SHRI DHARMASTHALA MANJUNATHESHWARA COLLEGE OF ENGINEERING & TECHNOLOGY, DHARWAD – 580 002

(An Autonomous Institution recognized by AICTE & Affiliated to VTU,Belagavi)
Ph: 0836-2447465   Fax: 0838-2464638   Web:
www.sdmcet.ac.in

BOARD OF STUDIES (BOS) MEETING - 2021

26.06.2021

Department of Civil Engineering

SDM College of Engineering & Technology, Dharwad – 580 002
Department of Civil Engineering

Board of Studies Committee
From 23.03.2020 to 23.03.2022

Sl. No	Particulars	Name of Expert	Address	Mobile No. & Email-Id	Sign
01.	Chairman	Dr.U.D.Hakari,	Associate Prof., & HOD, Dept. of Civil Engg., SDMCET, Dharwad- 580 002	7019284887 civilhod@sdmcet.ac.in	
02.	One Expert from outside the college to be nominated by the Honorable Vice-Chancellor, VTU.	Dr. Subhash Yaragal,	Professor in Civil Engineering, NITK, Suratkal.	9448952072 subhashyaragal@yahoo.com	online Apprvl. Recrd by e-mail
03.	Two Experts in the subject from outside the college to be nominated by the Academic Council	1. Dr.P.G.Rakaraddi,	Associate Professor in Civil Engineering, Basaveshwar Engineering College, Bagalkot.	9448085007 pgraddi@yahoo.co.in	..
		2.Dr.G.S.Manjunath,	Professor in Civil Engineering, Gogte Institute of Technology, Belgaum.	9449200885 gsmanjunath@git.edu, galis.manjunath@gmail.com	''
04.	One representative from industry/ Corporate sector / allied area relating to placement to be nominated by the Academic Council.	Shri. Jagadeesh Nandi,	Director, JMSPL, Dharwad	9845335373 jagadeeshnandi@gmail.com jmsdwd@gmail.com	''
05.	One Postgraduate meritorious Alumnus to be nominated by the principal	Sri.Anoop Shirkol	Assistant Professor, Dept. of Civil Engineering, Malaviya National Institute of Technology, Jaipur- 302017	9549658329, 9538462532 anoopshirkol@gmail.com	''
06.	Five Faculty members at different levels covering different specializations to be nominated by the Academic Council	1. Mr. I.T. Shirkol	Prof., Dept. of Civil Engg., SDMCET, Dharwad – 580 002	9448729906 itshirkol@rediffmail.com	
		2. Dr.M.S.Patil	Prof., Dept. of Civil Engg., SDMCET, Dharwad-580 002	95900-07058 maahesh.pail@gmail.com	
		3. Prof. K. V.Pramod	Prof., Dept. of Civil Engg., SDMCET, Dharwad- 580 002	9448966985 pramodkarne626@rediffmail.com	
		4. Dr. D.K.Kulkarni	Prof., Dept. of Civil Engg., SDMCET, Dharwad -580 002	9449062826 dilipkkulkarni@rediffmail.com	
		5. Shri.Prateek Cholappanavar	Asst.Prof., Dept. of Civil Engg., SDMCET, Dharwad- 580 002	9483491230 pic@sdmcet.ac.in	

UG and PG Syllabus for 2021-22

HOD Civil <hodcivil@sdmcet.ac.in>

Tue 6/22/2021 4:32 PM

To: subhashyaragal@yahoo.com <subhashyaragal@yahoo.com>; pgraddi@yahoo.co.in <pgraddi@yahoo.co.in>;
galis.manjunath@gmail.com <galis.manjunath@gmail.com>; jagadeeshnandi@gmail.com <jagadeeshnandi@gmail.com>;
jmsdwd@gmail.com <jmsdwd@gmail.com>; anoopshirkol@gmail.com <anoopshirkol@gmail.com>
Cc: Prateek Cholappanavar <pic@sdmcet.ac.in>; itshirkol@rediffmail.com <itshirkol@rediffmail.com>; pramodkarne126
<pramodkarne126@yahoo.com>; Dr.Dilip K Kulkarni <dkkulkarni@sdmcet.ac.in>; dilipkkulkarni@rediffmail.com
<dilipkkulkarni@rediffmail.com>

🔗 6 attachments (3 MB)
2nd Year 2018 Scheme 21-22.pdf; 3rd Year 2018 Scheme 21-22.pdf; 4th Year 2018 Scheme 21-22.pdf; I Sem 18UCVC100
Engg Mechanics.pdf; PG CADS Civil I Year 2021-2022.pdf; PG CADS Civil II Year 2021-2022.pdf;

Dear Sir,

Sub: BOS Meeting of Department of Civil Engineering reg…

BOS meeting of the Department of Civil Engineering, SDMCET, Dharwad is scheduled on 26.06.2021 at 10.30
am.

The meeting will be conducted online through Google Meet and the meeting link shall be shared with you
through your email and WhatsApp.

The agenda for the meeting is as under:

1. Finalization of Vision & Mission statements of the department.

2. Finalisation of syllabus of all the semesters of UG Program in the revised curriculum of 175 credits as per
VTU norms.

3. Finalization of syllabus of all the semesters of PG Program.

4. Any other matter. (NEP implementation)

The files containing the above details are attached herewith for your reference and needful. I request you to
kindly participate in the meeting and offer your valuable inputs.

You are also requested to kindly forward us your bank details such as Account no./Bank and Branch/ IFSC code
etc. for the payment of honorarium.

