SARVAJANIK UNIVERSITY
Sarvajanik College of Engineering and Technology
Bachelor of Technology
Civil Engineering

B.Tech. II Semester IV

Subject Name: Highway Engineering **Subject Code:** BTCL13403

Type of course: PCC -IV

Prerequisite: Basics understanding of highway engineering and transportation engineering

Rationale: The study of this subject desires to impart knowledge to the civil engineering students about highway planning; it's geometric and structural design, methods of construction, quality control, traffic parameters, traffic control, accident causes and remedies, maintenance and economy.

Teaching and Examination Scheme:

TEACHING SCHEME				Theory Marks			Practical Marks		Total
L	T	P	C	TEE	CA1	CA2	TEP	CA3	150
2	0	2	3	60	25	15	30	20	

CA1: Continuous Assessment (assignments/projects/open book tests/closed book tests **CA2:** Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems **TEE:** Term End Examination **TEP:** Term End Practical Exam (Performance and viva on practical skills learned in course) **CA3:** Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course

Content:

Sr. No.	Topics	Teaching Hrs.	Module Weightage
1.	**Introduction of Highway Engineering:** Scope of highway engineering, Highway planning and development in India, Classification of rural and urban roads, Road patterns, Planning and alignment surveys.	03	10%
2.	**Highway Geometric Design:** Cross sectional elements, width, surface, camber, Sight distances,SSD, OSD, ISD, HSD, Design of horizontal and vertical alignment, curves, super-elevation, widening, gradients, summit and valley curves.	06	15%
3.	**Highway Materials:** Subgrade soil, aggregates, binder materials, bituminous materials, bituminous paving mixes, cement and cement concrete , their engineering and physical properties, basic tests.	06	15%
4.	**Highway Pavement:** Pavement Component functions, Types of Pavement, factors affecting pavement design and basic pavement design of Flexible and Rigid pavement as per IRC guidelines, Pavement Maintenance. **Highway Drainage, Arboriculture and Lighting:** Requirements of drainage system, Surface drainage system, Sub-surface drainage	08	35%

	system, Road Arboriculture, Highway lighting: Importance, Design factors and lighting layout.		
5.	**Traffic Engineering:** Basic elements, road users, vehicles, traffic flow characteristics, speed, volume studies, And surveys, parking studies, Accident studies: causes, collision and condition diagrams, preventive measures, Traffic control: markings, signs, signals, intersections, rotaries.	07	25%

Suggested Specification table with Marks (Theory/Practical):

% Distribution of Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
15	**20**	**20**	**20**	**15**	**10**

Legends: R: Remembrance, **U:** Understanding; **A:** Application, **N:** Analyze, **E:** Evaluate **C:** Create and above Levels **(Revised Bloom's Taxonomy)**

Note: This specification table shall be treated as a general guideline for students andteachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Text Books:

Sr. No.	Title of book /article	Author(s)	Publisher and details like ISBN	Year of publication	Publication Edition
1	Highway Engineering	L.R. Kadiyali	Khanna Publishers, New Delhi. 9386173131, 9789386173133	2018	1st
2	Highway Engineering	Dr. S.K. Khanna and Dr. C.E. G. Justo	Nem Chand & Bros., Roorkee.	2017	10th
3	Principles, Practice and Design of Highway Engineering	S.K. Sharma	S. Chand & Co., New Delhi. 978-8121901314	2014	3rd
4	IRC – 37 Guidelines for Design of flexible Pavements	-	IRC, New Delhi,	2001	2nd
5	IRC – 67 Code of Practice for Road Signs	-	IRC, New Delhi	2001	-
6	IRC: 58 Guidelines for the Design of Plain Jointed Rigid Pavements for Highways	-	IRC, N. Delhi, December	2002	2nd

7	Traffic Engineering and Transport Planning	L.R. Kadiyali	Khanna Publishers, New Delhi. 978-8174092205	1999	9th

Course Outcome:

Sr. No.	CO Statement After learning this subject, students will be able to	Marks % weightage
CO-1	Identify and Prioritize highway proposals for road development (U,N,A cognitive level)	15
CO-2	Compute the highway geometrical design(R,U,E cognitive level)	20
CO-3	Identify and test the properties of pavement materials. (N,E,A cognitive level)	15
CO-4	Design and construction of flexible and rigid pavement (N,E,R,U cognitive level)	25
CO-5	Apply the various traffic measures and control in real world(A,U,R cognitive level)	25

Mapping with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO-1	2	2	-	-	-	-	-	-	1	1	-	-	1	-	-
CO-2	2	2	1	-	1	-	-	-	-	-	1	1	-	2	1
CO-3	2	2	-	2	-	1	-	1	-	-	1	-	1	-	1
CO-4	2	2	2	-	-	-	1	1	1	-	1	-	-	2	1
CO-5	2	1	1	-	1	-	-	1	-	-	1	-	-	-	1
Rationale*	10	9	4	2	2	1	1	3	2	1	4	1	2	4	4

Rationale*:

All CO's are compatible and matching to the derived POs to several extents.The study of this subject enables to impart knowledge to the civil engineering students about highway planning; it's geometric and structural design, methods of construction, quality control, traffic parameters, traffic control, accident causes and remedies, maintenance and economy.

LIST OF PRACTICALS:

1. Determination of Aggregate Crushing Value
2. Determination of Aggregate Impact Value
3. Determination of Los Angeles Abrasion Value
4. Determination of Shape Tests on Aggregate
5. Determination of California Bearing Ratio Values

PCC- IV:ProfessionalCore Course

6. Determination of Viscosity of Bitumen
7. Determination of Softening Point of Bitumen
8. Determination of Ductility of the Bitumen
9. Determination of Bitumen Content
10. Determination of Flash Point and Fire Point of Bitumen
11. Determination of Marshall Stability

Major Equipment:

1. CBR testing machine
2. Los-Angeles abrasion testing machine
3. Aggregate Impact testing machine
4. Marshall stability testing machine
5. Bituminous material's ductility testing machine
6. Standard penetrometer for bituminous materials