tide, tide producing forces: earth moon and earth sun system, dynamic theory of tides- types of tides- tides and tidal current in shallow sea, storm surges, tides in rivers and estuaries, tidal power.
Coastal Processes: erosion/accretion due to waves, bed forms, long shore transport (Littoral drift) estimate of wave induced sediment, budget, tides, effect of tides, stability of inlets, effect of construction of coastal structures on stability of shoreline/beaches.
Coastal Structures and Shore Protection: Introduction to coastal structures and their types, concept of risk analysis and design waves along with the concept of break water, introduction and necessity of shore protection, methods of shore protection, groins, seal walls, offshore breakwaters, and artificial nourishment.
Coastal Management: Introduction to coastal zones: beach profile, surf zone, off shore zone etc, introduction to coastal waters, coastal sedimentation, estuaries, wet lands and lagoons, coastal dunes. pollution in coastal zone, disposal of waste/dredged spoils, oil spills and contaminants, coastal zone management: activities in coastal zone, CRZ, issues related to integrated coastal zone management, coastal regulation zone.

Reference:

1. Shore protection manual, Brunn Per and B. U. Naik, Nio, Goa.
2. Port planning, Qeen A. D. Mc Grow Hill Book Co. New York.
3. Coastal engineering, Vol-I-II, Silvester Richard, University of Western Australia.
4. Shore Protection Manual, U. S. Waterways Experiment Station Corps of Engineer.
5. Costal Engineering Research Center, Vickburg and USA1984, Coastal Protection Manual 2002.
6. Harbour and Coastal engineering Vol I & II, Ocean and Coastal Engineering Publication.

Integrated Water Resources Planning and Management

PGDIDC9 **Credits: 2**

Integrated Water Resources Planning and Management: Concept, definitions, objectives, principles, challenges and needs, components, approaches of IWRP & M, water as a global issue, introduction of global water partnership (GWP), introduction of central water commission (CWC), national water policy (only introductory), discussion of one case study.

Agriculture & IWRP & M: Agriculture in the concept of integrated water resources, water requirement for food production (numerical to be covered), blue Vs green water disputes, global water security -virtual water trading, irrigation methods and efficiencies of these methods (numerical to be covered), current water

pricing, ground water quality protection, sea water intrusion into fresh water aquifers due to human activities, ground water recharge (no numerical on ground water), participatory irrigation management (PIM), water distribution society's (WDS), introduction of water and land management institute (WALMI**).**

Considerations for Water Supply & Health: Importance of assessment of river water quality, prevention & control of surface & ground water pollution, cost effective water quality monitoring for basins, environmental impact assessment (EIA), central pollution control board (CPCB) regulations, need of training to water users for sustainability. application of polluters pays principle, need of treatment facilities for domestic sewage and industrial effluents, effluent quality standards as per CPCB and its strict implementation and monitoring, discussion of one case study.

Water Economics and IWRP & M: Water as economic good, economic value of water, water scarcity, importance of Water to the Indian economy, principles of planning and financing of water resources project: discussion on any two case studies, sustainability principles for water management, framework for planning a sustainable water future, economics and decision making.

Legal Regulatory Settings & IWRP&M: Global and national perspectives of water crisis, UN laws on non-navigable uses of international water courses, current water laws and regulation (national, state & local), water rights & priorities, CWC laws & guidelines, inter-basin water transfers and integrated water resources management, importance of arbitration in IWRM, Dublin Principles (1992), discussion of one case study.

Flood Control & Power Generation: Role of dams in flood control and power generation and its importance in IWRM, management of flood plains, flood risk mapping, flood forecasting and disaster relief, coordination between co-basins for flood management, use of QGIS for IWRM, effects of hydraulic structures on river surface profiles and sediment transport, hydro power generation, basic introduction of soft computing techniques for flood forecasting (only introductory).

Reference:

1. Integrated Water Resources Management: Water in South Asia Volume I, Peter P Mollinga, Ajaya Dixit and Kusum Athukorala, Sage Publications.
2. Ecosystem Principles and Sustainable Agriculture, Sithamparanathan, Rangasamy A. and Arunachalam, N, Scitech Publications (India) Pvt. Ltd, Chennai. Reference Books
3. Water Resources System Planning & Management, M. C. Chaturvedi, Tata McGraw-Hill.
4. Water Resources Systems Engg, D. P. Loucks, Prentice Hall.
5. Economics of Water Recourses Planning, L. D. James & R. R. Lee, McGraw Hills, New York
6. Integrated Water Resources Management: Global Theory, Emerging Practice and Local Needs, Peter P Mollinga, SAGE Publication
7. Principles of Water Resources: History, Development, Management and Policy, Thomas V., John Wiley and Sons Inc., New York. 2003.
8. Watershed Management in India, Murthy, J. V. S., Wiley Eastern Ltd., New York, 1995.
9. Soil Conservation and Land Management, Dalte, S.J . C., International Book Distribution,

City and Metropolitan Infrastructural planning

PGDIDC10 **Credits: 2**

Urban Growth and System of Cities: Growth of cities scale, complexity and its impact on national development, cities as engines of growth, cities as ecosystems, resources in cities.

City: Region Linkages: City, fringe and the periphery - physical and functional linkages, peri-urban development.

Metro and Mega Cities: Problems and Issues Growth trends and processes, characteristics, problems, concepts and concerns of urban sustainability, issues related to diversity and unintended growth, economic, social and environmental sustainability, quality of life, inclusivity and equity, climate change.

Role of transit oriented development, participatory planning. Inner city: Issues and problems, approach to development.

Human Settlement Planning: Concepts, approaches, strategies and tools; Policies and programs at various levels, impact on metro and mega city development.
Urban Development Policies and Programs: Government policies for cities and town, International examples of best practices.

References:

1. Urbanization and Urban Systems in India by Ramachandran, R, Oxford University Press, New Delhi, 1998 Indian Metropolis: Urbanization,
2. Planning and Management by Bawa, V. K., Inter-India Publications, New Delhi, 1997
3. City and Metropolitan Planning and Design, ITPI, New Delhi Madras 2011: A New Perspective for Metropolitan Management by MMRDA, Chennai

Internship and Project Work

PGDIDIntProj **Credits: 12**

Internship and Project Work: Internship and Project work is related to field-based applications, experimental work, model development using software etc. Solving problems related to metro and railway technology to avoid technical as well as system hazards.