Thanking you,

Yours faithfully,

(Dr. Udayashankar D. Hakari)
Head, Department of Civil Engineering,
SDM College of Engineering and Technology,
DHARWAD – 580 002
(Cell: 7019284887 , 9481930359)

Meeting of Board of Studies (BOS) (Online through Google Meet)

MEETING EXCERPTS

Date: 26.06.2021
Time: 10:30 AM   Venue: Chamber of HOD, Civil Engg. Dept.

Agenda:
1. Discussion / Finalization of Vision & Mission statements of the department.
2. Finalization of syllabus of all the semesters of UG Program in the revised curriculum of 175 credits as per VTU norms.
3. Finalization of syllabus of all the semesters of PG Program.
5. Any other matter – National Education Policy.

Sl. No.	Deliberations: Matter
	Matter
1	Dr. U.D.Hakari, Head of Civil Engineering Department welcomed Dr. Subhash Yaragal, NITK, Suratkal, Dr. P. G. Rakaraddy, BEC, Bagalkot, Dr. G. S. Manjunath, GIT, Belagavi, Sri. Jagadish Nandi, Director, GMSPL and Prof. Anoop Shirkol, MNIT, Jaipur. He also welcomed the internal members of BOS and also the faculty members of the department.
2	**Discussion / Finalization of Vision & Mission statements of the department:** The members of BOS went through the vision and mission statements of the department and approved the same with no modification.
3	**Finalization of syllabus of all the semesters of UG Program in the revised curriculum of 175 credits as per VTU norms:** Presentation was made on the draft syllabus of all the semesters of UG Program in the revised curriculum of 175 credits as per VTU norms. After discussion and deliberations, following suggestions/compliance were made:

Suggestions	Compliance
i) Inclusion of textbooks from foreign authors.	Complied
ii) Few experiments in BMT lab and Concrete and Highway lab overlapped, the same may be avoided.	Complied
iii) In Structural analysis -I, Unit 4 – Couple of cases may be added and 'Structural Analysis' by Devdas Menon may be included in the reference books.	Complied
iv) In Structural analysis -I, columns and struts can be added	Already included in 3rd Semester under the course 'Mechanics of Materials'.
v) In 6th semester, non-structural program electives may be added.	Suggestion is under consideration. It shall be incorporated in due course of time, may be for next year.
vi) Specific IS codes may be mentioned, instead of "relevant IS codes",.	Complied
vii)In Structural analysis -II, Unit V – (Matrix method) can be split into two units i. Flexibility matrix ii. Stiffness matrix	Unit V deals with only Introduction to Matrix Methods. A separate elective in 6th semester 18UCVE615 – "Matrix method of structural analysis" is offered in 6th semester.

	viii) In 5th semester, "Design of RC Structural elements", combined footing topic can be shifted to 7th semester "Advanced design of RC Structural elements".	Complied
	ix) In 5th semester program elective – "Alternate building material" name needs to be rewritten.	Complied
	x) In 7th semester "Structural Dynamics" – Introduction to MDOF and different types of dampers can be added which will be helpful to students in doing relevant projects.	Complied
	xi) Chapter on foundation settlement in VIth semester GTE-II may be included under Consolidation chapter of GTE-I.	Complied
	xii) Introduce "Lift irrigation systems".	The said topic is covered at introductory level in 8th semester "Water resource Engineering" course.
	xiii) Introduce concept of "drone survey".	The said topic is introduced in 3rd semester course "Surveying" under modern surveying tools.
4	**Finalization of syllabus of all the semesters of PG Program:** Presentation was made on the draft syllabus of all the semesters of PG Program. After discussion and deliberations, the syllabus was approved.	
5	**Any other matter:** Discussion on National educational policy was made and steps taken by respective institutions in complying with National educational policy was noted.	
6	**The meeting was concluded with vote of thanks.**	

HOD, Civil Engg.

Associate Prof. & HOD
Dept. of Civil Engineering
S.D.M. College of Engg. & Tech
Dharwad-580 002

(Note: The above BOS Proceedings has been approved by External & Internal members and the approval e-mails are available in the department)

Internal Members:

1. Prof. I.T.Shirkol

2. Prof. M.S.Patil

3. Prof. K.V. Pramod

4. Dr.D.K. Kulkarni

5. Shri. P.I.Cholappanavar

BOS 2021-2022 Meeting proceedings

HOD Civil <hodcivil@sdmcet.ac.in>

Mon 7/5/2021 1:20 PM

To: subhashyaragal@yahoo.com <subhashyaragal@yahoo.com>; pgraddi@yahoo.co.in <pgraddi@yahoo.co.in>; galis.manjunath@gmail.com <galis.manjunath@gmail.com>; jagadeeshnandi@gmail.com <jagadeeshnandi@gmail.com>; jmsdwd@gmail.com <jmsdwd@gmail.com>; Dr. Anoop I. Shirkol <anoopshirkol@gmail.com>

Cc: Prateek Cholappanavar <pic@sdmcet.ac.in>; itshirkol14@gmail.com <itshirkol14@gmail.com>; Pramod Karne <pramodkarne626@rediffmail.com>; Dr.Dilip K Kulkarni <dkkulkarni@sdmcet.ac.in>

📎 2 attachments (710 KB)
BOS Meeting Proceedings3.pdf; Action taken details.pdf;

Dear Sir(s),

Please find herewith attached, proceedings of BOS conducted on 26/06/2021.

You may please go through the same and communicate your approval at an early date.

