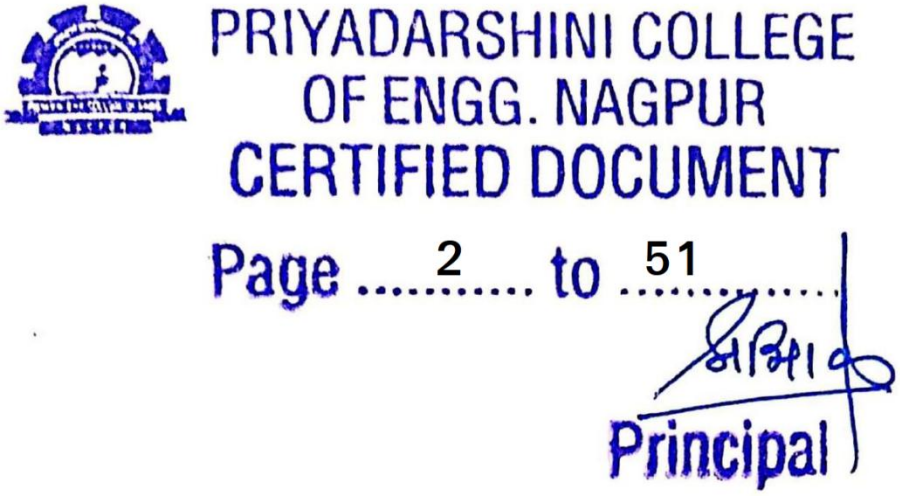
Lokmanya Tilak Jankalyan Shikshan Sanstha's
PRIYADARSHINI COLLEGE OF ENGINEERING
(Recognised by A.I.C.T.E., New Delhi & Govt. of Maharashtra, Affiliated to R.T.M.Nagpur University)
Near CRPF Campus, Hingna Road, Nagpur-440 019, Maharashtra (India)
Phone : 07104 – 236381, 237307, Fax : 07104 – 237681,
email : principal.pce.ngp@gmail.com, www.pcenagpur.edu.in

1.3.2 Average percentage of courses that include experiential learning through project work/field work/internship during last five years



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1.3.2 Average percentage of courses that include experiential learning through project work/field work/internship during last five years

B. E –CIVIL ENGINEERING SESSION 2017-2018

Sr. No	Name of the course that include experiential learning through Project work/ Internship	Subject Code	Domain	Page No
1	Concrete Technology	BECVE305T/P	Construction Technology, and Management	3-11
2	Surveying – I	BECVE 404T/P		
3	Building Construction & Material	BECVE 405T/P		
4	Surveying-II	BECVE602T/P		
5	Building Design and Drawing	BECVE604P		
6	Estimating and Costing	BECVE702T/P		
7	Construction Management and Law	BECVE704T		
8	Engineering Geology	BECVE304T/P	Geotechnical Engineering and Geology	12-21
9	Geotechnical Engineering-I	BECVE 402T/P		
10	Geotechnical Engineering -II	BECVE504T		
11	Environmental Engineering – I	BECVE303T/P	Environmental Engineering, Hydraulics and Water Resources Engineering	22-31
12	Fluid Mechanics -I	BECVE503T/P		
13	Hydrology & Water Resources (HWR)	BECVE505T		
14	Fluid Mechanics -II	BECVE603T/P		
15	Environmental Engineering-II	BECVE605T		
16	Elective -I : Air Pollution And Solid Waste Management	BECVE703T		
17	Irrigation Engineering	BECVE801T		
18	Elective - III :Water and Waste Water Treatment	BECVE803T		
19	Strength of Materials	BECVE302T/P	Structural Engineering	32-37
20	Structural Analysis – I	BECVE 401T/P		
21	Structural Analysis -II	BECVE501T/P		
22	Reinforced Cement Concrete (RCC) Structures	BECVE502T/P		
23	Steel Structures	BECVE601T/P		
24	Advanced Concrete Structures	BECVE701T/P		
25	Elective -I : Earthquake Resistant Design of Structure	BECVE703T		

26	Elective - III : Advanced Reinforced Cement Concrete Design	BECVE803T/P		
27	Transportation Engineering – I	BECVE 403T/P	Transportation Engineering	**38-46**
28	Transportation Engineering - II	BECVE705T		
29	Elective - II : Pavement Analysis And Design	BECVE802T		
30	Applied Mathematics-III	BECVE301	Other	**47-50**
31	Communicative English & Technical Writing	BECVE506P		
32	Site Visit & Mini Project	BECVE606P		
33	Industrial Case Study and Project Seminar	BECVE706P		
34	Construction Economics and Finance	BECVE804T		
35	Project	BECVE805P		

Domain 1: Construction Technology and Management

Sr. No	Name of the course that include experiential learning through Project work/ Internship	Subject Code	Domain
1	Concrete Technology	BECVE305T/P	Construction Technology and Management
2	Surveying – I	BECVE 404T/P	
3	Building Construction & Material	BECVE 405T/P	
4	Surveying-II	BECVE602T/P	
5	Building Design and Drawing	BECVE604P	
6	Estimating and Costing	BECVE702T/P	
7	Construction Management and Law	BECVE704T	

BECVE 305T CONCRETE TECHNOLOGY

Objectives:

1. To prepare the students to understand constituents of concrete and their effect on quality of concrete.
2. The course will prepare students to apply basic rules for manufacture of plastic concrete and its mechanization.
3. To prepare students to apply various methods for testing of plastic and hard concrete.
4. To prepare students to analyse behavior of concrete structure under different environmental conditions.
5. The course will prepare students to analyse and design various basic concrete building components.

Outcomes:

a. The students would be able to check and recommend different constituent of concrete.
b. The students would be able to control method of manufacture of concrete.
c. The students would be able to test strength and quality of plastic and set concrete.
d. The students would have the understanding of application admixture and its effect on properties of concrete.
e. The students would be able to understand the effect of process of manufacturing on different properties of concrete.
f. The students would be able to understand various environmental factors which affect durability of concrete, analyse cause of deterioration of concrete components and to suggest various preventive measures to it.
g. The students would be able to test various strength of concrete by destructive and nondestructive testing methods.

Syllabus:

Unit – I Cement

Chemistry of Cement, Main constituents of cement Hydration of cement, Water required, Physical properties and testing of cement, Soundness test. Hardening and compressive strength Grades and different types of cements. Ordinary Portland cement, Rapid Hardening Cement, B.B. Blast furnace slag cement, Low heat Portland cement, Portland pozzolones cement, Portland flyash cement, Sulphate resisting cement. Field test,

Aggregates : Sources of aggregates, classification and nomenclature. Coarse and fine aggregate, normal weight (light and heavy weight aggregates). Aggregate characteristics and their significance in strength, workability, placement and compartion of concrete.Sampling. Particle shape and texture, Bond of aggregate, size & grading of aggregate strength of aggregates Mechanical properties and test-Specific gravity, Bulk density, porosity absorption of aggregates, moisture content of aggregate, bulking of sand abrasion test, impact value. Sieve analysisDeleterious substances in aggregates, organic impurities class and other fine material etc.

Water : Quality of water for concrete mixing, suitability.

Unit – II

Fresh concrete : Batching, Mechanical mixers, automatic batching and mixing plants. Efficiency of mixing. Workability Measurement – Slump cont test, compacting factor test,

flow table, Vee-Bee consistometer, Factor affecting workability, setting time. W/C Law Significance of w/c ratio cohesiveness.Segregation, bleeding, voids, permeability.Hot weather concreting.Underwater concreting, Conveyance of concrete, Placing of concrete.Compaction-vibrators. Curing of concrete Significance, methods of curing, Temperature effect on during& strength gain. IS code on curing.Maturity of concrete.

