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VISVESVARAYA TECHNOLOGICAL UNIVERSITY BELAGAVI



Scheme of Teaching and Examinations and Syllabus
M. Plan- SMART CITY PLANNING (SCP)
(Effective from the Academic year 2021-22)

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

Scheme of Teaching and Examinations

Master of Planning in Smart City Planning (M. Plan-SCP)

Choice Based Credit System (CBCS) 2020 Scheme (w.e.f. 2021-22)

Semester-I

Sl. No	Course	Course Code	Course Title	Teaching Hours /Week				Examination					Credits
				Lecture	Studio	Skill Development Activities	Total hours	Exam duration	CIE Marks	SEE Marks		Total Marks	
										Theory	Viva voce		
L	S	SDA											
1	PCC	20SCP11	Planning Studio - 1	2	2	2	6	--	40	--	60	100	6
2	PCC	20SCP12	Introduction to Smart Cities	2	2	--	4	3	40	60	--	100	4
3	PCC	20SCP13	Remote Sensing and GIS-1	2	2	--	4	--	40	--	60	100	4
4	PSC	20SCP14	History & Theory of Planning	2	--	--	2	3	40	60	--	100	2
5	PSC	20SCP15	Research Methods & IPR	2	--	--	2	3	40	60	--	100	2
6	PSC	20SCP16	Data Science for Planning	2	--	2	4	--	40	--	60	100	4
7	PEC	20SCP17	Professional Elective 1	2	--	--	2	--	100	--	--	100	2
8	POE	20SCP18	Open Elective 1	2	--	--	2	--	100	--	--	100	2
TOTAL				16	6	4	26	9	440	180	180	800	26

Note: PCC: Professional Core, PSC: Professional Support, PEC: Professional Elective. POE: Professional Open Elective

Professional Elective 1		Open Elective 1
Course Code	Course title	
20SCP17-a	Rural and Regional Planning Techniques	<p>Open Electives: The topics for Open Electives to be selected from the list of available courses on premier institute portals such as (but not limited to):</p> <p>https://www.mooc.org/ https://www.edx.org/ https://ocw.mit.edu/courses/find-by-topic/ https://nsdcindia.org/ https://www.nptel.ac.in https://coursera.org https://www.esri.com/training/mooc/</p> <p>Students can opt for Paid or Free offline (As per NEP 2020-NCC, NSS, Yoga, etc.)/ online courses offered on the portals per semester totaling a minimum of 2 Credits. Certificate of online course completion is mandatory for the award of credits. Voluntary Service with civic agencies such as DULT/BDA/BMRCL, etc., or NGOs such as Janagraha, Youth for Sewa, Sewa Dal, etc., will also be considered for the award of credits, subjected to the submission of a letter of appreciation from the concerned organization.</p> <p>Students must obtain prior consent from the institution/ department before accepting voluntary work.</p>
20SCP17-b	Urban Design & Landscape	
20SCP17-c	Urban Renewal	

1. Studio:

Faculty and students (in a faculty-students ratio of not more than 1:10) are to involve either individually or in small groups to interact together to enhance the learning and application skills.

The students should interact with Planning and Civic agencies of a medium and large-sized town/cities to understand their functioning and problems or foresee what can be undertaken for study in the form of research/ case studies/testing/projects, and for creative and innovative methods to solve the identified problem. The students shall prepare a master plan based on provisions of the KTCP act. This exercise is intended to give students;

- (1) Confidence in working along with Planning and civic agencies.
- (2) Work on different software/s (tools) to Simulate, analyze and authenticate the output to interpret and conclude.
- (3) Understand the various stakeholders – both public and private.
- (4) Involve in case studies and field visits/ field work.
- (5) Accustom with the use of various acts and legal provisions in preparation of master plan etc.,

2. Skill Development Activities: They may be in the form of lab exercises, periodic guest lectures, conferences, and webinars, some of which may not be a fixed slot in the timetable.

3. Audit Courses:

The Audit course can be any credit course offered by other programs/ courses run under the same institution/ campus, apart from the program to which the student is admitted. This may be taken in place of Open Elective. The student shall submit a letter requesting for the desired course/subject from the interesting program to the Head of Department to obtain NOC before the commencement of the semester.

4. Viva-voce:

The viva-voce shall be conducted for 15 minutes (per student/group- in case of group assignments) for the subjects listed under viva voce for all the semesters.

5. Site Visits:

The students, accompanied by faculty are expected to undertake mandatory site visits to gather ground-level data for Planning Studio and other exercises. Also visit various civic agencies (public/ private/NGOs) to gather data and also learn about the function of relevant agencies, their ongoing/ completed projects. The site visits shall be taken up on designated days as per the timetable. Faculty may do a reconnaissance of sites chosen for the visit, before taking students, when necessary

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

Scheme of Teaching and Examinations

Master of Planning in Smart City Planning (M. Plan-SCP)

Choice Based Credit System (CBCS) 2020 Scheme (w.e.f. 2021-22)

Semester-II

Sl. No	Course	Course Code	Course Title	Teaching Hours /Week				Examination					Credits
				Lecture	Studio	Skill Development Activities	Total hours	Exam duration	CIE Marks	SEE Marks		Total Marks	
										Theory	Viva voce		
L	S	SDA											
1	PCC	20SCP21	Planning Studio - 2	2	2	2	6	--	40	--	60	100	6
2	PCC	20SCP22	Smart City- Transport Planning	2	2	--	4	3	40	60	--	100	4
3	PCC	20SCP23	Remote Sensing and GIS – 2	2	2	--	4	--	40	--	60	100	4
4	PSC	20SCP24	Housing and Legal Frame Work	2	--	--	2	3	40	60	--	100	2
5	PSC	20SCP25	Urbanization and Land Management	2	--	--	2	3	40	60	--	100	2
6	PSC	20SCP26	Demography and Statistics	2	--	--	2	3	40	60	--	100	2
7	PEC	20SCP27	Professional Elective 2	2	--	--	2	--	100	--	--	100	2
8	POE	20SCP28	Open Elective 2	2	--	--	2	--	100	--	--	100	2
TOTAL				16	6	2	24	12	440	240	120	800	24

Note: PCC: Professional Core, PSC: Professional Support, PEC: Professional Elective. POE: Professional Open Elective

Professional Elective 2		Open Elective 2	
Course Code	Course title		
20SCP27-a	Project management in Smart Cities	<p>Open Electives: The topics for Open Electives to be selected from the list of available courses on premier institute portals such as (but not limited to):</p> <p>https://www.mooc.org/ https://www.edx.org/ https://ocw.mit.edu/courses/find-by-topic/ https://nsdcindia.org/ https://www.nptel.ac.in https://coursera.org https://www.esri.com/training/mooc/</p> <p>Students can opt for Paid or Free offline (As per NEP 2020-NCC, NSS, Yoga, etc.)/ online courses offered on the portals per semester totaling a minimum of 2 Credits. Certificate of online course completion is mandatory for the award of credits. Voluntary Service with civic agencies such as DULT/BDA/BMRCL, etc., or NGOs such as Janagraha, Youth for Sewa, Sewa Dal, etc., will also be considered for the award of credits, subjected to the submission of a letter of appreciation from the concerned organization.</p> <p>Students must obtain prior consent from the institution/ department before accepting voluntary work.</p>	
20SCP27-b	Urban Farming and Gardening		
20SCP27-c	Sustainable Cities		

1. Studio:

Faculty and students (in a faculty-students ratio of not more than 1:10) are to involve either individually or in small groups to interact together to enhance the learning and application skills.

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The students should interact with agencies involved with traffic and transport infrastructure planning- design and management; waste management, for a case study of urban or inter-urban level traffic and transportation plan; and Waste Management Plan for a city. The objective of this studio is to train the students for the preparation of a comprehensive transport plan of a city & comprehensive waste management plan of a city.

This exercise is intended to give students;

- (1) Confidence in working along with Planning and civic agencies.
- (2) Work on different software/s (tools) to Simulate, analyze and authenticate the output to interpret and conclude.
- (3) Understand the various stakeholders – both public and private.
- (4) Involve in case studies and field visits/ field work.

2. Skill Development Activities:

They may be in the form of lab exercises, periodic guest lectures, conferences, and webinars, some of which may not be a fixed slot in the timetable.

3. Audit Courses:

The Audit course can be any credit course offered by other programs/ courses run under the same institution/ campus, apart from the program to which the student is admitted. This may be taken in place of Open Elective. The student shall submit a letter requesting for the desired course/subject from the interesting program to the Head of Department to obtain NOC before the commencement of the semester.

4. Viva-voce:

The viva-voce shall be conducted for 15 minutes (per student/group- in case of group assignments) for the subjects listed under viva voce for all the semesters.

5. Site Visits:

The students, accompanied by faculty are expected to undertake mandatory site visits to gather ground-level data for Planning Studio and other exercises. Also visit various civic agencies (public/ private/NGOs) to gather data and also learn about the function of relevant agencies, their ongoing/ completed projects. The site visits shall be taken up on designated days as per the timetable. Faculty may do a reconnaissance of sites chosen for the visit, before taking students, when necessary

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

Scheme of Teaching and Examinations

Master of Planning in Smart City Planning (M. Plan-SCP)

Choice Based Credit System (CBCS) 2020 Scheme (w.e.f. 2021-22)

Semester-III

Sl. No	Course	Course Code	Course Title	Teaching Hours /Week				Examination				Credits	
				Lecture	Studio	Skill Development Activities	Total hours	Exam duration	CIE Marks	SEE Marks			Total Marks
										Theory	Viva voce		
L	S	SDA											
1	PCC	20SCP31	Planning Studio- 3	2	2	2	6	--	40	--	60	100	6
2	PCC	20SCP32	Spatial Data Infrastructure	2	2	--	4	3	40	60	--	100	4
3	PCC	20SCP33	DPR and Project Appraisal	2	2	--	4	--	40	--	60	100	4
4	PSC	20SCP34	Environmental Planning	2	--	--	2	3	40	60	--	100	2
5	PSC	20SCP35	IOT, Artificial Intelligence	2	--	2	4	3	40	--	60	100	4
6	PEC	20SCP36	Professional Elective 3	2	--	--	2	--	100	--	--	100	2
7	POE	20SCP37	Open Elective 3	2	--	--	2	--	100	--	--	100	2
8	Internship	20SCP38	Professional Training / Internship	(Completed during the intervening vacation between II and III semesters.)				--	--	100	100	100	4
TOTAL				14	6	4	24	9	400	120	280	800	28

Note: PCC: Professional Core, PSC: Professional Support, PEC: Professional Elective. POE: Professional Open Elective

Professional Elective 3		Open Elective 3	
Course Code under	Course title	Open Electives: The topics for Open Electives to be selected from the list of available courses on premier institute portals such as (but not limited to):	
20SCP36-a	Legislation and Governance	https://www.mooc.org/ https://www.edx.org/ https://ocw.mit.edu/courses/find-by-topic/ https://nsdcindia.org/ https://www.nptel.ac.in	
20SCP36-b	Real Estate and Urban Economics.	https://coursera.org https://www.esri.com/training/mooc/	
20SCP36-c	Planning for Disaster Management	Students can opt for Paid or Free offline (As per NEP 2020-NCC, NSS, Yoga, etc.)/ online courses offered on the portals per semester totaling a minimum of 2 Credits. Certificate of online course completion is mandatory for the award of credits. Voluntary Service with civic agencies such as DULT/BDA/BMRCL, etc., or NGOs such as Janagraha, Youth for Sewa, Sewa Dal, etc., will also be considered for the award of credits, subjected to the submission of a letter of appreciation from the concerned organization. Students must obtain prior consent from the institution/ department before accepting voluntary work.	

Note:

1. Dissertation Stage-1:

Students in consultation with the guide/co-guide, if any (with a faculty/ Guide-students ratio of not more than 1:5), shall pursue a literature survey and complete the preliminary requirements of selected Project work meeting the objective of the course.

Each student shall prepare a relevant introductory project document, and present a seminar.

CIE marks shall be awarded by a committee comprising of Dean, PG coordinator/HOD, and Guide/co-guide of the department.

The CIE marks awarded for Dissertation Stage -1, shall be based on the evaluation of Dissertation Report, Dissertation Presentation skill, and performance in Question-and-Answer session in the ratio/ percentage of 50:25:25.

SEE (University examination) shall be as per the University norms.

2. Skill Development Activities:

They may be in the form of lab exercises, periodic guest lectures, conferences, and webinars, some of which may not be a fixed slot in the timetable.

3. Audit Courses:

The Audit course can be any credit course offered by other programs/ courses run under the same institution/ campus, apart from the program to which the student is admitted. This may be taken in place of Open Elective. The student shall submit a letter requesting for the desired course/subject from the interesting program to the Head of Department to obtain NOC before the commencement of the semester.

