NEW HORIZON
COLLEGE OF ENGINEERING

Autonomous College Permanently Affiliated to VTU, Approved by AICTE & UGC
Accredited by **NAAC** with **'A'** Grade, Accredited by **NBA**

The Trust is a Recipient of Prestigious Rajyotsava State Award 2012 Conferred by the Government of Karnataka
Awarded Outstanding Technical Education Institute in Karnataka-2016
Ring Road, Bellandur Post, Near Marathalli, Bangalore -560 103, INDIA

Academic Year 2021-22

Department of Civil Engineering

Third and Fourth Semester

Scheme and Syllabus

VISION

To contribute to society by imparting quality education encompassing Technical, Managerial and Entrepreneurial skills

MISSION

- ➢ To create an environment wherein Faculty and Students engage in cutting edge research.
- ➢ To undertake Collaborative projects in order to develop a partnership between Institute and
    Industry
- ➢ To motivate Entrepreneurship and to imbibe Professional Ethics
- ➢ To promote participation in activities which help in holistic development of students.

Program Education objectives (PEOs)

PEO1	Graduates will be able contribute to the development of sustainable infrastructure
PEO2	Graduates as part of an organization or as Entrepreneurs, will continue to learn to hone-up evolving technologies
PEO3	Graduates will be professional Civil Engineers with ethical and societal responsibility
PEO4	Graduates will be able to work as a team in intra and interdisciplinary endeavors for development of new ideas and products for the betterment of society

Program Specific objectives (PSOs)

PSO1	Enhancing the employability skills by making the students find innovative solutions for challenges and problems in various domains of Civil Engineering
PSO2	Inculcating in students tech suaveness to deal with practical aspects of Civil Engineering

PEO to Mission Statement Mapping

Mission Statements	PEO1	PEO2	PEO3	PEO4
To create an environment wherein Faculty and Students engage in cutting edge research.	2	3	2	3
To undertake Collaborative projects in order to develop a partnership between Institute and Industry.	2	2	2	3
To motivate Entrepreneurship and to imbibe Professional Ethics.	2	3	3	3
To promote participation in activities which help in holistic development of students.	2	3	2	2

Correlation: 3- High, 2-Medium, 1-Low
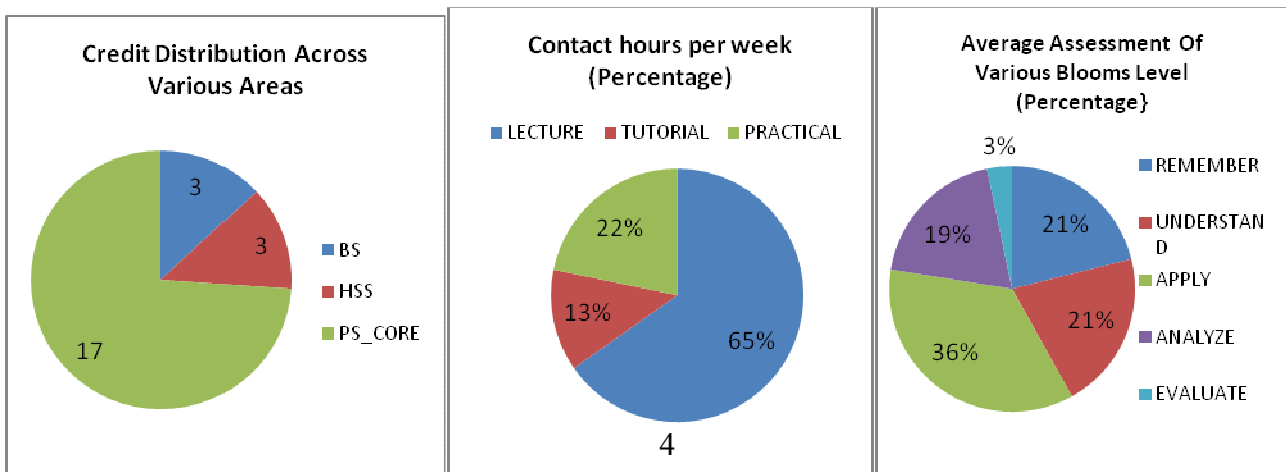
Program Outcomes (PO) with Graduate Attributes

	Graduate	Program Outcomes (POs)
1	Engineering Knowledge	**PO1:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex civil engineering problems.
2	Problem analysis	**PO2:** Identity, formulate, research literature and analyze complex civil engineering problems reaching substantiated conclusion using first principles of mathematics and engineering sciences.
3	Design/ Development of Solutions	**PO3:** The ability to analyse complexities of various civil engineering elements and design similar such elements.
4	Investigation of Problem	**PO4:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information related to civil engineering problems to provide valid conclusions.
5	Modern Tool usage	**PO5:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex civil engineering activities with an understanding of the limitations.
6	The Engineer and society	**PO6:** Apply reasoning based on the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the civil engineering professional practice.
7	Environment and sustainability	**PO7:** Understand the impact of the civil engineering solutions in societal and environmental contexts and demonstrate the knowledge of need for sustainable development.
8	Ethics	**PO8:** Apply ethical principles, commit to professional ethics, own up responsibilities and abide by the norms of the civil engineering practice.
9	Individual & team work	**PO9:** As a civil engineer function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10	Communication	**PO10:** Communicate effectively on complex civil engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11	Project management and finance	**PO11:** Demonstrate knowledge and understanding of the civil engineering and management principles and apply these to one's work, as a member and leader in a team, to manage projects and in multidisciplinary environments as a civil engineer.
12	Lifelong learning	**PO12:** Recognize the need for, willingness to prepare for and to exhibit pro-activeness to engage in independent and lifelong learning in the broadest context of technological change with respect to civil engineering field

Mapping of POs TO PEOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PEO1	3	3	3	3	2	3	3	2	2	2	2	3
PEO2	3	3	3	3	3	3	2	3	2	2	3	3
PEO3	3	3	3	3	2	3	2	3	2	3	2	3
PEO4	3	3	3	3	2	3	2	3	3	3	3	3

Scheme of III Semester B.E Program

Sl. No	Course Code	Course	BOS	Credit Distribution				Overall Credits	Contact Hours	Marks		
				L	T	P	S			CIE	SEE	Total
1	20CIV31A	Applied Mathematics-III	BS	2	1	0	0	3	4	50	50	100
2	20HSS321A	Economics for Engineers	HSS	2	0	0	0	2	2	25	25	50
3	20HSS324 / 20HSS325	Aadalitha Kannada / Vyavaharika Kannada	HSS	1	0	0	0	1	1	25	25	50
4	19CIV33	Building Materials & Construction	CIV	3	0	0	0	3	3	50	50	100
5	19CIV34	Strength of Materials	CIV	2	1	0	0	3	4	50	50	100
6	19CIV35	Plane Surveying	CIV	3	0	0	0	3	3	50	50	100
7	19CIV36	Mechanics of Fluids	CIV	2	1	0	0	3	4	50	50	100
8	19CIV37	Material testing Lab	CIV	0	0	2	0	2	4	25	25	50
9	19CIV38	Plane Surveying Lab	CIV	0	0	1.5	0	1.5	3	25	25	50
10	19CIV39	Mechanics of Fluids Lab	CIV	0	0	1.5	0	1.5	3	25	25	50
		** *The following courses are exclusively for Lateral Entry Students*										
1	*20DMAT31A*	*Basic Applied Mathematics - I*	BS	*0*	*0*	*0*	*0*	*0*	*1*	*25*	*25*	*50*
2	*19HSS171*	*Essential English*	HSS	*0*	*0*	*0*	*0*	*0*	*1*	*25*	*25*	*50*
		Total						**23**	**31**	**375**	**375**	**750**