Unit - III

Strength of concrete-

Gain of strength, Wet ratio, Factor affecting compressive strength w/c ratio. Type of cement, air entrainment, aggregates, mixing water, Admixtures, curing conditions. Tensile and flexural strength.Relation between cracking in compression.Impact strength fatigue strength. Shear strength, Bond between concrete & reinforcement. Modulus of elasticity, Poison's ratio.

Testing of Hardnessof Concrete: Compression test-cube strength & cylinder strength their relation, effect of aspect ratio on strength. Flexural strength of concrete, Determination of tensile strength.Indirect tension test.Splitting test.Abrasion resistance.Accelerated curing test.

Unit – IV

Mix Design – Process, Statistical relation between mean & characteristic strength, Variance, Standard deviation. Factor affection mix properties. Grading of aggregate, aggregate/ cement ration etc. Degree of quality control. Design mix by Road note no. 4 (BS). IS:10262:2009.

Additives and Admixtures: Types of admixtures, Natural products-DietomaceousearthBy products- Pozzolones. Fly ash, silica fume, rice husk ash, , G.G. blast furnace slag. Admixturers-air encraining, water reducing, acceletors, retarders, plasticizers & Super plasticizers, permeability reducing,surface harderners.Corrosion inhibitors & water proofing agents.

Unit – V

Special concrete : Self compacting concrete, High performance concrete, fiber reinforced & polymer concrete, Ferro cement, Shortcrete pumped concrete, Free flow concrete.

Shrinkage-Early volume changes, drying shrinkage, mechanism of shrinkage.Factor affecting shrinkage. Influence of curing & storage conditions. Differential shrinkage.Carbonation shrinkage.Creep-Factors influencing.Relation between creep & time, nature of creep, effect of creep.

Unit – VI

Durability of concrete-significance water as an agent of deterioration. Permeability of concrete, Efflorescence.Distress in concrete structures and its causes, cuses of deterioration of concrete.

BECVE 405 T BUILDING CONSTRUCTION & MATERIAL

Objectives:

1. To prepare the students to understand components of buildings and their functions.
2. To prepare students to understand execution of various constructions activities and material.
3. To prepare students to analyse behaviour of structure under different environmental conditions.
4. To prepare students to identify & suggest rectification the various defects in civil engineering works.

Outcomes:

a. The students are able to identify components of a building.
b. The students are able to differentiate and identify types of building materials.
c. The students are able to select appropriate material for building construction.
d. The students are able to plan various construction related activities and their quality control.

Syllabus :

Unit-I :

Foundations: Necessity and types of R.C.C. foundations, Detail of Deep foundation and precast foundation in general, Details shallow foundations. Bearing capacity of soils and its assessment. PreSumptive bearing capacity values from codes. Loads on foundations. Causes of failures of foundations and remedial measures, Foundation on black cotton soils Setting out foundation trenches, excavation timbering of foundation trenches. Load bearing and framed structures.

Unit-II

Brickwork :Qualities of good bricks, classification of bricks tests on bricks as per as codes. Terms used in brickwork, commonly used types of bonds in brickwork such as header, stretcher, English andFlemish bonds, principles of construction. Reinforced brickwork, brick knogging. Parapets, copings, sills and corbels, brief introduction to cavity walls, load bearing and partition walls.Masonry construction using cement concrete blocks and clay walls, load bearing and partition walls.
Masonry construction using cement concrete blocks and clay blocks.
Precest construction : Introduction to method and materials. Precast elements likes poles, cover, jallies, stepscorbets, truss element etc.

Unit-III:

Stone Work : Stones, cutting and dressing, selection of stones types of stone masonary, principles of constructionjoints in masonary. Lifting heavy stones, common building stones in India.
Arches and Lintels : Terminology in contraction, types chajjas and canopies, pre cast Lintels & Arches.Damp Proofing : Causes and effect of dampness. Various methods of damp proofing

Damp proofing in plinth protection, New Techniques of Damp Proofing Damp Proofing in Plinth Protection,New Techniques of Damp proofing. Epoxy etc.

Unit-IV

Floors and Roofs : Floors : General principals, types and method of construction, floors finished quality, ~~testing~~ ~~floor tiles,~~ synthetic & Ceramic Tiles.

Roofs : Flat and pitches roofs, roof coverings, types AND their constructional features. Thermal Insulation

Unit-V :

Stairs : Types of stairs, functional design of stairs.
Doors and Windows : Purpose materials of construction and types.

Unit-VI :

Plastering and Pointing : Necessity, types and methods
Temporary Timbering : Centering and formwork shoring, underpining and scaffolding. Painting : White washing, colour washing and distempering new materials & Techniques.

Text book

Sr. No.	Title	Publication
1	Building Construction by Rangwala	Charotar Pub. Hou

EFFECTIVE UTILIZATION OF WASTE MATERIAL IN CONCRETE

A project submitted
in partial fulfillment for the award
of the degree of
BACHELOR OF ENGINEERING
In
CIVIL ENGINEERING
Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur

Submitted by-

Yogesh Singh
Venkatesh Vedulla
Pratik Surkar
Rahul Aggrawal
Aman Singh

Under the guidance of

Dr. S.A. DHALE
H.O.D
Department of Civil Engineering
(Guide)

Prof. Aasif M. Baig
Asst. Professor
Department of Civil Engineering
(Co-Guide)

DEPARTMENT CIVIL ENGINEERING
PRIYADARSHINI COLLEGE OF ENGINEERING
NAGPUR-440019

2017-2018

CERTIFICATE

This is to certify that the project entitled **Effective Utilization of Waste Material in Concrete** has been completed by students of B.E. (Civil Engineering) of this college, in satisfactory manner and in partial fulfillment of the requirement for the degree of bachelor of Engineering in Civil Engineering of the Rashtrasant Tukadoji Maharaj Nagpur University.

Guided by-
Dr. S.A. DHALE
(H.O.D)
(Department Of Civil Engineering)
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Co-guided by-
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Prof. Veena Ganvir
(Co-ordinator)
Dept. of Civil Engineering
P.C.E., Nagpur

Dr M.P. Singh
Principal
P.C.E. , Nagpur

ABSTRACT

The study investigated the effect of waste foundry sand and bottom ash in equal quantities as partial replacement of fine aggregates in various percentages (0–60%), on concrete. The following characteristics of the concrete were defined, i.e.: absorptivity, density, open porosity, and salt resistance. This paper reviewed some of this industrial waste like waste foundry sand, coal bottom ash. Out of these materials, maximum number of experiments has been conducted using waste foundry sand and coal bottom ash. Out of these material, maximum number of experiments have been conducted using waste foundry sand and coal bottom ash as a replacement , but still more examinations are required for other waste material as replacement of sand in concrete. Physical and chemical properties of industrial waste as well as of industrial waste concrete, in which natural sand is substituted, have been reviewed and comparisons are made between them. Utilization of industrial waste materials in concrete compensates the lack of natural resources, solving the disposal problem of waste and to find alternative technique to safeguard the nature. There are a number of industrial wastes used as fully or partial replacement of coarse aggregate or fine aggregate. This review carries out a thorough assessment about industrial waste substances, which can be adequately utilized in concrete as fine aggregate substitution.