Thanking you,

Yours faithfully,

(Dr. Udayashankar D. Hakari)
Head, Department of Civil Engineering,
SDM College of Engineering and Technology,
DHARWAD – 580 002
(Cell: 7019284887 , 9481930359

Re: BOS 2021-2022 Meeting proceedings

Dr. Anoop I. Shirkol <anoopshirkol@gmail.com>

Mon 7/5/2021 1:40 PM

To: HOD Civil <hodcivil@sdmcet.ac.in>

Respected sir,

The Syllabus can be approved.

Thanks for giving me the opportunity.

Thanks & Regards

DR. A. I. SHIRKOL M. Tech (Structural Engg), Ph.D (Ocean Engg.)

Assistant Professor

Department of Civil Engineering

MNIT Jaipur

Jaipur, India - 302017

On Mon, Jul 5, 2021 at 1:20 PM HOD Civil <hodcivil@sdmcet.ac.in> wrote:

Dear Sir(s),

Please find herewith attached, proceedings of BOS conducted on 26/06/2021.

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Thanking you,

Yours faithfully,

(Dr. Udayashankar D. Hakari)
Head, Department of Civil Engineering,
SDM College of Engineering and Technology,
DHARWAD – 580 002
(Cell: 7019284887 , 9481930359

Re: BOS 2021-2022 Meeting proceedings

G.S.Manjunath Sathyanarayana <galis.manjunath@gmail.com>
Mon 7/5/2021 5:18 PM
To: HOD Civil <hodcivil@sdmcet.ac.in>

Sir,

I have gone through the excerpts of the BoS meeting.
I approve the same.

Thanks for the opportunity extended to get associated with your esteemed organization

Regards

Dr. G S Manjunath

On Mon, 5 Jul 2021, 1:20 pm HOD Civil, <hodcivil@sdmcet.ac.in> wrote:
Dear Sir(s),

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You may please go through the same and communicate your approval at an early date.

Thanking you,

Yours faithfully,

(Dr. Udayashankar D. Hakari)
Head, Department of Civil Engineering,
SDM College of Engineering and Technology,
DHARWAD – 580 002
(Cell: 7019284887 , 9481930359

Re: BOS 2021-2022 Meeting proceedings

Subhash Yaragal <subhashyaragal@yahoo.com>

Mon 7/5/2021 9:06 PM

To: HOD Civil <hodcivil@sdmcet.ac.in>; HOD Civil <hodcivil@sdmcet.ac.in>; pgraddi@yahoo.co.in <pgraddi@yahoo.co.in>; galis.manjunath@gmail.com <galis.manjunath@gmail.com>; Jagadeeshnandi@gmail.com <jagadeeshnandi@gmail.com>; jmsdwd@gmail.com <jmsdwd@gmail.com>; Dr. Anoop I. Shirkol <anoopshirkol@gmail.com>

Cc: Prateek Cholappanavar <pic@sdmcet.ac.in>; itshirkol14@gmail.com <itshirkol14@gmail.com>; Pramod Karne <pramodkarne626@rediffmail.com>; Dr.Dilip K Kulkarni <dkkulkarni@sdmcet.ac.in>

Dear sir,

I approve the meeting proceedings.

Sent from Yahoo Mail on Android

On Mon, 5 Jul 2021 at 1:20 pm, HOD Civil <hodcivil@sdmcet.ac.in> wrote:

Dear Sir(s),

Please find herewith attached, proceedings of BOS conducted on 26/06/2021.

You may please go through the same and communicate your approval at an early date.

Thanking you,

Yours faithfully,

(Dr. Udayashankar D. Hakari)
Head, Department of Civil Engineering,
SDM College of Engineering and Technology,
DHARWAD – 580 002
(Cell: 7019284887 , 9481930359

Re: BOS 2021-2022 Meeting proceedings

Jagadeesh Nandi <jagadeeshnandi@gmail.com>

Tue 7/6/2021 9:59 AM

To: HOD Civil <hodcivil@sdmcet.ac.in>

Sir, I am in agreement with the proceedings.The same can be deemed approved from me.

Please note the name corrections.

Jagadeesh Nandi.
Managing Director.
JMSPL...JALAVAHINI MANAGEMENT SERVICES PVT LTD

THANK YOU,SIR

On Mon, 5 Jul 2021, 13:20 HOD Civil, <hodcivil@sdmcet.ac.in> wrote:
  Dear Sir(s),

Please find herewith attached, proceedings of BOS conducted on 26/06/2021.

You may please go through the same and communicate your approval at an early date.

Thanking you,

Yours faithfully,

(Dr. Udayashankar D. Hakari)
Head, Department of Civil Engineering,
SDM College of Engineering and Technology,
DHARWAD – 580 002
(Cell: 7019284887 , 9481930359

Re: BOS 2021-2022 Meeting proceedings

prabhu rakaraddi <pgraddi@yahoo.co.in>
Tue 7/6/2021 10:23 AM

To: HOD Civil <hodcivil@sdmcet.ac.in>; galis.manjunath@gmail.com <galis.manjunath@gmail.com>; jagadeeshnandi@gmail.com <jagadeeshnandi@gmail.com>; jmsdwd@gmail.com <jmsdwd@gmail.com>; Dr. Anoop I. Shirkol <anoopshirkol@gmail.com>; Subhash Yaragal <subhashyaragal@yahoo.com>
Cc: Prateek Cholappanavar <pic@sdmcet.ac.in>; itshirkol14@gmail.com <itshirkol14@gmail.com>; Pramod Karne <pramodkarne626@rediffmail.com>; Dr.Dilip K Kulkarni <dkkulkarni@sdmcet.ac.in>

Dear sir,
Good morning,
I approve the proceedings of the meeting.
With warm regards

On Monday, 5 July, 2021, 09:06:48 pm IST, Subhash Yaragal <subhashyaragal@yahoo.com> wrote:

Dear sir,
I approve the meeting proceedings.

