CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY

DEPARTMENT OF CIVIL ENGINEERING

FEEDBACK ON CURRICULUM -2021-22

ANALYSIS AND ACTION TAKEN REPORT

Structured feedbacks on curriculum are obtained from stakeholders. The suggestions are analyzed and corrective measures suggested by stakeholders are considered.

Sr. No.	Suggestions/Comments	Actions taken
1	Practical oriented learning and teaching process to be strengthened.	Faculty have been implementing usage of new ICT tools to improve the teaching learning process.
2	Students need practical exposure.	Internship has been mandatory in R20 curriculum to bridge the gap between Institute and Industry.
3	Students should be aware of earthquake resistant devices.	Earthquake resistant devices and construction techniques have been added to make the course design oriented.
4	Masonry design being the oldest way of construction, to be included as an elective.	Introduced newly in R18 to make students aware of masonry design and its behaviour in compression, shear and seismic resistance etc.
5	More emphasis to be laid on modern surveying techniques.	The syllabus was rearranged in the line of suggestions given in BoS meeting and also latest topics such as LiDAR survey were introduced.
6	Recent building masonry practices to be included.	Blocks and block masonry topics are included in Building Construction Practices & Concrete Technology Course. 2 units from Concrete Technology were added to the course because the components of core subjects were reduced in R20 curriculum due to implementation of AICTE model curriculum.
7	Less emphasis to be laid on WSM which is included in RCD-I.	As water tanks and bridge structures are still designed by WSM method, the method is retained.

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With effect from the Academic Year 2021-22

20CE C06

BUILDING CONSTRUCTION PRACTICE & CONCRETE TECHNOLOGY

Instruction	3L Hours per week
Duration of Semester End Examination	3 Hours
SEE	60 Marks
CIE	40 Marks
Credits	3

Course Objectives: To enable the student

1. To study about the traditional building materials, properties and their applications.
2. To learn the properties & conduct tests on various ingredients of concrete.
3. To understand various properties of fresh and hardened concrete.
4. To understand the concepts of building planning and various practices adopted and different types of roofs, doors, windows and stairs.
5. To understand different types of masonry, types of bonds used in construction of walls of buildings.

Course outcomes: At the end of the course the student is able

1. To identify the traditional building materials and select suitable type for given situation.
2. To determine the properties of the ingredients of concrete and adjudge their suitability.
3. To know various properties of fresh and hardened concrete.
4. To know the concepts of building planning and various practices adopted and different types of roofs, doors, windows and stairs.
5. To know different types of masonry, types of bonds used in construction of walls of buildings.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2				1						1	1	1	1
CO2		1			1							1		1	1
CO3		1			1							1	1	1	
CO4	1	1	2		1							1	1		1
CO5	1	1	2		1							1	1	1	1

UNIT- I:

Traditional Building Materials: Properties, Types, Applications and testing of traditional building materials - Stone, Timber, Brick, Paints, Varnishes and distempers.

Introduction to new materials/composites: Plastics, Tiles, AAC Blocks, CLC Blocks

UNIT- II:

Concrete Materials: Manufacturing process of cement, properties of cement, types and tests conducted on cement - Properties of aggregate (Fine & coarse) and tests on aggregate (Fine & coarse) – Properties and tests on cement mortar.

Production of concrete: batching, mixing, transportation, handling, placing and curing of concrete & methods of curing. Water cement ratio, Gel space ratio.

UNIT- III:

Influence of constituent materials on Fresh concrete: Segregation and bleeding of concrete - Workability, factors affecting workability, measurement of workability using slump cone and compaction factor tests.

Hardened concrete: Behaviour of concrete under compression - Maturity concept.

Concrete Mix Design: Basic considerations - Factor to be considered in choice of mix design - I.S. code method of mix design

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UNIT- IV:

Concepts of Building Planning: Types of Buildings as per National Building Code, Functional needs and differences in their planning requirements – Principles of Planning - Building Byelaws – Planning of a building with byelaws - Plumbing services – HVAC services – Formwork & Shuttering – Plastering & Pointing - Types of roofs, doors, windows and staircases – Representation of Building materials and Plumbing services.

UNIT- V:

Masonry Construction: Introduction

Stone Masonry: Elevation, sectional plans and cross sections of walls of Ashlar, CRS I and II sort and RR stone masonry

Brick Masonry: Plan and isometric view of external main wall junctions, Stretcher Bond, Header Bond; English Bond& Flemish Bond – for half brick, one & one and a half brick wall.

Composite Masonry: Stone Composite Masonry, Brick Stone Composite Masonry, Cement Concrete Masonry, Hollow Clay tile Masonry, Reinforced Brick Masonry.