3. Viva-voce:

The viva-voce shall be conducted for 15 minutes (per student/group- in case of group assignments) for the subjects listed under viva voce for all the semesters.

4. Site Visits:

The students, accompanied by faculty are expected to undertake mandatory site visits to gather ground-level data for Planning Studio and other exercises. Also visit various civic agencies (public/ private/NGOs) to gather data and also learn about the function of relevant agencies, their ongoing/ completed projects. The site visits shall be taken up on designated days as per the timetable. Faculty may do a reconnaissance of sites chosen for the visit, before taking students, when necessary

5. Internship Requirements: All the students have to undergo a mandatory internship of a minimum of 4 weeks (2 more weeks if VTU calendar permits it and the place of the internship is open to extension) during the vacation between II and III semesters in Public/Private Sector/NGO/Agencies/Consultants involved in the domain of City Planning and Development. A viva-voce shall be conducted during the III semester examination and the prescribed internship credit shall be counted for the same semester. The internship shall be considered as a head of passing and shall be considered for the award of degree. The students are required to submit periodic progress reports of the internship undertaken.

6. Internship Assessment: CIE marks shall be awarded by a committee comprising of Director/ Special Officer and PG course HOD/ Senior most Professor. The CIE marks awarded for the Internship shall be based on the evaluation of the Internship Report, Internship Presentation skill, and understanding of the Organisation's role by the student.

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Master of Planning in Smart City Planning (M. Plan-SCP)												
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Semester-IV												
Sl. No	Course	Course Code	Course Title	Teaching Hours /Week				Examination				Credits
				Lecture	Studio	Skill Development Activities	Total hours	Exam duration	CIE Marks	SEE Marks Viva voce	Total Marks	
				L	S	SDA						
1	Project	20SCP41	Dissertation	4	14	4	22	--	40	60	100	22
TOTAL				4	14	4	22	--	40	60	100	22

Note:

1. Dissertation Stage-2:
CIE marks shall be awarded by a committee comprising of Director/Special Officer and Guide/Co-guide. The CIE marks awarded for Dissertation Stage 2, shall be based on the evaluation of Periodic reviews of Dissertation Progress- offline or online,

SEE (Viva-voce) shall be based on Dissertation Presentation skill and performance in Viva in the ratio/ percentage of 50:25:25, at the end of IV semester. Dissertation work evaluation and Viva-Voce examination, after satisfying the plagiarism check, shall be as per the University norms.

The student is expected to interact with the guide in offline/ online or hybrid mode and update his/ her progress on weekly basis.

2. Skill Development Activities:
They may be in the form of lab exercises, periodic guest lectures, conferences, and webinars, some of which may not be a fixed slot in the timetable.

3. Viva-voce:
The viva-voce shall be conducted for 15 minutes (per student/group- in case of group assignments) for the subjects listed under viva voce for all the semesters.

4. Site Visits:
The students, accompanied by faculty/guide (based on their availability) shall undertake mandatory site visits to gather ground-level data for their dissertation. Also, visit various civic agencies (public/ private/NGOs) to gather data about their dissertation topic. The site visits shall be taken up on designated days as per the timetable or in consultation with their respective guides.

SEMESTER 1

PLANNING STUDIO - 1			
Course Type	PCC	CIE Marks	40
Course Code	20SCP11	SEE Marks	60
Teaching Hours/Week (L: S: SDA)	2:2:2, Total: 06 Hrs.	Total	100
Credits	06	SEE: Viva-Voce	15 min per student (Individual Exercise) excl. group presentations

FOUNDATION STUDIO:**Exercise-1: Topographic sheet analysis (2 weeks)**

- Introduction to maps.
- Obtaining and analyzing the topographic sheet
- Presentation Techniques
- Individual Assignment: Interpretation of Topographical sheets

Exercise-2: Neighbourhood Appreciation (Group assignment) (5 weeks)

The neighborhood appreciation exercise aims to enable the students to understand and contextualize the location of the area to the city, zone, and area in which the particular place is situated. This is done with the socio-economic, spatial, and cultural characteristics of that city, zone, location, etc. The main purpose is to make the students appreciate the locational attributes of land parcels for future development in a city. Due to the size of the area, this exercise is done in groups of students being assigned to a particular area.

The following planning issues at the area level should be identified:

- Review of the Master Plan /Zonal/ Area plan concerning the selected areas.
- Appreciation/Analysis of ward-level data.
- Perception of areas in terms of legal/illegal/authorized/unauthorized, Slums, Urban Aesthetics.
- Social Categorizations of people- Type of population living, people's perception about the area, and its planning problems.
- Land use includes Agriculture land and land-use conflicts, extent (%) of broad land use such as commercial, industrial, residential, institutional, and recreational.
- The extent of formal/informal activities present in the area including their location and conflicts.
- General land tenure of the area and land value for different uses
- Major types of transport, type of roads, the hierarchy of roads, type of transport modes used.

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- Amenities: Location of Social and Physical infrastructure and their problems as perceived by the local population. Look for specific infrastructure such as Water supply, drainage (water logging areas), waste collection and disposal system, sanitation, etc.
- Environmental Issues: Open Spaces – Availability and extent of open space to the built-up area, garbage disposal, encroachment (through photographic evidence and sketches)
- Locating the study area in the zone, city, and regional context for all the above aspects.

Exercise-3: Placemaking exercise (Group assignment) (3 weeks)

A City is bound to have small pockets of public places which inadvertently open up or become points of congestion and are in dire need of beautification to aid the public in the smoother and more vibrant operation of the spaces.

Students in consultation with any agencies like Bengaluru Smart City Ltd; DULT; BBMP; etc., shall engage in preparing and proposing placemaking initiatives by incorporating the below:

- Study of the public space available for placemaking project in consultation with the concerned authorities
- Design submissions with presentation drawing and specifications upon approval from the authorities
- Preparation of basic estimate and BOQ for the design finalized
- Preparation of basic DPR for submission to the concerned authorities.

Exercise-4: Preparation of City Development/ Master Plan (Group assignment) (6 weeks)

A City is a multi-dimensional, dynamic, and futuristic space. Understanding the city involves appreciating its several dimensions and including them in the city planning process. The job of a physical planner is not merely to understand the existing conflicts in development but to emerge out of this and to come out with a practical vision for the city. To arrive at this vision, a planner needs to understand the dynamics of various components of the city and how and at what level interventions can be made to achieve that vision.

A group of students is expected to study a small to a medium-sized city in terms of its present problems and issues and project a futuristic vision in terms of scenario building.

The exercise shall involve the following:

- Revision of Masterplan for a small/medium-sized town.
- The bulk of the data may be obtained through secondary sources like Govt. websites, gov. Publications.
- Visit the selected town shall focus on meeting various stakeholders/departments to ascertain their respective plans for the proposed planning period.
- Interaction with the local planning authority/ development authority and their consultants may provide any missing data.
- The proposed Master Plan at the time of presentation shall present more than one scenario of development. The study template of Neighbourhood analysis shall form the basis for investigation and proposals.
- Students divided according to selected study templates shall contribute to the preparation and submission of a comprehensive Proposed Master Plan document for their SEE.

References:

1. Nelson Petrie, 2016, *Analysis and Interpretation of Topographical Maps*, The Orient Blackswan, India.
2. *URDPFI guidelines*, 2016, Ministry of Housing and Urban Development.
3. Census of India publications, Govt. of India.
4. *Revised Master Plan 2016*, Bangalore Development Authority, 2006.
5. *Revised Master Plan 2031 draft*, Bangalore Development Authority, 2017.
6. Gallion A B, 2005, *The Urban Pattern: City Planning & Design*, CBS publications, 5th Edition.
7. Ashok Kumar, et. al, 2020, *City planning in India:1947-2017*, Routledge.
8. Marichela Sepe, 2012, *Planning and place in the city: Mapping place identity*, Routledge,

INTRODUCTION TO SMART CITIES			
Course Type	PCC	CIE Marks	40
Course Code	20SCP12	SEE Marks	60
Teaching Hours/Week (L:S: SDA)	2:2:0, Total: 04 Hrs.	Total	100
Credits	04	SEE: Theory	03 hours

Module 1- Understanding Smart Cities

Introduction to smart cities- Definition, dimensions, scope Smart Cities –Global Standards and Performance Benchmarks, Practice Code. India “100 Smart Cities” Policy and Mission.

Planning for Urban Infrastructure

Urban Infrastructure, Role of Planner in the provision of urban networks and services, feasibility studies for infrastructure projects, planning for major infrastructure projects, Various Infrastructure Programmes and policies by MOUD, PPP (DBOOT, BOOT, etc.) in infrastructure projects

Module 2- Water Supply

Water– sources of water, treatment and storage, transportation and distribution, quality, networks, distribution losses, water harvesting, recycling and reuse, norms and standards of provision, institutional arrangements, planning provisions, and management issues. Network design, Economics, distribution networks, Computer applications – Appurtenances –sensor-based Leak detection. Principles of design of water supply in buildings – House service connection.

Module 3- Sanitation and Solid waste

Sanitation – points of generation, collection, treatment, disposal, norms and standards, grey water disposal, DEWATS, institutional arrangements, planning provisions, and management issues.

storm water collection and disposal, norms and standards, institutional arrangements, planning provisions, and management issues.

Municipal and other wastes –generation, typology, quantity, collection, storage, transportation, treatment, disposal, recycling and reuse, wealth from waste, norms, and standards, institutional arrangements, planning provisions, and management issues.

Approach to the special category of Solid Waste i.e., E-Waste, Building & Debris Waste, Medical Waste, Food Waste, Garden Waste, etc, Scientific Landfill and reclamation of existing dump yard, Critical examinations of SWM endeavor with special emphasis on clean city rankings along with case study on solid waste management.

Module 4- Electricity & Fire services and Renewable Energy

Electricity – Sources of electricity, distribution networks, demand assessment, norms and standards, planning provisions, and management issues. Fire –fire hazards, vulnerable locations, methods of firefighting, norms, and standards, planning provisions, and management issues.

Energy Management, energy requirement, non-conventional energy systems, management of solar energy, wind energy, tidal energy, biomass energy, energy from waste.

Module 5- Social Infrastructure – Education, Health, Civic

Social Infrastructure – Education, Health, Civic Types, hierarchical distribution of facilities, Access to facilities, provision and location criteria, Norms and standards, etc. provisions for e-education, Tele- Health

References:

1. Ben Green, 2019, *The Smart Enough City: Putting Technology in Its Place to Reclaim Our Urban Future*, MIT Press.
2. Rashid Mehmood, et.al., 2020, *Smart Infrastructure and Applications: Foundations for Smarter Cities and Societies*, Springer, Switzerland.
3. Sameer Kochhar, et.al., 2008, *Infrastructure and Governance*, Academic Foundation, New Delhi.
4. Gathe Donald E Billings, et.al., 2009, *Managing urban water supply*, Dordrecht, Kulwer, Academic Press.
5. Holmes, J.R., 1984, *Manual on Municipal Solid Waste Management, The Expert Committee GoI, MoUD, CPHEEO 2000: Managing Solid Waste in Developing Countries*

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Remote Sensing and GIS-1			
Course Type	PCC	CIE Marks	40
Course Code	20SCP13	SEE Marks	60
Teaching Hours/Week (L:S: SDA)	2:2:0, Total: 04 Hrs.	Total	100
Credits	4	SEE: Viva-Voce	15 min per student

Module 1- Remote Sensing

Lecture: Concept and Scope of Remote Sensing: Definitions, Process, and Characteristics of Remote Sensing System, Advantages and limitations. Concept of Electromagnetic Radiation (EMR): Wavelength-frequency-energy relationship of EMR, EMR Spectrum and its properties, EMR wavelength regions and their applications, Energy Interaction in the atmosphere: Scattering, absorption, transmission, atmospheric windows. Energy Interactions with Earth Surface Features.

Practical

- Show ERDAS platform and ArcGIS pro platform and students can get a hang of the new software and its UI.
- Make ppts for different Indian and global sensors (Spatial, spectral, temporal, radiometric resolution, launch date, swath, coverage, country of launch, usages, sample images any other noteworthy mentions)

SDA

Self-study: History of Remote Sensing Scenario in Global and Indian Context. Specification of some popular satellites – IRS, Landsat, and SPOT series; High-resolution satellites – IKONOS, Cartosat, Quickbird, OrbView, GeoEye, Pléiades, World-View; Other latest earth resource satellites. (Basics info of the above)

Module 2- Remote Sensing

Part A

Lecture: Types and Characteristics of Sensor: Imaging and non-imaging sensors, Active and passive sensors, Resolution of Sensors - Spectral, Spatial, Radiometric & Temporal, Scale, Mapping unit, multi-band concepts, and False Colour Composites, Orbital Characteristics – Coverage, Passes, Pointing Accuracy, types of orbits. Multispectral and Hyper-spectral RS, Radar, Lidar;

Practical

- File import and conversion
- False-color composite and visual identification
- Layer stack, Mosaic, creation of AOI and image subsets/clipping

SDA

Self-study: further readings on Ground, Airborne, and Space borne Platforms and their nuances. Further understanding of Multispectral, Hyper spectral, Radar, and Lidar remote sensing, sensors, and characteristics.