Sent from Yahoo Mail on Android

On Mon, 5 Jul 2021 at 1:20 pm, HOD Civil
<hodcivil@sdmcet.ac.in> wrote:

Dear Sir(s),

Please find herewith attached, proceedings of BOS conducted on 26/06/2021.

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Yours faithfully,

(Dr. Udayashankar D. Hakari)
Head, Department of Civil Engineering,
SDM College of Engineering and Technology,
DHARWAD – 580 002
(Cell: 7019284887 , 9481930359

18UCVC301	Mechanics of Materials	(4-0-0)4

Contact Hours: 52

Course Learning Objectives (CLOs): Mechanics of Materials is taught as a core course in Civil Engineering program. In this course, topics on Simple stresses and strains, Compound stresses, BMD and SFD for determinate beams, bending and shear stresses in beams, deflection of beams, Torsion of circular shafts, stability of columns and thin and thick cylinders are dealt. The evaluation is made by means of the internal assessment tests and semester end examination.

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs (1,12)/ PSO (1,2,3)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Analyze and calculate simple stresses and strains, Elastic constants, thermal stresses.	1,2		
CO-2	Analyze and calculate Compound stresses by analytical and graphical method.	1,2		
CO-3	Analyze, calculate and draw BMD, SFD and calculate bending Stresses, Shear Stresses in beam cross section.	1,2	3	
CO-4	Analyze and calculate Slopes and deflections of beams & columns and buckling loads for long columns.	1,2		
CO-5	Analyze and calculate stresses and strains in circular shafts subjected to torsion and thin and thick cylinders subjected to internal pressures.	1,2	3	

POs	PO-1	PO-2	PO-3
Mapping Level	3	3	2

Prerequisites:
Students taking this course shall have the knowledge of following:
Engineering Mechanics

Contents:

Unit-I

Simple stresses and strains: Simple Stresses & Strains, Elastic constants, compound bars, thermal effects.   **10 Hrs.**

Unit-II

Compound stresses: Inter-relations of direct and shear stresses, Mohr's circle of stresses   **9 Hrs.**

Unit-III

Bending Moment and Shear Force Diagram: Simply supported, Cantilever, overhanging beams for standard and general loadings.

Bending & Shear stresses: Calculation of bending and shear stresses in rectangular and flanged sections.   **12 Hrs.**

Unit-IV

Slopes and deflections: Calculation of slopes and deflections in determinate beams by Double Integration Method and Macaulay's method.

Long Columns: Elastic stability of Columns, Euler's theory, Rankine's formula.
                                                                                     12 Hrs.

Unit-V

Torsion: Torsion of circular shafts, power transmitted, design and comparison of hollow & solid shafts.

Thin and Thick Cylinders: Analysis and design of thin and thick Cylinders.
                                                                                      9 Hrs.

Reference Books:

1) Punmia B.C., Ashok Jain, Arun Jain, "Strength of Materials", Lakshmi Publications, New Delhi.
2) Basavarajaiah and Mahadevappa, "Strength of Materials", Khanna Publishers, New Delhi
3) Bhavikatti S.S., "Strength of Materials", Vikas Publishers, New Delhi.
4) Ramamrutham, "Strength of Materials", DhanapathRai Publishers, New Delhi.
5) Beer & Johnston, "Mechanics of Materials", McGraw Hill Education.

| 18UCVL305 | Basic Material Testing Lab | (0-0-3) 1.5 |

Contact Hours: 36

Course Learning Objectives (CLOs) Basic Material Testing Laboratory is taught as one of the regular labs for III Semester Civil Engineering students. In this coarse various test on steel, aggregates cement, bricks, concrete blocks are dealt. The delivery of topics will be made through instruction classes, demonstration and laboratory works as per IS codes. The evaluation will be carried out through continuous evaluation & end semester practical examination.

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:	Mapping to POs (1,12)/ PSO (1,2,3)		
	Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Perform tests on metals and Interpret results.	4	9	8
CO-2	Perform tests on fine and coarse aggregate and arrive at suitability of aggregates based on test results.	4	9	8
CO-3	Perform test on Cement, interpret results. and Identify grade of cement.	4	9	8
CO-4	Perform tests on Bricks and classify based on results.	4	9	8

POs	PO-4	PO-8	PO-9
Mapping Level	3	1	2

Prerequisite:
1) Building Construction
2) Strength of Materials

Contents:
1) **Test on steel & metals:** Tension, compression, shear, Hardness and impact test.
2) **Test on fine aggregate:** Specific gravity, Bulk density, Silt and deleterious materials.
3) **Test on Coarse aggregate:** Specific gravity, Bulk density, water absorption.
4) **Test on Cement:** Specific gravity, Fineness, Normal Consistency, Initial and Final setting time.
5) **Tests on Bricks:** Size, water absorption, Compression strength.

Course learning objectives (CLOs): In this course, characteristics of cement, strength of aggregate, shape tests on aggregate, strength parameters of concrete, properties of bitumen are dealt. The delivery of topics will be made through demonstration and Laboratory work. The delivery of topics will be made through instruction classes, demonstration and Laboratory work. The evaluation will be carried out through continuous evaluation & Semester End practical examination.