Keywords – ***Industrial*** **solid waste; Waste management; Waste foundry sand; coal bottom ash**

1.1 INTRODUCTION

1.1 General:

High consumption of natural sources, high amount production of industrial wastes and environmental pollution are some of the factors which are responsible for obtaining new solutions for a sustainable development. A sustainable development can be achieved only if the resources efficiency increases. The resources efficiency increment is possible by the reduction in use of energy and materials. Thus solution is utilization of industrial by products or solid waste such as fly ash(FA), bottom ash(BA), waste foundry sand(WFS) use in producing concrete. These concrete technologies reduce the negative effects on economical and environmental problems of concrete industry by having low costs, high durability properties and environmental friendliness. A foundry produces metal castings by pouring molten metal into a performed mold to yield the resulting hardened cast. The metal casts include iron and steel from the ferrous family and aluminum, copper, brass and bronze from non-ferrous family. Waste foundry sand is high quality silica sand with uniform physical characteristics. It is a by-product of ferrous and non-ferrous metal casting industries, where sand has been used for centuries as a Molding material because of its thermal conductivity. Foundries successfully recycle and reuse the sand many times. When the sand can no longer be reused in the foundry, it is removed from the foundry and is termed as waste foundry sand. When coal is burned in a coal fired boiler, it leaves behind ash, some of which is removed from the bottom of the furnace known as bottom ash, and some of which is carried upward by the hot combustion gases of the furnace, and removed by collection devices (fly ash). Worldwide, coal-fired power generation presently accounts for roughly 38% of total electricity production. Coal use in some of more developed countries is statics or in decline. Significant increases in coal-fired generation capacity are taking place in many of the developing nation and large capacity increases are planned. During coal fired electric power generation three types of coal combustion products (CCPs) are obtained. These by-products; fly ash, bottom ash and boiler slag are the largest sources of industrial waste. Utilizations of CCPs in construction industry is an important issue involving reduction in technical and economic problems of plants, besides reducing the amount of solid wastes, greenhouse gas emission and conserving existing natural resources. The engineering properties and behavior of sands can be readily estimated from the literature for use in preliminary design.

Domain 2: Geotechnical Engineering and Geology

Sr. No	Name of the course that include experiential learning through Project work/ Internship	Subject Code	Domain
1	Engineering Geology	BECVE304T/P	Geotechnical Engineering and Geology
2	Geotechnical Engineering-I	BECVE 402T/P	
3	Geotechnical Engineering -II	BECVE504T	

BECVE 402 T GEOTECHNICAL ENGINEERING-I

Objectives:

1. To impart knowledge about origin and classification of soils.
2. To impart knowledge about index properties and their determination.
3. To impart knowledge about engineering properties and their determination.
4. To impart knowledge about stress distribution in soil mass.

Outcomes:

a. Students would be able to determine the index and engineering properties of the soil.
b. Students would be able to determine the suitability of foundation for a particular type of soil.
c. Students will be able to classify the soils.
d. Students would be able to evaluate the stresses in the soil mass.

Syllabus :

Unit I

1. Introduction : Formation of soil, residual & transported soil, major deposits found in India, soils generally used in practice such as sand, gravel, organic soil, clay, Betonies, , black cotton soil etc. Introduction to clay mineralogy.
2. Phases of soil: Various soil weight & volume inter-relationship. Density index, methods of determining in situ density.

Unit II

Index Properties & Their Determination, Water content, specific gravity, sieve analysis, particle size distribution curve, sedimentation analysis, Differential and free swell value, Consistency of soil, Atterberge's limits . Classification of Soil : Particle size classification, Textual classification, Unified & I.S. classificationsystem, field identification of Expansive soil, Swelling pressure.

Unit III

3. Permeability: Darcy's law & its validity, Discharge & seepage velocity, factors affecting permeability, Determination of coefficients of permeability by Laboratory and field methods, permeability of stratified soil.
4. Seepage : Seepage pressure, quick sand condition, characteristics & uses of flownets, Preliminary problems of discharge estimation in homogeneous soils, Effective, Neutral and total stresses in soil mass.

Unit IV

5. Stress Distribution : Stress distribution in soil Mass, Boussinesque equation, point load and uniformly distributed load over rectangular & circular areas, Use of Newmarks charts.

Unit V

6. Consolidation : Compression of laterally confined soil, Terzaghis 1-D consolidation theory (formation of Differential equation), Determination of coefficient of consolidation, Degree of

consolidation. Determination of preconsolidation pressure, Settlement, Rate of settlement.

7. Compaction : Mechanism of compaction, factors affecting compaction, standard & modified proctor Tests, field compaction equipments, quality control, Advance compaction Techniques, Nuclear density meter.

Unit VI

8. Shear Strength : Introduction, Mohr Coulombs theory, Drainage condition, Measurement of shear strength by direct shear test, triaxial test, unconfined compression test, vane shear test, sensitivity.

BECVE 402 P **PRACTICAL: GEOTECHNICAL ENGINEERING - I**

These shall comprise ~~of~~ ten experiments and terms work to be presented in the form of journal for assessment ofsessional and practical examination.

A. List of Experiments : Any 10

1. Moisture content and Specific gravity of soil.
2. Grain size Analysis – (Sieve Analysis).
3. Consistency limit, plastic limit and liquid limit of soil.
4. Hydrometer Analysis.
5. Constant Head Permeability test ~~of~~ or Falling Head Permeability test.
6. Consistency limit of soil (shrinkage limit).
7. Field Density by sand replacement method.
8. Field Density by core cutter method.
9. Unconfined compression test.
10. Direct shear Test.
11. Triaxial shear test (Demonstration).
12. Proctors compaction Test and Proctor needle test.

B. One field visit or one case study included in journal.

C. Use of plasticity Chart or Newmarks Chart.

Text book

Sr. No.	**Title**	**Publication**
1	Soil Mechanics & Foundation Engg. by K.R. Arora	Std. Publisher
2	Soil Mechanics & Foundation Engg.by B.C.Punmia	Laxmi Publication
3	Basic & Applied Soil Mechanics by Gopal Rajan & Rao	Newage international Pub.
4	Geotechnical Engg.by P. Raj	Dorling Kindersley Pvt. Ltd
5	Geotechnical Earthquake Engg. by Steven L. Kramer	Prentice Hall

Refrence book

Sr. No.	**Title**	**Publication**
1	Soil Mechanics & Foundation Engg by Modi	Std. Publisher
2	Soil Mechanics & Foundation Engg by V.N.S.Murthy	CBS Publisher

GEOTECHNICAL ENGINEERING-II

BECVE504T **Evaluation Scheme: (80/20)**
(L-3 Hrs/Week, T-1 Hr/Week); Total Credits- 4 **Exam Duration: 3hrs**

COURSE OUTCOMES: The students shall be able to

1. Use the knowledge of different soil exploration techniques to ascertain the properties of soil
2. To analyze the stability of natural slopes, safety & sustainability of the slopes, design of retaining structures, reinforced earth walls, etc.
3. Practice Ground Improvement Techniques.
4. Design the shallow & deep foundation.

Unit- I: GEOTECHNICAL EXPLORATION

Importance and objective of field exploration , geophysical methods and its limitations, methods of subsurface exploration, methods of boring, number, location and depth of boring, types of soil samples and samplers, principles of design of samplers, collection & shipments of samples, boring and sampling record.

Unit- II: STABILITY OF SLOPES

Causes and types of slope failure, stability analysis of infinite slopes, Taylor's stability numbers & stability charts, stability analysis of finite slope for purely C- soils and C - soils, center of critical slip circle, (Swedish circle method), slices method for homogeneous C - soil slopes with pore pressure consideration, Friction circle method, method of improving stability of slopes; types, selection and design of graded filters.

Unit- III: LATERAL EARTH PRESSURE

Earth pressure at rest, active and passive pressure; general & local states of plastic equilibrium in soil. Rankine's and Coulomb's theories of earth pressure. Effects of surcharge & submergence. Determination of Active earth pressure through graphical construction; Rebhann's and Culman's method.