Credit Distribution Across Various Areas

Contact hours per week (Percentage)

Average Assessment Of Various Blooms Level (Percentage)

4

Scheme of IV Semester B.E Program

Sl. No	Course Code	Course	BOS	Credit Distribution				Overall Credits	Contact Hours	Marks		
				L	T	P	S			CIE	SEE	Total
1	20CIV41A	Applied Mathematics-IV	BS	2	1	0	0	3	4	50	50	100
2	20HSS422A	Life Skills for Engineers	HSS	3	0	0	0	3	3	50	50	100
3	20HSS423A	Environmental Science and Awareness	HSS	0	0	0	0	0	1	25	25	50
4	19CIV43	Concrete Technology	CIV	3	0	0	0	3	3	50	50	100
5	19CIV44	Analysis of Determinate Structures	CIV	2	1	0	0	3	4	50	50	100
6	19CIV45	Higher Surveying	CIV	3	0	0	0	3	3	50	50	100
7	19CIV46	Applied Hydraulics and Machinery	CIV	2	1	0	0	3	4	50	50	100
8	19CIV47	Higher Surveying Lab	CIV	0	0	1.5	0	1.5	3	25	25	50
9	19CIV48	Applied Hydraulics and Machinery Lab	CIV	0	0	1.5	0	1.5	3	25	25	50
10	19CIV49	Mini Project – I (Building Planning & Drawing)	CIV	0	0	2	0	2	4	25	25	50
		** The following courses are exclusively for Lateral Entry Students										
11	20DMAT41A	*Basic Applied Mathematics - II*	BS	0	0	0	0	0	1	25	25	50
12	18HSS272	*Constitution of India & Professional Ethics*	HSS	0	0	0	0	0	1	25	25	50
		Total						23	32	400	400	800

Credit Distribution Across Various Areas

Contact Hours Per Week (Percentage)

AverageAssessement Of Various Blooms Level (Percentage)
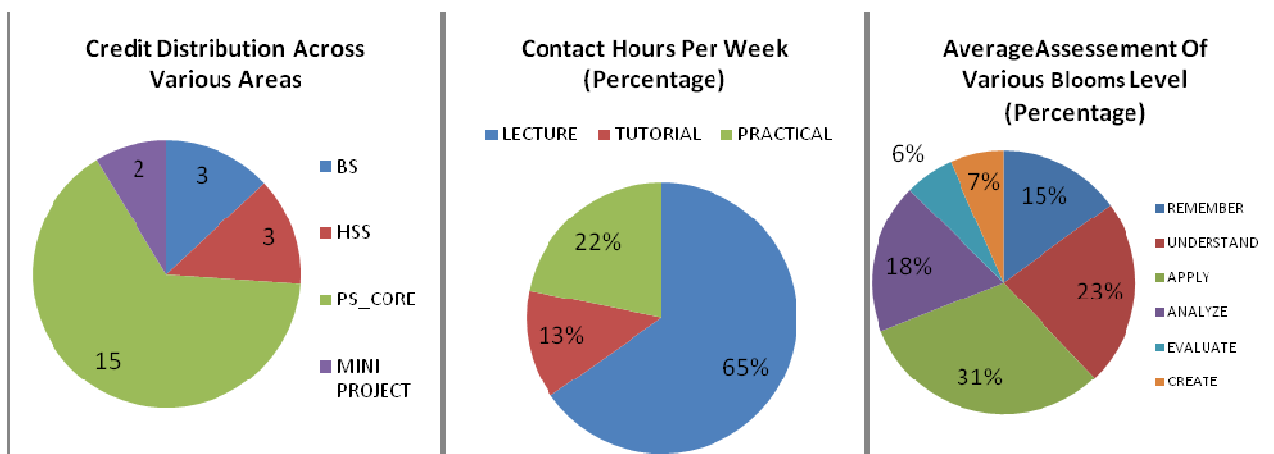
III
Semester

APPLIED MATHEMATICS – III

Course Code: 20CIV31A

L: T: P: S: 2:1:0:0

Exam Hours: 03

Credits: 3

CIE Marks: 50

SEE Marks: 50

Course Outcomes: At the end of the Course, the Student will be able to do the following:

CO1	Use appropriate numerical methods to solve algebraic equations and transcendental equations
CO2	Differentiate the physical problems numerically, evaluate a definite integral numerically and use appropriate numerical methods to solve boundary value problems in partial differential equations.
CO3	Fit a suitable curve by the method of least squares and determine the lines of regression for a set of statistical data and obtain the extremal of a functional.
CO4	Express the periodic functions as Fourier series expansion analytically and numerically.
CO5	Solve the continuous model problems using Fourier transform.
CO6	Applying Fast Fourier transforms method, solve the discrete model problems.

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	-	3	-	-	-	3	3
CO2	3	3	3	3	3	-	3	-	-	-	3	3
CO3	3	3	3	3	3	1	3	-	-	1	3	3
CO4	3	3	3	3	3	-	-	-	-	-	3	3
CO5	3	3	3	3	3	-	-	-	-	-	3	3
CO6	3	3	3	3	3	-	-	-	-	-	3	3

Module No.	Contents of the Module	Hours	Co's
1.	**Numerical Methods-1:** Numerical solution of algebraic and transcendental equations: Regula-falsi method and Newton-Raphson method-Problems. Interpolation: Newton's forward and backward formulae for equal intervals, Newton divided difference and Lagrange's formulae for unequal intervals (without proofs)-Problems.	9	CO1
2.	**Numerical Methods-2**: Numerical Differentiation: Derivatives of first order and second order using Newton's forward differences and Newton's backward differences. Numerical integration: Simpson's $1/3^{rd}$ rule, Simpson's $3/8^{th}$ rule, Weddle's rule (without proofs)-Problems. **Applications:** Application of numerical integration to velocity of a particle and volume of solids. Numerical solution of one-dimensional wave equation, heat equation and two-dimensional Laplace's equation.	9	CO2
3.	**Statistical Methods and Calculus of Variation:** Fitting of the curves of the form $y = a + b\,x$, $y = a + b\,x + c\,x^2$, $y = a\,e^{bx}$, $y = a\,x^b$, and $y = a\,b^x$ by the method of least square-Problems. Correlation and Regression lines - Problems. Variation of a function and functional, variational problems, Euler's equation and Isoperimetric problems. **Applications:** Minimal surface of revolution and Hanging cable.	9	CO3
4.	**Fourier series:** Periodic function, Dirichlet's conditions, Fourier series of periodic functions of period 2π and arbitrary period $2l$, half range series-Problems. **Applications:** Fourier series and half Range Fourier series of periodic square wave, half wave rectifier, full wave rectifier, Saw-tooth wave with graphical representation, practical harmonic analysis-Problems.	9	CO4
5.	**Fourier Transforms:** Infinite Fourier transforms, Fourier Sine and Cosine transforms, Inverse Fourier sine and cosine transforms. **Discrete Fourier Transform and Fast Fourier Transform:** Definition of N-Point DFT, problems for 4-points and inverse DFT for four points only. FFT algorithm to compute the Fourier transforms 4-point only.	9	CO5, CO6

Text Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley-India Publishers, 10th Edition, 2014, ISBN: 978-81-265-5423-2.

