

Academic Course Description

<p>BHARATH UNIVERSITY Faculty of Engineering and Technology Department of Civil Engineering</p> <p>BCE 405 – TRANSPORTATION ENGINEERING Fourth Semester, 2016-17 (Even Semester)</p>
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Course (catalog) description

To impart knowledge on behavior and the performance of saturated soil. To understand and access both physical and engineering behavior of soils, mechanism of stress transfer in two-phase systems and stability analysis of slopes

Compulsory/Elective course : Compulsory for Civil students

Credit/ Contact hours : 3 credits / 45 Hour

Course Coordinator : Mr. S. Vinothkumar, Assistant Professor

Instructors :

Name of the instructor	Class handling	Office location	Office phone	Email (domain: @bharathuniv.ac.in)	Consultation
Mr. S. Vinothkumar	Second year Civil	Civil Block			9.50 – 10.40 AM
Ms. Maria subashini .L	Second year Civil	Civil Block			2.20 – 3.10 PM

Relationship to other courses:

Pre –requisites : BME 103 Mechanical engineering

Assumed knowledge : -

Following courses :

Syllabus Contents

UNIT I HIGHWAY PLANNING AND ALIGNMENT 9

Highway Development in India, Macadam's Method of Road Construction, Jayakar Committee Recommendations and Realizations, Twenty-year Road Development Plans, Concepts of On-going Highway Development Programmes at National Level, Institutions for Highway Development at National level - Indian Roads Congress, National Highway Authority of India, Ministry of Road Transport and Highways (MORTH) and Central Road Research Institute. Requirements of Ideal Alignment, Factors Controlling Highway Alignment Engineering Surveys for Alignment - Conventional Methods and Modern Methods (Remote Sensing, GIS and GPS techniques) Classification and Cross Section of Urban and Rural Roads (IRC), Highway Cross Sectional Elements – Right of Way, Carriage Way, Camber, Krebs, Shoulders and Footpaths [IRC Standards]

UNIT II GEOMETRIC DESIGN OF HIGHWAYS 9

Design of Horizontal Alignments – Super elevation, Widening of Pavements on Horizontal Curves and Transition Curves [Derivation of Formulae and Problems] Design of Vertical Alignments – Rolling, Limiting, Exceptional and Minimum Gradients, Summit and Valley Curves Sight Distances - Factors Affecting Sight Distances, PIEV Theory, Stopping Sight Distance (SSD), Overtaking Sight Distance (OSD), Sight Distance at Intersections, Intermediate Sight Distance and Illumination Sight Distance [Derivations and Problems in SSD and OSD] Geometric Design of Hill Roads [IRC Standards Only]

UNIT III DESIGN OF RIGID AND FLEXIBLE PAVEMENTS 9

Rigid and Flexible Pavements- Components and their Functions Design Principles of Flexible and Rigid Pavements, Factors Affecting the Design of Pavements - ESWL, Climate, Sub-grade Soil and Traffic Design Practice for Flexible Pavements [CBR method, IRC Recommendations- Problems] Design Practice for Rigid Pavements – [IRC Recommendations-Problems]

UNIT IV HIGHWAY MATERIALS AND CONSTRUCTION PRACTICE

9

Desirable Properties and Testing of Highway Materials: - (Tests have to be demonstrated in Highway Engineering Laboratory) Soil – California Bearing Ratio Test, Field Density Test, Aggregate - Crushing, Abrasion and Impact Tests Bitumen - Penetration, Ductility, Viscosity, Binder Content and Softening Point Tests. Construction Practice - Water Bound Macadam Road, Bituminous Road and Cement Concrete Road [as per IRC and MORTH specifications] Highway Drainage [IRC Recommendations]

UNIT V HIGHWAY MAINTENANCE

9

Types of Defects in Flexible Pavements – Surface Defects, Cracks, Deformation, Disintegration – Symptoms, Causes and Treatments. Types of Pavement Failures in Rigid Pavements – Scaling, Shrinkage, Warping, Structural Cracks, Spalling of Joints and Mud Pumping – and Special Repairs Pavement Evaluation – Pavement Surface Conditions and Structural Evaluation Overlay Design by Benkleman Beam Method [Procedure only]

TEXT BOOKS:

1. Khanna K and Justo C E G, Highway Engineering, Khanna Publishers, Roorkee, 2001.

REFERENCE:

1. Indian Roads Congress (IRC) specifications: Guidelines and special publications on Traffic Planning and Management
2. Transportation Engineering – An Introduction, C.Jotin Khisty, B.Kent Lall, Prentice Hall of India Pvt Ltd, 2006
3. MORTH Guidelines for Highway Engineering.
4. Kadiyali L R, Principles and Practice of Highway Engineering, Khanna Technical Publications, Delhi, 2000

Computer usage: Nil

Professional component

General	-	0%
Basic Sciences	-	0%
Engineering sciences & Technical arts	-	0%
Professional subject	-	100%

Broad area:

Test Schedule

S. No.	Test	Tentative Date	Portions	Duration
1	Cycle Test-1	February 1 st week	Session 1 to 14	2 Periods
2	Cycle Test-2	March 2 nd week	Session 15 to 28	2 Periods
3	Model Test	April 2 nd week	Session 1 to 45	3 Hrs
4	University Examination	TBA	All sessions / Units	3 Hrs.

