CET383	ECO-FRIENDLY TRANSPORTATION SYSTEMS	CATEGORY		L T P		CREDIT	YEAR OF INTRODUCTION
		VAC	3	1	0	4	2019

Preamble : Objective of the course is to introduce the principles and practice of sustainability on transportation systems and development of an eco-friendly transport system.

Prerequisite: Nil

Course Outcomes:

	Description
CO No.	At the end of the course, students will be able to:
CO 1	Apply the basic principles of sustainability to infrastructure related problems
CO 2	Analyse Transportation network for eco-friendliness and quantify the levels.
CO 3	Design eco-friendly transportation systems
CO 4	Apply concepts of sustainability in developing green fuels and vehicles.
CO 5	Design for sustainability in public transport, Applications of tools like GIS, GPS.

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	2	2	2	1		1	3	1		2		1	2	3
CO 2	2	2	1	2	1	1	1	1	1	1		1	2	2
CO 3	2	1	3	1	2	1	1	1	2	2	1	2	2	3

CO 4	2	2	2	1	1	2	2	1	1	1	1	2	2	3
CO 5	1	3	3	3	3	3	2	2	3	3	2	2	2	3

CIVIL ENGINEERING

Assessment Pattern

Bloom's Category	Continuous Assessment		End Semester Examination (marks)
	Test 1 Marks	Test 2 Marks	
Remember	**7.5**	**7.5**	**30**
Understand	**7.5**	**7.5**	**30**
Apply	**-**	**-**	**-**
Analyse	**5**	**5**	**20**
Evaluate	**5**	**5**	**20**
Create			

Mark Distribution

Total Marks	CIE (Marks)	ESE (Marks)	ESE Duration
150	50	100	3 hours

Continuous Internal Evaluation Pattern:

Attendance : 10 marks
Continuous Assessment Test (2 numbers) : 25 marks
Assignment/Quiz/Course Project : 15 marks

End Semester Examination Pattern:

The question consists of two parts- Part A and Part B. Part A consists of 10 questions with 3 marks for each (two questions from each module). Part B consists of two questions from each

module, out of which one has to be answered. Each question carries 14 marks and can have maximum 2 subdivisions.

Sample Course Level Assessment Questions:

1 **Course Outcome 1 (CO1):**Define sustainability in transportation context. How can the principles be applied here?

2 Course Outcome 2 (CO2): Describe the procedure of evaluating the performance of a transportation network, citing any example.

3 Course Outcome 3 (CO3): What are the characteristics of eco-friendly transportation system? What changes are to be incorporated in designing the same?

4 Course Outcome 4 (CO4): Discuss the concept of green vehicles describing the aspects that make them green.

5 Course Outcome 5 (CO5): Giving KSRTC as an example explain how sustainability can be achieved in public transport.

Syllabus

Module	Contents	Hours
1	Introduction to the concept of sustainability, basic principles.	10
2	Transport networks basics, Performance measures, Advanced transport systems	10
3	Design for eco-friendly Transportation, Professional praxis in sustainability, concept and applications	9
4	Emerging concepts in sustainable transportation: green vehicles and green roads	9
5	Sustainable public transport: Promoting public transport, Transit oriented development, integrated multi-modal transport.	7

Text Books

1. Chisty, J, Lall, K. Introduction to Transportation Engineering. PHI
2. O' Flaherty, C.A (Ed.)., Transport Planning and Traffic Engineering, Elsevier. 3. Jeffrey Tumlin: Sustainable Transportation Planning: Tools for Creating Vibrant, Healthy, and Resilient Communities, John Wiley & Sons

References

1. Green Transportation Logistics: The Quest for Win-Win Solutions Editors: Psaraftis, Harilaos N. (Ed.), Springer
2. Thomas Abdallah: Sustainable Mass Transit: Challenges and Opportunities in Urban Public Transportation.
3. Chester Patton, Public Transit Operations: The Strategic Professional
4. Sustainable and Efficient Transport: Incentives for Promoting a Green Transport Market Edited by Ellen Eftestøl-Wilhelmsson, et al, Edward Elgar
5. Rani Iyer:Green Transport: Exploring Eco-Friendly Travel for a Better Tomorrow:
6. Smart City project reports.
7. Environmental Impact Assessment Reports on Infrastructure projects.