Unit- IV: GROUND IMPROVEMENT

Need of ground improvement, ground improvement techniques, stabilization using lime, cement & flyash; prealoading concept, vibrocompaction/flotation, concept of sand drains, stone columns, encased stone column, concept of NPVD (natural prefabricated vertical drain) and PPVD (polymer prefabricated vertical drain). Basic concept of reinforced soil, different types of Geo-synthetics, Geo-synthetic application and functions in civil engineering

Unit- V: SHALLOW FOUNDATION

Bearing capacity of soil: Factor affecting bearing capacity, Terzaghis theory, its validity and limitation, types of shear failure in foundation soil, effect of water table on bearing capacity, (introduction to IS method, factor affecting bearing capacity, field determination of bearing capacity through plate load test and standard penetration test,

Settlement of shallow foundation: Causes of settlement, elastic and consolidation settlement, differential settlement, control of excessive settlement. (Standard penetration test, corrections for N - values to obtain design soil parameters**.)**

Unit- VI: PILE FOUNDATION

Classification of piles, constructional features of cast- in – situ & pre cast concrete piles. Pile driving methods, effect of pile driving on ground. Pile capacity by static formula & dynamic formulae, pile load test, group action of piles, spacing of piles in group, settlement of group of pile (pile group,) negative skin friction and its effect on pile capacity, general features of under reamed piles.

"EXPERIMENTAL STUDY OF THE PROPERTIES OF BLACK COTTON SOIL MODIFIED WITH LIME AND FLYASH"

A project report submitted in partial fulfillment of

The requirement of degree of

BACHELOR OF ENGINEERING IN

CIVIL ENGINEERING

Submitted by

YASH WARE

SHIVANI ALONE

REVENDRA GHAGARE

Under the Guidance of

Prof. VIKASH AGRAWAL

{B.E., M.Tech (Environmental Engg.)}

DEPARTMENT OF CIVIL ENGINEERING

PRIYADARSHINI COLLEGE OF ENGINEERING

NAGPUR- 440019

2017-2018

PRIYADARSHINI COLLEGE OF ENGINEERING

NAGPUR

CERTIFICATE

This is to certify that the work presented in this thesis entitle "**EXPERIMENTAL STUDY ON THE PROPERTIES OF BLACK COTTON SOIL MODIFIED WITH LIME AND FLYASH**" has been completed by:-

YASH WARE

SHIVANI ALONE

REVENDRA GHAGARE

Students of BE. (Civil engineering) of this institute in satisfactory manner and in partial fulfillment of the requirement for the degree of Bachelor of Engineering in Civil Engineering of the Nagpur University.

Prof. Vikash Agrawal

(Guide)

Department of Civil Engineering

Dr. S.A. Dhale

(H.O.D)

Department of Civil Engineering

Prof. Veena Ganvir

(Co-ordinator)

Department of Civil Engineering

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ABSTRACT

The study investigated the effect of waste foundry sand and bottom ash in equal quantities as partial replacement of fine aggregates in various percentages (0–60%), on concrete. The following characteristics of the concrete were defined, i.e.: absorptivity, density, open porosity, and salt resistance. This paper reviewed some of this industrial waste like waste foundry sand, coal bottom ash. Out of these materials, maximum number of experiments has been conducted using waste foundry sand and coal bottom ash. Out of these material, maximum number of experiments have been conducted using waste foundry sand and coal bottom ash as a replacement , but still more examinations are required for other waste material as replacement of sand in concrete. Physical and chemical properties of industrial waste as well as of industrial waste concrete, in which natural sand is substituted, have been reviewed and comparisons are made between them. Utilization of industrial waste materials in concrete compensates the lack of natural resources, solving the disposal problem of waste and to find alternative technique to safeguard the nature. There are a number of industrial wastes used as fully or partial replacement of coarse aggregate or fine aggregate. This review carries out a thorough assessment about industrial waste substances, which can be adequately utilized in concrete as fine aggregate substitution.

Keywords – ***Industrial*** **solid waste; Waste management; Waste foundry sand; coal bottom ash**

1.1 INTRODUCTION

1.1 General:

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Domain 3: Environmental Engineering, Hydraulics and Water Resources Engineering

Sr. No	Name of the course that include experiential learning through Project work/ Internship	Subject Code	Domain
1	Environmental Engineering – I	BECVE303T/P	Environmental Engineering, Hydraulics and Water Resources Engineering
2	Fluid Mechanics -I	BECVE503T/P	
3	Hydrology & Water Resources (HWR)	BECVE505T	
4	Fluid Mechanics -II	BECVE603T/P	
5	Environmental Engineering-II	BECVE605T	
6	Elective -I : Air Pollution And Solid Waste Management	BECVE703T	
7	Irrigation Engineering	BECVE801T	
8	Elective - III :Water and Waste Water Treatment	BECVE803T	

ENVIRONMENTAL ENGINEERING-II

BECVE605T **Evaluation Scheme: (80/20)**

(L-3 Hrs/Week, T-1 Hrs/Week); Total Credits-4 **Exam Duration: 3 hrs.**

COURSE OUTCOMES: The students shall be able to

1. Use the concept related to water & its quality, sewage, sewer, storm water, etc in its hydraulic design
2. Apply the knowledge of different components of sewer in construction, testing & maintenance of sewers,
3. To test the sample of waste water in the laboratory for physical & chemical characteristics.
4. Take-up functional planning, layout and design of water treatment plant components.
5. Take-up functional planning, layout and design of sewage treatment plant components.
6. Plan for rural sanitation provisions, perform functional design of septic tank,
7. Analyze the industrial waste water for its treatment units.
8. Make use of knowledge & effect of air pollution, solid waste in planning for its prevention and control.

Unit-I

General Aspects of Environmental Engineering – Study of waste water, black water & grey water. System of collection and conveyance of sewage- separate and combined systems, patterns of sewage collection systems. Quantity of storm water and sanitary waste water, Sewer: Types, Shapes, Hydraulic Design (Capacity, Size, Grade, etc.)

Unit - II

Construction of sewer - Shoring, Trenching and laying to grade. Sewer materials, Sewer Appurtenances - manhole street inlets, storm water overflows, inverted syphons, flushing and ventilation: House plumbing systems, sanitary fitting and appliances, traps, anti-syphonage, inspection chambers and intercepting traps. Sewage pumping - location of pumping station and types of pumps. Sewer testing and maintenance.

Unit - III

Physical and chemical characteristics of wastewater, significance of BOD, COD, BOD rate constant, Sewage treatment flow sheet, site selection for sewage treatment plant. Preliminary and primary treatment - Screens, Grit chambers, oil & grease removal. Primary settling tank (including simple design)

Unit- IV

Secondary treatment - Principle of Biological Treatment Activated sludge process, trickling filter, (Indian Standard for disposal), Methods of disposal, Sewage farming, self purification of stream (Streeter Phelp's equation, Oxygen sag curve). Recycle & reuse of sewage (Zero discharge concept). Sludge digestion, sludge drying beds

Unit - V

Rural sanitation; Pit privy, aqua privy, bio-gas recovery Septic tank including soak pit, including design problem (as per relevant I.S. Code) Sullage collection and disposal

Industrial Waste Water Treatment - Significance of Industrial Waste Water Treatment, important physical and chemical parameters, unit operations and processes (flow equalization, neutralization, adsorption, chemical and biological treatment (in brief)

Unit VI

Air pollution and solid waste: Sources, classification, Effects, prevention and control. Introduction to carbon credit system and climate change

AIR POLLUTION AND SOLID WASTE MANAGEMENT (ELECTIVE-I)

BECVE703T **Evaluation Scheme: (80/20)**
(L-3 Hrs/Week, T-1 Hrs/Week); Total Credits-4 **Exam Duration: 3 hrs**

COURSE OUTCOMES:-The students will be able to

1. Understand different aspects of air pollutants, its sources and effects on man and material etc.
2. Design controls methods and equipments for air pollution to reduce its impact on environment.
3. Understand problems arriving in handling large amount of solid waste generated ,its collection and transportation, processing and will bw able to design safe collection and disposal methods.