2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43rd Edition, 2014, ISBN: 978-81-7409-195-5.

Reference Books:

1. Glyn James, Modern Engineering Mathematics, Prentice Hall, 4th Edition, 2015, ISBN: 978-0-273-73409-3

2. B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education (India) Private Limited, 4th Edition, 2016, ISBN: 978-0-07-063419-0.

3. H. K. Dass, Advanced Engineering Mathematics, S. Chand & Company Ltd., 28th Edition, 2012, ISBN: 81-219-0345-9.

4. N.P.Bali and Manish Goyal, A Text Book of Engineering Mathematics, Laxmi Publications (P) Ltd., 9th Edition, 2014, ISBN: 978-81-318-0832-0.

Assessment Pattern:

1. CIE- Continuous Internal Evaluation (50 Marks).

Bloom's Category	Tests (25 Marks)	Assignment-1 (7.5Marks)	Assignment-2 (7.5Marks)	Quiz-1 (05 Marks)	Quiz-2 (05 Marks)
Remember	5	2.5	2..5	-	-
Understand	5	2.5	2.5	-	-
Apply	10	2.5	2.5	05	05
Analyze	2.5	-	-	-	-
Evaluate	2.5	-	-	-	-
Create	-	-	-	-	-

2. SEE- Semester End Examination (50Marks).

Bloom's Category	SEE Marks
Remember	10
Understand	10
Apply	20
Analyze	5
Evaluate	5
Create	-

ECONOMICS FOR ENGINEERS

Course Code : **20HSS321A**   **Credits** : **02**

L:T:P:S : **2:0:0:0**   **CIE Marks :** **25**

Exam Hour : **03 Hrs**   **SEE Marks:** **25**

Course Outcomes: On completion of the course, the student will be able to:

CO1	Summarize the knowledge of economics and its importance in business decision making
CO2	Make use of economic concepts in business
CO3	Examine the impact of market forces on business
CO4	Interpret the role of market structure in the economic development of a country
CO5	Evaluate the role of budgeting in business decisions

Mapping of Course Outcomes to Program Outcomes:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	0	1	0	1	1	3	3	3	3	1	2	3
CO2	1	1	1	1	2	2	1	2	2	2	3	3
CO3	3	2	3	1	1	2	2	3	1	1	2	2
CO4	1	2	1	2	1	3	1	2	2	2	2	2
CO5	3	2	3	2	2	1	1	2	1	1	3	1

Module No.	Contents of Module	Hours	Cos
1	**Introduction to Economics:** Role of Engineer as an Economist, Types and problem of economies, Basics of economics (GDP, National income, inflation, business cycle, fiscal and monetary policies, balance of payment).	4	CO1, CO4
2	**Basic concepts of Microeconomics:** concept of Demand & Elasticity of Demand. Concept of Supply & Elasticity of Supply, Meaning of Production and factors of production, Production Possibility Curve, Law of variable proportions and returns to scale. Relevance of Depreciation towards industry, Depreciation computing methods.	4	CO2, CO3
3	**Concepts of cost of production:** different types of cost; accounting cost, sunk cost, marginal cost and opportunity cost. Break even analysis, Make or Buy decision. Cost estimation, Elements of cost as Direct Material Costs, Direct Labor Costs, Fixed Over-Heads, Factory cost, Administrative Over-Heads.	4	CO3
4	**Market structure: Perfect Competition:** Features, Determination of Price under Perfect Competition - Monopoly: Features, Pricing under Monopoly, Oligopoly: Features, Kinked Demand Curve, Cartel, Price Leadership – Monopolistic Competition: Features, Pricing under Monopolistic Competition, Product Differentiation.	5	CO1, CO4
5	**Capital budgeting:** Traditional and modern methods, Payback period method, IRR, ARR, NPV, PI. . Interest and Interest factors: Interest rate, Simple interest, Compound interest, Cash - flow diagrams, Personal loans and EMI Payment. Present worth, Future worth.	7	CO3, CO5

TEXT BOOKS:

1. Riggs J.L, Engineering Economy, TMH, 2012 edition
2. Jain T.R., Economics for Engineers, VK Publications, 2008 Edition
3. IM PANDEY,Finacial Management, Vikas Pub. House, 2018 Edition
4. D N Dwivedi, MangerialEconomics ,Vikas Pub. House, 2018 Edition
5. Dr.A.R Sainath,Sasikala Devi,Engineering Economics and Financial Accounting,Charulatha

   Publications, 2015 edition

REFERENCE BOOKS:

1. Thuesen H.G, Engineering Economy. PHI
2. Prasanna Chandra, Financial Mangement,TMH
3. Singh Seema, Economics for Engineers, IK International
4. Chopra P. N, Principle of Economics, Kalyani Publishers
5. Dewett K K, Modern Economic Theory, S. Chand

Assessment pattern

CIE - Continuous Internal Evaluation (25 Marks, Theory)

Bloom's Category	Test	Assignment
Marks	**15**	**10**
Remember	5	-
Understand	5	-
Apply	5	-
Analyze	-	5
Evaluate	-	5
Create	-	-

SEE – Semester Ending Examination (25 Marks)

Bloom's Category	SEE Theory (25)
Remember	5
Understand	5
Apply	5
Analyze	5
Evaluate	5
Create	-

ಆಡಳಿತ / ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ

(ಕನ್ನಡಿಗರಿಗಾಗಿ for Kannadigas common to all branches)

Course code : 20HSS324/424	Credits	: 01
L:T:P : 1:0:0	CIE Marks	: 25
Exam Hours : 2	SEE Marks	: 25

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಅಧ್ಯಯನದ ಕಲಿಕಾಂಶಗಳು:

CO1 ವಿದ್ಯಾರ್ಥಿಗಳು ಕನ್ನಡ ವ್ಯಾಕರಣದ ಬಗ್ಗೆ ಹಾಗೂ ಭಾಷಾ ರಚನೆ ನಿಯಮಗಳನ್ನು ಅರ್ಥೈಸಿಕೊಳ್ಳುತ್ತಾರೆ.

CO2 ಕನ್ನಡ ಭಾಷಾ ಬರಹದಲ್ಲಿನ ದೋಷಗಳು, ನಿವಾರಣೆ ಮತ್ತು ಲೇಖನ ಚಿಹ್ನೆಗಳನ್ನು ಅರಿಯುಕೊಳ್ಳವರು.

CO3 ಸರ್ಕಾರಿ ಮತ್ತು ಅರೆಸರ್ಕಾರಿ ಪತ್ರ ವ್ಯವಹಾರದ ಬಗ್ಗೆ ತಿಳುವಳಿಕೆ ಪಡೆಯುವರು .

CO4 ಭಾಷಾಂತರ ಮತ್ತು ಪ್ರಬಂಧ ರಚನೆ ಬಗ್ಗೆ ಅಸಕ್ತಿವಹಿಸಿಕೊಳ್ಳುವರು.

