OPEN ELECTIVES

(Offered by Civil Engg. Dept. to the other Departments)

Sl. No.	Code	Subject Name	Semester
1	20CE O 01	Infrastructure for Smart Cities	Even Semester
2	20CE O 02	Disaster Risk Reduction and Management	Odd Semester
3	20CE O 03	Rural Water Supply and Onsite Sanitation System	Odd Semester

20CE O 01

INFRASTRUCTURE FOR SMART CITIES

Instruction	3L Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	60 Marks
CIE	40 Marks
Credits	3

Course Outcomes: At the end of the course, Student will be able to

1. Understand the necessity of infrastructural development for smart cities.
2. Identify components of infrastructure and Prepare infrastructure plan for smart city.
3. Understand smart transport system for smart cities and its application
4. Study of water resources systems for smart city and its application.
5. Understand National and Global policies to implement for smart city development.

UNIT I

Fundamental of smart city & Infrastructure: Introduction of Smart City, Concept of smart city, Objective for smart cities, History of Smart city world and India. Need to develop smart city, Challenges of managing infrastructure in India and world, various types of Infrastructure systems, Infrastructures need assessment

UNIT II

Planning and **development of Smart city Infrastructure :** Energy and ecology, solar energy for smart city, Housing, sustainable green building, safety, security, disaster management, economy, cyber security, Project management.

UNIT III

Intelligent transport systems: Smart vehicles and fuels, GIS, GPS, Navigation system, traffic safety management, mobility services, E-ticketing

UNIT IV

Management of water resources and related infrastructure: Storage and conveyance system of water, sustainable water and sanitation, sewerage system, flood management, conservation system

UNIT V

Infrastructure Management: system & Policy for Smart city, Integrated infrastructure management systems for smart city, Infrastructure management system applications for existing smart city. Worldwide policies for smart city Government of India - policy for smart city, Mission statement & guidelines, Smart cities in India, Case studies of smart city.

Text Books :

1) John S. Pipkin, Mark E. La Gory, Judith R. Balu (Editors); “Remaking the city: Social science perspective on urban design”; State University of New York Press, Albany (ISBN: 0-87395-678-8)
2) Giffinger, Rudolf; Christian Fertner; Hans Kramar; Robert Kalasek; Nataša Pichler-Milanovic; Evert Meijers (2007). "Smart cities – Ranking of European medium-sized cities". Smart Cities. Vienna: Centre of Regional Science
3) Smart City on Future Life - Scientific Planning and Construction by Xianyi Li
4) The Age of Intelligent Cities: Smart Environments and Innovation-for-all Strategies (Regions and Cities) by NicosKomninos 3. Smart Cities: Big Data, Civic Hackers, and the Quest for a New Utopia by Anthony Townsend

5) Grig N.S., Infrastructure engineering and management, Wiley-Interseience, 1988 5. Hudson W.R., Haas R., Uddin W., Infrastructure Management, McGraw-Hill, 1997

References:

1) Giffinger, Rudolf; Christian Fertner; Hans Kramar; Robert Kalasek; Nataša Pichler-Milanovic; Evert Meijers (2007). "Smart cities – Ranking of European medium-sized cities". Smart Cities. Vienna: Centre of Regional Science
2) Mission statement &guidelines on Smart City Scheme". Government of India - Ministry of Urban Development http://smartcities.gov.in/upload/uploadfiles/files/Smart City Guidelines(1).pdf
3) "Draft Concept Note on Smart City Scheme". Government of India - Ministry of Urban Development (http://indiansmartcities.in/downloads/CONCEPT_NOTE_-3.12.2014__REVISED_AND_LATEST_.pdf)

20CE O02

DISASTER RISK REDUCTION AND MANAGEMENT

Instruction	3 Hours per Week Duration of Semester End
Examination	3Hours
Semester End Examination	60Marks
Continuous Internal Evaluation	40Marks
Credits	3

Course Outcomes: Upon completion of this course, the student will be able to,

1. Identify and understand the concepts of hazards, causes and impacts of disasters.
2. Develop a critical capacity to evaluate the principles and practices of disaster risk reduction and management;
3. Develop a deep awareness of disaster resilience, risk mitigation, and recovery policies as they arise from natural hazards around the globe;
4. Apply knowledge about existing global frame work sand existing agreements and role of community in successful Disaster Risk Reduction
5. Evaluate DM study including data search, analysis and presentation as a case study.

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	1	1	2	2	2	2	1	2	2	2	1	1	1	1
2	1	1	2	2	2	3	3	1	2	1	1	1	1	1	-
3	2	2	2	2	2	2	3	2	1	1	2	1	1	-	-
4	2	2	2	2	3	2	1	1	1	1	1	1	-	-	-
5	2	1	2	1	2	3	1	2	2	2	2	1	1	1	1
Average	**1.8**	**1.4**	**1.8**	**1.8**	**2.2**	**2.4**	**2**	**1.4**	**1.6**	**1.4**	**1.6**	**1**	**1**	**1**	**1**

UNIT 1

Fundamental concepts in disaster management: Hazard and disaster-concepts, vulnerability and risk, Hazard and disaster type – Natural, Water- related, pandemic and Human induced hazards disasters. Causes and Impacts of disasters – Impacts on natural eco systems: physical, psychological and social impact. Disaster and financial resilience.GIS and remote sensing. Disaster vulnerability profile of India –Specific to geographical regions and states (as per regional significance)