Mapping of Instructional Objectives with Program Outcome

S.NO	Topics	Problem solving (Yes/No)	Text / Chapter
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	Correlates to program outcome		
	H	M	L
1. To study about different materials used in masonry	c,d	-	-
2. To analyse the steel structures.	c,d	-	-
3. To design of trusses and their members.	c,d	-	-
4. To carry out the analysis of simple beams	c,d	-	-
5. To study about different loading conditions on trusses	c,d	-	-

UNIT I HIGHWAY PLANNING AND ALIGNMENT			
1.	Highway Development in India, Macadam's Method of Road Construction	YES	T1/R1
2.	Jayakar Committee Recommendations and Realizations	YES	
3.	Twenty-year Road Development Plans	YES	
4.	Institutions for Highway Development at National level	YES	
5.	Ministry of Road Transport and Highways (MORTH) and Central Road Research Institute	YES	
6.	Classification and Cross Section of Urban and Rural Roads (IRC)	YES	
7.	Highway Cross Sectional Element	YES	
8.	Right of Way, Carriage Way, Camber	YES	
9.	Krebs, Shoulders	YES	
10.	Footpaths [IRC Standards]	YES	
UNIT II GEOMETRIC DESIGN OF HIGHWAYS			
11.	Design of Horizontal Alignments	YES	T1/R1
12.	Widening of Pavements	YES	
13.	Design of Vertical Alignments	YES	
14.	Summit and Valley Curves Sight Distances	YES	
15.	Stopping Sight Distance (SSD), Overtaking Sight Distance (OSD)	YES	
16.	Distance and Illumination Sight Distance	YES	
17.	Geometric Design of Hill Roads [IRC Standards Only]	YES	
UNIT III DESIGN OF RIGID AND FLEXIBLE PAVEMENTS			
18.	Rigid and Flexible Pavements	YES	T1/R1
19.	Components and their Functions	YES	
20.	Design Principles of Flexible	YES	
21.	Factors Affecting the Design of Pavements	YES	
22.	Traffic Design Practice for Flexible Pavements	YES	
23.	Rigid Pavements	YES	
24.	Design Practice for Rigid Pavements	YES	
25.	ESWL, Climate, Sub-grade Soil	YES	
UNIT IV HIGHWAY MATERIALS AND CONSTRUCTION PRACTICE			
26.	Desirable Properties	NO	T1/R1
27.	Testing of Highway Materials	NO	
28.	Soil – California Bearing Ratio Test	NO	
29.	Field Density Test	NO	
30.	Aggregate - Crushing, Abrasion and Impact Tests	NO	
31.	Bitumen - Penetration	NO	
32.	Ductility, Viscosity, Binder Content	NO	
33.	Construction Practice	NO	
34.	Water Bound Macadam Road	NO	
35.	Bituminous Road	NO	
36.	Cement Concrete Road	NO	
UNIT V HIGHWAY MAINTENANCE			
37.	Types of Defects in Flexible Pavements	NO	T1/R1
38.	Surface Defects, Cracks, Deformation	NO	
39.	Disintegration – Symptoms, Causes and Treatments	NO	
40.	Types of Pavement Failures in Rigid Pavements	NO	
41.	Scaling, Shrinkage	NO	
42.	Warping, Structural Cracks		
43.	Spalling of Joints and Mud Pumping	NO	
44.	Special Repairs Pavement Evaluation	NO	
45.	Structural Evaluation Overlay Design by Benkleman Beam Method	NO	

Teaching Strategies

The teaching in this course aims at establishing a good fundamental understanding of the areas covered using:

- Formal face-to-face lectures
- Laboratory sessions, which support the formal lecture material and also provide the student with practical construction, measurement and debugging skills.

Evaluation Strategies

Cycle Test – I	-	5%
Cycle Test – II	-	5%
Model Test	-	5%
Assignment	-	5%
Attendance	-	10%
Final exam	-	70%

Prepared by: Mr. Mr. S. Vinothkumar, Assistant Professor, Department of Civil

Dated :

BCE405- TRANSPORTATION ENGINEERING

Addendum

ABET Outcomes expected of graduates of B.Tech /Civil / program by the time that they graduate:

- a. An ability to apply knowledge of mathematics, science, and engineering
- b. An ability to design and conduct experiments, as well as to analyze and interpret data
- c. An ability to design a hardware and software system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- d. An ability to function on multidisciplinary teams
- e. An ability to identify, formulate, and solve engineering problems
- f. An understanding of professional and ethical responsibility
- g. An ability to communicate effectively
- h. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- i. A recognition of the need for, and an ability to engage in life-long learning
- j. A knowledge of contemporary issues
- k. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Program Educational Objectives

PEO1: PREPARATION

Civil Engineering graduates will have knowledge to apply the fundamental principles for a successful profession and/or for higher education in Civil Engineering based on mathematical, scientific and engineering principles, to solve realistic and field problems that arise in engineering and non engineering sectors

PEO2: CORE COMPETENCE

Civil Engineering graduates will adapt to the modern engineering tools and construction methods for planning, design, execution and maintenance of works with sustainable development in their profession.

PEO3: PROFESSIONALISM

Civil Engineering Graduates will exhibit professionalism, ethical attitude, communication and managerial skills, successful team work in various private and government organizations both at the national and international level in their profession and adapt to current trends with lifelong learning.

PEO4: SKILL

Civil Engineering graduates will be trained for developing soft skills such as proficiency in many languages, technical communication, verbal, logical, analytical, comprehension, team building, inter personal relationship, group discussion and leadership skill to become a better professional.

PEO5: ETHICS

Civil Engineering graduates will be installed with ethical feeling, encouraged to make decisions that are safe and environmentally-responsible and also innovative for societal improvement.

BCE405- TRANSPORTAION ENGINEERING

Course Teacher	Signature
Mr. S. Vinothkumar	
Ms. Maria subashini .L	

Course Coordinator

HOD/Civil