Text Books:

1. S.P. Arora & S. P. Bindra, "*A text book of Building Construction*", Dhanpat Rai Publications, 2010.
2. B.C Punmia, Ashok Kumar Jain &Arun Kumar Jain "*Building Construction*", Laxmi Publications (P) LTD, 2016.
3. A.M Neville., "Properties of Concrete", Pearson Education. 2012.
4. M.S. Shetty, and A. K. Jain, "Concrete Technology: Theory and Practice", S. Chand & Company, 2018.
5. R. Santhakumar, "Concrete Technology", Oxford University, Press 2018.

Suggested Reading:

1. P.C. Varghese, "*Building construction*" PHI, 2016.
2. CBRI Roorkee, "*Advances in Building Materials and construction*".
3. Sushil Kumar, "*Building Construction*", Standard Publishers, 1992.
4. National Building Code of India, 2006.

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18CE E23

EARTHQUAKE RESISTANT DESIGN OF STRUCTURES
(Core Elective-6)

Instruction		3L Hours per week	
Duration of Semester End Examination		3 Hours	Semester
End Examination		70 Marks	CIE
30 Marks	Credits		
3			

Course objectives: To enable the student

1. Understand the causes of earthquakes , their Magnitude & effects and various types of earthquake waves
2. Understand the concepts of damped and un damped vibrations and the response of single , two and multi-degree systems to thesevibrations , and concepts of Response spectrum
3. Review various case studies of past earthquakes, and performance of buildings during those earthquakes, understand the concepts of Seismic Design Philosophy and Earthquake Resistant Design of Masonry, RC and Steel structures. Evaluate the seismic loads on the structures using IS 1893 Part I codal provisions.
4. Gain knowledge of Seismic Performance of Engineered and NonEngineered Urban and Rural buildings
5. Understand the basic concepts of Seismic resistant construction, Base isolation techniques and other energy dissipation devices and Concepts of Seismic retrofitting

Course Outcomes: At the end of the course, the student will be able to

1. relate the fundamentals of engineering seismology, understand the characteristics and effects of strong motion earthquakes.
2. understand the concepts of damped and un-damped vibrations in single and multi-degrees of freedom systems.
3. estimate the seismic loads on structures and analyse using seismic coefficient and response spectrum methods.
4. examine the causes of damages of urban and rural buildings and interpret the design provisions from IS-1893 part - I (2016) and IS - 13920(2016).
5. know the use of various earthquake resistant devices, apply suitable construction techniques for retrofitting.

UNIT – I:

Engineering Seismology& Elements : Causes of Earthquakes–Geological faults,Tectonic Plate theory – Elastic Rebound theory –Focus - Epicentre – Hypocenter,Seismic waves –Primary and Secondary waves, Seismogram - Magnitude, Intensity and Energy release during earthquakes – Magnitude & Intensity Scales, Characteristics of strong earthquake ground motions – Effect of soil properties – Liquefaction of soils.

UNIT – II:

Theory of Vibrations: Introduction to Vibrating Systems – mass, stiffness and damping parameters – Concept of inertia, elastic restoring force and damping –types of damping, difference between static forces and dynamic excitation.

Single Degree of Freedom (SDOF) Systems – SDOF idealization - Formulation of Equation of motion(for mass as well as base excitation) and response for free, forced (harmonic loads only), damped &undamped vibrations, Logarithmic Decrement & Influence of gravitational force on the equation of motion, Natural Time period & Natural Frequency.

Multi Degree of Freedom (MDOF) Systems - Equation of Motion–Mass, stiffness and damping matrices, Modal Analysis -Natural frequencies - generation of modal frequencies and mode shapes, Concept of Response Spectrum – Response Spectrum Curve as per IS: 1893 Part I (2016).

UNIT – III:

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Evaluation of Seismic Loads on Structures: Concepts of over strength, Ductility and Redundancy –Determination of earthquake forces on structures – Seismic Co-efficient and Response Spectrum Methods.

UNIT – IV:

Seismic Performance of Buildings: Case Studies of damages to urban and rural buildings during some past earthquakes – Damage Patterns in structural and non –structural elements – Soft storey effect, Design Provisions as per IS – 1893(2016), Ductile detailing as per IS – 13920(2016).

UNIT – V:

Earthquake Resistant Devices &Construction Techniques: Vibration Control Devices - Base isolators, Energy dissipating devices – Dampers, Lateral Displacement Control - Bracing Systems, Shear Walls.