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:	Mapping to POs (1,12)/ PSOs (13,15)		
	Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1 Perform tests on cement and coarse aggregate.		15	9
CO-2 Perform tests on fresh and hardened concrete.	3	15	9
CO-3 Perform tests on bitumen.		15	9

POs	PO-3	PO-9	PO-15
Mapping Level	3	1	2

Contents:
1. **Cement:** Determination of grade of Cement.
2. **Aggregates:** Abrasion, Impact, crushing strength, shape tests - Flakiness & Elongation.
3. **Fresh concrete:** Concrete Mix design, workability - slump, compaction factor and Vee-Bee test.
4. **Hardened concrete:** Compressive strength and NDT.
5. **Bituminous materials and mixes:** Specific Gravity, Penetration, Ductility, Softening point, Flash and fire point, Viscosity. Marshall Stability tests, bitumen extraction. Sub grade Soil CBR Test.

Reference Books:
1) Gambhir. M.L., "Concrete Manual", Dhanpat Rai & sons New Delhi.
2) "Highway Material Testing Laboratory Manual", Nem Chand & Bros.

| 18UCVC400 | Structural Analysis–I | (4-0-0) 4 |

Contact Hours: 52

Course Learning Objectives (CLOs): Structural Analysis-I is taught as one of the core courses in Civil Engineering program. In this course, topics on Structural systems, Deflection of beams, Strain Energy, Arches and Cables, Influence Line Diagram for Beams and Analysis of Indeterminate beams are dealt. The delivery of topics will be made through lecture classes. The evaluation is made by means of the internal assessment tests and semester end examination

Course Outcomes (COs):

| Description of the Course Outcome: At the end of the course the student will be able to: | Mapping to POs (1,12)/ PSO (1,2,3) | | |
	Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1 Classify the different Structural Systems and Calculate the deflection in beams by Moment Area Method, Conjugate Beam Method,	1,2		
CO-2 Analyze beams, frames and trusses using energy principles and energy theorems.	1,2		
CO-3 Calculate the forces in arches and cables.	1,2		
CO-4 Calculate and sketch the bending moment and shear force in the beam under moving load using ILD.	1,2		
CO-5 Analyze the indeterminate beams by consistent deformation method and Clapeyron's theorem of three moments.	1,2		

POs	PO-1	PO-2
Mapping Level	3	3

Prerequisites:
Students taking this course shall have the knowledge of following:
1) Engineering Mechanics
2) Strength of Materials

Contents:

Unit-I

Introduction to Structural Systems: Forms of structures, conditions of equilibrium, degree of freedom, linear and non-linear structures, one, two and three-dimensional structural systems, determinate and indeterminate structures [Static and Kinematics].

Deflection of beams: Moment area method, conjugate beam method.   **12 Hrs.**

Unit-II

Energy Principles and Energy Theorems: Strain energy and complimentary strain energy, strain energy due to axial load, bending and shear, theorem of minimum potential energy, Law of conservation of energy, principle of virtual work, the first theorem of Castigliano, Betti's law, Clarke -Maxwell's theorem of reciprocal deflection, deflection of beams and trusses using strain energy and unit load methods.   **12 Hrs.**

Unit-III

Arches and cables: Three hinged circular and parabolic arches with support at same levels and different levels, determination of thrust, shear and bending moment, analysis of cables under point loads and UDL, length of cables supports at same level and at different levels.   **10 Hrs.**

Unit-IV

Influence line diagrams for beams: Influence line for maximum shear force, maximum bending moment for simply supported, cantilever and overhanging beams.   **08 Hrs.**

Unit-V

Analysis of beams: Consistent deformation method -propped cantilever and fixed beams, strain energy method -propped cantilever and fixed beams Clapeyron's theorem of three moments -continuous beams.   **10 Hrs.**

Reference Books:

1) Devdas Menon, "Structural Analysis", Alpha Science International Ltd.
2) Reddy C. S., "Basic Structural Analysis", Tata McGraw Hill.
3) Punmia B.C., Jain A.K., "Strength of Materials and Theory of Structures Vol I & II", Laxmi Publication
4) Ramamrutham S., "Theory of Structures"; Dhanpat Rai & Sons, Delhi.
5) Bhavikatti S.S., "Structural Analysis Volume - I", Vikas Publications, New Delhi.

Contact Hours: 52

Course Learning Objectives (CLOs): Design of reinforced concrete structures is taught as a core course in Civil Engineering program. In this course, introduction to Working Stress Method and Limit State Method of design for design of beams, slabs, columns, footings, staircases are dealt. The delivery of topics will be made through lecture classes and site visits. The evaluation will be carried out through Internal evaluation and Semester End Examination.

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs (1,12)/ PSO (1,2,3)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Explain working stress method and limit state method.		1	
CO-2	Design and detail different types of beams for different support conditions.	1,3	2	6,8
CO-3	Design and detail different types of slabs.	1,3	2	6,8
CO-4	Design and detail columns and footings.	1,3	2	6,8
CO-5	Design different types of staircases.	1,3	2	6,8

Pos	PO-1	PO-2	PO-3	PO-6	PO-8
Mapping Level	2.8	2	3	1	1

Prerequisites:
1) Mechanics of Materials
2) Structural Analysis I

Contents:

Unit-I

General features of Reinforced Concrete: Introduction, design loads, materials for reinforced concrete, code requirements of reinforcements, elastic theory of RC sections, moment of resistance of section, balanced, under reinforced and over reinforced sections.

