Department of Civil Engineering

Date 20/09/2023 & Time 11:00 am

Venu: Online Mode

CONTENTS

CONSITUTION OF BOARD OF STUDIES

Sr. No.	Nomenclature	Designation
1.	Dr.Jaspal Singh, Professor Dept. of Civil Engineering, PAU, Ludhiana	Member B.O.S.
2.	Dr. G.S. Bath, Professor, Dept. of Civil Engg., GZS Campus College of Engg. & Tech., Bathinda	Member B.O.S.
3.	Er. Inderjeet Singh Bath, Director Geomedia Engg. and Consultancy Services, Bathinda	Member B.O.S.
4.	Er. Sidhant Chopara, Alumni Dept. of Civil Engg., SBSSTC, Mohali (J.E., GLADA)	Member B.O.S.
5.	Dr. Bohar Singh, Associate Prof., Dept. of Civil Engg., SBSSU, Ferozepur	Member B.O.S.
6.	Dr. Parampreet Kaur, Assistant Prof., Dept. of Civil Engg., SBSSU, Ferozepur	Member B.O.S.
7.	Dr. Gurpreet Singh, Assistant Prof., Dept. of Civil Engg., SBSSU, Ferozepur	Member B.O.S.
8.	Dr. Dapinder Deep Singh, Assistant Prof.& Head, Dept. of Civil Engg., SBSSU, Ferozepur	Chairman

Agenda Item No. 3.1 **Conformation of the Minutes of Meeting of 2nd meeting of Board of Studies of Dept. of Civil Engineering.**

The approved minutes of meeting were circulated to all B.O.S. members on dated 130/07/2023 and all members signed the minutes of meeting (Annexure-I, Page No. 5 to 6)

The approval of minutes of meeting of 2nd meeting of Board of Studies are placed for conformation please.

Agenda Item No. 3.2 **To report action taken o the decisions of the 2nd meeting of Board of Studies of Dept. of Civil Engineering.**

Agenda Item No. 2.1 Approval regarding scheme of 3rd to 8th semester along with open electives and Syllabus of 3rd semester of Batch 2022 and onwards.

Decision: The item has been rectified as discussed and approved.

Action: Decision Implemented.

Agenda Item No. 2.2 Regarding starting six months certificate course on Testing of Building Materials

Decision: Item has been approved as proposed.

Action: Decision Implemented.

Agenda Item No. 3.3 **Approval regarding Scheme of M. Tech. Transportation Engineering (Part-Time) 1st to 6th semester and syllabus of 1st semester of Batch 2023 and onwards of SBSSU, Ferozepur**

The scheme of M.Tech. Transportation Engineering (Part-Time) Batch 2023 and onwards from 1st to 6th semesters along with the skeleton and the syllabus of 1st semester. The detail of scheme and syllabus is attached as (Annexure-II, Page No. 7-18). Skeleton is attached as Annexure-III, Page No. 19.

This item is placed before BOS for approval please.

Agenda Item No. 3.4 **Approval regarding Ph.D. course work syllabus of department of Civil Engineering.**

Civil department is going to start a Ph.D. programme. The structure/nature of the subjects taken for the course work was approved by university is attached as Annexure-IV, Page No. 20-22. Syllabus of Ph.D. course work is attached as Annexure-V, Page No. 23-35.

This item is placed before BOS for approval please.

Annexure-I

Shaheed Bhagat Singh State University, Ferozepur

Department of Civil Engineering

Minutes of Meeting

2nd meeting of Board of Studies was held on 13/07/2023 in the office of Head, Department of Civil Engineering and the following decisions were taken unanimously.

Agenda Item No: 2.1	Approval regarding scheme of 3rd to 8th semester along with open electives and Syllabus of 3rd semester of Batch 2022 and onwards.
Decision:	The item has been rectified as discussed and approved.
Agenda Item No. 2.2	Regarding starting six months certificate course on Testing of Building Materials
Decision:	Item has been approved as proposed.

Dr.Jaspal Singh, Professor
Dept. of Civil Engineering, PAU, Ludhiana

Dr. G.S. Bath, Professor, Dept. of Civil Engg., GZS Campus College of Engg. & Tech., Bathinda

Er. Inderjeet Singh Bath, Director
GeomediaEnggLand Consultancy Services, Bathinda

Dr. Bohar Singh, Associate Prof., Dept. of Civil Engg., SBSSU, Ferozepur

Dr. Gurpreet Singh, Assistant Prof.,
Dept. of Civil Engg., SBSSU, Ferozepur

Dr. Dapinder Deep Singh, Assistant Prof. & Head, Dept. of Civil Engg., SBSSU, Ferozepur

Annexure-II

M.Tech. Transportation Engineering (Part-Time)

Scheme and Syllabus

Batch 2023and Onwards

Department of Civil Engineering

Semester 1st									Total Credits=9	
Sr. No.	Category	Subject Code	Course Title	Contact Hours			Maximum Marks		Total Marks	Credits
				L	T	P	Internal	External		
1.	Core Subject	MTTE-101	Advanced Traffic Engineering	3	0	0	40	60	100	3
2.	Core Subject	MTTE-102	Advanced Soil Engineering	3	0	0	40	60	100	3
3.	Department Elective	MTTE-111	Reinforced Soil Design & Construction	3	0	0	40	60	100	3
		MTTE-112	Transportation Economics & Finance)							
		MTTE-1113	Transportation & Environment							
4.	Mandatory (Non-Credit)	SBS101C	Introduction to Shaheed Bhagat Singh and his co-patriots	S/US						
Total				**9**	**0**	**0**	**120**	**180**	**300**	**9**

Semester 2nd									Total Credits=24	
Sr. No.	Category	Subject Code	Course Title	Contact Hours			Maximum Marks		Total Marks	Credits
				L	T	P	Internal	External		
1	Core Subject	MTTE-201	Highway Construction Material and Methods	3	0	0	40	60	100	3
2	Core Subject	MTTE-202	Application of GIS in Transportation Engineering	3	0	0	40	60	100	3
3	Core Subject	MTTE-203	Pavement Materials Testing Laboratory	0	0	2	30	20	100	2
Total				**6**	**0**	**2**	**110**	**140**	**300**	**8**