Seismic Retrofitting: Repair, rehabilitation and retrofitting, retrofitting strategies – Importance of Re-analysis, Retrofitting Techniques for RCC, Masonry and rural buildings, IS – 13935(2009) codal provisions for Retrofitting.

Text Books:

1. PankajAgarwal and Manish Shrikhande, "Earthquake Resistant Design of Structures", Prentice Hall of India Pvt. Ltd, 2011.
2. S.K Duggal, "Earthquake Resistant Design of Structures", Oxford Higher Education, Second Edition, 2013.

Suggested Readings:

1. A.K. Chopra, "Dynamics of Structures", Pearson Education, Fifth Edition,2017.
2. Jai Krishna, A.R Chandrasekaran, Brijesh Chandra, "Elements of Earthquake Engineering", South Asian Publishers Pvt. Ltd, Second Edition,2014.
3. Steven L Kramer, "Geo-Technical Earthquake Engineering", Pearson Education Ltd, 2013.

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20CE E08

DESIGN OF MASONRY STRUCTURES

Instruction	3L Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	60 Marks
Continuous Internal Evaluation	40 Marks
Credits	3

COURSE OUTCOMES:

At the end of the course, the students will be able to,

1) Explain engineering properties, uses of masonry units, defects, crack in masonry and its remedial measures and factors affecting compressive strength of masonry units.
2) Explain the different masonry elements, permissible stresses, design considerations and criteria as per IS: 1905 and SP-20.
3) Design different types of masonry walls subjected to axial loads ; UDL and concentrated axial loads.
4) Design different types of masonry walls subjected to eccentric loads, lateral loads and transverse loads
5) Design infill walls of frames and implement the design principles and detailing aspects to ensure seismic safety of unreinforced and reinforced masonry walls

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	2	1	1	-	3	-	1	-	-	-	1	2	2	1
2	2	2	1	1	-	3	-	1	-	-	-	1	2	2	1
3	2	2	1	1	-	3	-	1	-	-	-	1	2	2	1
4	2	2	1	1	-	3	-	1	-	-	-	1	2	2	1
5	2	2	1	1	-	3	-	1	-	-	-	1	2	2	1
Average	2	2	1	1	-	3	-	1	-	-	-	1	2	2	1

UNIT I

Masonry Units, Materials, types and masonry construction: Bricks, Stone and Block masonry units-strength, modulus of elasticity and water absorption of masonry materials – classification and properties of mortars. Defects and Errors in masonry construction – cracks in masonry, types, reason for cracking, methods of avoiding and repairing cracks

Strength and Stability: Strength and stability of axially loaded masonry walls, effect of unit strength, mortar strength, joint thickness, rate of absorption, effect of curing, effect of ageing, workmanship. Compressive strength formulae based on elastic theory and empirical formulae.

UNIT II

Permissible stresses: Types of walls, permissible compressive stress, stress reduction and shape modification factors, increase in permissible stresses for eccentric vertical and lateral load, permissible tensile stress and shear stresses.

Design Considerations: Effective height of walls and columns, openings in walls, effective length, effective thickness, slenderness ratio, eccentricity, load dispersion, arching action in lintels. Problems on design considerations for solid walls, cavity walls, wall with pillars

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NIT III

oad considerations and design of Masonry subjected to axial loads: Design criteria, design examples of alls under UDL, solid walls, cavity walls, solid wall supported at the ends by cross wall, walls with piers **esign of walls subjected to concentrated axial loads:** Solid walls, cavity walls, solid wall supported at the nds by cross wall, walls with piers, design of wall with openings.

UNIT IV

Design of walls subjected to eccentric loads: Design criteria – stress distribution under eccentric loads – problems on eccentrically loaded solid walls, cavity walls, walls with piers.

Design of Laterally and transversely loaded walls: Design criteria, design of solid wall under wind loading, design of shear wall – design of compound walls. Introduction to reinforced brick masonry, lintels and slabs.

UNIT V

In-filled frames: Types – modes of failures – design criteria of masonry retaining walls.

Seismic safety Considerations for Masonry walls : Design principles, detailing aspects and construction features for seismically safe masonry structures (both – unreinforced and reinforced)

Text Books:

1) Dayaratnam P, Brick and Reinforced Brick Structures, Scientific International Pvt. Ltd.
2) M. L. Gambhir, Building and Construction Materials, McGraw Hill education Pvt. Ltd.
3) Henry, A.W., " Structural Masonry" , Macmillan Education Ltd., 1990.