CO-PO Mapping :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	-	-	3	-	-
CO2	-	-	-	-	-	-	-	-	-	3	-	-
CO3	-	-	-	-	-	-	-	-	-	3	-	-
CO4	-	-	-	-	-	-	-	-	-	3	-	-

ಪರಿವಿಡಿ (ಪಠ್ಯ ಪುಸ್ತಕದಲ್ಲಿರುವ ವಿಷಯಗಳ ಪಟ್ಟಿ)

ಭಾಗ–1 ಲೇಖನಗಳು : ಕನ್ನಡ ನಾಡು ನುಡಿ ಮತ್ತು ಸಂಸ್ಕೃತಿಗೆ ಸಂಬಂಧಿಸಿದ ಲೇಖನಗಳು

ಭಾಗ–2 ಕಾವ್ಯ ಭಾಗ (ಆಧುನಿಕ ಪೂರ್ವ)

ಭಾಗ–3 ಕಾವ್ಯ ಭಾಗ (ಆಧುನಿಕ)

ಭಾಗ–4 ತಾಂತ್ರಿಕ ವೃತ್ತಿ ಪರಿಚಯ ಕಥೆ ಮತ್ತು ಪ್ರವಾಸ ಕಥನ

ಭಾಗ–5 ವಿಜ್ಞಾನ ಮತ್ತು ತಂತ್ರಜ್ಞಾನ

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಪಠ್ಯ ಪುಸ್ತಕದ ಲೇಖಕರು

ಡಾ.ಎಲ್.ತಿಮ್ಮೇಶ, ಪ್ರೊ.ಎ. ಕೇಶವಮೂರ್ತಿ, ಪ್ರಕಟಣೆ: ಪ್ರಸಾರಾಂಗ,ವಿ.ತಾ.ವಿ ಬೆಳಗಾವಿ

ಪರೀಕ್ಷೆಯ ವಿಧಾನ:

ನಿರಂತರ ಅಂತರೀಣ ಮೌಲ್ಯ ಮಾಪನ (Continuous Internal Evaluation)   : 25

ಸೆಮಿಸ್ಟರ್ ಎಂಡ್ ಪರೀಕ್ಷೆ   (Semester End Examination)   : 25

Bloom's Category	CIE (25)	SEE(25)
Remember	12	12
Understand	13	13

ವ್ಯಾವಹಾರಿಕ/ ಬಳಕೆ ಕನ್ನಡ

Vyavaharika / Balake Kannada

(Kannada for usage - common to all branches)

Course code : 20HSS325/425	Credits	: 01
L:T:P : 1:0:0	CIE Marks	: 25
Exam Hours : 2	SEE Marks	: 25

Course Outcome: On completion of the course student will be able to:

CO1 Understand Kannada Language.

CO2 Communicate in Kannada Language

CO3 Read simple Kannada words

CO4 Pronounce Kannada words

CO – PO Mapping:

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	-	-	-	-	-	-	-	-	-	3	-	-
CO2	-	-	-	-	-	-	-	-	-	3	-	-
CO3	-	-	-	-	-	-	-	-	-	3	-	-
CO4	-	-	-	-	-	-	-	-	-	3	-	-

Syllabus

Chapter -1   Abbreviations

Chapter -2   Key to Transcription

Chapter -3   Easy learning of a Kannada Language: A few tips

Chapter -4   Necessity of learning a local Langauge

Chapter -5   Tips to learn the language with easy methods.

Chapter -6   Hints for correct and polite conservation

Chapter -7   About Kannada Language (Kannada Bhashe)

Chapter -8   Eight Kannada authors who have won 'Jnanpith Award'

Chapter -9   Information about Karnataka State

Text Book:

Balake Kannada by Dr. L. Thimmesh, Prof. V. Keshavamurthy, published by: VTU, Belagavi

Continuous internal evaluation & semester end examination (25 Marks each)

Bloom's Category	CIE (25)	SEE(25)
Remember	12	12
Understand	13	13

BUILDING MATERIALS AND CONSTRUCTION

Course Code:	19CIV33	**Credits**	: 03
L: T: P :S	3:0:0:0	**CIE Marks**	: 50
Exam Hours :	3 Hours	**SEE Marks**	: 50

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

CO1	Understand the basic components of the building and different types of structures
CO2	Characterize the properties & uses of construction material.
CO3	Classify the different types of foundation and masonry works in construction
CO4	Illustrate the functions of building components such as doors, windows, floors, and roofs.
CO5	Determine the geometrical components of dog legged stairs.
CO6	Describe the plastering, painting varnishes and formwork.

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	3	-	3	-	-	-	3	3	3
CO2	3	-	-	-	-	3	-	3	-	-	-	3	3	3
CO3	3	-	-	-	-	3	-	3	-	-	-	3	3	3
CO4	3	-	-	-	-	3	-	3	-	-	-	3	3	3
CO5	3	-	1	-	-	3	-	3	-	-	-	-	3	3
CO6	3	-	-	-	-	3	-	3	-	-	-	3	3	3

Module No.	Content of Module	Hrs	COs
1	**Introduction:** Definition, Types of Building as per National Building Code, Basic Components of building, Requirement of parts of a building, Types of loads. Types of building structures, its components, uses, advantages and disadvantages: Load bearing structures, RC framed structures, Steel structures (components of a typical industrial building). Composite structures. **Stones:** Types of rocks, Requirements of good structural stone, Properties, and uses of principal building stones, dressing of stones. **Bricks:** Constituents of good brick earth, the Manufacturing process of bricks, Types of bricks, Testing of bricks.	09	CO1, CO2
2	**Timber:** Properties and defects in timber, seasoning, advantages of seasoning, tests on timber, timber preservation techniques. **Bamboo as a Building Material:** Properties, Selection criteria, advantages and disadvantages, uses and preservation techniques. **Metals:** Ferrous metals – Cast iron, wrought iron, steel – types, properties and their uses in the building industry. Non-ferrous metals – Aluminum, Copper, Lead, Nickel, Titanium, Magnesium – properties and their uses.	09	CO2
3	**Foundation:** Foundation, Types (Shallow/Deep) and their suitability, Causes of failure of the foundation. Site exploration techniques, the purpose of the site exploration. **Building masonry:** Introduction, Various terms used, Classification of masonry. Stone Masonry - Classifications of stone masonry: Rubble masonry, Ashlars masonry. **Brick Masonry** - Types of bricks, Bonds in brick work, Laying brick work, Plastering and Pointing. Introduction to load bearing, cavity and partition walls.	09	CO3
4	**Doors and Windows:** Technical terms used, Locations of doors and windows. Types of Doors. Types of Windows, fixtures, and fasteners for doors and windows. **Roofs:** Types of roofs, their suitability. Types pitched roofs -King post truss, Queen post truss, Steel Roof truss, and its component. **Floors:** Various types of floorings - timber flooring, cement concrete flooring, mosaic flooring, ceramic flooring, tile flooring RCC flooring, their suitability. **Stairs:** Definition of technical terms, Requirements of the good stair, Types of Stairs, Geometrical design of RCC Dog legged (Plan and sectional elevation).	09	CO4 CO5
5	**Plastering:** Purpose of plastering, Materials of plastering, Methods of plastering, Defects in plastering. **Paints and Varnishes:** Characteristics of good paint, types of paints, painting to wood, steel, iron and wall surfaces. Varnishes – constituents of varnishes – types of varnishes, method of applying varnishes. **Form work:** Material for form work, form work details in RCC columns, beams and floors	09	CO6

Text Books:

1. National Building Code of India (2016), Volume-1 & 2, Bureau of Indian Standards, New Delhi, India.

2. Building Construction by Sushil Kumar, Standard Publishers, 20th Edition, 2010, New Delhi. (ISBN13 - 9788180141683).

3. Engineering Materials by S.R. Rangwala, Charotar Publications, 2012 (ISBN10-9380358792)

Reference Books:

1. Building Construction by B.C.Punmia, Laxmi Publications Pvt. Ltd, 10th Edition, New Delhi. 2008 (ISBN10-8131804283).

2. Building Materials by S. K. Duggal by New Age International Publishers, New Delhi 4th Edition 2010(ISBN-13: 9788122433791).