Unit - I

Introduction to air pollution : Definition, air pollution episodes, atmosphere & its zones.

Classification and sources of air pollutants, Standards for air pollution (as per Indian Standards and CPHEEO). Effects of air pollutants on man, and materials.

Unit - II

Meteorological parameters and Air sampling: Primary and secondary parameters, atmospheric stability, plume behavior. Wind rose diagram, wind data analysis & wind impact area diagram, Stack height determination.

Air sampling and measurement : ambient air sampling and stack sampling, collection of particulate and gaseous pollutants, site selection criteria methods of estimation.

Unit – III pollution control

Air pollution controls methods and equipments ; Principles of control methods for particulates and gaseous pollutants, gravity settlers, electrostatic precipitators, bag filters, cyclones and wet scrubbers, (adsorption, absorption, incineration, condensation)

Automobile exhaust :Introduction to Pollution due to diesel & petrol engines,

Noise Pollution : Sources, ill effects, control measures.

Unit - IV

Introduction to solid waste management.(SWM) : Structure , necessity and responsibility,

Sources, Quantity and quality, Sources of solid waste, classification and components, physical and chemical characteristics, per capita contribution, sampling and analysis.

Unit – V : Collection and Transportation methods:

Collection and transportation of solid waste: Method of collection, equipment used for collection and transportation, transfer stations, optimization of transport route.

Solid waste processing : Methods of processing, choice of methods, merits and demerits of various methods, gas control measures.3R concept

Unit – VI : Disposal methods:

Composting of waste, methods of composting, factors affecting composting

Sanitary land filling : Site requirements, methods, leachate management., control of gases.

Incineration: Principles of incineration, types of incinerators, advantages and disadvantages.,3T Diagrams

REFERENCE BOOKS

1. M.N. Rao & H.V.N.Rao, " Air Pollution", Tata McGraw Hill Publishing Co. Ltd.
2. C.S.Rao, "Environmental Pollution Control Engineering", Wiley Estern Ltd. New Delhi.
3. Stern A.C., "Air Pollution" Vol I to X.
4. A. D. Bhide, & Sunderesan B.B., "Solid Waste Management in developing countries, INSDOC, N. Delhi.
5. Tchobanoglous, "Integrated Solid Waste Management in Engineering principles and management isssues,
6. K.V.S.G. Murlikrishna" Air Pollution" JTNU, Kakinada

"STUDY OF MODERN SANITATION SYSTEM FOR MANDAV (GHORAD) VILLAGE, TH-HINGNA, DIST-NAGPUR" (MAHARASHTRA)

A Project Report Submitted In partial fulfillment of the requirement for the award of the Degree Of

BACHELOR OF ENGINEERING

IN

CIVIL ENGINERRING

RASHTRASANT TUKDOJI MAHARAJ NAGPUR UNIVERSITY

NAGPUR

Submitted by

Prachi Gaurkar

Digvijay Raut

Piyush Pande

Under the guidance of

Prof. VIKASH AGRAWAL

(B.E.,M.Tech(Environmental Engg.)

(Dept. of Civil Engineering)

DEPARTMENT OF CIVIL ENGINEERING

PRIYADARSHINI COLLEGE OF ENGINEERING,

SESSION 2017 – 2018

CERTIFICATE

This is certify the work presented in this project entitled **"STUDY OF MODERN SANITATION SYSTEM FOR MANDAV (GHORAD) VILLAGE, TH-HINGNA, DIST-NAGPUR"** has been completed by Prachi Gaurkar,Digvijay Raut,Piyush Pande, students of B.E. (Civil Engineering) of this institution in satisfactory manner and in partial fulfilment of the requirements for the award of the degree of bachelor of engineering in civil engineering of the Rashtrasant Tukdoji Maharaj Nagpur university, Nagpur during year 2017-2018.

Prof. Vikash Agrawal
(Guide)
Civil Dept.
PCE, Nagpur.

Dr. S. A. Dhale
Vice Principal,
H.O.D.Civil Dept.
PCE, Nagpur.

Prof.Veena Ganvir
(Co-Ordinator) Civil Dept.
PCE, Nagpur

Dr. M. P. Singh
Principal
PCE, Nagpur.

1.1 INTRODUCTION

1.1 General:

High consumption of natural sources, high amount production of industrial wastes and environmental pollution are some of the factors which are responsible for obtaining new solutions for a sustainable development. A sustainable development can be achieved only if the resources efficiency increases. The resources efficiency increment is possible by the reduction in use of energy and materials. Thus solution is utilization of industrial by products or solid waste such as fly ash(FA), bottom ash(BA), waste foundry sand(WFS) use in producing concrete. These concrete technologies reduce the negative effects on economical and environmental problems of concrete industry by having low costs, high durability properties and environmental friendliness. A foundry produces metal castings by pouring molten metal into a performed mold to yield the resulting hardened cast. The metal casts include iron and steel from the ferrous family and aluminum, copper, brass and bronze from non-ferrous family. Waste foundry sand is high quality silica sand with uniform physical characteristics. It is a by-product of ferrous and non-ferrous metal casting industries, where sand has been used for centuries as a Molding material because of its thermal conductivity. Foundries successfully recycle and reuse the sand many times. When the sand can no longer be reused in the foundry, it is removed from the foundry and is termed as waste foundry sand. When coal is burned in a coal fired boiler, it leaves behind ash, some of which is removed from the bottom of the furnace known as bottom ash, and some of which is carried upward by the hot combustion gases of the furnace, and removed by collection devices (fly ash). Worldwide, coal-fired power generation presently accounts for roughly 38% of total electricity production. Coal use in some of more developed countries is statics or in decline. Significant increases in coal-fired generation capacity are taking place in many of the developing nation and large capacity increases are planned. During coal fired electric power generation three types of coal combustion products (CCPs) are obtained. These by-products; fly ash, bottom ash and boiler slag are the largest sources of industrial waste. Utilizations of CCPs in construction industry is an important issue involving reduction in technical and economic problems of plants, besides reducing the amount of solid wastes, greenhouse gas emission and conserving existing natural resources. The engineering properties and behavior of sands can be readily estimated from the literature for use in preliminary design.

ABSTRACT

The study investigated the effect of waste foundry sand and bottom ash in equal quantities as partial replacement of fine aggregates in various percentages (0–60%), on concrete. The following characteristics of the concrete were defined, i.e.: absorptivity, density, open porosity, and salt resistance. This paper reviewed some of this industrial waste like waste foundry sand, coal bottom ash. Out of these materials, maximum number of experiments has been conducted using waste foundry sand and coal bottom ash. Out of these material, maximum number of experiments have been conducted using waste foundry sand and coal bottom ash as a replacement , but still more examinations are required for other waste material as replacement of sand in concrete. Physical and chemical properties of industrial waste as well as of industrial waste concrete, in which natural sand is substituted, have been reviewed and comparisons are made between them. Utilization of industrial waste materials in concrete compensates the lack of natural resources, solving the disposal problem of waste and to find alternative technique to safeguard the nature. There are a number of industrial wastes used as fully or partial replacement of coarse aggregate or fine aggregate. This review carries out a thorough assessment about industrial waste substances, which can be adequately utilized in concrete as fine aggregate substitution.

Keywords – ***Industrial*** **solid waste; Waste management; Waste foundry sand; coal bottom ash**

CHAPTER 1

1.1 INTRODUCTION

A large section of Indian population lives in villages and is mainly engaged in agriculture. They belong to weaker section of the society. There is a definite trend of rural population migrating to the urban areas due to lack of employment opportunities, low earnings, insufficient means of transport and insanitary living conditions. The latter is mainly responsible to repel the educated youth from working in rural areas. One source of insanitary condition in rural areas is the drainage of waste water from bathing and cooking areas of dwellings over the kutcha roads and lanes having inadequate slopes. The situation is further aggravated due to the movements of carts and animals which result in the creation of pot holes and ditches that gets filled up with dirty stagnant water. The mosquitoes and flies find good breeding centres in these places and spread diseases.