References:

1) IS 1905–1987 "Code of practice for structural use of un-reinforced masonry- (3rd revision) BIS, New Delhi.
2) SP 20 (S&T) – 1991, "Hand book on masonry design an d construction (1 st revision) BIS, New Delhi.
3) A. W. Hendry, B. P. Sinha and S. R. Davies, An introduction to load bearing brickwork design.
4) Sven Sahlin, Structural Masonry, Prentice-Hall Inc., 1971 4. Miha Tomezevic, Earthquake resistant design of masonry buildings, Imperial College Press, 1999, 693.852N99
5) Robert Drysdale and A A Hamid, Masonry structures behaviour and design, Publisher: The Masonry Society, Boulder, Colorado USA, 3rd Ed. 2008

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With effect from the Academic Year 2021-22

20CE C03

SURVEYING I

Instruction	3L Hours per week
Duration of Semester End Examination	3 Hours
SEE	60 Marks
CIE	40 Marks
Credits	3

Course Objectives: To enable the student

1. To understand basic concepts of surveying and use of chains for developing the map of a given area
2. To perform levelling operations and developing contour maps
3. To know the concepts and use of Tacheometry technique in surveying
4. To give exposure to the latest instruments like Total Station and GPS for solving the surveying problems
5. To understand the importance of trigonometric levelling and applying the same for finding the elevations of objects by various methods.

Course Outcomes:

At the end of the course the student should have learnt

1. To select basic surveying instruments such as chains, tapes etc., to measure areas.
2. To apply the principles of levelling and prepare contour maps to estimate volumes of earthwork using Simpsons and/or trapezoidal rules.
3. To apply the principles of tacheometry on the field.
4. To operate modern instruments like Total Station and GPS in the field
5. To make use of principles of trigonometric levelling for measuring elevations of required objects
6.

PO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	2	1	1												
CO 2	2	1	2												
CO 3	2	1													
CO 4	2	1	1	1											
CO 5	2	1	1	1											

UNIT- I: INTRODUCTION AND BASIC PRINCIPLES OF SURVEYING

Concepts of surveying, principles of surveying, various classifications of surveying. Chain survey- Concepts of survey lines, offsets. Errors in chain survey. Measurement of area - Simpson's method, average ordinate, mid ordinate and trapezoidal rules. Basics of compass survey and plane table survey- accessories and methods.

UNIT – II: LEVELLING AND CONTOURS

Definition of levelling, terms used in levelling. Instruments of levelling, methods of booking levels, Height of Instrument and Rise and Fall methods. Concepts of balancing levels. Types of levelling, reciprocal levelling, profile levelling, precise levelling. Correction to refraction, errors in levelling. Definition of contours- Characteristics of contours, contour interval, methods of contouring-direct and indirect. Development and use of contour maps.

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UNIT – III: TACHEOMETRY

Tacheometry - Theory and use of stadia wires in levelling instruments and theodolite. Fixed hair tacheometers, and concepts and use of Tangential tacheometry. Concepts of Reduction Diagrams, tacheometric, tables, Principle and use of substance bar and concepts of Beaman's stadia arc.

UNIT – IV: MODERN SURVEYING INSTRUMENTS TOTAL STATION AND GPS

Modern Field Survey Systems: Principle of Electronic Distance Measurement, Modulation, Types of EDM instruments, Total station-Parts of a Total Station – Accessories, Advantages and Applications, Field Procedure for total station survey, traversing by Total Station, Errors in Total Station Survey. Concepts of consecutive coordinates- Closing error adjustment and accuracy of a traverse – Gale's traverse table. Advantages of plotting traverse by co-ordinates, solutions to omitted measurements in traverse .Global Positioning: Systems- Segments, GPS measurements, errors and biases, surveying with GPS, co-ordinate transformation, accuracy considerations.

UNIT – V: TRIGONOMETRIC LEVELLING

Trigonometrical levelling Calculation of elevations and distances of accessible and inaccessible objects, numerical problems. Geodetic observations-refraction and curvature. Corrections, axis signal correction, determination of difference in elevation by single and reciprocal observations, numerical problems.

Text Books:

1. C. Venkataramaiah, "A Textbook of Surveying", Universities Press, Hyd, 2011.
2. R. Subramanian,''*Surveying and Levelling*", Oxford Higher Education, 2012.
3. B.C. Punmia & Ashok Jain, "Surveying", Vol II, 12th edition, Laxmi Publication, 2010.

References

1. AM. Chandra, "Plane Surveying", New Age International", 2007.
2. Arora, K.R," Surveying Vol II & III", Standard Book House & SBH Publishers & Distributors,1705, A Nai Sarak, New Delhi - 110 006, 12th edition, 2013.
3. S. K. Duggal, "Surveying", Tata McGraw-Hill Education Private Ltd, New Delhi India, 2013.

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