3. Building Construction by S.P.Bindra and S.P. Arora, Dhanpat Rai and Sons, Edition 2010 New Delhi (ISBN10 – 8189928805).

CIE-Continuous Internal Evaluation (50Marks)

Bloom's Category	Tests	Assignments	Quizzes	Co-curricular Activities
Marks(out of 50)	**25**	**10**	**05**	**10**
Remember	10	5		5
Understand	10	-	05	5
Apply	5	5		
Analyze				
Evaluate				
Create				

SEE–Semester End Examination (50Marks)

Bloom's Category	Tests
Remember	20
Understand	20
Apply	10
Analyze	
Evaluate	
Create	

Percentage Evaluation of Various Blooms' levels

Bloom's Category	CIE	SEE	TOTAL	%
Remember	20	20	40	40
Understand	20	20	40	40
Apply	10	10	20	20
Analyze	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-
TOTAL	**50**	**50**	**100**	**100**

STRENGTH OF MATERIALS

Course Code: 19CIV34

L: T: P :S 2:1:0:0

Exam Hours : 3 Hours

Credits : 03

CIE Marks : 50

SEE Marks : 50

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

CO1	Analyze the stresses and strains in different materials and interpret their strength including temperature effects.
CO2	Develop the shear force and bending moment diagrams for the structural elements. .
CO3	Analyse the structural elements for induced shear and bending stresses.
CO4	Evaluate the behavior of torsional members.
CO5	Evaluate the behavior of columns and struts.
CO6	Examine the principal stress and strain failure mechanisms in materials.

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	-	-	-	-	-	-	-	-	2	3	3
CO2	3	3	2	-	2	-	-	-	-	-	-	2	3	3
CO3	3	3	2	-	2	-	-	-	-	1	-	2	3	3
CO4	3	3	2	2	2	-	-	-	-	1	-	2	3	3
CO5	3	3	2	2	2	-	-	-	-	1	-	2	3	3
CO6	3	3	2	2	2	-	-	-	-	1	-	2	3	3

Module No	Content of Module	Hrs	Cos
1	**SIMPLE STRESS AND STRAIN**: Introduction, Properties of Materials, Stress, Strain, Hook's law, Poisson's Ratio, Stress – Strain Diagram for mild steel and non ferrous materials, total elongation of tapering bars of circular and rectangular cross sections. Elongation due to self – weight, Problems **ELASTIC CONSTANTS AND THERMAL STRESSES**: Composite section, Volumetric strain, expression for volumetric strain, Elastic constants, relationship among elastic constants, Thermal stresses (including thermal stresses in compound bars), Problems.	09	CO1
2	**BENDING MOMENT AND SHEAR FORCE**: Introduction, Types of beams, loadings and supports, Shearing force in beam, Bending moment, Sign convention, Relationship between loading, shear force and bending moment, Shear force and bending moment equations, SFD and BMD with salient values for simply supported beams, cantilever beams, and overhanging beam considering with point loads, UDL, UVL, Couple and their combinations Problems.	09	CO2
3	**BENDING AND SHEAR STRESSES IN BEAMS**: Bending stresses in Beams: Introduction, pure bending theory, Assumptions, derivation of pure bending equation, modulus of rupture, section modulus and flexural rigidity. Shear Stresses in Beams, Expression for transverse shear stress in rectangular beams, Bending and shear stress distribution diagrams for circular, rectangular, 'I', and 'T' sections Problems.	09	CO3
4	**TORSION OF CIRCULAR SHAFTS**: Introduction – Pure torsion-torsion equation of circular shafts, Strength and stiffness, Torsional rigidity and polar modulus, Power transmitted by shaft of solid and hollow circular sections, combined bending and torsion Problems. **COLUMNS AND STRUTS:** Introduction – Short and long columns, Euler's theory on columns, Effective length slenderness ration, radius of gyration, buckling load, Assumptions, derivations of Euler's Buckling load for different end conditions, Limitations of Euler's theory, Rankine's formula and problems	09	CO4, CO5
5	**THEORIES OF FAILURE**: Introduction, maximum principal stress theory (Rankine's theory), Maximum principle strain theory (St. Venant's theory), Maximum shearing stress theory (Tresca's theory), Strain energy theory (Beltrami and Haigh) , Distrotion strain energy theory (Von Miske's theory). **COMPOUND STRESSES (SIMPLE PROBLEMS)**: Compound Stresses: Introduction, state of stress at a point, General two dimensional stress system, Principal stresses and principal planes. Mohr's circle of stresses, Concept of Radial and Hoop stresses, Problems.	**08**	CO3, CO6

TEXT BOOKS:

1. Bansal, R.K., "Strength of Materials", Laxmi Publications, (ISBN: 9788131808146), 6th Edition, 2015.

2. Bhavikatti S.S., "Strength of Materials", Vikas Publishing House Pvt. Ltd., New Delhi, (ISBN: 9789325971578), 4th Edition, 2013.

3. Ramamrutham. S., "Strength of Materials", New Delhi Dhanpat Rai and Sons, (ISBN: 978-93-84378-26-4), 2015

REFERENCE BOOKS:

1. Timoshenko and Young, "Elements of Strength of Materials", Affiliated East-West Press, 5th Edition, 2010

2. Chakarborty, "Strength of Materials", S K Kataria and Sons, (ISBN:978-93-5014-375-9), 2nd Edition, 2001.

3. Sadhu Singh, "Strengths of Materials", Khanna Publishers, New Delhi, (ISBN : 978-81-7409-048-7) , 11th Edition, 2014.

4. Rajput R.K., "Strengths of Materials", S. Chand Publishers, (ISBN: 9789385401367), 6th Edition, 2015.

5. Punmia .B.C, Ashok Jain, Arun Jain, "Mechanics of Materials", Lakshmi Publications, New Delhi , (ISBN: 9788131806463) Edition: Revised, 2016.

6. B.S. Basavarajaiah, P Mahadevappa "Strength of Materials" in SI Units, University Press (India) Pvt. Ltd., (ISBN 978-1439854198)3rd Edition (2010).

7. Ferdinand P. Beer, E. Russell Johnston and Jr.John T. DeWolf "Mechanics of Materials", Tata McGraw-Hill, Third Edition, SI Units

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Tests	Assignments	Quizzes
Marks(out of 50)	**25**	**15**	**10**
Remember	-	0	0
Understand	5	3	2
Apply	10	6	4
Analyze	10	6	4
Evaluate			
Create			

SEE – Semester End Examination (50 Marks)

Bloom's Category	Tests(Theory)
Remember	5
Understand	5
Apply	20
Analyze	20
Evaluate	
Create	

Percentage Evaluation of Various Blooms' levels (50)

Bloom's Category	CIE	SEE	Total	%
Remember	-	5	5	5
Understand	10	5	15	15
Apply	20	20	40	40
Analyze	20	20	40	40
Evaluate				
Create				
Total	**50**	**50**	**100**	**100**

PLANE SURVEYING

Course Code	:19CIV35	**Credits CIE**	: 3
L:T:P:S	: 3:0:0:0	**Marks SEE**	: 50
Exam Hours	: 03	**Marks**	: 50

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

CO1	Carryout linear measurements using surveying instruments
CO2	Survey using compass instruments
CO3	Prepare contour maps using leveling instruments.
CO4	Carryout angular measurements using theodolite
CO5	Measure the areas of irregular boundaries..
CO6	Compute earthwork volume and reservoir capacity.