UNIT 2

Disaster Management Cycle: Rescue, Relief ,Rehabilitation, Prevention ,Mitigation and Preparedness. Disaster risk reduction {DRR). Community based DRR, institutions concerned with safety, disaster mitigation and construction techniques as per Indian standards and Early warning systems

UNIT 3

Disaster Impacts Management: Trauma and stress management, First aid and emergency procedures Awareness generation strategies for the community on safe practises in disaster (as per regional significance)

UNIT 4

Institutional framework of disaster management in India: NDMA-SDMA ,NDRF, civic volunteers, and NIDM. Phases of disaster/risk management and post-disaster responses. Compensation and insurance Applications of remote sensing & GIS in disaster management**.**Components of disaster management.Preparedness of rescue and relief, mitigation, rehabilitation & reconstruction. Institutional frame work of disaster management in India

UNIT 5

Capacity building for disaster/damage mitigation: Structural and Non structural measures forcapacity building for disaster/damage mitigation. Disaster risk reduction strategies and national disaster management guidelines.Disaster management Act -2005. Regional issues as per regional requirement/university can take minimum two topics as per high powered committee

Text Books:

1. Singh, R. (2017), "Disaster management Guidelines for Earth quakes, Landslides, Avalanches and Tsunami". Horizon Press publications.
2. Taimpo (2016), "Disaster management and preparedness". CRC Press Publications

Suggested Reading:

1. Nidhi, G.D. (2014), "Disaster management preparedness" .CBS Publications Pvt. Ltd.

2. Gupta, A.K.,Nair, S.S., Shiraz, A. and Dey, S. (2013), "Flood Disaster Risk Management-CBS Publications Pvt Ltd

3. Singh, R. (2016), "Disaster management Guidelines for Natural Disasters" Oxford University Press Pvt. Ltd.

20CE O03

RURAL WATER SUPPLY AND ONSITE SANITATION SYSTEM

Instruction	3L Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	60 Marks
CIE	40 Marks
Credits	3

Course Outcomes: At the end of the course the student will be able to

1) Identify the problems related to rural water supply and sanitation.
2) Develop different stages of water treatment and sanitation system forrural community.
3) Plan wastewater collection system in rural areas and identify compact wastewater treatment units.
4) Develop occupation related onsite sanitation and hygiene system and identify occupational hazards.
5) Design an effluent disposal mechanism; develop solid waste management system in rural areas.

COs	**POs**												**PSOs**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	-	1	-	-	-	2	2	-	-	-	-	1	1	-	2
2	1	-	2	-	-	1	1	1	-	-	-	-	1	2	-
3	1	-	2	-	-	1	1	1	-	-	-	-	1	2	-
4	-	-	-	-	-	1	2	-	-	-	-	1	1	-	2
5	-	-	2	-	-	-	-	1	-	-	-	1	1	-	1
Average	**1**	**1**	**2**			**1.25**	**1.2**	**1**				**1**	**1**	**2**	**1.66**

UNIT- I:

Rural Water Supply: Issues of rural water supply –Various techniques for rural water supply- merits- National rural drinking water program- rural water quality monitoring and surveillance- operation and maintenance of rural water supplies, Relationships between diseases and water quality, hygiene and sanitation.

UNIT- II:

Water Treatment: Need for water treatment, point of use water treatment systems, filters, bio-sand filters, disinfection systems for rural areas, chlorination, solar disinfection systems, removal of arsenic, fluoride and iron, hygiene and sanitation; Low Cost treatment: Epidemiological aspects of water quality methods for low cost water treatment - Specific contaminant removal systems

UNIT- III:

Rural Sanitation: Introduction to rural sanitation- Community and sanitary latrines - Planning of wastewater collection system in rural areas- Treatment and Disposal of wastewater - Compact and simple wastewater treatment units and systems in rural areas.

UNIT- IV:

Onsite sanitation system: Nexus between water quality and sanitation. Importance of hydrogeology on selection of onsite sanitation systems, Industrial Hygiene and Sanitation: Occupational Hazards- Schools- Public Buildings, Hospitals- Industrial plant sanitation.

UNIT- V:

Septic tanks: Design of septic tanks, single pit and double pit toilets. small bore systems, bio digesters, constructed wetlands, sludge/seepage management systems, solid waste management: Biogas plants - Rural health - Other specific issues and problems encountered in rural sanitation.

Text Books:

1) Gupta, S. "Rural Water Supply and Sanitation", 1st Edition, Vayu Education of India, New Delhi, 2014.
2) Ahluwalia, P. and Nema, A. K., "*Water and Wastewater Systems: Source, Treatment, Conveyance and Disposal"*, S. K. Kataria& Sons, 2014.
3) F. B. Wright, "*Rural Water Supply and Sanitation*", 3rd Revised edition, Krieger Publishing Company USA, 1977
4) V. M. Eulers and E. W. Steel, "*Municipal and Rural Sanitation*", 6th Ed., McGraw Hill Book Company, 1965.

Suggested Reading:

1) A handbook on "*Technological Options for On-site sanitation in rural areas",* Ministry of Drinking water & Sanitation, Govt. of India, New Delhi, June 2016.
2) Guidelines *"Research & Development for Rural Water Supply & Sanitation Sector"*, Ministry of Rural Development, Govt. of India, New Delhi, 2003.
3) P. Juti, S. K.Tapio, and H. Vuorinen, "*Environmental History of Water: Global Views on Community Water Supply and Sanitati*on", IWA Publishing (Intl Water Assoc), 2007.
4) A Guide to the Development of on-Site Sanitation, WHO, 1992.