Part B

Lecture: Feature identification and identification keys

Practical

- Feature identification
- Spectral profile generation

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Viva deliverables for remote sensing

1. Layer stack and mosaiced images of any two satellite images in standard FCC and True color composite
2. Visual change detection for any city between 2 time periods
3. Feature identification using identification keys for city/region with ground truth images
4. Spectral profile generation with inferences and analysis for any given place

Module 3- GIS

Lecture: Basic Concepts: definition of GIS, Components of GIS, Variables - points, lines, polygon, Functionality of GIS, Areas of GIS application, Advantage and Limitation of GIS

SDA: understanding the evolution and history of GIS, looking at the difference between analogues and digital maps

Practical: to be presented by students

Understanding basic geography required for GIS (Understanding cartesian co-ordinates, Geographic co-ordinate system and Projected co-ordinate system, latitudes & longitudes, conversion of lat-long between different formats, understanding resolutions in 'arc seconds' and conversion between arcseconds to meters (for standard resolutions like 1km, 100m, 10m, etc), Northing and Easting, Differentiate between real earth surface, geoid, and ellipsoid, Define horizontal datum, vertical datum, and their major components, map scales and map projection (different types), Identify major characteristics of UTM and find the UTM zone for any given region (e.g. a county)

Module 4- GIS

Lecture: GIS Data: Spatial and Attribute Data, Data Structures - Raster and Vector data structures, GIS Software, and formats, Geo-database. Digitization, georeferencing, spatial and non-spatial data

Practical:

- Getting familiar with ArcGIS Pro
- Georeferencing the images/toposheets
- Digitization of point-like and polygon
- Creation of attributes
- Conversion between various projections and file types

Module 5- Digital Cartography

Lecture: Nominal, Ordinal, Interval and Ratio Scales, Qualitative vs. Quantitative data, Discrete vs. Continuous data.

Practical:

- Creating visually well-composed maps
- Map elements
- Composition and color scheme in a map

Viva deliverable

1. Georeferenced Toposheet
2. Well composed Base map of a studio project with various thematic layers
3. A report on geographic elements required for understanding GIS

References:

1. Crown R.G. and S. John, 1984, *Computers and Information Systems*. McGraw Hill Book Company, Mumbai.

2. De Bruijin (ed.), 1986, *Urban Information System and Low-Cost Survey Techniques: International Workshop on Urban and Regional Planning Information Systems*. NRS and ITC, New Delhi.
3. Brenda White: *Urban Information Systems*,
4. Rhind and H. Mounsey, 1989, *Understanding GIS*. Taylor and Francis. London.
5. C.J.Date, A. Kannan S. Swamynathan, 2009, *An Introduction to Database Systems* (8th Ed.), Pearson Education.
6. Bonczek, R.H., C.W. Holsapple, and A.B. Whinston, 1981, *Foundations of Decision Support Systems*, Academic Press, New York. Basic text on DSS.
7. Raghu Ramakrishnan, Johannes Gehrke, 2002, *Database Management Systems*, McGraw-Hill.
8. Elmasri and Navathe, 2011, *Fundamentals of Database Systems* by (6th Ed.), Addison-Wesley.
9. Geoffrion, A.M., 1983, "Can OR/MS evolve fast enough?" *Interfaces* 13:10. Source for six essential characteristics of DSS.
10. House, W.C. (ed.), 1983. *Decision Support Systems*, Petrocelli, New York. Basic DSS text.
11. P.S. Roy, 2000. *Natural Disaster and their mitigation*. Published by Indian Institute of Remote Sensing (IIRS).
12. Schultz, G. A., and Engman, E. T., 2000, *Remote Sensing in Hydrology and Water Management*, Springer-Verlag, Berlin, Germany.

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HISTORY & THEORY OF PLANNING			
Course Type	PSC	CIE Marks	40
Course Code	20SCP14	SEE Marks	60
Teaching Hours/Week (L:S: SDA)	2:0:0, Total:02 Hrs.	Total	100
Credits	02	SEE: Theory	03 hours

Module 1- Planning History

A brief history of human settlements, from the Stone Age and milestones, in prehistoric to the historic period. Evolution of physical forms as a result of geographical, geological, climatic, social, economic, political, and technological aspects of human settlements. Ancient river valley civilizations (Egyptian, Mesopotamian, Indus valley, and Chinese). Types of plans described in Vedic Scripts (Swastika, Karmukha, Dandaka, Padmaka, etc.) Settlements and their physical forms during various dynasties up to the 18th century and during colonization (Case studies - Jaipur, New Delhi, etc.), Town planning after independence (Case studies - Chandigarh, Gandhinagar, Amaravati, etc.).

Module – 2 – Town Planning after 18th Century

Updated 11.09.2022

The industrial revolution, Evolution of towns as per the functions of the towns, Constraints on city form, Elements of urban structure - Networks, Buildings, open spaces, etc. The form of the modern city in the age of automobile - Inner-city & Suburban area.

Utopian Concepts and Contribution of Planners

Robert Owen, Georges Eugene Haussmann, Arturo Soria Y Mata, Walter Griffin, Patrick Geddes, Patrick Abercrombie, Tony Garnier, Ebenezer Howard, Daniel Burnham, Le Corbusier, Clarence Perry, Frank Lloyd Wright, CA Doxiades, Lucio Costa.

(Case studies - Garden Cities, Satellite Towns, first-generation Towns, and New Towns).

Module –3- Theories of Urban Planning

Scope, purpose, and methods of Planning, the nature, and purpose of Town and Country Planning at National, Regional and local levels. Land-use planning, determinants of Land Use and spatial patterns of urban land use, Concentric Zone model, Sector model, Multiple Nuclei model, etc. The economic base of the city, the parts of the town and their relationship, planning standards, site layout and development, zoning, and Building Bye-Laws.

Module –4- Theories of Regional Development

Regional Development Theories-W. Christaller (Central Place theory), Von Thunen (Theory of agricultural location), Losch (General theory of location), A.Weber (Industrial location theory), and W. Isard (Theory of location and space economy).

Module –5 - Settlement Analysis

Methods of analysis of Socio-Economic and Physical data; Use of techniques of Location Quotient, Coefficient of Localization; Locational attributes of activity and population; Techniques for the Understanding structure of urban areas, land values, and density patterns; space standards for facility areas, utilities, and networks; Population, Distance criteria; Performance standards; Case studies.

Plan Preparation Techniques

The setting of Goals and Objectives; Methodologies for preparation of structure plan and strategy plan techniques; plan implementation techniques; public participation and plan implementation; techniques of urban renewal and central area redevelopment; Contents of a structured plan

References:

1. A.E.J. Morrises, 1994, *History of Urban Form: Before the Industrial Revolution*, Routledge, New York, 3rd Ed.
2. Frederick Gibberd, 1959, *Town Design*, Praeger
3. Stephen V. Ward (ed), 1992, *The Garden City: Past, present, and future*, Routledge, published in 2011.
4. David Adams, 1994, *Urban Planning and Development process*, UCL Press London
5. Jay M Stein, 1994, *Classic Readings in urban planning: An introduction*, McGraw-Hill, New York
6. C.A. Doxiades, 1976, *Action for Human Settlements*, Athen's, Centre of Ekistics.

7. William H.Wilson, 1989 *City Beautiful Movement*, The Johns Hopkins University Press, Baltimore, and London.
8. Arthur Korn,1953, *History Builds the Towns*, Lund, Humphris, London.
9. Arthur B. Gallion, 1975, *Urban Pattern*, Van Nostrand Reinhold Inc, U.S.; 3rd Revised edition
10. Lewis Mumford, 1938, *Culture of Cities*, Harcourt Brace Jovanovich.
11. P. Geddes, 1915, *Cities in Evolution*, McGraw Hill,
12. Dutta, 2009, *Ancient Town Planning in India*, Isha Books, India.
13. Lewis Keeble, 1969, *Principles of Town and Country Planning*. Estates Gazette Ltd, London, 4th edition.
14. K.S. Ramegowda, 1972, *Urban and Regional Planning*, Prasaranga, University of Mysore
15. Rangwala, 2015, *Town planning in India*, Charotar Book Distributors, India, 28th Ed.
16. Chris Paris, 1982, *Critical Readings in Planning Theory*: Pergamon press Oxford
17. Hundles S(Ed): *Ethics: A reader in Planning Theory: Practices and Education*. New Jersey

RESEARCH METHODOLOGY & IPR			
Course Type	PSC	CIE Marks	40
Course Code	20SCP15	SEE Marks	60
Teaching Hours/Week (L:S:SDA)	2:0:0, Total: 02 Hrs.	TOTAL	100
Credits	2	SEE: Theory	03 hours

Module 1: Research Methodology: Introduction, Meaning of Research, Objectives of Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method, Research Process, Criteria of Good Research, Problems Encountered by Researchers in India.

Defining the Research Problem: Research Problem, Selecting the Problem, Necessity of Defining the Problem, Technique Involved in Defining a Problem, with an Illustration.

Module 2: Reviewing the literature: Place of the literature review in research, bringing clarity and focus to the research problem, improving research methodology, broadening knowledge base in the research area, Review of the literature, searching the existing literature, reviewing the selected literature, developing a theoretical framework, developing a conceptual framework, writing about the literature review.

Research Design: Meaning of Research Design, Need for Research Design, Features of a Good Design, Important Concepts Relating to Research Design, Different Research Designs, Basic Principles of Experimental Designs, Important Experimental Designs.

Module 3: Data Collection: Introduction, Experimental and Surveys, Collection of Primary Data, Collection of Secondary Data, Selection of Appropriate Method for Data Collection, Case Study Method.

Measurement and Scaling: Qualitative and Quantitative Data, Classifications of Measurement Scales, Goodness of Measurement Scales, Sources of Error in Measurement, Techniques of Developing Measurement Tools, Scaling, Scale Classification Bases, Scaling Techniques, Multidimensional Scaling, Deciding the Scale.

Design of Sample Surveys: Design of Sampling: Introduction, Sample Design, Sampling, and Non-sampling Errors, Sample Survey versus Census Survey, Types of Sampling Designs.

Module 4: Testing of Hypotheses: Hypothesis, Basic Concepts Concerning Testing of Hypotheses, Statistics and Critical Region, Critical Value and Decision Rule, Procedure for Hypothesis Testing, Hypothesis Testing for Mean, Proportion, Variance, for Difference of Two Variances, P-Value approach, Power of Test, Limitations of the Tests of Hypothesis.

Chi-square Test: Test of Difference of more than Two Proportions, Test of Independence of Attributes, Test of Goodness of Fit, precautions in Using Chi-Square Tests.

Interpretation and Report Writing: Meaning of Interpretation, Technique of Interpretation, Precaution in Interpretation, Significance of Report Writing, Different Steps in Writing Report, Layout of the Research Report, Types of Reports, Mechanics of Writing a Research Report, Precautions for Writing Research Reports

Module 5: Intellectual Property: The Concept, Intellectual Property System in India and abroad, Development of TRIPS Complied Regime in India, Patents Act, 1970, Trade Mark Act, 1999, The Designs Act, 2000, Copyright Act, 1957, The Protection of Plant Varieties and Farmers' Rights Act, 2001, Trade Secrets, Utility Models, IPR and Biodiversity, Competing Rationales for Protection of IPRs, Leading International Instruments Concerning IPR, World Intellectual Property Organisation (WIPO), WIPO and WTO, Paris Convention for the Protection of Industrial Property, National Treatment, Right of Priority, Common Rules, Patents, Marks, Trade Names, Indications of Source, Unfair Competition, Patent Cooperation Treaty (PCT), Advantages of PCT Filing, Berne Convention for the Protection of Literary and Artistic Works, Basic Principles, Duration of Protection, Trade Related Aspects of Intellectual Property Rights (TRIPS) Agreement, Covered under TRIPS Agreement, Features of the Agreement, Protection of Intellectual Property under TRIPS, Copyright and Related Rights, Trademarks, Geographical indications, Patents, Patentable Subject Matter, Rights Conferred, Exceptions, Term of protection, Conditions on Patent Applicants, Process Patents, Other Use without Authorization of the Right Holder, Protection of Undisclosed Information, Enforcement of Intellectual Property Rights, WTO.