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	POI0	POII	PO12	PSO1	PSO2
CO1	3	3	-	-	-	-	-	-	-	1	-	1	-	-
CO2	3	3	-	-	-	-	-	-	-	1	-	1	-	-
CO3	3	3	-	-	1	-	-	-	1	1	-	1	-	-
CO4	3	3	-	-	1	-	-	-	1	1	-	1	-	-
CO5	3	3	-	-	1	-	-	-	-	1	-	1	-	-
CO6	3	3	-	-	1	-	-	-	-	1	-	1	-	-

Module No	Content of Module	Hrs	Cos
1	**INTRODUCTION:** Definition of surveying, Objectives and importance of surveying. Classification of surveys. Principles of surveying. Units of measurements, Surveying measurements and errors, types of errors, precision and accuracy. Classification of maps, map scale, conventional symbols, topographic maps, map layout, Survey of India Map numbering systems. Types of Chain, errors and corrections in chain survey. Measuring tape and types. Measurement using tapes, taping on level ground and sloping ground. Errors and corrections in tape measurements,	09	CO1
2	**MEASUREMENT OF DIRECTIONS AND ANGLES:** Compass survey: Basic definitions; meridians, bearings. Prismatic and surveyor's compasses, temporary adjustments, dip and declination. Bearing systems, local attraction and related problems. Traverse Survey and Computations of Latitudes and departures, Traverse adjustments, Bowditch rule and transit rule, Numerical Problems	09	CO2
3	**LEVELING:** Basic terms and definitions, Methods of leveling, Dumpy level, auto level, digital and laser levels. Curvature and refraction corrections. Booking and reduction of levels. Differential leveling, profile leveling, fly leveling, check leveling, reciprocal leveling, Contours and their characteristics, Methods of contouring, direct and indirect methods, Interpolation techniques, Uses of contours Numerical problems on determining indivisibility, Grade contours and uses.	09	CO3
4	**THEODOLITE SURVEYING:** Theodolite and types, Fundamental axes and parts of Transit theodolite, uses of theodolite, Temporary adjustments of transit theodolite, measurement of horizontal and vertical angles. Trigonometric levelling (heights and distances-single plane and double plane method when the base is accessible and inaccessible.	09	CO4
5	**COMPUTATION OF AREAS AND VOLUMES:** **Measurement of area** – by dividing the area into geometrical figures, area from offsets, mid ordinate rule, Trapezoidal and Simpson's one third rule, area from co-ordinates, introduction to planimeter, digital planimeter. **Measurement of volumes-**Trapezoidal and Prismoidal formula. Contouring Contours, Methods of contouring, Interpolation of contours, contour gradient, characteristics of contours and uses.	09	CO5 & CO6

TEXT BOOKS:

1. 'Surveying' Vol 1 - B.C. Punmia , Er. Ashok Kr. Jain, Dr. ArunKumar Jain, Laxmi Publications, New Delhi. Edition: 16th(2016), ISBN: 8170088836

2. **'Surveying' Volume1** S.K.Duggal, Tata McGraw- Hill Education India, 4thEdition (2013), ISBN9781259028991

3. **'Plane Surveying'** A.M. Chandra–New age International (P) Ltd, 3rdEdition (Reprint 2015), ISBN978- 81-224-3880-2

REFERENC EBOOKS:

1. **Fundamentals of Surveying-** Milton O. Schimidt –Wong, Thomson Learning.

2. **Fundamentals of Surveying-** S.K. Roy–Prentice Hall of India, 2nd Edition, ISBN978-81-203- 4198**.**

3. **Surveying**, Arther Bannister etal., Pearson Education, India, 7 Edition (2006), ISBN 9788131700662

SEE: Semester End Examination (50)

Bloom's Category	Tests (Theory)
Remember	10
Understand	10
Apply	20
Analyze	10
Evaluate	
Create	

CIE-Continuous Internal Evaluation (50 Marks)

Bloom's Category	Tests	Assignments	Quizzes
Marks(outof50)	**25**	**15**	**10**
Remember	5	-	-
Understand	5	-	5
Apply	10	10	5
Analyze	5	5	-
Evaluate	-	-	-

Percentage Evaluation of Various Bloom's levels (50)

Bloom's Category	Theory		TOTAL	%
	CIE	SEE		
Remember	5	5	10	10
Understand	10	10	20	20
Apply	25	25	50	50
Analyze	10	10	20	20
Evaluate				
Create				
TOTAL	**50**	**50**	**100**	**100**

MECHANICS OF FLUIDS

Course Code: 19CIV36

L: T: P:S: 2:1:0:0

Exam Hours: 03

Credits   : 3

CIE Marks   : 50

SEE Marks   : 50

COURSE OUTCOMES: At the end of the Course, the Student will be able to:

CO1	Understand the properties of fluids and fluid statics
CO2	Apply the basic concepts of fluid pressure and its measurements.
CO3	Develop the skill for applying the principles of kinematics for solving civil engineering problems.
CO4	Apply the concepts of fluid dynamics to solve engineering problems.
CO5	Analyze pipe flow including laminar and turbulent flows and losses in pipe flow.
CO6	Understand the concept of dimensional homogeneity.

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	3	-	-	-	-	-	-	-	-	-	2	-
CO2	3	3	-	-	-	--	-	--	-	-	-	-	-	-
CO3	3	-	3	-	-	-	-	-	-	-	-	-	2	-
CO4	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	3	3	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	3	1	-	-	-	-	-	-	-	-	-	-

Module No	Contents of Module	Hrs	COs
1	**Introduction-**Definition of fluid, Fluid Properties: mass density, Specific Volume, Specific Weight, Specific Gravity- Definitions, Units and Dimensions, Viscosity, Newton's Law of Viscosity, Newtonian & Non-Newtonian Fluids, Ideal & Real Fluids, Surface Tension, Capillarity rise in a vertical tube and between two plane surface, Problems on Fluid Properties. **Hydrostatics -**Definition of Total Pressure, Centre of pressure, Total pressure &centre of pressure on Vertical and Inclined plane surfaces.	09	CO1
2	**Buoyancy and Flotation- S**tability of floating and submerged bodies, Meta centric height and its determination. **Fluid Pressure & Its Measurement-**Definition of Pressure, Units & Dimensions, Pressure at a point in a static fluid, Hydrostatic pressure law, Absolute, Gauge & Vacuum Pressure, Measurement of Pressure- Simple & Differential Manometers-Theory & Problems.	09	CO1 CO2
3	**Kinematics of Fluid Flow-** Description of Fluid Flow, Classification of fluid flow, Stream line, Streak Line, Path Line, Stream tube, Continuity Equation in differential form, definition of velocity potential, stream potential, equipotential line, Problems. **Dynamics of Fluid Flow-**Concept of Inertia force and other forces causing Motion, Derivation of Euler's & Bernoulli's Equation (Both for Ideal Fluids).	09	CO3, CO4
4	**Laminar and turbulent flow** - Reynold's number - shear stress and pressure gradient - Hagen Poiseuille equation for flow through circular pipes. **Losses in pipe flow** - Darcy-Weisbach equation for flow through circular pipe - Friction factor - Smooth and rough pipes .Minor losses - pipes in series and parallel - Equivalent length - Introduction to water hammer phenomena.	09	CO5
5	**Measurement of velocity and discharge**- Pitot tubes, venturimeter and orifice meters, venturiflume, orifices, notches (Rectangular and V- notches) and weirs (Sharp crested Weirs) **Dimensional Analysis-** Introduction, Dimension, Dimensional Homogeneity, Dimensionless numbers-Reynold's number, Froude number, Euler number, Weber number, mach number, Problems	09	CO4, CO6