Principles of Limit State Design and Ultimate Strength of RC Section: Philosophy of limit state design, principles of limit states, factor of safety,

characteristic and design loads, characteristic and design strength, Analysis of sections for flexure and shear. **12 Hrs.**

Unit-II

Design of Beams: Practical requirements of an RCC beam, designing and detailing of singly reinforced, doubly reinforced and flanged beams for different support conditions. **9Hrs.**

Unit-III

Design of Slabs: Introduction, general consideration of designing and detailing of slabs, spanning in one direction, spanning in two directions for various boundary conditions and for different support conditions. **9 Hrs.**

Unit-IV

Design of Columns: General aspects, effective length, loads on columns slenderness limits for columns, minimum eccentricity, design of short axially loaded columns, design of column subjected to combined axial load and uniaxial moment using SP16. **7 Hrs.**

Design of Footings: Introduction, loads for foundation, design basis, design of isolated footings subjected to axial load. **8 Hrs.**

Unit-V

Design of Staircase: General features, types of staircase, loads on staircases, effective span as per IS code provisions, distribution of loading on stairs, design of staircases. Straight, dog legged and open well stairs. **7 Hrs.**

Reference Books:

1) IS Codes: IS 456-2000 & SP16.
2) Varghese P.C., "Limit State Design of Reinforced Concrete", Prentice Hall of India, New Delhi.
3) Karve S R. and Shah V.L., "Limit state theory and design of reinforced concrete", Vidyarthi Prakashan, Pune.
4) Jain A.K., "Limit state method of design," Nemichand and Bros, Roorkee.
5) Krishnaraju N., "Reinforced concrete design", New Age Publication.

Contact Hours: 39

Course Learning Objectives (CLOs): Advanced design of RC structure is taught as one of the elective courses in Civil Engineering program. In this course, design and drawing of simple portal frame, circular and rectangular water tank, cantilever and counter fort retaining wall and raft and strap beam footings are dealt along with detailed drawings of structural components. The delivery of topics will be made through lecture classes. The evaluation will be carried out through IAs and Semester End Examination.

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs (1,12)/ PSO (1,2,3)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Design Portal frame, water tank, retaining wall and foundations.		2,13	1
CO-2	Prepare the structural drawings of Portal frame, water tank, retaining wall and foundations.		2,13	1
CO-3	Prepare the structural drawings for staircase, continuous beam, column footing, slab systems, prepare layout drawings for the components of the structure.		2,13	1

PO's	PO-1	PO-2	PSO-13
Mapping Level	1	2	2

Prerequisites:
1) Design of RC structural elements
2) Structural Analysis

Contents:

<p align="center">Unit-I</p>

Portal frames: Design and Drawing of the portal frames (single bay, single storey). **7 Hrs**

Unit-II
Water tank: Design and Drawing of the water tanks (circular and rectangular resting on the ground) as per IS code method. **8 Hrs**

Unit-III
Retaining wall: Design and Drawing of the cantilever and counterfort retaining walls. **8 Hrs**

Unit-IV
Foundation: Design and Drawing of the combined, raft and strap beam footing. **8Hrs**

Unit-V
Detailing: Prepare detailed drawings of staircases, beam and slab systems, column footing and layout drawing for a structure. **8 Hrs**

Question paper pattern:
Part A – 2 Questions of 60 marks each are to be set from Unit I to unit IV out of which anyone is to be answered.
Part B – 3 Questions of 20 marks each are to be set from Unit V out of which any two are to be answered.

Reference Books:
1) Krishnamurthy, "Structural Design and Drawing (Concrete Structures)", CBS, Publications New Delhi.
2) Krishnaraju N., "Design of RCC Structures", CBS publishers, New Delhi.
3) Punmia B.C., "Reinforced Concrete Structures", Vol 1 & 2, Laxmi Publication Pvt Ltd
4) Krishnaraju N., "Structural Design and Drawing", University press, Hyderabad.
5) IS Codes: SP-34, SP-16, IS 456 : 2000, IS 3370 : 2009 and IS: 875 :1987 Part I to V.

Course Learning Objectives (CLOs): Alternative Building Materials is taught as one of the elective courses in Civil Engineering program. In this course, the students understand environmental issues due to building materials and the energy consumption in manufacturing building materials. The course also exposes the students to the study the various masonry blocks, masonry mortar and the study the alternative building materials in the present context. Students shall also understand the alternative building technologies which are followed in present construction field. The evaluation will be carried out through Internal evaluation and Semester End Examination.

Contact Hours: 39

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:	Mapping to POs(1,12)/ PSO (1,2,3)		
	Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1 Explain the facts of energy, environment, cost effectiveness of different building materials.			1
CO-2 Explain the elements of structural masonry.			1
CO-3 Explain the types, characteristics and strength of mortars.			1
CO-4 Explain and apply the concepts of alternative building materials, types, properties.		1,2,7	
CO-5 Discuss the equipment for production of alternative materials and cost concepts.			1

POs	PO-1	PO-2	PO-7
Mapping Level	1.2	2	2

Contents:

Unit-I

Introduction: Energy in building materials, environmental issues concerned to building materials, Global warming and construction industry, environment friendly and cost-effective building technologies, requirements for building of different climatic regions.   **6 Hrs.**

Unit-II

Elements of Structural Masonry: Elements of Structural Masonry, Masonry materials, requirements of masonry units, characteristics of bricks, stones, clay blocks, concrete blocks, stone boulders, laterite blocks, Stabilized mud block. Manufacture of stabilized blocks, cementations materials, sand, natural & manufactured. **8 Hrs.**

Unit-III

Mortars: Types of mortars, classification of mortars as per BIS, characteristics and requirements of mortar, selection of mortar, uses of masonry, masonry bonding, Compressive strength of masonry elements, Factors affecting compressive strength, Bond strength of masonry, Flexure and shear, Elastic properties of masonry materials. **8 Hrs.**