Semester 3rd									Total Credits=24	
Sr. No.	Category	Subject Code	Course Title	Contact Hours			Maximum Marks		Total Marks	Credits
				L	T	P	Internal	External		
1	Core Subject	MTTE-301	Transportation System Planning & Management	3	0	0	40	60	100	3
2	Core Subject	MTTE-302	Advanced Foundation Engineering	3	0	0	40	60	100	3
3	Department Elective	MTTE-311	Road Safety & Management	3	0	0	40	60	100	3
		MTTE-312	Sustainable Transportation Systems							
		MTTE-313	Road Safety Engineering and Auditing							
Total				**9**	**0**	**0**	**120**	**180**	**300**	**9**

Semester 4th									Total Credits=10	
Sr. No.	Category	Subject Code	Course Title	Contact Hours			Maximum Marks		Total Marks	Credits
				L	T	P	Internal	External		
1	Core Subject	MTTE-401	Geometric Design of Transportation Infrastructure	3	0	0	40	60	100	3
2	Core Subject	MTTE-402	Airport Infrastructure, Planning and Design	3	0	0	40	60	100	3
3	Core Subject	MTTE-403	Seminar	0	0	4	60	40	100	4
Total				**6**	**0**	**4**	**100**	**140**	**300**	**10**

Semester 5th									Total Credits=24	
Sr. No.	Category	Subject Code	Course Title	Contact Hours			Maximum Marks		Total Marks	Credits
				L	T	P	Internal	External		
1	Core Subject	MTTE-501	Intelligent Transportation Systems	3	0	0	40	60	100	3
2	Core Subject	MTTE-502	Project	3	0	0	150	100	250	10
Total				**6**	**0**	**4**	**190**	**160**	**350**	**10**

Semester 6th									Total Credits=24	
Sr. No.	Category	Subject Code	Course Title	Contact Hours			Maximum Marks		Total Marks	Credits
				L	T	P	Internal	External		
1	Dissertation	MTTE-601	Thesis	-	-	-	S/US			20
Total										**20**

Syllabus

Sr. No.	Category	Subject Code	Course Title	Contact Hours			Credits
1.	Core Subject	MTTE-101	Advanced Traffic Engineering	L	T	P	3
				3	0	0	
Internal Marks: 40, External Marks: 60, Total Marks: 100							

Course Objectives: The course should enable the students to:

1. know the traffic flow characteristics
2. study various traffic surveys
3. understand the traffic signal timing design and traffic flow theories.

UNIT-I

Introduction to Traffic Engineering: Properties of traffic engineering elements, road vehicle performance.
Traffic Studies: Volume studies, speed studies, origin & destination studies and parking studies.

UNIT-II

Traffic Control devices: Various traffic control devices, principles of intersection design, design of signalized and unsignalized intersections, signal coordination, traffic regulations and statistical methods.

UNIT-III

Traffic Safety and Level-of-service: Accidents, lighting, capacity and level-of-service analysis**.**
Uninterrupted traffic Flow Theory: Fundamentals of traffic flow theory, uninterrupted traffic flow including macroscopic and microscopic traffic flow models.

UNIT-IV

Interrupted traffic Flow Theory: Fundamentals of interrupted traffic flow, shockwave analysis, car following theory, queuing theory, vehicle arrival: gap and gap acceptance, simulation of traffic systems

Course Outcomes: Upon completion of this course the student shall be able to:

1. use the traffic survey analysis for management of traffic and for designing new road infrastructure
2. design various types of intersections
3. implement of traffic control devices and traffic regulations
4. apply of traffic flow theories in solving congestion problems and use of simulation techniques.

Books Recommended :

1. Kadiyali, L. R., Traffic Engineering and Transport Planning,. Khanna Publishers
2. O'Flaherty C A, "Transport Planning and Traffic Engineering", Butterworth Heinemann, Elsevier, Burlington, MA
3. Mannering Fred L., Kilarski Walter P. and Washburn Scott S., Principles of Traffic Engineering and Traffic Analysis, Third Edition, Wiley
4. Chakroborty Partha and Animesh Das, Principles of Transportation Engineering, Prentice hall

Sr. No.	Category	Subject Code	Course Title	Contact Hours			Credits
1.	Core Subject	MTTE-102	Advanced Soil Engineering	L	T	P	3
				3	0	0	
Internal Marks: 40, External Marks: 60, Total Marks: 100							

Course Objectives: The course should enable the students to:

1. understand the engineering properties and behaviour of soil under different field condition and loading.

UNIT-I

Origin, nature and distribution of soils: Engineering behaviour of soils of India, black cotton soils, alluvial silts and sands, laterites, collapsible and sensitive soils, aeolin deposits.

Description of individual particle: Clay mineralogy, clay-water-electrolytes, soil fabric and structure, effective stress principle, steady state flow in soils, effect of flow on effective stress.

UNIT-II

Consolidation: One, two and three dimensional and radial consolidation, sand drain and prefabricated drain, variation of effective stress during consolidation, stress-path, shear behaviour of granular soils, factors affecting shear behaviour, determination of parameters, shear behaviour of fine grained soils, pore-pressure parameters, UU, CU, CD tests, total and effective stress paths.

Factors affecting strength: Stress history, rate of testing, structure and temperature, anisotropy of strength, thixotropy, creep, stress-strain characteristics of soils, determination of modulus values, critical state model.

UNIT-III

Geosynthetics: Types and functions, materials and manufacturing processes, principles of soil reinforcement, design and construction of geosynthetic reinforced soil retaining structures – walls and slopes, embankments on soft soils,

Geosynthetics in pavements: Geosynthetics in roads and railways, separations, drainage and filtering in road pavements and railway tracks.

UNIT-IV

Methods of site investigations: Direct methods, semi-direct methods and indirect methods, drilling methods. boring in soils and rocks, methods of stabilizing the bore holes, measurement of water table, field record.

Field tests: In-situ shear test, in-situ permeability test, SPT, DCPT, SCPT, in-situ vane shear test, pressure meter test, dilatometer test codal provisions.

Slope stability analysis: Bishop (rigorous and simplified) method, Mongestern's method, Spencer's method.

Course Outcomes: Upon completion of this course the student shall be able to:

1. certain the behavior of soil as a construction material or supporting medium for Civil Engineering structures.
2. analyze distress/failure condition relating to soil and hence to suggest remedial measures.
3. apply of traffic flow theories in solving congestion problems and use of simulation techniques.