Text Books

1. P.N.Modi&S.M.Seth , "Hydraulics & Fluid Mechanics", Standard Book House, New Delhi, (ISBN: 8190089374),15th edition.

2. R.K.Bansal,"A text book of Fluid Mechanics", Laxmi Publications, New Delhi, (ISBN-13: 978-8131808153), 9 th edition.

3. K.L.Kumar, S, "Fluid Mechanics". Chand & Company Ltd, New Delhi, (ISBN: 8121901006, 9788121901000), 8th edition.

Reference Books

1. R K Rajput, "Fluid Mechanics and Hydraulic Machines", Shand & Company, (ISBN: 9788121916660, 8121916666), New Delhi,

2. Fluid Mechanics- Victor L Streeter & E. Benjamin Wylie, Mc-Graw Hill publications, ISBN: 0070622246.

3. Fluid Mechanics- Frank M White, Sixth Edition, the Mc-Graw Hill Companies, ISBN: 9780073398273

CIE (50 MARKS)

Bloom's Category	Tests	Assignments	Quizzes
Marks (out of 50)	25	15	10
Remember	5	5	
Understand	5	5	5
Apply	10	5	5
Analyze	5	-	-
Evaluate	-	-	-
Create	-	-	-

SEE: Semester End Examination (50 Marks)

Bloom's Category	Tests (Theory)
Remember	5
Understand	5
Apply	30
Analyze	10
Evaluate	
Create	

Percentage Evaluation of various Blooms levels

Blooms category	Theory		TOTAL	%
	CIE	SEE		
Remember	10	5	15	15
Understand	15	5	20	20
Apply	20	30	50	50
Analyze	5	10	15	15
Create	-	-	-	-
Total	**50**	**50**	**100**	**100**

MATERIAL TESTING LABORATORY

Course Code : 19CIV37	**Credits**	: 2	
L: T: P :S : 0:0:2:0	**CIE Marks**	: 25	
Exam Hours : 03	**SEE Marks**	: 25	

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

CO1	Evaluate tensile, compressive, impact, shear and torsional strength of structural steel.
CO2	Analyze the compressive and bending strength of timber.
CO3	Interpret the hardness of ferrous and non ferrous metals.
CO4	Evaluate the strength of brick/block/tiles and specific gravity of fine and coarse aggregate.

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	POI0	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	2	-	-	-	3	2	-	2	3	3
CO2	3	-	-	-	2	-	-	-	3	2	-	2	3	3
CO3	3	-	-	-	2	-	-	-	3	2	-	2	3	3
CO4	3	-	-	-	2	-	-	-	3	2	-	2	3	3

Experiment No	Experiment Name	Hrs	CO'S
1.	Tension Test on Mild steel	3	CO1
2.	Tension Test on HYSD Bars	3	CO1
3.	Compression test of Mild steel / Cast iron	3	CO1,
4.	Compression test of Wood (parallel and perpendicular to grains)	3	CO2
5.	Impact Test on Mild Steel (Charpy & Izod)	3	CO1
6.	Shear test on Mild Steel/HYSD Bars	3	CO1
7.	Hardness tests on ferrous and non-ferrous metals- Brinell's and Rockwell's	3	CO3
8.	Bending test on Wood under single point loading	3	CO2
9.	Test on Bricks/Blocks and Tiles	3	CO4
10.	Torsion Test on Mild steel Circular sections	3	CO1
11.	Sieve analysis and specific gravity for fine and coarse aggregate	3	CO4

TEXT BOOKS:

1. B.S. Basavarajaiah, P Mahadevappa "Strength of Materials" in SI Units, University Press (India) Pvt. Ltd., (ISBN 978-1439854198)3rd Edition (2010)

2. Punmia .B.C, Ashok Jain, Arun Jain, "Mechanics of Materials", Lakshmi Publications, New Delhi , (ISBN: 9788131806463) Edition: Revised, 2016

3. Bansal, R.K., "Strength of Materials", Laxmi Publications, (ISBN: 9788131808146), 6th Edition,2015.

REFERENCE BOOKS:

1. Timoshenko and Young, "Elements of Strength of Materials", Affiliated East-West Press, 5th Edition, 2010

2. Chakarborty, "Strength of Materials", S K Kataria and Sons, (ISBN:978-93-5014-375- 9), 2_{nd} Edition, 2001.

3. Bhavikatti S.S., "Strength of Materials", Vikas Publishing House Pvt. Ltd., New Delhi, (ISBN: 9789325971578), 4th Edition,2013.

4. Ramamrutham. S., "Strength of Materials", New Delhi Dhanpat Rai and Sons, (ISBN: 978-93-84378-26-4), 2015

5. Sadhu Singh, "Strengths of Materials", Khanna Publishers, New Delhi, (ISBN : 978-81- 7409 048-7) , 11th Edition,2014

6. Rajput R.K., "Strengths of Materials", S. Chand Publishers, (ISBN: 9789385401367), 6th Edition, 2015.

7. Relevent IS Codes

CIE- Continuous Internal Evaluation (25 Marks)

Bloom's Category	Practical
Marks (out of 25)	25
Remember	0
Understand	2
Apply	8
Analyze	8
Evaluate	7
Create	0

SEE – Semester End Examination (25 Marks)

Bloom's Category	Test (Practical)
Remember	0
Understand	2
Apply	8
Analyze	8
Evaluate	7
Create	

Percentage Evaluation of Various Bloom's levels (25 + 25 Marks)

	Practical			
Bloom's Category	**CIE**	**SEE**	**Total**	**%**
Remember				
Understand	2	2	4	8
Apply	8	8	16	32
Analyze	8	8	16	32
Evaluate	7	7	14	28
Create				
TOTAL	**25**	**25**	**50**	**100%**

PLANE SURVEYING LABORATORY

Course Code	:19CIV38	**Credits**	:1.5
L:T:P:S	:0:0:1.5:0	**CIE Marks**	:25
Exam Hours.	:03	**SEE Marks**	:25

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

CO1	Determine the distance using chain/tape & directions using compass.
CO2	Compute the difference in elevation and prepare contour maps
CO3	Determine horizontal and vertical angles using theodolite
CO4	Determine the distance and elevations of points by using single/double plane method

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	POI0	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	-	-	-	-	3	3	-	3	-	-
CO2	3	3	-	-	3	-	-	-	3	3	-	3	3	3
CO3	3	3	-	-	3	-	-	-	3	3	-	3	3	3
CO4	3	3	-	-	3	-	-	-	3	3	-	3	3	3

Exercise No.	Description	Hrs	Cos
1	To measure distance between two points using direct ranging.	3	**CO1**
2	To set out perpendiculars at various points on given line using cross staff, optical square and tape.	3	**CO1**
3	To set out rectangles, pentagon, hexagon, using tape /chain and	3	**CO1**
4	To determine the distance between two inaccessible points using chain/tape & compass.	3	**CO1**
5	To determine difference in elevation between two points using both HI and Rise & Fall methods.	3	**CO2**
6	To conduct leveling operations for road work and determine the depth of cut and depth of filling for a given formation level.	3	**CO2**
7	To prepare a contour map for the given area by using interpolation method.	3	**CO2**
8	To measurement of horizontal angles by repetition and reiteration method using theodolite.	3	**CO3**
9	To determine the elevation of an object using single plane method when base is accessible.	3	**CO4**
10	To determine the elevation of an object using single plane method when base is inaccessible.	3	**CO4**
11	To determine the distance and difference in elevation between two inaccessible points using double plane method.	3	**CO4**