References:

1. Alan Bryman, 2015, *Social Research Methods*, OUP Oxford; 5th edition.
2. C.R. Kothari, Gaurav Garg, *Research Methodology: Methods and Techniques* New Age International 4th Edition,
3. Ranjit Kumar, 2011, *Research Methodology a step-by-step guide for beginners* (For the topic Reviewing the literature under module 2) SAGE Publications Ltd. 3rd Edition.

4. *Intellectual Property Rights, Law, and Practice*, The Institute of Company Secretaries of India, Statutory Body Under an Act of Parliament, September 2013
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Data Science for Planning			
Course Type	PSC	CIE Marks	40
Course Code	20SCP16	SEE Marks	60
Teaching Hours/Week (L:S:SDA)	2:0:2, Total:04Hrs.	TOTAL	100
Credits	2	SEE: Viva-Voce	15 min per student

Module 1- Introduction to Computers

Introduction to Computers, Data representation, Conversion of data. Memory organization, Different secondary storage devices and Magnetic media devices, Translators, Types of Programming languages, Data Representation, Data Science, and applications to Smart Cities.

Module 2- Operating Systems & DBMS

Information Technology and Operating System: Information Technology Infrastructure Hardware, software, and Data related issues, Systems Application software, Enterprise software, Operating System Concepts, Structures, Files, Directories, Process and Memory management.

Relational database system, DBMS, Data Flow Diagrams, Logical Data model, Data Warehouses, Meta Data, and Global Databases, Spatial Databases available for natural resources and Terrain.

Module 3- Introduction to C- Programming

C programming: Basic structure of C programming, executing a C program. Constants, variables, and data types. Operators and expressions.

Managing input and outputs, operations, conditional branching, and loops. Arrays (1D & 2D)- character arrays and strings.

Basic algorithms: searching and sorting, linear search, binary search, bubble sort, selective sort Reaction and user-defined functions.

Module 4- Introduction to Python Program

Parts of python programming language, keywords, data types, reading input, printing output, conditions and loop statements, functions definition, and calling a function.

Lists- creating lists, basic list operation- Tuples, dictionaries, data pre-processing and data visualization, PANDAS, NUMPY, MATPLOTLIB, SEABORN

Module 5 - PRACTICAL

- C Programming Language: Basics, Statements, Loop, Array, String, Pointer, Execution of basic programs.

Implement the programs with WINDOWS / LINUX platform using the appropriate C compiler.

1. Design and develop a flowchart or an algorithm that takes three coefficients (a, b, and c) of a Quadratic equation ($ax^2+bx+c=0$) as input and compute all possible roots. Implement a C program for the developed flowchart/algorithm and execute the same to output the possible roots for a given set of coefficients with appropriate messages.
 2. Design and develop an algorithm to find the reverse of an integer number NUM and check whether it is PALINDROME or NOT. Implement a C program for the developed algorithm that takes an integer number as input and outputs the reverse of the same with suitable messages. Ex: Num: 2014, Reverse: 4102, Not a Palindrome
 3. Design and develop a flowchart to find the square root of a given number N. Implement a C program for the same and execute for all possible inputs with appropriate messages. Note: Don't use library function sqrt(n).
 4. Design and develop a C program to read a year as an input and find whether it is a leap year or not. Also, consider the end of the centuries.
 5. Develop an algorithm, implement and execute a C program that reads N integer numbers and arranges them in ascending order using Bubble Sort.
- Python programming:
 1. Simple demonstrative python programs
 2. Write a python program to perform a linear search
 3. Implement a python program to demonstrate:
 - a. Importing data sets- using PANDAS library
 - b. Clearing the data
 - c. Data frame manipulation- using NUMPY library
 4. Implement a python program to demonstrate data visualization with various types of graphs using NUMPY
 5. Implement a python program to demonstrate data visualization using SEABORN

References:

1. E Balaguru Swamy, 2000, *Programming in ANSI C* TMH 2nd Edition.
2. Evangelos Petroustos, 1998, *Mastering Visual Basic 6.0*, BPB Publications, Edition.
3. Mohammed Azam, *Programming with VB 6.0*, Vikash Publishing House Pvt. Ltd.
4. Rajaraman Y, 1999, *Fundamentals of Computers*, Prentice Hall of India, New Delhi.
5. Mano, M., *Digital Logic and Computer Design*
6. Pal, S.K, 1999, *Statistics for Geoscientists*, Concept Publishing Company, New Delhi: 423p.
7. Peter Norton and Michael Groh, *Guide to Visual Basic 6*, Techmedia, SAMS, Seventh Edition
8. R G Dromey, 1999, *How to solve it by Computer*, PHI, Edition
9. Scott Warner, 1999, *Teach Yourself Visual Basic 6.0*, TMH
10. Walford, P, 1995, *Geographical Data Analysis*, John Wiley and Sons Inc., New York:446p.
11. Yashwant Kanetkar, 2001, *Let us C*, BPB Publications.

Course Type	PEC	CIE Marks	100
Course Code	20SCP17-a	SEE Marks	--
Teaching Hours/Week (L:S: SDA)	2:0:0, Total:02 Hrs.	Total Marks	100
Credits	2	Elective shall have the CIE only decided by the faculty on the mode of examination	

Module 1 – Introduction to Village Planning

Nature of rural communities-Structure and forms of rural settlements, National planning, and rural development. Rural economy- Planning for the rural economic base, Agriculture, and other primary sectors. Rural Local Governments and rural Institutions in development activities- 73rd Constitution Amendment Act and its impact on rural development.

Module 2 –Schemes

Evaluation of rural development programs of central and state governments like MGNREGA, PMGSY, NBA, PMAY, NRIDP, NRHM, AMRUT, PURA, Bharat Nirman, etc. Planning for rural infrastructure-Energy, roads, water supply, sanitation, and rural services–Agro services. Appropriate Technology for rural development like the use of local resources, Rain water Harvesting, water recharge, and soil conservation and waste land development. Village Industries and village trade and services.

Module 3 –Smart Village

Understanding Concept of Smart Village, Issues of Smart Village, Smart Village Performance Benchmark, Smart Village Policy and Mission, Planning and Management of Smart Village- A Case study of smart Village "PUNSARI" along with economics, Financing Smart Villages, Renewable energy in smart village.

Module 4 –Introduction to Regional Plan

Aims and Objectives and need for regional planning- Concept, Types, and Classification of regions. Delineation of planning regions by various Techniques-Principal component method, Composite index, Ridge line technique, Gravity potential technique, Boundary girdle method. Regional Planning and Economic Development-Backward regions and Developed regions, Characteristics and reasons for backwardness. Case study of any regional plan, Introduction to regional analysis. Linear Programming, Input and Output Analysis- Growth Model, Core-periphery models. Application of Regional techniques in District Planning

Module 5–Levels of Planning

Multilevel planning– Needs and methods of multi-level planning in India. Growth-Foci concept, regional planning as a tool to integrate rural and urban areas. District Planning: Integrated approach to district level planning (vertical and horizontal spatial integration); Rural-Urban spatial relationship. District Development Plans– Guidelines for District Planning: Content and context

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and methodologies.

Reference:

1. R.P.Misra, 1998, *Regional Planning: Concepts, Techniques, and case-studies*, Concept Publishers, New Delhi.
 2. W. Isard, 1960, *Methods of Regional Analysis- An Introduction to Regional Science*. MIT Press, Cambridge.
 3. Chand Mahesh and V.K. Puri, 1983, *Regional Planning in India*, Allied Publishers, NewDelhi.
 4. K.V. Sundaram, 1984, *Urban and Regional Planning in India*, Vikas Publishing House, New Delhi.
 5. Hansen M. (Ed), 1996, *Regional Policy and Regional Integration*, Edward Edgar U.K.
 6. R.P. Misra. (Ed), *Regional Planning*, UNCRD Nagoya, Japan 10 volumes.
 7. K.V. Sundaram, *Rural Area Development*, Concept Publishers, New Delhi.
 8. IIPA: *Rural Administration*.
 9. Government of Karnataka: *Karnataka Panchayat Raj Act*.
 10. H.A.Hye, 1986, *Integrated approaches to Rural Development*. Sterling Publishers, NewDelhi.
 11. B.S. Khanna, 1991, *Rural Development in South Asia*. Allied Publishers New Delhi.
 12. R.P. Misra (Ed), 1981, *Rural Development and National policies and Experiences*. UNCRD Nagoya
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URBAN DESIGN & LANDSCAPE			
Course Type	PEC	CIE Marks	100
Course Code	20SCP17-b	SEE Marks	--
Teaching Hours/Week (L:S:SDA)	2:0:0, Total:02Hrs.	Total Marks	100
Credits	2	Elective shall have the CIE only decided by the faculty on the mode of examination	

Module 1- Introduction

Urban Design terminologies & definition, Relevance of Urban design in Planning & Architecture Urban Renewal, Rehabilitation, Revitalization, Redevelopment and Conservation, Urban design – an integral part of Urban planning, Urban Design Theory, and Principles

Module 2 – Features of Urban Design

Updated 11.09.2022

Urban form and its determinants by inter – play of masses, voids, building typology Scale, harmony, symmetry, color, texture, light and shade Dominance, height, urban signage and graphics, Public Realm, organization of spaces and their articulation in the form of squares, streets, vistas, and focal points, Image of the city and its components such as edges, paths, landmarks, street features, sky– line,

Module 3 – Surveys

Survey techniques for urban aesthetics, Steps to carry out Visual survey and its recordings, Contents, and development of an aesthetic plan, urban design schemes. Case studies of urban design characteristics of cities in India and abroad, Related issues for public intervention. Role of urban designer

Module 4 - Introduction to Landscape

Landscape as a broad terminology, Natural and Man-modified landscapes. Brief history and the growth of landscape architecture as a design and planning profession from gardens to regional landscapes. Scope and nature of professional work in contemporary landscape architecture, changing priorities of disciplinary approach: ecology, biodiversity and sustainability Objective of landscape planning, environmental impact on the landscape. Landscape impact on the environment, Landscape design, and concepts used in different countries. Landscape design related to land-use, various landscape plans.

Module 5 – Landscape in Planning

Norms for open spaces and landscape planning. Types, hierarchy, rules and laws, functions, and importance of open spaces. Gardens and parks, National and regional parks, Special parks. Landscape planning in association with new projects like an expressway, river roads, homes for the blind, etc. Characteristics and components of open space patterns in towns and cities (traditional and contemporary) Basic types: streets, squares, plazas, gardens, river ghats and play grounds, public parks at district, local, and neighborhood levels, Street furniture as a component of the urban landscape, Process of designing a functional landscape Plan

References:

1. Spreiregen, Paul. D, *Urban Design: The architecture of towns & cities*, McGraw-Hill publications, New York.
2. Gordon Cullen, 1961, *Townscape*, Architectural Press, Routledge.
3. Claude S Fischer, 1976, *The Urban Experience*, Harcourt Brace Jovanovich,
4. Edmund N Bacon, 1976, *Design of cities*, Penguin Publishing Group
5. Frederick Gibberd, 1959, *Town Design*, Praeger
6. Gallion, A B, 2005, *The urban pattern: city planning and design*, CBS publishers, India, 5th Ed.
7. Kevin Lynch, 1960, *The Image of the City*, MIT Press
8. Cliff Moughtin, 1992, *Urban Design: Street and square*, Butterworth Architecture.
9. Michael Larice, Elizabeth Macdonald, 2007, *The Urban Design Reader*, Routledge
10. Douglas Farr, 2011, *Sustainable Urbanism: Urban Design with Nature*, Wiley & Sons
11. William M. Marsh, 2005, *Landscape Planning: Environmental Applications*, Wiley & Sons

URBAN RENEWAL			
Course Type	PEC	CIE Marks	100
Course Code	20SCP17-c	SEE Marks	--
Teaching Hours/Week (L:S:SDA)	2:0:0, Total:02Hrs.	Total Marks	100
Credits	2	Elective shall have the CIE only decided by the faculty on the mode of examination	

Module 1 - Introduction

Urban redevelopment/renewal/reconstruction/regeneration – definitions and distinctions; Urban redevelopment as a part of the urban plan; Identification of areas to be redeveloped; Conservation, rehabilitation, and redevelopment – the interrelationship. Surveys for renewal and sources of data, Methods of analysis

Module 2 - Economic, Financial and Management Aspects

Economic and spatial implications of urban renewal programs; Mobilization of resources; Urban renewal through Incentive zoning. Problems and prospects of renewal in Indian cities, Urban renewal a comparative study

Module 3 – Urban conservation and Policies

What and Why to conserve, Conservation Approaches, History of Conservation Movement Internationally and in India, Philosophy & Discourses; Differing schools of thought, Scope of Conservation in Indian Context, International Bodies, Charters & Trends: ICOMOS/ICCROM /INTACH Charters and changing trends. Policies for urban renewal, Legislation for renewal.