Course Content and lecture Schedule:

No.	Topic	Course Outcome	No. of Hrs
1	**Module 1**		Total: 10
1.1	Sustainability: Definition, concepts	CO1	2
1.2	Environmental impacts of infrastructure projects, depletion of natural resources and pollution.	CO1	2
1.3	Problems of present transportation systems, performance analysis. Introduction to eco-friendly systems.	CO1	6
2	**Module 2**		Total: 10
2.1	Transportation network basics: network planning, design, operation and management (elementary ideas only)	CO2	3

2.2	Measures of network performance, factors and parameters.	CO2	4
2.3	Introduction to advanced transport systems: metro, monorail, maglev, hyperloop.	CO2	3
3	**Module 3**		Total: 7
3.1	Eco-friendly transport: Necessity, Basics: reducing natural fuels	CO3	2
3.2	Eco-friendly transport network. Parameters, design, implementation.	CO3	3
3.3	Professional praxis in sustainability: concepts, practical applications. Paradigm shift: Mobility and accessibility.		2
4	**Module 4**		Total: 9
4.1	Emerging concepts in sustainable transportation: green vehicles and green roads: basics and necessity.	CO4	2
4.2	Green vehicles: minimizing fuel consumption, alternate fuels. Green pathways: sustainable design, construction,	CO4	4
4.3	Forgiving designs for safety, ITS applications.	CO4	3
5	**Module 5**		Total: 9
5.1	Sustainable public transport: Promoting public transport, Fleet management and scheduling: Concepts and tools only.	CO5	3
5.2	Transit oriented development (smart cities), integrated multi modal transport, GIS applications.	CO5	6

5.3	Micro projects: i) Compilation of studies on green fuels and transport, with comparison. ii) A study on literature available on a typical smart city project, in the transport context, and propose designs. (may be given as assignments)		

Model Question Paper

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIFTH SEMESTER B. TECH DEGREE EXAMINATION, MONTH & YEAR

Course Code: CET383

Course Name: **Eco-friendly Transportation Systems (Minor)**

Marks:100 Duration: 3 hrs

PART A
(Answer all questions. Each question carry three marks)

1. Define sustainability with emphasis on transport.
2. List the principles of sustainability.
3. What are the fundamental elements of a transport network? How do they contribute to performance?
4. Compare metro and maglev technologies.
5. Why is an eco-friendly transport necessary? Cite a typical example.
6. Why is a paradigm shift necessary in sustainability?
7. Explain the terms: Green roads, Green fuels.
8. With a typical example, explain forgiving designs.
9. List a few methods of promoting public transport.
10. What do you understand from Transit Oriented Development?

PART B
(Answer one full question from each module)

11. a) Describe how an infrastructure project affects environment. (10) b) What are the issues with present transport systems? (4) **OR**

12 a)When is a system deemed eco-friendly? Explain in transport context. (6)

b). What are the parameters of performance analysis of transportation systems? Explain (8)

13 a) With a typical example, illustrate the performance evaluation of a transport network(6)

b) What is hyperloop? Is it eco-friendly? How? (8) **OR**

14a) Describe the process of network planning, design, operations and management (10) b) What are the challenges faced by metro rail systems? (4)

15a) Explain the principles of an eco-friendly transport network (8) b)Discuss the term professional praxis in a sustainability scenario. (6) **OR**

16 a) How is the eco-friendliness of a transport network evaluated? Discuss the steps involved(8)
b)Explain the factors involved in designing an eco-friendly network (6)

17 a) List the alternate fuels for transport and discuss any two (6) b) Define ITS. What are its application in eco-friendly transport. Expalin any two. (8) **OR**

18 a) Discuss any two eco-friendly construction methods for roads (8) b) What are the methods of reducing fuel consumption in vehicles (6)

19a)Write a note on public transport fleet management. (6) b) /what is meant by integrated multi-modal transport? Discuss it's possibilities in a city in Kerala. (8) **OR**

20 Discuss the applications of GIS and GPS in transport, explaining how eco-friendliness can be achieved. (14)