Books Recommended :

1. Soil Mechanics in Engineering Practice, Terzaghi and Peck, John Wiley and Sons.
2. Physical and geotechnical properties of soils, Bowles
3. Design aids in soil mechanics and foundation engineering, Kaniraj S.K.
4. Soil Mechanics, Lambe and Whitman, Wiley India
5. Reinforced soil and its engineering application, Swami Saran, I K International

Sr. No.	Category	Subject Code	Course Title	Contact Hours			Credits
1.	Departmental Elective	MTTE-111	Reinforced Soil Design & Construction	L	T	P	3
				3	0	0	
Internal Marks: 40, External Marks: 60, Total Marks: 100							

Course Objectives: The course should enable the students to:

1. develop a basic understanding of characteristics of the different types of reinforcing material
2. examine, evaluate and select appropriate reinforcement material as per desired requirements
3. carry out the design of the structures using reinforced soil
4. get acquainted with the geosynthetics, its properties, application and usage in soil stabilization.

UNIT-I

Introduction: Basic concept of the reinforced soil, mechanism design principles, materials used for construction, advantages of reinforced soil.

Practical Applications: Reinforced soil in flyovers bridges and other civil engineering structures, basic components and strength characteristics of reinforced soil, reinforced soil construction detailing.

UNIT-II

Geosynthetics: An overview of geosynthetics, description of geotextiles, geogrids, geonets, geomembranes, geocomposites, geocells- properties and test methods, functions, design methods for separation, stabilization, filtration, drainage.

Retaining Walls: Types of walls, earth pressures for gravity/counter fort walls, structural design of wall and its foundation, stability of the wall-soil system, slip circle analysis.

UNIT-III

Reinforced soil walls: Stability analysis and construction aspects of reinforced soil walls, effect of reinforced sloped backfill on soil wall design, drainage design procedure.

Wall with reinforced backfill: Theoretical analysis, pressure-intensity on the wall, stability against sliding and overturning, design procedure, limitations of the analysis.

UNIT-IV

Foundations on reinforced soil: Brief overview, analysis of strip footing, isolated- square and rectangular footing on reinforced soil bed, determination of pressure ratio.

Soil nailing and anchors: Applications of soil nailing, its components, advantages and limitations, design aspects.

Course Outcomes: Upon completion of this course the student shall be able to:

1. learn the concepts of reinforced soil and its applications in the Civil Engineering field.
2. distinguish between different types and varied applications of geosynthetics.
3. design the reinforced soil walls.

Books Recommended :

1. Designing with Geosynthetics, Robert M. Koerner, Prentice Hall. (2012)
2. Engineering with Geosynthetics, G.V Rao & GVS Suryanarayana Raju, Tata Mc Graw Hill Publishing Co. New Delhi. (1990)
3. Reinforced Soil and its Engineering Application," Swami Saran, New Age Publication. (2006)

Sr. No.	Category	Subject Code	Course Title	Contact Hours			Credits
				L	T	P	
1.	Departmental Elective	MTTE-112	Transportation Economics & Finance	3	0	0	3
Internal Marks: 40, External Marks: 60, Total Marks: 100							

Course Objectives: The course should enable the students to:

1. gain an insight into road user cost, transportation cost, finance, taxation and economic evaluation of transportation projects
2. acknowledge the economic functions of transportation systems
3. analyze and evaluate the operating costs of vehicles
4. get acquainted with the concept of financing of highway projects and estimation of direct and indirect costs related to transportation.

UNIT-I

Introductory Concepts in Transportation Decision Making: Overall transportation project development, budgeting, financial planning, the process of transportation project development, models associated with transportation impact evaluation

Economic evaluation of transport projects: Need for economic evaluation, cost and benefits of transport projects, time horizon in economic assessment, basic principles of economic evaluation, interest rate, method of economic evaluation, benefit cost ratio method, first year rate of return, net present value method, internal rate of return method, comparison of methods of economic evaluation.

UNIT-II

Vehicle operating costs: Introduction, road user and cost study in India, components of VOC, factors affecting VOC, fuel consumption relationship, spare parts consumption, maintenance and repairs, labour, cost, tyre life, lubricants, utilization, and fixed costs.

Economic analysis of projects: Methods of evaluation - cost-benefit ratio, first year rate of return, net present value, and internal-rate of return methods; indirect costs and benefits of transport projects.

UNIT-III

Value of travel time savings: Introduction, classes of transport users enjoying travel time savings, methodology for monetary evaluation of passengers' travel time, review of work in India on passengers' travel time.

Accident costs: Introduction, relevance of accident costing for a developing country, review of alternative methodologies for accident costing, Indian studies.

UNIT-IV

Traffic congestion, traffic restraints and road pricing: Congestion as a factor in road traffic, traffic restraint, road pricing.

Appraisal and Evaluation of Transportation Projects: Feasibility and evaluation, cost, impacts and performance levels, evaluation of alternatives, analysis techniques, cost-benefit analysis, social and financial benefits, valuation of time, measures of land value and consumer benefits from transportation projects, prioritization of projects, multi-criteria decision assessment.

Highway finance: Methods for raising funds for maintenance, improvement and expansion of transportation networks, taxation and user fee, financing through loans, bonds, PPPs.

Course Outcomes: Upon completion of this course the student shall be able to:

1. analyse transportation project case studies
2. evaluate transportation project case studies.
3. perform analysis to determine vehicle operational cost, losses and expenditure cost of accidents.
4. compare various methods for raising funds for a highway project and chose the most feasible and viable among them.

Books Recommended :

1. Principles of Transportation engineering by Chakroborty& Das, Prentice Hall, India..
2. Highway Engg by S.K Khanna & CEG Justo, Nem Chand Bros., Roorkee
3. Principles and practices of Highway engg by L.R Kadyali, Khanna Publishers, Delhi. Edition 6
4. Principles of Transportation and Highway engg by G.V Rao, Tata Mc grawHill Publishing Co.Ltd. N.Delhi
5. HarralClell G., A Manual for the Economic Appraisal of Transport Projects, World Bank Report, Washington D.C

Sr. No.	Category	Subject Code	Course Title	Contact Hours			Credits
				L	T	P	
1.	Departmental Elective	MTTE-113	Transportation & Environment	3	0	0	3
Internal Marks: 40, External Marks: 60, Total Marks: 100							

Course Objectives: The course should enable the students to:

1. study the relation between transportation and environment and the effect of increasing transportation demand on land use
2. analyze and evaluate the direct and indirect effects of transportation sector on environment
3. get acquainted with various policies of Governmental organizations .