Module 4 – Urban conservation and Policies

Methodology for urban renewal, Alternative strategies for urban renewal, Preparation of plans, implementation, costing and phasing, Case Study, and Report Writing.

Module 5: Legal and Administrative Aspects

Implementation of urban renewal programs – an overview of national and international experiences; Legal and administrative aspects: archaeological acts/ charters and institutional mechanism in urban redevelopment and conservation in India

References:

1. Gehl, J. Gemzoe, L, 1996, *Compendium in town renewal and urban planning*,

Updated 11.09.2022

2. Chris Couch, 2003, *Urban regeneration in Europe*, Blackwell Science.
3. Edward Ng (Ed.), 2010, *Designing high-density cities- For Social and Environmental Sustainability*, Routledge.
4. JNURM, Govt of India

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SEMESTER II

PLANNING STUDIO - 2			
Course Type	PCC	CIE Marks	40
Course Code	20SCP21	SEE Marks	60
Teaching Hours/Week (L:S:SDA)	2:2:2 Total:06 Hrs.	Total	100
Credits	6	SEE: Viva-Voce	15 min per student (Individual Exercise) excl. group presentations

Exercise-1: Smart Neighbourhood Appreciation (Group assignment) (2 weeks)

- Planning Appreciation of a Smart Neighbourhood (Commercial/ Residential)
- Principles, Planning Norms, and Space Standards
- Implementation of technological advancements in the neighborhood

Exercise-2: Transportation Studio (Group Assignment) (8 weeks)

Comprehensive Detailed Micro or Project Level Study on Transport Infrastructure Planning, Design, and Management for A Case Study of Urban or Inter-urban Level Traffic and Transportation Plan for A City: The objective of this studio exercise is to train the students for the preparation of a comprehensive transport plan of a City/CBD/ Select hubs.

This exercise will involve field data collection on road networks, traffic and travel studies including household surveys, public transport studies, parking, terminal studies, etc. Besides secondary data collection, data collected would be analyzed to assess the existing characteristics and identify various problems and issues. Travel demand models would be developed for the base year and travel demand forecasts would be made finalized based on alternate scenarios of development, and then transport plans and proposals would be formulated. One of the features in the design

- Transit-Oriented Development
- MRTS
- Multi-Modal Transport System
- BRTS

Familiarization with various transport-related software.

Introduction to use of some of the standard software in transport planning and traffic engineering such as TRIPS, CUBE, VISUM, VISSIM, TRANSCAD, TRANSYT, etc.

Case studies

Planning and Execution: Airport Design and Planning, Multi-modal transit hubs, Port Design and Planning,

Exercise-3: Smart City Studio- Utilities, services, etc. (Group assignment) (6 weeks)

The purpose of this exercise is to understand the benchmarks for Smart cities in India, excluding those covered in previous studio exercises. The focus of this study is to analyze the gaps in the cities about utility and service components of a typical city. At the end of this studio exercise, the students are expected to have identified a live project undertaken by any smart city project in the country- suitably scaled down to meet the timeline and prepare conceptual proposals (DPR not necessary).

Concepts of Utility Management using GIS AND Remote Sensing:

The emphasis of this exercise shall be to conform to meet the various sustainability goals set out by the Smart Cities Mission of India by adopting the relevant and most recent technologies available.

Utility, Description of all essential services and utilities, Acquiring and integrating geospatial data, Spatial Data Bases, Applications and Problem-solving with GIS, Solid waste disposal, Telecommunication, Public health and safety, Crime analysis Electricity, Gas, Water supply, Sewerage system.

References:

1. Souparno Bannerjee et. al., 2021, *Waste-wise Cities*, NITI Aayog & Centre for Science and Environment.
2. Virendra Proag, 2021, *Infrastructure Planning and Management: An Integrated Approach*, Springer publications.
3. Alvin Goodman, Makrand Hastak, 2006, *Infrastructure Planning Handbook: Planning, Engineering & Economics*, McGraw Hill Publications
4. Charles K Coe, 2009, *Handbook of Urban Services*, Routledge
5. Karen Chappie, 2015, *Planning Sustainable Cities and Regions: Towards more equitable development*, Routledge

SMART CITY – TRANSPORT PLANNING			
Course Type	PSC	CIE Marks	40
Course Code	20SCP22	SEE Marks	60
Teaching Hours/Week (L:S: SDA)	2:2:0 Total:04 Hrs.	Total	100
Credits	04	SEE: Theory	03 hours

Module 1 – Transportation Systems

Role of transport, types of transport systems, the evolution of transport modes, transport problems, mobility issues, Urban Form, Transport patterns, land use – transport cycle, the concept of accessibility. Hierarchy, capacity, and geometric design elements of roads and intersections, Basic principles of Transport infrastructure design. Urban Road classification-Road characteristics– alignment and sight distance.

Module 2 – Urban Transport Planning Studies

Transportation surveys and studies, traffic and travel characteristics, Urban transport planning process – stages, study area, zoning, database, the concept of trip generation and distribution. Traffic surveys – Speed, Volume, Intersection Design– Rotary and Signalling system, Design of Urban Roads about different types of traffic, segregation of traffic, canalization. Parking needs, on and off-street parking, estimation of short-term and long-term parking demand, and planning including the planning of terminals. Planning, engineering, and management criteria for road junctions.

Module 3 – Traffic Management and Environment

Traffic management, principles, methods, Traffic operation plan, scope, and objective. Non-Motorized Transportation, Transport and Environment: Detrimental effects of traffic on human life, traffic noise, noise abatement measures. Green corridors. Analytical Transport Planning: The quantitative transport planning process, surveys, zoning, and network building. Transport model, prediction of future use of transportation systems, transport policy, and evaluation.

Module 4 – Transport Systems

Role and level of Intermediate Transport mode (IPT), Public transport and private mode in Indian Scenario, Types of Public Mass transport: Mass Rapid Transit System (MRTS), BRTS, LRT, RRTS and its role in the transport system. Land-use transport Cycle, Transit-Oriented Development, Multi-Modal Transport systems, and emerging Transport systems.

Module 5– Smart Transport Planning

Introduction to smart transport, Intelligent transportation system (ITS), GIS and GPS positioning Navigation and Identification system, Smart Automobiles and sustainable fuels, smart pedestrian walkways and cycle tracks, solar roads, electronic fee payment technology, electronic speed determination technology, smart signaling technology.

References:

1. Institute of Transportation Engineers, 1982, *Transportation and Traffic Engineering Handbook*, Prentice-Hall. Inc., New Jersey.
2. Khanna S K. and CEG Justo, 1987, *Highway Engineering*, Nemichand and Bros., Roorkee.
3. Kadiyali. L.R, 1991, *Traffic Engineering and Transport Planning*, Khanna Publishers, New Delhi.
4. HMSO, *Roads in Urban Areas*, HMSO London.
5. Michael J Bruton, 1985, *Introduction to Transportation Planning Process*, Routledge.

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REMOTE SENSING AND GIS – 2			
Course Type	PCC	CIE Marks	40
Course Code	20SCP23	SEE Marks	60
Teaching Hours/Week (L:S:SDA)	2:2:0 Total: 04 Hrs.	TOTAL	100
Credits	04	SEE: Viva-Voce	15 min per student

Module 1: Remote sensing

Practical: Indices (NDVI, NDBI, etc), Supervised and unsupervised classification with accuracy assessment, kappa coefficient, and matrix, pattern recognition (Spatial and temporal), Time series, Change detection techniques.

Module 2: Project RS

The project should contain well-composed maps prepared using various methods learned during the practical sessions

Sample project: Land use/landcover change in a city over years, vegetation loss in the garden city of Bangalore

Deliverables for Viva

1. Well composed poster suitable with satellite images/relevant maps

Module 3: GIS

Practical: Geoprocessing tools and queries, MCDM with AHP, DSM, DTM, slope and aspect, spatial interpolation, watershed analysis, model builder

Module 4: Project GIS

The project should contain well-composed maps prepared using various tools and analyses learned during the practical sessions.

Sample project examples: Urban governance themes like (property tax, demographics, storm water, so on), identification of suitable sites for urban development, morphometric analysis.

Deliverables for viva

1. Project report (maps with a detailed summary of the project)
2. Well composed maps in suitable sheet size for viva explanation

References:

1. Jensen J.R.,2005, *Digital Image Processing: A Remote Sensing Perspective*, 3rd ed., Prentice-Hall.
2. Jensen J.R.,2007, *Remote Sensing of the Environment: An Earth Resource Perspective*,2nd ed., Prentice-Hall.
3. Joseph George, 2003, *Fundamental of Remote Sensing*, University Press (India) Pvt. Ltd., Orient Longman Pvt. Ltd., Hyderabad, India.
4. Lillesand, T.M. and Kieffer, R.W., 2003, *Remote Sensing and Image Interpretation*, 5th Edition., Wiley, New York.
5. Panda, B. C., 2008, *Remote Sensing: Principles and Applications*, Viva Books Private Limited, India.
6. Campbell J.B., 2002, *Introduction to Remote Sensing*, 3rd ed., The Guilford Press.
7. Campbell, James B., *Introductory Remote Sensing: Principles and Concepts*, Routledge.

8. Castleman, K.R.,1979, *Digital Image Processing*, Prentice Hall Inc, New Jersey.
 9. Cracknell, A.P and L.W.B. Hayes, 1991, *Introduction to Remote sensing*, Taylor and Francis, Washington, DC.
 10. Curran, P.J., 1980, *Multi-spectral remote sensing of vegetation amount*, Progress in Physical Geography, 4:315.
 11. Curran, P.J., 1988, *Principles of Remote Sensing*, ELBS Edn. Longman Group UK Ltd.
 12. Gibson, P.J., *Introduction to Remote Sensing*, 2nd ed., Taylor & Francis, London.
 13. John R.J., 2000, *Introductory Digital Image Processing: Remote Sensing Perspective*, Prentice-Hall, New Jersey.
 14. Nag P. and Kudrat M., *Digital Remote sensing*, Concept Publishing, New Delhi
 15. Rafael C.G. and Woods R.E., 1992, *Digital Image Processing* Pearson, 4th edition
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HOUSING AND LEGAL FRAMEWORK			
Course Type	PSC	CIE Marks	40
Course Code	20SCP24	SEE Marks	60
Teaching Hours/Week (L:S:SDA)	2:0:0 Total:02 Hrs.	Total	100
Credits	02	SEE: Theory	03 hours

Module 1: Concepts and Definitions

Shelter as a basic requirement, determinants of housing form, Census of India definitions, Introduction to policies, housing need, demand and supply, dilapidation, structural conditions, materials of constructions, housing age, occupancy rate, crowding, housing shortage, income, and affordability, poverty, and slums, houseless population.

Various housing typologies viz. traditional houses, plotted development, group housing, multi-storied housing, villas, chawls, etc., slums and squatters, night shelters, public health issues related to housing, various theories of housing, the concept of green housing, green rating of housing projects.

Module 2: Housing Demand, Supply, Need or Deficit and Housing Market

Definitions and concepts of Housing demand, supply, and need or deficit. Ability to pay, economic character of the society, employment, Families and households and their characteristics, problems of age, regional differences, family income, mobility, migration, standards of living, the social structure of cities, etc. The local character of the market, quality of housing, filtering concept, the land ingredient, taxes, market indexes, etc. Conceptual framework of demand, supply, need or deficit and market, creation of a global set of key housing indicators, etc.

Module 3: Introduction, Concept, and Significance of Law.

Concept of Law, source of Law (Constitution, custom, legislation & precedent – case law), the meaning of norms of Law, legislation, ordinance bill, Act, President’s consent, Regulations, and Bye-Laws, etc. Significance of law and its relationship to Urban Planning, Statutory basis for planning. Urban & Rural relationship in planning. Indian Constitution concepts and contents,

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provision regarding property rights, legislative competence of state and central governments to enact town planning legislation.

Module 4: Policy, Acts, and Laws.

a) Policy

National Environmental Policy Act; Environmental Protection Act; Land Acquisition Act: Concepts, the procedure for compulsory acquisition of property and determination of compensation.

b) Acts

Acts on SEZ, disaster management, and legal aspects of innovative techniques such as Transfer of Development Rights, Air Rights, etc.; Consultancy document contract Agreement and Contract Management.

c) Law

Laws relating to Slum Clearance, environment, housing, landscape, and traffic; Laws relating to conservation and restoration, historical monuments, archaeological sites, and remnants of national importance; contract management and execution of projects.