Unit-IV

Conventional and Non-conventional Materials: Lime, Pozzolana cement, Raw materials & Manufacturing process, Properties and uses. Fibers- metal and synthetic, Properties and applications. Fiber reinforced plastics, Matrix materials, Fibers organic and synthetic, Properties and applications. Building materials from agro and industrial wastes, Types of agro wastes, Types of industrial and mine wastes, Properties and applications. Masonry blocks using industrial wastes. Construction and demolition wastes. **9 Hrs.**

Unit-V

Equipment for Production of Alternative Materials and cost concepts: Machines for manufacture of concrete, Equipment for production of stabilized blocks, Moulds and methods of production of precast elements, Cost concepts in buildings, Cost saving techniques in planning, design and construction, Cost analysis, Case studies using alternatives. **8 Hrs.**

Reference Books:
1) K. S. Jagadish, B.V Venkatarama Reddy and K.S Nanjunda Rao, "Alternative Building Materials and Technologies", New Age International Pvt. Ltd.
2) Arnold W Hendry, "Structural Masonry", Macmillan Publishers.
3) S. K. Duggal, "Building Materials", New Age International Pvt. Limited.

Contact Hours:39

Course Learning Objectives (CLOs): Structural Dynamics is taught as one of the elective courses for civil engineering program. In this course, mathematical model for single degree, multi degree of freedom systems for un-damped, damped forced and free vibrations are dealt. The delivery of topics will be made through lecture classes. The evaluation will be carried out through IA tests and SEE.

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:	Mapping to POs(1,12)/ PSO (1,2,3)		
	Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Explain D-Alembert's principle, SDOFS for free vibration of damped un-damped systems.	1,2	3	
CO-2	Explain Harmonic loading case and vibration isolation system for SDOFS.	1,2	3	
CO-3	Analyze the Multi storey shear building under free and forced vibration for damped and un-damped conditions.	1,2	3	
CO-4	Explain the effect of impulse load using Duhamel's Integral.	1,2	3	
CO-5	Apply the knowledge of Fourier series in structural dynamics.	1,2	3	

PO's	PO-1	PO-2	PO-3
Mapping Level	3	3	2

Prerequisites:
Students taking this course shall have the knowledge of following:
1) Engineering Mechanics
2) Structural Analysis – I
3) Structural Analysis – II

Contents:

Unit-I

Single Degree of Freedom System: Degrees of freedom, un-damped system, springs in parallel and series. Newton's laws of motion, free body diagrams.

D'Alembert's principle, solution of the differential equation of motion, frequency and period, amplitude of motion. Damped Single degree of freedom system – viscous damping, equation of motion, damped system - critically, over, under and logarithmic decrement.   **8 Hrs**

Unit-II

Harmonic Loading: Response of single degree of freedom system to harmonic loading – un-damped harmonic excitation, damped harmonic excitation, evaluation of damping at resonance, bandwidth method (Half power) to evaluate damping, response to support motion, force transmitted to the foundation, seismic instruments, generalized single degree of freedom system (rigid body and distributed elasticity).   **8 Hrs**

Unit-III

Multi Degree of Freedom System: Introduction, Generalized Co-ordinates and Rayleigh's method, Multistory Shear Building, free vibration – natural frequencies and normal modes, zero modes of vibration, forced vibration – modal superposition method, response of a shear building to base motion. Damped motion of shear building – equations of motions, Introduction to dampers and its types.   **8 Hrs**

Unit-IV

Impulse load using Duhamel's integral: Response to general dynamic loading, Impulsive loading and Duhamel's integral, numerical evaluation of Duhamel's integral, un-damped system, numerical evaluation of Duhamel's integral.   **7 Hrs**

Unit-V

Application of Fourier series: Fourier analysis and response in frequency domain – Fourier analysis, Fourier co-efficient for piece-wise linear functions, exponential form of Fourier series, discrete Fourier analysis, fast Fourier transforms.

8 Hrs

Reference Books:

1) Mario Paz, "Structural dynamics: Theory and Computation", CBS Publisher and Distributors, New Delhi.
2) Clough and Penzien, "Dynamics of Structures", McGraw-Hill, New Delhi.
3) Mukhopadhyay, "Vibration, Dynamics and Structural problems", Oxford IBH Publishers, New Delhi.

Contact Hours: 39

Course Learning Objective (CLOs): Geotechnical Engineering – I is taught as one of core subject for Civil engineering program. It consists of various engineering properties of soil and the principles of soil mechanics are imparted to the students. Topics covered include the index properties of soil, soil classification, flow of water through soils, compaction/ consolidation of soils and shear strength of soil along with numerical problems. The delivery of the topics is achieved through lecture classes, problem solving and demonstrations. The evaluation will be carried out through Internal evaluation and Semester End Examination.

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs(1,12)/ PSO (1,2,3)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Explain the soil formation, phase diagram, derive inter relations, identify soils in the field, explain various index properties of soil.		4	1, 2
CO-2	Explain soil classification, compute the permeability of soils, explain the laboratory methods for determination of permeability, explain seepage / superficial velocity and the quicksand phenomenon.	4		1,2
CO-3	Describe the compaction of soils, Explain the laboratory methods for determining the compaction parameters, explain the field compaction control.	4	2	1
CO-4	Explain the consolidation and its characteristics of soils.		2, 4	1
CO-5	Explain the shear strength of soil, Mohr Coulomb strength theory, explain various laboratory shear tests.		2, 4	1

POs	PO-1	PO-2	PO-4
Mapping Level	1	1.6	2.4

Prerequisites:
Students taking this course shall have the knowledge of following:

1) Strength of Material
2) Building Engineering Science

Contents:

Unit-I

Introduction: Origin and formation of soil, phase diagram, inter relations of soil properties, field identification of soils.