UNIT-I

Environmental effects of transport: Problems of identification, environmental impact assessment, evaluation of environmental impact due to construction of new facilities and the effect of traffic thereon due to bypasses, widening/four laning, expressway; grade separators, assessment and attenuation.

UNIT-II

Assessment of Environmental impacts of Transportation: Noise, vibration, air pollution, air pollution, emission levels, air- pollution dispersion, the box model, noise generation, noise measurement, noise propagation and mitigation strategies, noise measures, mathematical models of transportation noise, energy consumption and related issues, environmental traffic management, co-ordinated signal system on urban arterial road intersections to reduce air pollution.

UNIT-III

Pedestrian delay and danger: Severance, accidents, visual intrusion and aesthetics, toxic freight, construction effects.

UNIT-IV

Land consumption and land-use effects: Planning blight and compensation; global climate, energy and resource use; and sustainability, GOI policies and requirements for clearances for road projects. emergency care, institutions and management of traffic safety, education, training, policing, penalties, risk perception, probability, indices and indicators.

Course Outcomes: Upon completion of this course the student shall be able to:

1. learn about measures for controlling pollution for various transportation systems
2. aware of various environmental regulations
3. carry out EIA of an existing transportation facility and suggest required modifications to minimize the overall impact.

Books Recommended :

1. The Art of Regression Modeling in Road Safety,Hauer, E, Springer, 2015
2. The Way Forward: Transportation Planning and Road Safety. Tiwari, G., Mohan, D. and Muhlrad, N.(eds) New Delhi: Macmillan India Ltd., 2005.
3. Transport, Climate Change and the City, Robin Hickman and David Banister. Routledge, London, 2014
4. Human Factors in Traffic Safety, Paul Olson and Robert Dewar (2007) Amazon Digital.
5. World Report on Road Traffic Injury Prevention, Peden, M., et al. World Health Organization, Geneva, 2004.

Subject Code-SBS101C

Introduction to Shaheed Bhagat Singh and his co-patriots

1. **Introduction to Bhagat Singh as a person through the eyes of his collogues.** 2
   Family background and childhood, Education and participation in National Freedom Movement, his visits to Jallianwala Bag and Nankana Sahib.

2. **His contribution to National Freedom Moment.** 3
   Building of Youth Movement, His contribution through his writings, National College Movement and his comrades, Dwarka Das Library and Lahore Science movement, List of books Shaheed Bhagat Singh read.

3. **Shaheed Bhagat Singh's experiences at Kanpur** 2
   As journalist and joining Hindustan Republican Association

4. **His return to Punjab** 2
   Jaito Morcha, His first experience of underground life, Shaheed Bhagat Singh at Kirti Magazine, Establishment Hindustan Socialist Republican Association

5. **Shaheed Bhagat Singh's attacks on British rule** 2
   Saunders Case, Assembly bomb case, Hunger Strike for Jail Reforms, 'Cut Short Justice' system of the British.

6. **Overall contributions and his vision of free India.** 1

Reference books

1. Sardar Bhagat Singh by Jatinder Nath Sanyal, National Book Trust, New Delhi

Annexure-III

Shaheed Bhagat Singh State University, Ferozepur

Skeleton/Framework of M.Tech (Part-Time) Scheme 2023 and onwards

Semester	Core Subjects	Dept. Elective	Introduction to Shaheed Bhagat Singh and his co-patriots	Seminar	Project	Thesis	Total Credits
1	6	3	0	--		--	9
2	8	--	--	--	--	--	8
3	6	3	--	--	--	--	9
4	6	--	--	4	--	--	10
5	3	--	--	--	10	--	13
6	--	--	--	--	--	20	20
							69

Note:

1. Introduction to Shaheed Bhagat Singh and his co-patriots is a mandatory non credit course for all courses of university.

Annexure-IV

223 : Ratification of amendments in the course work structure/subjects of Ph.D. Candidates

The course work related to Ph.D. candidates was approved in 1st Academic Council meeting [Annexure-2d, 6 of the agenda of 1st ACM]. But as per the comments on it emailed by Dean (R&D), referring new guidelines from the draft of latest UGC regulations, two meetings were held dated 07/10/2022 and 03/11/2022 in this regard. As per the minutes of the meetings dated 07/10/2022 **(Annexure-XVI, Page No. 83)** and dated 03/11/2022 **(Annexure-VI, Page No. 53)**, the structure/subjects taken for the course work is as under:

Sr. No.	Nature of Subject	Name of Subject	Internal	External	Credits
1.	Mandatory	Research Methodology	40	60	04
2.	Core	Advanced subject in the relevant/cognate research area	40	60	03
3.	Inter-disciplinary	Elective subject	40	60	03
4.	Mandatory	Research and Publication Ethics (RPE)	20	30	02
5.	Mandatory	Presentation from the area of research	75	0	03
		Total Minimum Credits			**15**

These amendments have been applied for the Ph.D. Candidates provisionally admitted in 2022 (Summer) and it is proposed that the same structure/subjects may be applied for 2022 (Summer) onwards batches.

The above mentioned amended structure/subjects are put up before the Academic council for ratification and approval please.

SHAHEED BHAGAT SINGH STATE UNIVERSITY
MOGA ROAD, FEROZEPUR - 152004

Item No. 2.17 **Ratification of the start of B. Voc Interior Design in session 2022-23-Regarding.**

Decision: Ratified.

Item No. 2.18 **Ratification of the subject Programming for Problem Solving in place of FCPIT for 2022 Batch Regarding -Regarding.**

Decision: Ratified.

Item No. 2.19 **Ratification for addition of experts for B.Sc Environment Science and others in the existing BOS.**

Decision: Ratified.

Item No. 2.20 **Ratification of minutes of meeting (Ref. No. SBSSU/FZR/DASH/234) dated 29/07/2021 related with Ph.D. admissions, August 2021.**

Decision: Ratified.