Some of the village roads are brick paved with drains for waste water disposal. But these have not served the required purpose due to improper slopes, insufficient maintenance and unpredictable flow of water. Rural dwellings having their own source of water supply like hand pumps discharge more water on the streets. Furthermore, the agricultural waste and domestic refuse collect in drains obstructing the flow of water and ultimately, all these things appear on the streets.

Some of the village panchayats have suggested individual pits for collection of waste water and its disposal by intermittent sprinkling on large areas, either in the courtyard or on the streets. The villagers adopt this practice for some time, but their enthusiasm dies with time. A few progressive farmers have access to the technical know-how and capacity to invest finance to make large sized soakage pits filled with brickbats (to dispose of water underground). These are frequently choked with ash and soil used by the villagers to clean their utensils. This requires cleaning of the pit and involves considerable expenditure. The high cost of construction and costly maintenance make it beyond the reach of the poor.

Domain 4: Structural Engineering

Sr. No	Name of the course that include experiential learning through Project work/ Internship	Subject Code	Domain
1	Strength of Materials	BECVE302T/P	Structural Engineering
2	Structural Analysis – I	BECVE 401T/P	
3	Structural Analysis -II	BECVE501T/P	
4	Reinforced Cement Concrete (RCC) Structures	BECVE502T/P	
5	Steel Structures	BECVE601T/P	
6	Advanced Concrete Structures	BECVE701T/P	
7	Elective -I : Earthquake Resistant Design of Structure	BECVE703T	
8	Elective - III : Advanced Reinforced Cement Concrete Design	BECVE803T/P	

EARTHQUAKE RESISTANT DESIGN OF STRUCTURE (ELECTIVE-I)

BECVE703T **Evaluation Scheme: (80/20)**
(L-3 Hrs/Week, T-1 Hrs/Week); Total Credits-4 **Exam Duration: 3 hrs**

COURSE OUTCOMES: The Students will be able to

1 Understand the different aspects related to seismology and terms related to it
2 Analyze earthquake loading effect on structures.
3 Perform the analysis and design of structures against earthquake loading.
4 Analyze multi-storey structure using different methods like Equivalent Static Lateral Load Method and Response Spectrum Method
5 Understand the different seismic retrofitting techniques and its implementation.
6 Use the knowledge in practical situation.

Unit I :

Engineering seismology, Elastic rebound theory, Theory of plate tectonics and movement of Indian plate. Seismic waves. Seismic intensity, Richter scale, Introduction on to tsunami. Seismic zoning maps of India. Response spectra. Strong motion characteristics.

Unit II :

Earthquake effects on the structures, classification of loads,. Seismic damages during past earthquakes, effect of irregularities and building architecture on the performance of RC structures

Unit III :

Seismic methods of analysis, seismic design methods, Mathematical modeling of multistoried RC buildings with modeling of floor diaphragms and soil foundation, (Winkler model.)

Unit IV :

Design of multi – story RC structure foundation as per latest IS 1893 by Equivalent static lateral load method and Response spectrum Method. Introduction to Time history method. Concept of Capacity based design of soft story RC building.concept of shear walls. Ductile detailing as per latest IS :13920

Unit V :

Seismic retrofitting, Source of weakness in RC framed building, Various retrofitting techniques, Conventional and non- conventional methods, Comparative study of various methods and case studies.

Unit VI :

Introduction to Base Isolation system. IS code provision for retrofitting of masonry structures, failure modes of masonry structures and repairing techniques.

STUDY OF FAILURE OF PILE FOUNDATION DUE TO EARTHQUAKE & ITS REMEDIAL MEASURES

A project submitted in partial fulfillment for the award of the degree of

BACHELOR OF ENGINEERING

In

CIVIL ENGINEERING

Rashtrasant Tukodoji Maharaj Nagpur University, Nagpur

Submitted by-

1.Saurabh Mani Chaturvedi

2.Yashraj Singh

3. Akhil Batavia

4. Chandrashekhar Das

Under the guidance of

Dr. S.A. DHALE

H.O.D

Department of Civil Engineering

(Guide)

DEPARTMENT CIVIL ENGINEERING

PRIYADARSHINI COLLEGE OF ENGINEERINING

NAGPUR-440019

2017-2018

PRIYADARSHINI COLLEGE OF ENGINEERINING

NAGPUR

CERTIFICATE

This is to certify that the project entitled

STUDY OF FAILURE OF PILE FOUNDATION DUE TO EARTHQUAKE & ITS REMEDIAL MEASURES.

Has been completed by

Saurabh Mani Chaturvedi

Yashraj Singh

Akhil Batavia

Chandrashekhar Das

Students of B.E. (Civil Engineering) of this college, in satisfactory manner and in partial fulfillment of the requirement for the degree of bachelor of Engineering in Civil Engineering of the Rashtrasant Tukadoji Maharaj Nagpur University.

Dr. S.A. Dhale
Guide & H.O.D
Dept. of Civil Engineering
PCE, Nagpur

Dr. M.P. Singh
Principal
PCE Nagpur

ABSTRACT

The collapse of pile foundations has been observed in the majority of recent strong earthquakes. This paper reviews the current understanding of pile failure mechanism, its causes explained by many investigators. A hypothetical model of six floor building is analyzed using STAAD-PRO Software twice. Firstly building is analyzed considering no earthquake, & then it was analyzed considering earthquake effects for various earthquake parameters. From both cases reactions at column bases was obtained from STAAD result. Then two hypothetical cases of foundation soil condition were taken. First soil condition was that soil is Clayey soil (Black Cotton soil) up to greater depth, second soil condition was that soil strata comprises of 6m thick clay layer over a deep liquefiable sandy soil layer. For each soil condition & loading coming on column bases RCC design of bored cast in situ pile has been done as per IS 456 : 2000, IS 2911 (Part 1/ Sec 2) : 2010, IS 13920 : 1993 & IS 1893 (Part 1) : 2002.Ultimate vertical load bearing capacity of pile analysis is done by static analysis based on c-ϕ values in which bearing capacity factors suggested by IS 2911, Hansen & Terazaghi has been used. Conventional analysis of a single pile or pile group without considering the mat foundation along with piles results in severe tilting or settlement of the structure, eventually leading to complete collapse of structure. It has been concluded that the foundation mat over the non- liquefied crust shares a considerable amount of load of the super structure & hence resist the complete collapse of structure. In such soil use of under-reams also result in providing good stability.

1.1 GENERAL :

When the soil at or near the ground surface is not capable of supporting a structure, deep foundations are required to transfer the load to deeper strata. Pile foundations are commonly used to transfer axial loads from a superstructure to the ground in cases where: (a) the structural loads are very high; (b) where the surface soil or soils at shallow depths cannot carry the imposed loads. The most common types of the foundations are piles, piers & caissons. A deep foundation is generally much more expansive than a shallow foundation. It should be adopted only when shallow foundation is not feasible. Concrete piles are generally used for major construction work. Piles are generally classified based on method of installation as follows- 1) Driven piles & 2) Bored & cast in situ piles. Piles transfer the load in to soil in two ways. Firstly, through the tip in compression, termed as "end bearing" or "point bearing"; secondly, by shear along the surface termed as "skin friction".

Piles are used to support structures in areas of seismic risk especially where the soils can liquefy due to the seismic shaking. Following a moderate to strong earthquake in liquefiable areas, it has been observed that piled foundation suffer tilting along with settlement. Failures and/or collapse (excessive tilting) of pile-supported buildings in liquefiable soils are still observed after most major earthquakes, see for example the reconnaissance survey following the 1964 Niigata earthquake, the 1995 Kobe earthquake, the 2001 Bhuj earthquake or the 2004 Sumatra earthquake.