Module 5: Housing Laws concerning Housing Policies

Housing and Urban Policies in India. Fiscal Outlays in Five-Year Plans (1951-56 to 2017-2022). National Building Organization (NBO) and Town & Country Planning Organization (TCPO). Building Materials and Technology Promotion Council (BMTPC). Effect of the Urban Land (Ceiling & Regulation) Act. 1976. Rent Control Act on housing. National housing and habitat policy 1998. Model bylaws for cooperative societies and apartments. MHADA, CIDCO, etc. The legal status of women and children in housing. Environmental impact assessment of housing development. Housing schemes in Smart City Development.

Reference

1. Francis Cherunilam, Odeyar D. Heggade, 1987, *Housing in India*, Himalaya Publishing House.
2. Brian Aldrich, R.S.Sandhu, 1990, *Housing in Asia—Problems and Perspectives*, Rawat Publications.
3. C. Abrahams, *Man`s struggle for Shelter*.
4. IDS, 1978, *Shelter and Habitat- Asia Series: Research Monographs*.
5. Hari Anand, *Shelter in India*.
6. Turner JFC, 1979, *Housing for people*, Alexandria Press, Oxford.
7. *Shelter: In-house Journal of HUDCO*, New Delhi.
8. UNCHS, 1994, *National Experience with Shelter Delivery for the poorest group*, UNCHS, Nairobi.
9. Al Nichols, Jason Laros, 2009, *Inside the Civano Project: A Case Study of Large-Scale Sustainable Neighbourhood Development* (McGraw-Hill's Green source Series),
10. International Institute for Energy Conservation, 2009, *Eco housing Assessment criteria Version II*.

URBANIZATION AND LAND MANAGEMENT			
Course Type	PSC	CIE Marks	40
Course Code	20SCP25	SEE Marks	60
Teaching Hours/Week (L:S:SDA)	2:0:0 Total:02 Hrs.	Total	100
Credits	02	SEE: Theory	03 hours

Module 1- Urbanization

Urban growth and urbanization- Urbanization in India- past and future trends-Growth Dynamics of urban centers in India. Components of National Urbanization Policy and recommendations of National Commission on Urbanization. Metropolitan Center; Area and Region- Metropolitanization in India-Physical, economic and demographic characteristics of Metropolitan centers in India. Metropolitan Dominance- Phenomenon of Primate Cities-Need for Metropolitan Decentralization-Satellite towns, Ring towns, and Counter Magnets.

Module 2- Urban development schemes and Plans

Metropolitan Plan-preparation and implementation- Metropolitan Regional Plan and Structure Plan approach. The Draft State Urban Development Policy of Karnataka. Case studies of metropolitan centers from India viz. Bangalore, Delhi, Mumbai, Chennai, Kolkata, etc. Role of Special Agencies in Metropolitan Management. Planning for urban infrastructure in Metropolitan Cities– JNNURM, UIDSSMT schemes. Recent development in smart Urbanization.

Module 3- Introduction to Land Economics

Economic Principles of Land use, Concept of Rent and its application, Demand forecasting for land, factors affecting land supply and demand; interpretation of Revenue Maps (Cadastral maps). Market Conditions: formal and informal, legal and illegal. Income elasticity of land, business cycles and its impact on demand for land, externalities and internalities in land development and induced demand, economic growth and demand for land;

Module 4- Supply Side Management

Property Rights: ownership, user and exchange rights: Its implication on land supply; Land Development: Type, cost, methods of disposal; Corruption and land markets: Corruption, black money and land markets;

Regulation in Land Markets: Social justice and land distribution: public domain, social-democratic regulation, corporatist regulation, collective action of the state and regulation of its supply of land – the overall impact of regulation on land prices: Master Plan, Zoning and other planning regulations and their impact on supply.

Land Management Techniques: Private land assembly, co-operatives in land development, FDI in land development, land pooling, and plot reconstitution, Transfer of development rights, land sharing, and land lease.

Module 5 - Land Pricing and Information System

Land valuation techniques, land pricing, subsidies, auctions; type of development: plotted, flatted system, and their effect on land pricing; Hedonistic pricing; land price behavior in urban centers; Constructing the land price index. Land records in Rural areas (examples from Karnataka, Andhra, etc), transparency in a land transaction, methods of publicizing land prices, and land price monitoring.

References:

1. R D McKenzie, 2018, *The Metropolitan Community*, Forgotten Books.
2. Hans Blumenfeld, 1967, *Modern Metropolis*, MIT Pennsylvania
3. VLS.Prakash Rao, 1979, *Structure of Indian Metropolis*. ISEC Bangalore.
4. Peter Hall, Weidenfeld, and Nicholas, 1966, *World Cities*, Mc-Graw Hill.
5. ITPI New Delhi, 1991, *Technical Papers of 39th All India T&CP Seminar*.
6. Sivaramakrishnan KC, 1993, *Metropolitan Planning and Management in the Developing world-spatial decentralization policy in Bombay, Cairo, and Nairobi*, United Nations Centre for Human Settlements (Habitat), Nairobi.
7. Devas N, Rakir. C. (Ed), 1993, *Managing Fast-Growing Cities: New Approaches to Urban Planning and Management in the developing world*. Longman, London,
8. Miles R Smith, 1970, *Metropolitan Problems*, Methuen publication. London.
9. Harvey, Jack and Jowsey Erine, 2003, *Urban Land Economics*, Palgrave Macmillan; 6th edition.
10. World Bank, 2008, *Sustainable Land Management Sourcebook*, World Bank Publications, Washington.

DEMOGRAPHY AND STATISTICS			
Course Type	PSC	CIE Marks	40
Course Code	20SCP26	SEE Marks	60
Teaching Hours/Week (L:S:SDA)	2:0:0 Total: 02 Hrs.	Total	100
Credits	02	SEE: Theory	03 hours

Module 1 – Demography

Sources of demographic data in India, Settlement type, growth pattern, and structure: urban settlement analysis, Concentration: spatial, vertical and size, peri-urban sprawl, economic base; Rural Settlements – Size, occurrence, and character, transformation, Policies towards various size class settlements. Population Census in India- Census Operation- Census Questionnaires and Schedules.

Module 2 - Population structure and composition

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Age, sex, gender, marital status, caste, religion, literacy level, etc.; Age - sex ratio, structure, pyramid; dependency ratio; occupational structure; Fertility; mortality, migration analysis, natural growth of population, migration and its implications in spatial planning;

Module 3 – Statistical analysis

General concepts- statistical interference, population and samples variables, simple statistical models, Measures of Central Tendency, Measures of Dispersion, Measures of the shape of the distribution

Module 4 – Statistical Applications in City Planning

Statistics as a tool to analyze and interpret data related to urban and regional planning
Measures of Central tendency, measures of dispersion- standard deviation. Chi-square Test, simple linear regression, and correlation

Module 5 – Surveys

Types of primary surveys, Design of planning questionnaires, sample surveys, and Various Sampling methods. National Sampling Survey, Automatic Sampling survey.

References:

1. Donald J Bogue, 1969, *Principles of Demography*, John Wiley & Sons Inc
 2. Davis. H Craig, 1995, *Demographic projects techniques for regions and smaller areas*. Premier, UBC Press, Vancouver.
 3. Levin R and DS Rubin, 1995, *Statistics for Management*, Prentice Hall of India Ltd., Vi Ed, New Delhi.
 4. United Nations, 1974, *Methods for projection of urban and rural population*, Manual and Methods of estimating population, UN New York.
 5. Bhende, A., Kanitkar, T, 2003, *Principles of Population Studies: Bombay*, Himalaya Publishing House.
 6. Pathak, K.B, and Ram, F., 1992, *Techniques of Demographic Analysis*, Bombay, Himalaya Publishing House.
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PROJECT MANAGEMENT IN SMART CITIES			
Course Type	PEC	CIE Marks	100
Course Code	20SCP27- a	SEE Marks	--

Teaching Hours/Week (L:S:SDA)	2:0:0 Total: 02 Hrs.	Total Marks	100
Credits	02	Elective shall have the CIE only decided by the faculty on the mode of examination	

Module 1- Fundamental of Research

The basic concept of research, Objectives, Motivation, and Significance of research, Types of Research, Deductive and Inductive Approach, Levels of Certainty: Facts, Hypotheses, Theories and Laws, Criteria of good research. *Research Problem*: Identification and Techniques of defining a research problem, the significance of literature review *Research Design*: Research design for Exploratory, Descriptive and Hypothesis-testing research studies. *Sampling Design*: Steps in Sampling Design, Types of Sampling and their applications in research, Collection of Spatial and Temporal Data. Problems encountered by researchers in India.

Module -2 - Statistical Inference for Research

Concepts and Procedure concerning testing of Hypothesis, Chi-square Test, Variance and Co-variance analysis, Concept of Standard Error. Model Calibration and Validation. Preparation of research projects and writing of reports, Critical Writing, Ethical Issues in research.

Module 3 – Introduction to Project Management

Project: Definition and Characteristics of Project, Project Objectives and Functions, Classification of projects, Project Life Cycle. *Project Management*: Definition and elements of Project management, Techniques of Project Management, Roles and attributes for the project manager, types of projects in smart city planning. Basic approaches and principles- Stages in project formulation and execution of the projects- Pre-feasibility studies.

Module 4 – Project structure and Evaluation

Phases and stages of Project, Work Break down, Project Organizing structures, Planning, Scheduling and Evaluation, project approvals, Types of Evaluation–Pre; Concurrent and Post Project-Economic, technical, market, managerial and financial aspects- Principles of measuring Cost-Benefit Analysis. Economic and Social costs. Components of Cash Flow– Net Present Value and Future Value-Treatment of Uncertainty of projects. Payback period. Accounting rate of return–IRR-Emerging trends in the decision-making process for joint sector projects like Escrow cover and Guarantee. Capital Budgeting and Performance Budgeting

Module 5 – Project structure and Evaluation

Networks–CPM and PERT analysis, Resource allocation and leveling, Line of Balance Technique, Technique of monitoring of development works. BOT; BOOT; and Turnkey Projects., Project control, Project risk management.

References:

1. George Irvin, 1984, *Modern Cost-Benefit Methods- An Introduction to Financial, Economic*

- and Social Appraisal of Development Projects*, Macmillan, London.
2. T.M.Mahesh, 2010, *Evaluation of Watershed Programmes in Karnataka, Sujala Project and its impact on landless laborers, small and marginal farmers, and socially marginalized groups in Chitradurga District*, North Staffordshire Press Limited, U.K.
 3. Lanyard, *Cost-benefits analysis*.
 4. Ramaraju Thirumalai, 2002, *Project Management-in Emerging Environment of Globalization*, Himalaya Publishing House.
 5. UNIDS, *Project Formulation, and Evaluation– Research, monographs*.
 6. VTD Balaraman, 1978, *Cost-Benefit analysis*, UNIDS.
 7. David Little and James Merlees, 1974, *Project Planning for Developing Countries*, Heinemann Educational
 8. E J Mishan, 2020, *Cost-Benefit Analysis*, Routledge, 6th Ed.
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URBAN FARMING AND GARDENING			
Course Type	PEC	CIE Marks	100
Course Code	20SCP27-b	SEE Marks	--
Teaching Hours/Week (L:S:SDA)	2:0:0 Total: 02 Hrs.	Total Marks	100
Credits	02	Elective shall have the CIE only decided by the faculty on the mode of examination	

Module – 1: Introduction

Definition of urban farming, Need, and Importance of urban farming, Evolution, advantages, and disadvantages of urban farming. Various types of urban farming, recent developments in urban farming, the concept of producing food in an urban setting, the effect of urban farming on the environment, the need for urban farming, and gardening in Urban planning.

Module – 2

Potential of urban gardens and farming in rooftops, balconies, indoors, vertical gardens, footpaths, dividers, etc., advantages and disadvantages, the economics of urban farming, health benefits of urban farming, the importance of urban gardens and farming on ecology and other species. Designing of a policy framework for Farming in vacant plots.

Module – 3

Aquaculture, hydroponics – importance, advantages, and disadvantages. Wet waste management in individual houses in urban areas using urban farming – composting in individual houses and Vermicompost, the effect of wet waste management in individual houses on the local authority, recycling of kitchen wastewater in urban farming, Design of wet waste management site in a small neighborhood.

Module – 4

Urban livestock – requirement, advantages and disadvantages, Design – small neighborhood containing 25 houses which is compatible for urban gardening and urban farming, (along with wet waste management, rainwater harvesting, and biogas plant)

Module – 5

Policy related to urban farming and garden in India, Government schemes related to urban gardening and urban farming across various states in India, UNSDG related to urban garden and farming, Design – policy framework in bye-law to promote urban farming and gardening.