Item No. 2.21 **Ratification of the course work structure/subjects of Ph.D. students admitted in 2021 batch.**

Decision: Ratified.

Item No. 2.22 **Ratification of minutes of meeting dated 02/08/2022 for amendment in eligibility criteria for Ph.D. Supervisor.**

Decision: The item is ratified by Academic Council and the Clause mentioned at serial no.(i) i.e."the research papers need to be published free of cost in the above mentioned journals except in case of Open Access SCI/SCIE/ABDC journals" has no relevance and therefore deleted.

Item No. 2.23 **Ratification of amendments in the course work structure/subjects of Ph.D. Candidates.**

Decision: Ratified.

Item No. 2.24 **Ratification of the subjects and syllabus for Ph.D. course work in CSE and ME for 2022 batch onwards.**

Decision: Ratified.

Item No. 2.25 **Ratification of question paper pattern for new courses.**

Decision: Ratified.

Item No. 2.26 **Ratification of some subjects common across branches/ courses.**

Decision: Ratified.

Item No. 2.27 **Ratification of Teaching Schemes of 2022 Batch.**

Decision: Ratified.

Annexure-V

Ph.D. Course Work Syllabus

Batch 2023 and onwards

Course Work Scheme

Sr. No.	Nature of Subject	Subject Code	Name of Subject	Maximum Marks		Total Marks	Credits
				Internal	External		
1	Mandatory Course	PHCE101	Research Methodology	40	60	100	4
2	Core	PHCE201	Transportation and Highway Technology	40	60	100	3
		PHCE202	Advanced Foundation Design and Construction				
		PHCE203	Environment Engineering and Management				
		PHCE204	Advanced Structural Engineering				
3	Interdisciplinary	PHCE301	Civil Engineering applications of Remote sensing and GIS	40	60	100	3
		PHCE302	Town and Country planning				
		PHCE303	Computer Aided Design Methods				
4	Mandatory	PHRPE101	Research and Publication Ethics	20	30	50	2
5	Mandatory	PHCE102	Presentation from the area of research	75	0	75	3
Total				**215**	**210**	**425**	**15**

Syllabus

Sr. No.	Category	Subject Code	Course Title	Contact Hours		
1.	Mandatory Course	PHCE101	Research Methodology	L	T	P
				4	0	0
Internal Marks: 40, External Marks: 60, Total Marks: 100						

UNIT-I

lntroduction Research Methodology: Definition of Research, Need of Research, Concept and steps of Research Methodology , Uses of Research Methodology, Research Techniques. Reviewing Literature: Need, Sources-Primary and Secondary, Purposes of Review, Scope of Review, Steps in conducting review.

ldentifying and defining research problem: Locating, Analyzing stating and evaluating problem, Generating different types of hypotheses and evaluating them.

UNIT-II

Data collection: Static and dynamic characteristics of instruments used in experimental set up, calibration of various instruments, sampling methods, methods of data collection, Selection of Appropriate Method for Data Collection, Data collection using a digital computer system, case studies of data collection.

Data Analysis: Data processing, data analysis strategies and tools, data analysis with statistical packages, Basic Concepts concerning testing of hypotheses, procedures of hypothesis testing, generalization and interpretation Applied statistics: Regression analysis, Parameter estimation, Multivariate statistics, Principal component analysis Software tools for modeling, Simulation and analysis.

UNIT-III

Research reports and Thesis writing: Introduction: Structure and components of scientific reports, types of report, developing research proposal. Thesis writing: different steps and software tools in the design and preparation of thesis, layout, structure and language of typical reports, illustrations and tables, bibliography, referencing and footnotes, word processing tools such as Latex oral presentation: planning, software tools, creating and making effective presentation, use of visual aids, importance of effective communication.

UNIT-IV

Research ethics, IPR and publishing Ethics: Ethical issues. IPR: intellectual property rights and patent law, techniques of writing a Patent, filing procedure, technology transfer, copy right, royalty, trade related aspects of intellectual property rights Publishing: design of research paper, citation and acknowledgement, plagiarism tools, reproducibility and accountability.

Books Recommended :

1. C.R. Kothari, "Research Methodology - Methods and Techniques", Wiley Eastern Ltd 2009.
2. B.L. Wadehra, Law relating to patents, trademarks, copyright designs and geographical indications, Universal Law Publishing, 2014.
3. K. N. Krishnaswamy, Appa Iyer Sivakumar, M. Mathirajan ," Management Research Methodology: Integration of Methods Techniques, Pearson, 2006.
4. S.P Gupta,"statistical Methods", Sultan and Chand & Sons, 2006

Sr. No.	Category	Subject Code	Course Title	Contact Hours		
1.	Core	PHCE201	Transportation and Highway Technology	L	T	P
				3	0	0
Internal Marks: 40, External Marks: 60, Total Marks: 100						

UNIT-I

Highway Materials: Soil stabilization types, source, functions' requirements, properties, tests and specifications for use in various components of road, Soil compaction for use in fill and subgrade of roads. Soil stabilization - principle, methods and tests, proportioning of materials and mix design application of Rotchfutch method. Marginal and waste materials in road construction, properties and scope in road construction. Bituminous Material (properties of the material) and Marshall mix design (both wet and dry), Usage of Geosythentics and Geotextiles in construction of highways.

UNIT-II

Highway Construction and Maintenance: Components of road and pavement structure functions, requirements and sequence of construction operations. Plants and equipment for production of materials, Road construction equipment, Pre-construction surveys and marking on ground, Different types of granular base course, Different types of sub-base Road maintenance works and quality control tests as per MoRTH specifications.

UNIT-III

Road Safety and Management: Road accidents, causes, scientific investigations and data collection. Road safety issues and various measures for road safety. Engineering, education and enforcement measures for improving road safety' Short term and long term measures Traffic management techniques. Evaluation of the effectiveness and benefits of different traffic management measures, management and safety practices during road works Economic evaluation of roads.