The major problem concerning the seismic resistant design of pile foundations is the presence of liquefiable soils in the foundation region. Liquefiable soil layers alter the pile capacity and also can cause large lateral loads on pile foundations. Piles driven through a weak, potentially liquefiable, soil layer to a stronger layer not only have to carry vertical loads from the superstructure, but must also be able to resist horizontal loads and bending moments induced by lateral movements if the weak layer liquefies. Thus, it is very essential to investigate the liquefaction susceptibility of sub surface soil layers before proceed for the seismic design. Semi empirical method recommended by Idriss and Boulanger (2004) is being followed to evaluating the liquefaction potential.

Domain 5: Transportation Engineering

Sr. No	Name of the course that include experiential learning through Project work/ Internship	Subject Code	Domain
1	Transportation Engineering – I	BECVE 403T/P	Transportation Engineering
2	Transportation Engineering - II	BECVE705T	
3	Elective - II : Pavement Analysis And Design	BECVE802T	

BECVE 403 T TRANSPORTATION ENGINEERING – I

Objectives:

1. To educate the students on the various components of Highway Engineering and Bridge engineering.
2. To expose the students to highway planning, engineering surveys for highway alignment, Design of Geometric Elements of Highways and Urban roads, Flexible and Rigid pavements design, Traffic Engineering, traffic safety analysis, transportation planning and Highway material testing.
3. To make them understand desirable properties and testing procedures of highway materials as per BIS standard and Indian Roads Construction (IRC) for various practices adopted for construction.
6. To educate students on the various components of Pavements.
7. It exposes the student to learn types of pavements, components and functions of pavements, types of highway vehicles and aircrafts, IRC loadings, equivalent axle loading and load factors, Flexible and Rigid design methods, etc.

Outcomes:

a. A person with broad vision and complete knowledge of design and construction practices in highway engineering and pavement.
b. The student will be able to test highway materials and draw appropriate conclusion.
c The student will be able to maintain and propose measurement.
d. The student will be able to undertake Traffic studies.

Syllabus:

Unit -I

Highway Development & Planning: Principles of Highway planning, Road development in India Classification of roads, network patterns, Planning, Surveys.
Highway Alignment: Requiremnts, Engineering Surveys.
Highway Materials: Properties of sub grade and pavement component materials, Tests on sub grade soils, aggregates and bituminous materials. Application of Geosynthetics.

Unit - II:

Highway Geometric Design: Cross Section elements, carriageways, camber, stopping & overtaking sight distances Horizontal alignment- Curves, design of super elevation, widening, transition curves, vertical curves.

Unit- III

Pavement Design: Types of pavements & characteristic, Design parameters, Axle & Wheel load, tyre pressure, ESWL for dual Wheels, repetitions, Group Index & IRC method of flexible pavement design. Analysis of load & temperature stresses of rigid pavement, joints

Highway Construction & Maintenance: Earthen/Gravel road, Water Bound Macadam, Wet Mix macadam, Bituminous pavement, Cement Concrete pavement. Pavement failures, Pavement evaluation, Maintenance and strengthening measures.

Unit-IV

Traffic Engineering: Traffic characteristics (Road User, Driver and Vehicular characteristics)
Traffic Studies (Volume studies, speed studies, parking studies and accident studies.)
Traffic Safety (Causes and types of accidents, Use of intelligent transportation system)

Unit- V

Bridge Engineering: Classification, identification and site selection.
Flood discharge, waterways, scour depth, economic span.
IRC classification of Loads, Forces, Stresses: IRC Specification & code of practices, Critical combinations.

Unit-VI

Sub-Structure: Types of foundations & their choice, Open, Pile and well foundation, pneumatic Caissons, cofferdams. Abutment, Piers & Wing walls, Their types general design principles (empirical.)

Super Structure: Different structural forms
Rating and Maintenance: Methods & Techniques of rating of existing bridges Inspection, Repairs, maintenance, corrosion-causes and prevention, Aesthetics.

ADVANCED TRAFFIC ENGINEERING (ELECTIVE-I)

BECVE703T **Evaluation Scheme: (80/20)**
(L-3 Hrs/Week, T-1 Hrs/Week); Total Credits-4 **Exam Duration: 3 hrs**

COURSE OUTCOMES: The Students will be able to

1 Use the knowledge to carry out traffic studies and give solutions to planning of transportation system.
2 Apply basic principles for the geometric design of roads and other traffic controlling devices
3 To understand the parking systems, riding quality standards, traffic safety and accident study and suggest the solutions to the practical problems.

Unit – I

Elements of Traffic Engineering : Road, Road user & Road Vehicle Characteristics, problems related to heterogeneous traffic.

Traffic Surveys and Data collection : Speed, journey time and delay studies, methods of measurement of spot speed, headway, gaps, volume / capacity surveys, speed, volume-density interrelations, measurements of running and journey speeds, origin-Destination surveys, necessity, survey methods, sample size, data analysis & Presentation. Highway capacity, level of service concepts.

Unit – II

Statistical methods : Binomial, Normal Poisson, Probability. distributions, Discrete and continuous, variable application to traffic flow, Test of significance – Chi-square & 'T' test, (Regression analysis)

Unit – III

Traffic Design : Hierarchy of urban roads and their standards, Diverging, merging crossing weaving maneuver's conflict points, types of road junctions ,channelization of traffic flow, traffic rotary design, Grade separated inter-sections, Drive ways, design of pedestrian facilities, Design criteria for separate cycle track, Exclusive Bus lane, (Bus stop locations and facilities.) introduction to Intelligent Transport system

Unit – IV

Traffic Control Devices : Traffic signs, road markings, traffic signals, design of signalized intersections & signaling systems,(Queuing)Theory, Traffic control aids, and street furniture.

Introduction to transport systems, Traffic controls for Expressway.

Unit – V

Traffic Safety, **Enforcement and Education :**

Elements responsible for accidents, situations in India, Collection and interpretation of accident data and recording in Standard form, Analysis of Accidents. Traffic regulation and E`s of traffic management, (vulnerable road user safety, Introduction to Regulation Act.)

Motor Vehicle Acts and Rules, traffic Education, traffic Controls on National Highways

Unit – VI

Urban Traffic: Present traffic scenario. Urban transportation problems, mixed traffic flow, head and administrative set up of traffic cells at various levels, co-ordination with other transport modes.

Parking : Parking surveys, on and off street parking, parking systems, parking demand, design of off-street parking lot, underground & multistoried parking.(Truck lay bye, bus lay bye, facilities to parking and way side amenities.