Index Properties of Soils: Definition and importance of Index properties of soils, viz., specific gravity, water content, particle size distribution, consistency limits and indices, in situ density, and density index etc. Determination of specific gravity, particle size distribution and consistency limits.   **8Hrs.**

Unit-II

Classification of Soils: Particle size classification, MIT classification, textural classification, unified soil classification and IS classification, plasticity chart and its importance.

Permeability: Darcy's law, assumptions and validity; coefficient of permeability and its determination in laboratory, Factors affecting permeability, Permeability of stratified soils, Seepage velocity, Superficial velocity and coefficient of percolation, quicksand phenomenon, Capillary phenomenon.   **8Hrs.**

Unit-III

Compaction of Soils: Definition, standard and modified Proctor's compaction tests, factors affecting compaction, effect of compaction on soil properties, field compaction methods, rollers and vibrators, field compaction control, Procter's needle   **8Hrs.**

Unit-IV

Consolidation of soils: Definition, mass-spring analogy, Terzaghi's one dimensional consolidation theory, assumptions and limitations, normally consolidated, under consolidated and over consolidated soils, pre-consolidation pressure and its determination by Casagrande's method, consolidation characteristics of soil viz., co-efficient of consolidation, co-efficient of volume change, co-efficient of compressibility, compression index. Foundation Settlement, ill effects of settlement of soil on buildings, immediate, primary and secondary settlements.   **8Hrs.**

Unit-V

Shear Strength of Soil: Concept of shear strength, Mohr's strength theory, Mohr Coulomb theory, measurement of shear parameters, direct shear test, unconfined compression test, triaxial compression test and vane shear test, Factors affecting shear strength of soils.   **7Hrs.**

Reference Books:

1) Punmia B.C., "Soil Mechanics and Foundations", Laxmi Publications (P) Ltd., New Delhi.

2) Gopal Ranjan and A.S.R Rao., "Basic and applied soil mechanics", New Age International Publishers, Bangalore.

3) Narasimha Rao A.V. and Venkatramaiah C., "Geotechnical Engineering", University Press (India) Ltd., Hyderabad.

4) Singh Alam and Chowdhary G.R., "Soil Engineering in Theory and Practice", CBS Publishers and Distributors Ltd., New Delhi.

Course Learning Objective (CLOs): Surveying is taught as a core course in Civil Engineering program. The course deals with topics on measurement of distances, angles and elevations. The usage of instruments like chains, tapes, dumpy level and theodolite are dealt with. The delivery of topics will be made through lecture classes and demonstrations. The evaluation is made by means of the internal assessment tests and semester end examination.

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:	Mapping to POs (1,12)/ PSOs (13,15)		
	Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1 Explain basic principles of surveying, carry out leveling operations.	1		
CO-2 Carry out theodolite survey and determine heights and distances by trigonometrical methods.	1	9	
CO-3 Determine heights and distances by tacheometric principle and understand the concept of contours.	1	9	
CO-4 Design different types of curves based on suitability.	3	9, 6, 15	
CO-5 Calculate areas and volumes of civil engineering works, set out works and use modern equipment like GPS and Total Station.	5	9, 8	10

POs	PO-1	PO-3	PO-5	PO-6	PO-8	PO-9	PO-10	PO-15
Mapping Level	3	3	3	2	2	2	1	2

Prerequisites:
Students taking this course shall have the knowledge of following:
1) Trigonometry and geometry

Contents:

Unit-I

Introduction: Definition and classification of surveying, units of measurements, maps and plans, Survey of India Topographical maps and their numbering, Basic

principles of surveying. Measurement of horizontal distances - Chains and Tapes, Ranging of lines-Direct and Indirect.
Levelling: Principles and basic definitions, Fundamental axes and part of a dumpy level, Temporary adjustments of a dumpy level, Types of levelling.   **10 Hrs.**

Unit-II
Theodolite Survey: Types of theodolites, Measurement of horizontal and vertical angles by repetition and reiteration methods.
Trigonometric Levelling: Determination of heights and distances.   **10 Hrs.**

Unit-III
Tacheometry: Principles of tacheometry, measurement of heights and distances
Contouring: Contours, characteristics and uses.   **10 Hrs.**

Unit-IV
Curve Setting: Curves-Necessity-Types of curves, Simple curves, Compound curves, Reverse curves, transition curves and vertical curves. Setting of simple circular curves by successive bisection of chords, offsets from long chord, Rankin's method. Compound curve, Reverse curves of equal and unequal radius. Examples. Transition curves–Necessity, elements and type of curves, Vertical curves -Types of vertical curves- Numerical examples.   **10 Hrs.**

Unit-V
Areas and Volumes: Computations of areas and volumes by trapezoidal and prismoidal methods
Construction Survey: Setting out of works for buildings and tunnels
Modern surveying instruments: Introduction to GPS, Total station and drone survey.   **12 Hrs.**

Reference Books:
1) Punmia B.C., "Surveying, Vol- 1& 2", Laxmi Publishers (Pvt.) Ltd., New Delhi.
2) Chandra A.M., "Plane Surveying", New Age International (P) Ltd.
3) Chandra A.M., "Higher Survey", New Age International (P) Ltd.
4) S.K Kanetkar, "Surveying", Vol- 1& 2".