UNIT-IV

Traffic Surveys & Application of Remote Sensing And GIS in Highway Engineering: Traffic studies- Trip distribution, generation assignment and model split (Statistical analysis). Design of the traffic signals at urban intersections. Level of service at intersections. Design of parking in urban areas and problems. Concepts, components, working of GIS, data capture, data integration, data structures. Coordinate systems and map projections, Registration GIS analysis and tasks Input, manipulation, management, query and analysis, visualization, proximity analysis, overlay analysis, GIS and Remote sensing data integration. Overview of image processing software and GIS software, Introduction to GPs and its application (includes the recent software's used in the highway engineering)

Books Recommended :

1. MoRTH 'Specifications for Roads and Bridges Works'- Indian Roads Congress
2. lS 73, revised 2006, lS 2720, lS 2386, IS 1201 to 1220, IS 8887-1995, ISD 217- 1986.
3. IRC -37, IRC -58, IRC:42-1994, IRC:15-2002, IRC SP :11-1988, 55-2001,57-2001,5&2001, IRC 19-1977, 27- 1967, 29-1988, 34-1970, 36- 197O,48-1972,61-1976, 63-1976, 68-1976, 81-1997,82-1982, 84-1983,93-1985, 94- 1986, 95-1987, 98-1997, 105-1988.
4. Peurifoy, R.L., and Clifford, JS "Construction Planning Equipment and Method"- Mccraw Hill Book Co. inc.
5. Leonards G. A. "Foundation engineering" - Mccraw Hill Book Company, New York, 1962

Sr. No.	Category	Subject Code	Course Title	Contact Hours		
1.	Certificate Course	PHCE202	Advanced Foundation Design and Construction	L	T	P
				3	0	0
Internal Marks: 40, External Marks: 60, Total Marks: 100						

UNIT-I

General principles of Foundation Design: Functions of foundations, essential requirements of a good foundation, types of foundations, principal modes of failure' estimation of allowable bearing pressures, calculation of ultimate bearing capacity by theoretical and empirical methods: Terzaghi's Method, Skempton's analysis for clays Mayerhof's analysis BlS Method (IS:6403), Settlement of foundations. Factors to be considered foundation design, numerical problem based in BIS method.

UNIT-II

Pile Foundations: Purpose/uses of pile foundations, classification of piles based on different criteria, Brief details of timber, concrete, steel piles their advantages and disadvantages, selection of pile type, pile action, behaviour of pile and pile groups under load. Definition of failure load. Estimation of carrying capacity: single driven pile in cohesion less soils-methods based of on SPT and CPT, ultimate load on driven and cast-in-place piles and bored and cast-in-place piles incohesion less soils Factors affecting pile capacity - Numerical problems Ultimate capacity of single pile driven incohesive soils; modification for driven and cast in place piles and bored and cast-in-place piles. Capacity of very long piles - Numerical problems Carrying capacity of piles on rocks.

UNIT-III

Well Foundations: Basic Principles, Forces acting on Well foundations, sinking of Wells, Tilts and Shifts.

Soil StabiIity: Retaining walls- introduction, types, Principles of design, Modes of failure, drainage of the backfill, problems related to design of gravity retaining wall and stability of retaining walls. Unbraced excavations, braced excavations. Sheet piles - types anchors and tie backs. Shoring and Underpinning - necessity and methods.

UNIT-IV

Improvement of Foundation Soils Purpose : (a) improvement of granular soils : term used to describe degree of compactness relative density, density ratio and degree of compaction; Methods - Vibration at ground surface, factors influencing roller compaction; deep dynamic compaction, vibro-compaction impact at methods depth. (b) improvement of cohesive soils : preloading, or dewatering/ of installing sand drains ,drain wicks, electrical and thermal methods' Grouting : purpose, functions, types of grouts; soil bentonite - cement mix, emulsions, solutions: grout injection methods. Geo-synthetics: types, functions, manufacturing of geo-textiles, Classification of geo-textiles. Specific Applications : Bearing capacity improvement, reinforcement, retaining walls, embankment etc. testing of geo-synthetics, usage in India and a case study.

Books Recommended :

1. Tomlinson MJ, Foundation Design and Construction , ELBs-LonBman, 6e,.
2. Bowles Joseph E, Foundation Analysis and Design, McGraw Hill.
3. Som, NN & Das S.C. , Theory and Practice of Foundation Design, Prentice Hall of lndia, 2003.
4. Braja M. Das, Principles of Foundation Engineering, 6e, Thomson, 2007.
5. Koerner, Robert M, Construction and Geotechnical Methods in Foundation Entineering ' Mccraw Hill.
6. Dinesh Mohan, Pile foundations, Oxford & IBH, 1998.
7. Kurian, N.P. Modern Foundations, Tata McGraw Hill, 1982.
8. Fang H.Y. Foundation Engineering Handbook, van Nostrand Reinhold, 23,1991.

Sr. No.	Category	Subject Code	Course Title	Contact Hours		
1.	Certificate Course	PHCE203	**Environment Engineering and Management**	L	T	P
				3	0	0
Internal Marks: 40, External Marks: 60, Total Marks: 100						

UNIT-I

Environment & Ecology: Definition and understanding of concepts, ecosystem, energy flow in ecosystem, water, carbon and nitrogen cycle, community's inter-relationships in an ecosystem. Importance of clean environment.

UNIT-II

Type of Pollutants and Protection of Environment: Water Pollution: sources, causes and measurement of water pollutants in surface and ground water, water quality criteria for various uses of fresh Water, river basin studies for surface water pollution control, biochemical oxygen demand, effect of oxygen demanding wastes on rivers. Domestic and industrial Pollution : Sources, Standards for disposal of waste water and industrial effluents, basic unit operations in control of waste water pollution, C.P.C.B. /M.O.E.F. for abatement of Industrial Pollution and Pollution control/Treatment methods and technologies.

UNIT-III

Air Pollution: Definition, principle materials causing pollution, types of air contaminants, their sources and ill effects on living and nonliving materials, permissible limits. Air pollution control - basic principles, natural self cleansing, pollution control methods and various engineering devices to control particulate and gaseous pollutants, controlling air pollution from automobiles, Noise Pollution : Definition, sources of noise and its units, adverse effects of noise pollution, sound pressure level and its measurement, octave band and its importance; noise pollution control measures. Solid Waste Pollution: Sources, effects and treatment of solid wastes.