References:

1. Ben Mark, *Hydroponics and Urban Gardening*, independently published
2. April Philips, *Designing Urban Agriculture*, Wiley Publishers
3. Novella Carpenter, *The Essential Urban Farmer*, Penguin Random House
4. Olivia Abby, *Vertical Gardening*, Kindle Edition
5. Pavasiya Hardi, *Vertical Garden: Future perspective to save the environment*, Lambert Academic Publishing

SUSTAINABLE CITIES			
Course Type	PEC	CIE Marks	100
Course Code	20SCP27-c	SEE Marks	--
Teaching Hours/Week (L:S:SDA)	2:0:0 Total: 02 Hrs.	Total Marks	100
Credits	02	Elective shall have the CIE only decided by the faculty on the mode of examination	

Module 1 – Introduction

Introduction to Sustainable Development Concepts History, definitions, and perspectives on Sustainability Theory and Background to Sustainability Planning Changing patterns of urban growth, Quality of life in the city. Efficiencies and inefficiencies in cities; challenges and opportunities. Eco challenges in the contemporary cities; Principles of green and smart cities, international initiatives including UN and EU level; Corporate social and environmental strategies in cities; The Three E's: Environment, Economics, ethics, and ecology of sustainable

Module 2 – Sustainability

Analyzing the Three E's within an urban development debate, Ethics, Worldviews, and Sustainability, Tools for Sustainability Planning: indicators, ecological footprint, other mechanisms, Planning, planners, and sustainability plans sustainable development Climate change

indicators and their meaning for cities, Green technologies in cities, Green buildings and ecological footprint Green Infrastructure, Urban sustainability foundations, models, & theories.

Module 3- Sustainable services

Planning for Sustainability at Different Scales, Regional Planning and Sustainability, Municipal Planning and Sustainability, Implementing sustainability Role of local authorities and public participation in shaping the cities, Liveability, placemaking, and walkability; City services: utilities (water, energy, and communications), public street lighting, roadways and traffic, public transport, signage, environmental quality, cleaning of public spaces, waste and sewage management, maintenance, the impact of ICT on the social fabric, on the management of cities and their innovation potential. Concept of New Urbanism and Smart Growth.

Module 4

Materials, Energy, and Food, The Natural step, Environmental Issues, Concepts, and Theory: Industrial Ecology, Study of the existing cities, Finding problems and how far they are solvable, Designing for Smart cities, Design, development, and exhibition of a feasible innovation project which will enrich citizens and the city through all its phases: determining the scope, defining the idea, establishing objectives, identifying partners, selecting and acquiring tools and knowledge, planning and presentation, beginning to put the project into practice. Case study

Module 5

Neighborhood Planning and Sustainability, Ecological Site Design and Architecture, Sustainable building, Green building concept, assessment, Design of any small town into a sustainable smart city

References:

1. Dimitri Devuyt, 2001, *How Green is Cities?* Columbia University Press, New York
2. Martin A. Abraham (editor), *Sustainability Science and Engineering Vol 1*, Elsevier Publication
3. www.smartcitiescouncil.com
4. Timothy and Kristy Manning, 1997, *The Ecology of Place: Planning for Environment, Economy, and Community*, Washington, D.C. Island Press.
5. Cedric Pugh, 2000, *Sustainable Cities in Developing Countries*. Earthscan, London, UK.
6. John Tillman Lyle, *Regenerative Design for Sustainable Development*, John Willy & Sons, New York
7. Joe Ravetz, *City-Region 2020*, London, UK, Earthscan, 2000

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SEMESTER 3

Planning Studio-3			
Course Type	PCC	CIE Marks	40
Course Code	20SCP31	SEE Marks	60
Teaching Hours/Week (L:S:SDA)	2:2:2 Total: 06 Hrs.	TOTAL	100
Credits	06	SEE: Viva-Voce	15 min per student

Preparation of District Development Plan (Regional Planning Exercises)

Course outcome

At the end of the studio/course the students will be able to

- 1) Collect data and information and analyze and interpret data at regional level/district level.
- 2) Acquire skills on preparation of District Development Plan by analyzing and interpreting data and proposals through team exercise

COURSE CONTENT

1. The students are required for Preparation and presentation of Synoptic Note on Planning Thesis through seminar.
2. The students are required to undertake a Regional Planning exercise by choosing any one of the Regions like Resource Region/River Valley Region/Command Area/ District or Metropolitan Region. The Planning exercise includes base map preparation, resource inventory, economy of the region, special programs and working out goals, formulation of strategies and broad proposals for the development of the Region. The presentation is through Graphs and Charts, Spatial analysis and Report. The students are expected to apply the planning techniques and statistical tools to draw conclusions.

Introduction to Dissertation

Objective: To conduct independent scientific research on the topic of City Planning, with an orientation towards Smart City. Each student is required to undertake a Dissertation project on a subject related to any topic broadly connected to the Smart City Planning/ projects, in consultation with the allotted guide. The research proposal shall be prepared following learning from the subject Research Methods & IPR from Semester 1.

Students are expected to gather adequate material related to the topic from both primary and secondary sources, identify case studies and resource persons/ experts in domains identified for research. There shall be at least 2 reviews during the semester to present the data gathered and confirm with the guides/ reviewers the adequacy of preparatory work leading to Dissertation Stage-2 in semester 4.

Project identification, literature review, and Case studies shall be the basis of marking in the viva-voce during the semester examination.

Spatial Data Infrastructure			
Course Type	PCC	CIE Marks	40
Course Code	20SCP32	SEE Marks	60
Teaching Hours/Week (L:S:SDA)	2:2:0 Total: 04 Hrs.	Total	100
Credits	04	SEE: Theory	03 hours

Module 1: Concepts and Hierarchy

Spatial Data Infrastructure (SDI): Concepts, Contents, Nature and SDI hierarchy; Global, National, Regional and Local SDI initiatives; Building an SDI and using it in planning and decision-making process; Open Geospatial Consortium - ISO standards (TC211); Data streaming and mining in Spatial Data Infrastructure.

Module 2: From Global to Local SDI applications

National SDI Initiatives: NRDMS: Multi-level spatial data infrastructure, NSDI: Assimilation and Dissemination and Data warehouse; State SDI: NCT Delhi SDI, Karnataka and Kerala Portals; Case studies from various levels. Karnataka's Land Management Programme- Bhoomi, geoportal assisting local to the state-level planning process; Gujarat's Tax program, etc.; Application to coastal area planning

Module 3: SDI application in Planning and Decision Support

SDI – Location-based technology development, Interoperability arrangement for geospatial data and ontology mapping; Application in Bhuvan and its spatial applications,

Module 4: SDI application in Planning and Data Management

Population Data Sets, Natural Resource Repository, Integrated Water Resource Management, mKrishi – application in agriculture and rural development, geospatial application in transportation, disaster management, and conservation; Spatio-temporal data modeling and analysis; 3-D mapping of land and its use in the city and regional planning, Geo visualization of landscapes: rural and urban; spatial inequalities. **Participatory GIS (PGIS):** Definition, concept, and need; PGIS and PPGIS; Geo-referencing and visualizing indigenous spatial knowledge; Ethical issues in PGIS; PGIS for regional

Module 5: Technology in SDI and decision support system

Real-time technologies and their application: landslides monitoring in the Himalayan region, web-based Spatio-temporal prediction of landslides, decentralization planning in Uttarakhand - web-based model. Satellite-based and other real-time technologies and their use in identifying physical

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transformation. Its application in urban and rural areas: slum formation, illegal colonies, flash flood warning system in the river and coastal belt, etc

References:

1. Martin Wegman, Stefan Dech, 2020, *An Introduction Spatial Data Analysis*, Pelagic Publishing.
 2. Worrall L, 1992, *Spatial Analysis and Spatial Policy using GIS*, CBS Publishers.
 3. N L Sarda, S Sen, 2018, *Geospatial Infrastructure-Applications and Technologies*, Springer Publications.
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DPR and Project Appraisal			
Course Type	PCC	CIE Marks	40
Course Code	20SCP33	SEE Marks	60
Teaching Hours/Week (L:S: SDA)	2:2:0 Total: 04 Hrs.	TOTAL	100
Credits	4	SEE: Viva-Voce	15 min per student

Module 1: Introduction to Detailed Project Report

Definition of DPR and Appraisal, need and importance of DPR and Appraisal in urban Planning, content in DPR – step by step process, Project Background, Feasibility study approach – (Pre-implementation stage, implementation stage, and Post-implementation stage, types of surveys to be carried out for DPR, team mobilization for DPR making.

Module 2: DPR for a Water supply and conservation in a small neighborhood

A case study of a small neighborhood to prepare a step-by-step detailed project report for water supply and conservation including water treatment plant, rainwater harvesting, and policy frameworks using GIS

Module 3: DPR for sanitation and solid waste management for a neighborhood

A study on the requirements of sanitation and solid waste management, for a neighborhood in an urban area – to prepare a step-by-step detailed project report, including DWATs for sanitation using GIS.

Module 4: DPR for introducing Multimodal transport system in an urban area

A study on the existing condition of a transportation network, traffic condition, Demographic and vehicular studies, parking, etc., and the need for different modes of transport system along with last-mile connectivity and intelligent transport system using GIS

Module 5: DPR for Industrial townships

A study on an existing planned industrial township, single sector vs mixed industries, Industrial corridor projects, the role of NITI Ayog, Demographic studies, Incentives, etc., the role of GIS
Studio project to involve preparation of DPR similar to those learned in modules 2 to 5 as a group exercise.

References:

1. Garg RK, *Handbook on Project Reports Concepts, Preparation Analysis and Financing*, Bharat Law House Pvt. Ltd., 2011
2. Odisha Water Supply and Sewerage Board, 2016, *DPR on Design, Construction, Operation, and Maintenance of Sewage Treatment System*.
3. DULT, 2016, *Better Access to Majestic Area*.
4. Ministry of Commerce and Industry, 2019, *Progress report of Japan Industrial Townships (JIT) in India*.

Environmental Planning			
Course Type	PSC	CIE Marks	40
Course Code	20SCP34	SEE Marks	60
Teaching Hours/Week (L:S:SDA)	2:0:0 Total: 02 Hrs.	Total	100
Credits	2	SEE: Theory	03 hours

Module 1: Introduction

Fundamentals of Ecosystem and Environment, Components of Natural and Built Environment- Man’s role in changing the face of the earth. Man’s impact on natural features viz. Atmosphere (climate), -Urban Heat Island; Forests and Landforms. Environmental pollution–types of pollution, air; water; noise, and land–Their source, impact, and abatement.

Module 2: Global Environmental Concerns and Planning of Settlements

UN/ International Conferences/ Conventions (Global /National issues), Environmental Concerns of human settlements, Components, structure and meaning of the urban and regional environment. Impact of various human activities on the environment including recreation, tourism, urban waste, and impact on the environment

Module 3: Emerging Concepts

Emerging Concepts: smart growth, clustered cities, ecological footprints, green development, sustainable cities and inclusive cities for sustainable livelihood; Environment and poverty links; Environment and Economy interaction: Kuznets curve, Green GDP, Carbon Trading, carbon sequencing, environmental accounting, and Green Budgeting.

Module 4: Environmental Risks, Impact, and Role of Institutions in Environment Management

Environmental Risks in rural and urban areas, health and environmental links, sustainable growth, carrying capacity, optimum city, Environmental Impact Assessment: project-specific, universal; Acts and Regulations; Role of various levels of governments in environmental management; NGOs and other agencies in environmental management; Case studies from developing and developed countries. Political commitment and environmental policy; Local Agenda 21, MDGs, environmental standards.

Module 5: Environment planning techniques

Environmental surveys- Methods of data collection, interview techniques, analysis. Database for incorporation of environmental concerns in planning Analysis, Techniques of resource protection and conservation (land suitability analysis, carrying capacity, vulnerability analysis. Resources type, scale, inventory Resource Assessment – Land – topographic analysis, Water – quality standards, Air and Noise – quality standards, Biodiversity – basics of flora and fauna diversity assessment.

References:

1. Brain J.L. Berry and Frand E.Horton, 1974, *Urban Environmental Management*, USA.
 2. Detwyler, *Urban Environment*
 3. Office of United Nations Disasters Relief Coordinator, 1986, *Disaster prevention and mitigation Vol.12*, United Nations New York.
 4. S.Ramani, 1980, *Disaster Management: Advanced course on Modern Trends in Housing*. Structural Engineering Research center, Vol.2 Madras.
 5. Detwyler, *Urban Ecology*
 6. Wilfred Beckerman, 1974, *In Defense of Ecodevelopment*, Jonathan Cape Ltd
 7. Scoorer R.S, *Pollution– Air problems and policies*
 8. *ENVIS- Journal of School of Planning and Architecture*, New Delhi.
 9. UNCHS: *Human Settlements and Sustainable Development*.
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IoT, Artificial Intelligence			
Course Type	PSC	CIE Marks	40
Course Code	20SCP35	SEE Marks	60
Teaching Hours/Week (L:S:SDA)	2:0:2 Total: 04Hrs.	Total	100

Credits	04	SEE: Theory	03 hours
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Module 1: Introduction to Internet of Things

What is IoT, Genesis of IoT, IoT and Digitization, IoT Impact, Convergence of IT and IoT, IoT Challenges, IoT Network Architecture and Design, Drivers Behind New Network Architectures, Comparing IoT Architectures, A Simplified IoT Architecture, The Core IoT Functional Stack, IoT Data Management and Compute Stack, Introduction to concepts of Data Ware House and Data mining

Module 2: Smart Objects and Smart City

Sensors/ Devices, Connectivity, Data Processing, An IoT Strategy for Smarter Cities, Smart City IoT Architecture, Smart City Security Architecture, Smart City Use-Case Examples.