Students should complete the assignment based on

1. ***Accident data collection***
2. ***Speed, Volume and Parking studies.***
3. ***Data collection for Rotary design and traffic signal.***

Reference Book:

1. Traffic Flow fundamentals: Adolf D.MayVIII
2. Traffic Engineering :Mcshane and Roess
3. Traffic Engineering and Transport Planning : L.R. KadyaliI
4. Principles of Transportation Engineering :PathaChakraborty and Animesh Das III
5. Traffic Flow Theory *by* Drew, D.R., McGraw- Hill Book Co., New York.VII
6. Highway Engg*by*S.K.Khanna& C.E.G. Justo, Nem Chand Bros., Roorkee.IV
7. Traffic Engg. *by* Matson, T.M., Smith, W.S. and Hurd, F.W., McGraw- Hill Book Co., New York.VI
8. principles of traffic engg. Garber &Hoel. II

ANALYSIS AND MODELLING OF HETEROGENEOUS TRAFFIC IN NAGPUR CITY (NH-07)

A project submitted in partial fulfillment for the award of the degree of

BACHELOR OF ENGINEERING

In

CIVIL ENGINEERING

Rashtrasant Tukodoji Maharaj Nagpur University, Nagpur

Submitted by-

1.AYUSH MEGHARE

2.RAJSHRI BARMATE

3.PRASHANT SHARMA

4.DEVENDRA KARLEKAR

5.RAVIRANJAN PATEL

Under the guidance of

Prof. Vishal Ghutke
Asst. Professor
Department of Civil Engg.
(Guide)

Prof. Roshani Dhapudkar
Asst. Professor
Department of Civil Engg.
(Co-Guide)

DEPARTMENT OF CIVIL ENGINEERING

PRIYADARSHINI COLLEGE OF ENGINEERINING

NAGPUR-440019

2017-2018

APRIL 2018

PRIYADARSHINI COLLEGE OF ENGINEERINING

NAGPUR

CERTIFICATE

This is to certify that the project entitled **"Analysis and Modelling of Heterogeneous Traffic in Nagpur City (NH-07)"** has been completed by **Ayush Meghare ,Rajshri Barmate ,Prashant Sharma ,Devendra Karlekar ,Raviranjan Patel ,** students of B.E(Civil Engineering) of this college, in satisfactory manner and in partial fulfillment of the requirement for the degree of Bachelor of Civil Engineering of the Rashtrasant Tukadoji Maharaj Nagpur University .

Prof. Vishal Ghutke
(Guide)
Department of Civil Engineering

Prof. Roshani Dhapudkar
(Co-Guide)
Department of Civil Engineering

Prof. Veena Ganvir
(Co-ordinator)
Department of Civil Engineering

Dr. S.A. Dhale
Vice-Principal & H.O.D ,
Department of Civil Engineering
PCE, Nagpur

Dr. M.P. Singh
Principal
PCE, Nagpur

ABSTRACT

Mixed or heterogeneous traffic flow is defined as traffic stream containing various vehicles either motorized or non-motorized. Indian roads are among the most motorized in the world as it claim over 1.5 lakh lives each year and most of it is due to improper modeling of traffic parameter. Indian roads are design on the equation which are followed in foreign countries but the behavior of traffic flow in foreign countries is homogeneous and Indian traffic is heterogeneous. In order to understand the exact meaning of mixed traffic is, it is important to understand the traffic flow itself. Traffic flows occur because of the intersection between its components comprising land use, road infrastructure and vehicles.

This project based on Heterogeneous traffic in Nagpur . First we observed the behavior of the traffic i.e. Homogeneous and Heterogeneous traffic and found that the behavior of Indian traffic is heterogeneous . For that we select the section of NH-07 near MIHAN bridge , Nagpur. We recorded the video of traffic stream of NH-07 and analyze the data to study the different traffic parameters such as , speed ,flow and density . Then we studied the traffic parameters such as speed ,flow and density, and their relation between speed ,flow and density. We get the different relationship between speed flow and density which was then compared with standard fundamental diagrams given by Highway Capacity Manual (HCM) . From this graph we get new equations for Heterogeneous traffic for that section of road i .e on NH-07, Nagpur by using the SPSS software. This model is helpful for road planning and traffic Parameters management to reduce the jam density and accident on the highways and increase the safety for road users.

Keywords :- Density, Flow, Heterogeneous traffic , Speed, , SPSS Software

Chapter 1

INTRODUCTION

Indian roads are among the most motorized in the world as it claim over 1.5lakh lives each year and most of it is due to improper modeling of traffic parameter. Indian roads are design on the equation which are followed in foreign countries but the behavior of traffic flow in foreign countries is homogeneous and Indian traffic is heterogeneous. Mixed or heterogeneous traffic flow is defined as traffic stream containing various vehicles either motorized or non-motorized. In order to help understand what the exact meaning of mixed traffic is, it is important to understand the traffic flow itself. Traffic flows occur because of the intersection between its components comprising land use, road infrastructure and vehicles.

Traffic flow defined as "The movement of pedestrian, cyclist and motorized vehicle along routes". Moreover motorized vehicles are classified into five groups i.e. two wheelers, cars, buses, truck, commercials vehicles. In contrast to (TRB-TRANSPOTATION REASERCH BOARD COMMITTIES) classify motorized vehicle into six classes i.e. cars, trucks, vans, buses, recreational vehicles and motorcycles.

Based on the above explaination the definition of mixed traffic is closer to various transport modes or types of vehicles available in the road segments. Different types of vehicle will have different characteristics affected by the environment surrounding the road. Such characteristics play a key role in the analysis of traffic flow characteristics, road capacity and road pavement. The characteristics include the physical properties of vehicles (i.e. dimensions and weight) and also the operation of the vehicle i.e. speed and movement. Therefore, the vehicle standard is needed in the analysis.

Understanding traffic behavior requires a thorough knowledge of traffic stream parameter and their mutual relationship. The traffic stream parameter provide information regarding the nature of traffic flow, which help the analyst in detecting any variation in flow characteristics the fundamental parameter of traffic flow are:-

INDUSTRIAL CASE STUDY & PROJECT SEMINAR

BECVE706P **Evaluation Scheme: (50-Internal/50-External) (P-3 Hrs /Week); Total Credits-3**

Industrial Case Study

The student is expected to prepare Mini project report on the basis of data collected in Summer Training (ST-2) of 3 / 4 Weeks and submit detailed report .

Project & Seminar

This includes preparation of preliminaries for the project work to be under taken in 8th Semester.

1. Finalizing the title of the Project .
2. Literature Survey
3. Collection of Data
4. Scope of the project

Each group shall deliver seminar on the work done during the semester. In addition student will deliver one more seminar on the topic finalized by him with the consent of his guide.

AN INTERNSHIP REPORT OF CONSTRUCTION WORKS FOR
RESIDENTIAL COMPLEX/HOUSE
SUBMITTED TO

PRIYADARSHINI COLLEGE OF ENGINEERING, NAGPUR

IN

DEPARTMENT OF CIVIL ENGINEERING

BY

Shivani Singh

Priyanka Gour

UNDER THE GUIDANCE OF

Dr. Manoj Kumar Chourasia

(M/s. Advanced Metal Scan Industries)

PRIYADARSHINI COLLEGE OF ENGINEERING,
NAGPUR-441019

2017-2018

CERTIFICATE

Certified that the summer internship project report "Civil Engineering Construction woks for Residential Complex/ House" the Project "Civil Engineering Construction woks for Residential Complex/ House" is the bonafide work of " Priyanka Gour" of the candidate, roll no 27 and section B" 3rd year B.E. in civil Engineering of Priyadarshini College of Engineering,

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1) Foundation:

1.1 Foundation is the base of any structure. Without a solid foundation, the structure would not hold for long. We have to be very cautious with the design of foundations because our entire structure rests on the foundation. The job of a foundation is to transfer the loads of the building safely to the ground.

1.2 **Laying of Column Footing Reinforcement Foundation**

The strength of the foundation determines the life of the structure. The design of foundation depends on the type of soil, type of structure and its load. Higher the load bearing capacity of the soil, the larger the load it could safely carry.

1.3 **Foundations are basically divided into Shallow Foundations and Deep Foundations.**

In this residential building construction designer has consider the Column Footing Design for a shallow foundation.

1.4 **Reinforced Concrete Footings**

Footing comprises of the lower end of a column, pillar or wall which enlarged with projecting courses to distribute load.

Footings shall be designed to sustain the applied loads, moments and forces and the induced reactions and to ensure that any settlement which may occur shall be as uniform as possible and the safe bearing capacity of soil is not exceeded.

In sloped or stepped footings, the effective cross-section in compression shall be limited by the area above the neutral plane, and the angle of slope or depth and location of steps should be such that the design requirements are satisfied at every section.