UNIT-IV

Degradation of Land Resources, Deforestation and Wetlands: Forest land, deforestation and its effects on land use and environmental quality, wetland and their importance in environment, causes and extent of wasteland, Soil degradation problems, erosion, salinization, water logging, land use management & planning.

Land Fills: Sitting Criteria, Waste containment Principles, types of barrier materials, planning and design aspects relating to waste disposal in landfills, Control and remediation of sub-surface contamination. Case Studies.

UNIT-V

Environment Impact Assessment : Definition and its importance for environment management, constituents of environment impact assessment , project data for EIA study, prediction of impacts, EIA methodologies, constraints in implementation of EIA, impact prediction on water resources projects and other relevant case studies. Environment pollution.

Environmental Management System: Main clauses and basic steps for certification. Water pollution, air pollution and EPA and their salient features.

Books Recommended :

1. Peavy,Rowe,,Techobanoglous, Environmental Engg. Tata McGrawHill.
2. Mackenzie L Davis, Environmental Engg. Tata McGrawHill.
3. Baljeet S. Kapoor; Environmental Engg. An overview, Khanna Publishers.
4. Glbert H.Masters, Environmental Engineering and Science, Prentice Hall of India Pvt. Ltd.
5. GN Panday, GC Carney Environmental Engineering,Tata MccrawHill.
6. P.D, Sharma, Ecology and Environment Rastogi Publications.
7. Ray P.A Lcances Environmental lmpact Assessment Hand Book, National Environmental Protection Council Manila.
8. P Venugopala Rao ; Text Book of Environmental engineering, PHI

Sr. No.	Category	Subject Code	Course Title	Contact Hours		
1.	Certificate Course	PHCE204	Advanced Structural Engineering	L	T	P
				3	0	0
Internal Marks: 40, External Marks: 60, Total Marks: 100						

UNIT-I

Three dimensional elasticity problems, Torsion of open section, Thermal Stresses, Fracture mechanics. Kirchoff and Mindlin theory of plates, higher order shear deformation theories, classical theories of skew plates, Shell surfaces, bending theory of shells.

UNIT-II

Matrix methods of structural analysis and associated computer programme assembly of matrices. Solution equations. Flow charts. Stiffness and flexibility methods for analysis of beans and frames.

UNIT-III

Finite Element Method, 2D and 3D applications in plane and three dimensional elasticity problems. Analysis of plate and shell structures. Applications using proper software. Nonlinear analysis of structural elements. Material and geometric nonlinearity. Applications for beam, plates and shells.

UNIT-IV

Multi- variable and Multi-objective optimization. Non linear and non traditional techniques of optimization. Design for reliability, reliability based optimization. Stability Analysis: Beam column, buckling of frames. Lateral buckling of beams, torsional buckling, energy criterion and energy based methods, dynamic stability.

Books Recommended :

1. Timoshenko and Goodier - Theory of Elasticity, McGraw-Hill Publications
2. S. Crandall, N. Dahl and T. Lardner - Mechanics of Solids, McGraw Hill Publications
3. Anil K Chopra - Dynamics of Structures Theory and Applications to Earthquake Engineering, Prentice-Hall Publications
4. R.W Clough and J Penzin - Dynamics of Structures, McGraw Hill Publications
5. R.C. Roy - Structural Dynamics an Introduction to Computer Methods, John Wiley & Sons Publications.

Sr. No.	Category	Subject Code	Course Title	Contact Hours		
1.	Interdisciplinary	PHCE301	Civil Engineering applications of Remote sensing and GIS	L	T	P
				3	0	0
Internal Marks: 40, External Marks: 60, Total Marks: 100						

UNIT-I

Photogrammetry and Aerial Photogrammetry: Introduction, basic definitions, terrestrial photogrammetry, phototheodolite, horizontal and vertical angles from terrestrial photographs, horizontal position of a point from photographic measurements. Aerial Photogrammetry- advantages, vertical, tilted and oblique photographs, geometry of vertical photographs, scale of vertical photograph over flat and variable terrain, ground coordinates, computation of length of a line, overlaps, flight planning, computation of required number of photographs for a given area, ground control in photogrammetry, Basic elements in photographic interpretation. Introduction to digital photogrammetry.

UNIT-II

Remote sensing: Introduction, Ideal remote sensing system, basic principles of electromagnetic remote sensing, electromagnetic energy, electromagnetic spectrum, interaction with earth's atmosphere, interaction with earth-surface.

Remote Sensing platforms and sensors: Introduction, platforms- Indian satellite IRS and Land sat specifications, Sensors-active and passive, MSS, AVHRR, LISS, TM, PAN, WIFS, microwave sensors, sensor resolutions (spatial, spectral, radiometric and temporal).

UNIT-III

GIS: Definition, Components of GIS, Data types, Sources of data, Data Structure , Types of Analysis and errors, Global positioning system GIS.

Applications of Remote sensing: Applications in land use land cover analysis, change detection, water resources, urban planning, Design of construction structures, and geological applications.

UNIT-IV

Environmental Applications of RS and GIS: Re-modelling of water Distribution systems using GIS, ground water vulnerability, Modelling using GIS, Urban Development Planning using RS and GlS Environmental Solid Waste and Degradation Assessment using RS and GIS, RS and GIS site selection for Dams, Bridges, Reservoirs.

Books Recommended :

1. Mikhail E., J. Bethel, and J.C. McGlone, Introduction to modernphotogrammetry. Wiley,2001.
2. Wolf P.R, and B.A. Dewitt, Elements of photogrammetry : withapplications in GlS. 3rd ed. McGraw-Hi11,2000.

Sr. No.	Category	Subject Code	Course Title	Contact Hours		
1.	Interdisciplinary	PHCE302	Town and Country planning	L	T	P
				3	0	0
Internal Marks: 40, External Marks: 60, Total Marks: 100						

UNIT-I

Historic Development & planning Theory-origin, evolution and contemporary developments in planning, Formation of metropolitan areas & impacts of Industrial Revolution, socio-economic & technological, impacts of growth of population; rural urban migration, characteristics of the urban environment: Land uses, physical structure, the interim and comprehensive plans: Structure plan, Master Plan, Zonal Development plan methods - their purpose and contents, surveys, analyses and design and practices Planning, planning in comprehensive planning, Residential Areas: Neighbourhood and sector of New Towns in India and abroad. Spatial & Environmental Aspects of planning-Environmental degradation and its impact, environmental impact.