Module 3: IoT Data Analytics

Data and Analytics for IoT, An Introduction to Data Analytics for IoT, Machine Learning, Big Data Analytics Tools and Technology, Edge Streaming Analytics, Network Analytics, Securing IoT

Module 4: Artificial Intelligence

AI System- Agent and its environment, Machine perception, the role of computational psychology, computational philosophy, and computer science in AI.

Module 5: IoT Physical Devices and Endpoints Programming

IoT Physical Devices and Endpoints - Arduino UNO: Introduction to Arduino, Arduino UNO, Installing the Software, Fundamentals of Arduino Programming. IoT Physical Devices and Endpoints - RaspberryPi: Introduction to RaspberryPi, About the RaspberryPi Board: Hardware Layout, Operating Systems on RaspberryPi, Configuring RaspberryPi, Programming Examples on Using Arduino and RaspberryPi.

References:

1. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, *"IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things*, 1st Edition, Pearson Education (Cisco Press Indian Reprint). (ISBN: 9789386873743)
 2. Steve Austakalnis, 2016, *Practical Augmented Reality: A Guide to the Technologies, Applications, and Human Factors for AR and VR*, Addison- Wesley Professional.
 3. Arshdeep Bahga, Vijay Madisetty, 2014, *Internet of Things: A hands-on approach*.
 4. Oliver Theobald, 2021, *Machine Learning for Absolute Beginners: A Plain English Introduction*, Amazon Digital Services.
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Legislation and Governance			
Course Type	PSC	CIE Marks	100
Course Code	20SCP36-a	SEE Marks	--
Teaching Hours/Week (L:S: SDA)	2:0:0 Total: 02 Hrs.	Total Marks	100
Credits	02	Elective shall have the CIE only decided by the faculty on the mode of examination	

Module 1: Overview of Governance

Definition, concepts, components, government and governance, hierarchy and structure, forms of governance, the process of inclusion and exclusion. Concept of Good Urban Governance and Reforms, Resource Mobilization, Transparency, and better Municipal Management

Module 2: Legislations on Urbanisation

Karnataka Town & Country Planning Act 1961; Karnataka Urban Development Authority Act, Karnataka Municipal Corporations Act; Karnataka Land Requisition Act; BDA Act; BMRDA Act, Institutional frame and mechanism for governance as envisaged in the 74th CAA. Process of decision making in the process, further implementation and execution, and management process.

Module 3: Special Legislations:

Environment Protection Act 1986; HCPA 2010; Right to Fair Compensation & Transparency in Land Acquisition, Rehabilitation, & Resettlement Act 2013;

Module 4: Participatory Governance

System, structure, functions, powers, process and resource, performance, interface with NGOs, other agencies. Stakeholders' participation, roles, and responsibilities, access to government by various stakeholders.

Module 5: Smart Governance

Introduction to smart E-governance, Smart E-governance for citizen services, Smart E-governance within Government agencies, Smart E-governance for industries and commerce, Emerging trends in Smart E-governance, Implementation models for E-Governance, Regulatory guidelines for E-Governance.

References:

1. Karnataka Town and Country Planning Act, 1961
2. Bangalore Development Authority Act 1976
3. Bangalore Metropolitan Regional Development Authority Act.
4. The Karnataka Urban Development Authorities Act, 1985
5. The Karnataka Municipalities Act, 1964
6. AMDA, 1999, *Urban Governance and Management of Urban Environment*. New Delhi.

7. T.N. Chaturvedi (ed.), 2000, *Urban Governance*, IIPA, New Delhi.
 8. CSR Prabhu, 2013, *E-Governance- Concepts and Case Studies*, PHI Learning Pvt. Ltd.
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Real Estate and Urban Economics			
Course Type	PEC	CIE Marks	100
Course Code	20SCP36- b	SEE Marks	--
Teaching Hours/Week (L:S: SDA)	2:0:0 Total: 02 Hrs.	Total Marks	100
Credits	02	Elective shall have the CIE only decided by the faculty on the mode of examination	

Module 1 - Introduction

Introduction: Definition of real estate, the economic importance of real estate, an overview of real estate industry. Characteristics of land / real estate: Economic and physical characteristics, personal property; Tangible and intangible personal property. Concepts of Ownership: Forms of ownership, physical rights of ownership of land

Module 2 – Land Economics

Agglomeration Economics- Internal and external economies of scale, Multiplier effect about regional development. The economic concept of Land-relevance of Land Economics for Spatial Planning. Residential Location Theory. Development of Land-process of land development- Freehold Vs Leasehold-Urban Land Market and Real Estate Market. Stages in real estate development, real estate development process.

Module 3 – Influence of Land Market

Socioeconomic and political factors influencing the urban land market. Functions of the urban land market. A theoretical framework for functions of the urban land market, social control of land involving land supply and demand. Need for public intervention concerning urban Poor.

Module 4 – Stake Holders

Real Estate Agencies Role of Real Estate in controlling the demand and supply of urban land. Development Regulations and urban Tax base. Self-Assessment of Land Property- Guidance value and land supply. Economics of real estate markets-investment analysis tools like proformas, debt financing of real estate leasing and property management, appraisal, and the pricing of goods. Real Estate information system Mortgage market. Role of government and financial institutions and consumers. Transfer of Title: Voluntary and involuntary transfer of property, types of deeds, and legal conveyance

Module - 5

Real Estate Finance: Sources and techniques Land use and Control: Public control of private

property, zonal laws, enforcement of zonal laws, urban development emerging patterns of urban land use. Role players in real estate development: Techniques of mortgage valuation and pricing. Contract regulations and financing issues. Alternate mortgage instrument. Urban Policies and its impact on real estate. Transfer of Development Rights. Its impact on Real estate.

References:

1. Stuart Chapin and Edward Kaiser, 1979, *Urban Land Use Planning*, University of Illinois Press; 3rd ed.
2. Alans W Evans, 1985, *Urban Economics-An Introduction*, Wiley–Blackwell
3. Richardson H.W, et.al., 1996, *Analytical Urban Economics*, Edward Elgar Publishing Ltd
4. Karnataka State Town and Country Planning Act, recent Amendments and Urban Development Controls and Regulations.
5. Mike E. Miles, et.al., 2015, *Real Estate Development Principles and Process*, by Urban Land Institute (ULI): Washington, D.C.
6. Richard B Peiser & Anne B. Frej, 2003, *Professional Real Estate Development – The ULI Guide to the business*, Urban Land Institute U.S.A.
7. Tanya Davis, 2007, *Real Estate Developer’s Handbook*, Atlantic pub company, Ocala, USA.
8. Gerald R Cortesi, 2001, *Mastering Real Estate Principles*, Dearborn Trade Publishing, New York, U.S.A.
9. Donald A. Corb & Richard A. Giovangelo, *Real Estate Principles*, 2014, Lee Institute, Inc., Brookline, Massachusetts, USA., 2014

Planning for Disaster Management			
Course Type	PEC	CIE Marks	100
Course Code	20SCP36- c	SEE Marks	--
Teaching Hours/Week (L:S: SDA)	2:0:0 Total:02 Hrs.	Total Marks	100
Credits	02	Elective shall have the CIE only decided by the faculty on the mode of examination	

Module 1: Disaster Preparedness, Prevention, and Mitigation

Concepts, processes, and perceptions of Disasters – natural and man-made – causes and consequences. Disaster and the natural environment: Floods and flash floods-urban floods- causes and consequences-flood controls. Land Slides, mudflow, forest fires, wildlife fires, and winter storms Cyclones-cyclone preparedness and Risk Management landslides, soil erosion, earthquakes, tremor, tsunami, cloud bursts, etc. Damage to people and property due to disaster. Case studies from across the world. Disaster Recovery.

Module – 2- Disaster Management

Disaster preparedness, prevention, displacement and development; Government structure and disaster mitigation, Health Issues-Evacuation behavior-current measures- vulnerability assessment- Evacuation planning in all types of natural disasters. Emergency management-alerts and warning-Role of Communications in Alerts and warnings. Role of NDRF

Module – 3 Planning and Resource Management

Human response to the disaster – short term and long-term effects; Integrating disaster mitigation in the spatial planning process: micro zoning, building bye-laws, norms, and standards, density variations, provisions of infrastructure for disaster mitigation; vulnerability index and mapping; Disaster insurance at various levels: village, district, and town/city level. Geo-informatics-use of Remote Sensing in Disaster Management. Role and preparedness of Local Governments and NGOs in mitigating Urban Disasters.

Module – 4 Man-Made Disaster

Man-made disasters-Chemical spills, Terrorism and Urban Violence. Action plans to minimize the risks. Special Regulations. Identification of Special Areas for Development-Flood Prone Areas; Drought Prone Areas, Desert Land, and Saline Lands-Planning Appraisal and Planning Strategies

Module 5: Disaster Education

Community awareness and participation at various levels; Role of NGOs/CBOs and communities in disaster education; Relevance of disaster management with relevant to development and environment; Use of technology and media for spreading disaster awareness.

References:

1. Thomas D Schmid and Larry Collins, *Disaster Management and preparedness*. Occupational Safety and Health Guides Services, USA
2. David Alexander, 1991, *Natural Disasters*, University College, London.
3. John P Baston, et al, 1995, *An Ounce of prevention*, A Handbook on Disaster Contingency Planning for Archives.
4. Five-year Plan Reports of Government of India, Planning Commission/ NITI Ayog.
5. K.V. Sundaram, 1982, *Planning for Hill Area Development*, Concept Publishers.
6. R. P. Misra et.al., 2001, *Regional Planning-Concepts and Case Studies*, Vikas Publishers.

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Professional Training/ Internship			
Course Type	Internship	CIE Marks	--
Course Code	20SCP37	SEE Marks	100
Teaching Hours/Week (L:S:SDA)	--	TOTAL	100
Credits	04	SEE: Viva-Voce	15 min per student

A Candidate shall undergo Professional Training for six weeks immediately after the completion of 2nd-semester examinations and before the commencement of 3rd-semester course work. The training shall be undertaken in Government departments (Town Planning/ E-Governance/ Traffic Police command or similar)/ Urban Local Bodies/ Planning and Development Authorities/firms/organizations involved in Smart City Projects/ Town Planning / Transport Planning and policies/ Urban Design/ Infrastructure development projects. The training certificate shall be signed by an authorized signatory of the Government department/ Firm/ Company or Agency.

Every candidate shall submit a report of the Professional Training Report/Certificate, approved/signed/sealed by the authorized signatory.

Professional Training report shall consist of work/survey maps/drawings/study etc., done by the students.

The Viva-voce examination shall be conducted during the end of the third-semester examination.

SEMESTER 4

Dissertation			
Course Type	PCC	CIE Marks	40
Course Code	20SCP41	SEE Marks	60
Teaching Hours/Week (L:S: SDA)	4:20:0 Total: 24 Hrs.	Total	100
Credits	24	SEE: Viva-Voce	Min. 20 minutes per student with adequate time for Q & A

Objective: To develop the dissertation topic identified, approved, and reviewed in semester 3. The research may focus on institution mechanism, users, land use and accessibility, use of forecasting and modeling, interaction with Planning and implementation agencies that concern the dissertation topic.

Infrastructure Design and Management, logistics, Intelligent systems, etc., need to be highlighted. The dissertation shall be the platform for the student to synthesize the knowledge and skills acquired through the learning of various theories and practices during the course and apply it for strategy formulation for a live planning challenge.

Identification of issues and potentials culminating in policies, plans, and proposals or in proving the formulated hypothesis or research questions. The dissertation shall be monitored continuously and periodically through internal marked review to check the consistency of work, the relevance

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of the analysis concerning the data collected and project scope, and the progress towards logical proposals.

The final assessment shall include the submission of a detailed report and maps/visuals for jury members (2 external, 1 internal), in a given format. The thesis shall also be presented orally in an external jury by each student in the form of visuals/drawings for each topic. Online/ hybrid presentation shall be permitted in case of examiners based out of station/ country or lock-downs/ travel restrictions etc.

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