UNIT-II

Transportation & Utility Services-Transportation systems; Land use-transportation inter relationships; transportation planning process; Traffic management, Recent innovations technologies in and its probable impacts, Transport policies and evaluation of transportation proposals, water supply systems, waste water disposal systems & solid wastes correction and disposal, Reuse and recycle Techniques.

UNIT-III

Planning for urban electrical distribution system and communication systems, Economic feasibility tests Planning Administration & Professional Practices-planning legislation provisions ,constitutional basis and rerating to rand, Evolution of planning 1966 UDPFI Guidelines laws, Land Acquisition Act of India, MRTP Act Conservation (implications of 73rd and 74th amendment of the constitution),EPA, Conservation of natural resources, Landscape, Housing and slum clearance legislation. Role in inter disciplinary groups.

UNIT-IV

Social formation & Housing: Urbanization and Industrialization, slums squatters and settlements - problems and possibilities, Residential layouts, housing densities, neighbourhood unit, , community facilities, social aspects: built environment and human behaviour, Evaluation of user's satisfaction, Finance for housing: priority in the national plans- role of public and private agencies, and role of cooperatives and various institutions, cost reduction techniques housing, Housing in norms and standards.

Books Recommended :

1. K S Rangwala and P.s.Rangwala,. "Town planning,,,charotar pubtishing House, 15th Edition,1999.
2. Michael Hord, R. Remote sensing Methods and applications, John Wiley and sons, New York, 1986
3. National Building Code of India-Part-III
4. KA. Ramegowda, Urban and regional planning, University of Mysore.

Sr. No.	Category	Subject Code	Course Title	Contact Hours		
1.	Interdisciplinary	PHCE303	Computer Aided Design Methods	L	T	P
				3	0	0
Internal Marks: 40, External Marks: 60, Total Marks: 100						

UNIT-I

Introduction to CAD: Scope, simple description of computer hardware- micro, mini etc. - memory, processor ,Peripheral devices – disks, printer. Video terminals. Graphic floater, graphic screen digitizer.

UNIT-II

Computer Graphics- introduction, point plotting techniques, line drawing displays, two-three dimensional transformation, clipping and windowing, segmentation geometric modeling. Three dimensional graphics, curves and surfaces ,hidden surface elimination, shading. Graphic input devices. Graphic input technique, input function, Raster graphic fundamentals, interactive raster graphic, raster graphic systems.

UNIT-III

Computer aided linkage displays and synthesis, interactive acceleration analysis. Appreciation of graphic packages.

UNIT-IV

Basics of design and analysis software like STAAD PRO, ETABS, ANSYIS, MATLAB.

Data base management, storing and retrieving of data.

Books Recommended :

1. Principles of interactive computer graphics by William M. Newman & Robert F. Sproul.
2. Programming in Finite Element by Hunton and owan.
3. Principles of Computer Aided design by Joe Rooney & Philips Steadman.
4. Computer Fundamentals – P.K. Sinha, BPB Publications.

Shaheed Bhagat Singh State University, Ferozepur

Two credit course "Research and Publication Ethics (RPE)" for Ph.D. programme course work

A course of two credits on "Research and Publication Ethics (RPE)" is mandatory for all Ph.D. students in their pre-registration course work from session 2022 onwards. The course content/structure/syllabus as per UGC guidelines (letter No. D.O. No. F.1-1/2018 (Journal/CARE) dated December 2019) has been included in Ph.D. course work. The details are as follows:

Research and Publication Ethics (RPE)

(2 Credits)

1. **Course Structure**

The course comprises of six modules listed in table below:

Modules	Unit title	Teaching hours
Theory		
RPE 01	Philosophy and Ethics	3
RPE 02	Scientific Conduct	5
RPE 03	Publication Ethics	7
Practice		
RPE 04	Open Access Publishing	4
RPE 05	Publication Misconduct	4
RPE 06	Data base and Research Metrics	7
	Total	**30**

2. **Syllabus**

THEORY

- **RPE 01: PHILOSOPHY AND ETHICS (3 hrs.)**
  1. Introduction to Philosophy: definition, nature and scope, concept, branches
  2. Ethics: definition, moral Philosophy, nature of moral judgments and reactions
- **RPE 02: SCIENTIFIC CONDUCT (5 hrs)**
  1. Ethics with respect to science and research
  2. Intellectual honesty and research integrity
  3. Scientific misconducts: Falsification, Fabrication and Plagiarism (FFP)
  4. Redundant publications: duplicate and overlapping publications, salami slicing

5. Selective reporting and misrepresentation of data

- **RPE 03: PUBLICATION ETHICS (7 hrs)**
  1. Publication Ethics: definition, introduction and importance
  2. Best practices/standards setting initiatives and guidelines: COPE, WAME, etc.
  3. Conflicts of interest
  4. Publication misconduct: definition, concept, problems that lead to unethical behavior and vice-versa, types
  5. Violation of publication ethics, authorship and contributorship
  6. Identification of publication misconduct, complaints and appeals
  7. Predatory publishers and journals

PRACTICE

- **RPE 04: OPEN ACCESS PUBLISHING (4 hrs)**
  1. Open access publications and initiatives
  2. SHERPA/ROMEO online recourse to check publisher copyright & self-archiving policies.
  3. Software tool to identify predatory publications developed by SPPU
  4. Journal finder/journal suggestion tool viz. JANE, Elsevier Journal finder, Springer Journal suggester, etc.
- **RPE 05: PUBLICATION MISCONDUCT (4 hrs)**

  A. Group Discussion (2 hrs)
  1. Subject specific ethical issues, FFP, authorship
  2. Conflict of interest
  3. Complaints and appeals: examples and fraud from India and abroad

  B. Software tools (2 hrs)

  Use of plagiarism software like Turnitin, Urkund and other open-source software tools
- **RPE 06: DATABASES AND RESEARCH METRICS (7 hrs)**

  A. Databases (4 hrs)
  1. Indexing databases
  2. Citation databases: Web of Science, Scopus, etc.

  B. Research Metrics (3 hrs)
  1. Impact factor of journal as per Citation Report, SNIP, SJR, IPP, Cite Score
  2. Metrics, h-index, G-index, i10 index, altmetrics