TEXTBOOKS:

1. 'Surveying' Vol1- B.C.Punmia , Er. Ashok Kr. Jain , Dr. Arun Kumar Jain, Laxmi Publications, New Delhi. Edition: 16th(2016), ISBN: 8170088836

2. **Surveying' Volume 1** S.K.Duggal,Tata Mc Graw- Hill Education India, 4th Edition, (2013), ISBN9781259028991

3. **'Plane Surveying'** A.M. Chandra–New age international (P)Ltd, 3 2015),ISBN978-81-224-3880-2

REFERENCE BOOKS:

1. **Fundamentals of Surveying-**MiltonO. Schimidt–Wong, Thomson Learning.

2. **Fundamentals of Surveying-** S.K. Roy–Prentice Hall of India,2nd Edition, ISBN978-81 203-4198**.**

3. **Surveying**, Arther Bannister etal., PearsonEducation, India, 7th Edition (2006), ISBN9788131700662.

CIE-Continuous Internal Evaluation (25Marks)

Bloom's Category	Exam
Remember	5
Understand	5
Apply	10
Analyze	5
Evaluate	
Create	

SEE: Semester End Examination (25 Marks)

Bloom's Category	Exam
Remember	5
Understand	5
Apply	10
Analyze	5
Evaluate	
Create	

Percentage Evaluation of Various Bloom's levels (25+25)

	Practical			
Bloom's Category	CIE	SEE	TOTAL	%
Remember	5	5	10	20
Understand	5	5	10	20
Apply	10	10	25	40
Analyze	5	5	10	20
Evaluate				
Create				
TOTAL	**25**	**25**	**50**	**100**

MECHANICS OF FLUIDS LAB

Course Code:	19CIV39	**Credits**	: 1.5
L: T: P: S:	0:0:1.5:0	**CIE Marks**	: 25
Exam Hours:	03	**SEE Marks**	: 25

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

CO1	Understand the basic concepts of fluid measurement and apply the concepts of buoyancy
CO2	Determine the flow of fluid through pipe and channel and verify Bernoullis theorem
CO3	Analyse the major losses in pipe line
CO4	Predict the dynamics of fluid flow

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	-	-	-	-	-	-	-	-	-	3
CO2	3	3	3	3	-	-	-	-	-	-	-	-	-	3
CO3	3	2	3	3	-	-	-	-	-	-	-	-	-	3
CO4	3	3	3	3	-	-	-	-	-	-	-	-	-	3

LIST OF EXPERIMENTS

Experiment no.	Content of Experiment	Cos
1	To determine the coefficient of discharge of collecting tank	CO1
2	To determine the meta centric height of ship model	CO1
3	To study the flow over V notch and to find the coefficient of discharge	CO2
4	To determine the coefficient of discharge of Venturimeter	CO2
5	Verification of Bernouli's equation	CO2
6	To determine the coefficient of friction of pipes of different diameters	CO3
7	To determine the coefficients of orifices	CO1
8	To find the coefficient of discharge in venturi flume	CO2
9	To find the coefficient of discharge over broad crested weir and ogee weir	CO4

Text Books

1.   P.N.Modi & S.M.Seth , "Hydraulics & Fluid Mechanics", Standard Book House, New Delhi, (ISBN: 8190089374),15th edition.

2.   R.K.Bansal, "A text book of Fluid Mechanics", Laxmi Publications, New Delhi,(ISBN-13: 978-8131808153), 9 th edition.

3.   K.L.Kumar, S, "Fluid Mechanics". Chand & Company Ltd, New Delhi, (ISBN: 8121901006,9788121901000), 8th edition.

REFERENCE BOOKS

1. R K Rajput, "Fluid Mechanics and Hydraulic Machines", S Chand & Company, (ISBN: 9788121916660, 8121916666), New Delhi,

2. Fluid Mechanics- Victor L Streeter & E. Benjamin Wylie, Mc-Graw Hill publications, ISBN: 0070622246.

3. Fluid Mechanics- Frank M White, Sixth Edition, the Mc-Graw Hill Companies, ISBN: 9780073398273

CIE- Continuous Internal Evaluation (25 Marks)

Bloom's Category	Tests
Remember	5
Understand	10
Apply	10
Analyze	-
Evaluate	-
Create	-

SEE: Semester End Examination (25 Marks)

Bloom's Category	Tests
Remember	**5**
Understand	**10**
Apply	**10**
Analyze	**-**
Evaluate	**-**
Create	**-**

PERCENTAGE EVALUATION OF VARUIOUS BLOOM LEVEL (25+25)

Bloom's Category	THEORY		TOTAL
	CIE	SEE	
Remember	5	5	10
Understand	10	10	20
Apply	10	10	20
Analyze	-	-	-
Evaluate	-	-	-
Create	-	-	-

BASIC APPLIED MATHEMATICS-I

Course Code : 20DMAT31A **Credits : 00**

L:T:P:S : 0:0:0:0 **CIE Marks : 25**

Exam Hours : 02 **SEE Marks : 25**

Course Outcomes: At the end of the Course, the Student will be able to do the following:

CO1	Know the principles of engineering mathematics through calculus
CO2	Determine the power series expansion of a function
CO3	Find the definite integrals with standard limit sand also develop the ability to solve different types of differential equations
CO4	Apply ideas from linear algebra in solving systems of linear equations and determine the Eigen values and Eigen vectors of a matrix

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	-	-	-	-	-	-	-	-	3
CO2	3	3	3	-	-	-	-	-	-	-	-	3
CO3	3	3	3	-	-	-	-	-	-	-	-	3
CO4	3	3	3	-	-	-	-	-	-	-	-	3

Module No.	Contents of the Module	Hours	CO's
1.	**Differential Calculus:** Polar curves-Problems on angle between the radius vector and tangent, Angle between two curves-Problems, Pedal equation for polar curves-Problems. Macluren's theorems for function of one variable (statement only)-Problems.	5	CO1, CO2
2.	**Partial differentiation:** Definition and Simple problems, Euler's theorem for Homogeneous function (NO Derivation and NO extended theorem)- Problems, Partial differentiation of composite functions (chain rule)- Problems, Jacobians of order two - definition and problems.	5	CO1
3.	**Integral Calculus and Differential Equations:** Problems on reduction formulae for functions $\sin^n x$, $\cos^n x$, Problems on evaluation of these integrals with standard limits (0 to $\pi/2$). Solution of first order and first degree differential equations-Variable separable, Linear and Exact differential equations.	5	CO3
4.	**Linear Algebra-1:** Problems on rank of a matrix by elementary transformations, consistency of a system of linear equations and solution (homogeneous and non-homogeneous)-Problems. Solution of system of linear equations by Gauss elimination method-Problems.	5	CO4
5.	**Linear Algebra-2:** Linear transformation, Eigen values and Eigen vectors, diagonalisation of a square matrix-Problems.	5	CO4

Text Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley-India Publishers, 10th Edition, 2014, ISBN: 978-81-265-5423-2.

2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43rd Edition, 2014, ISBN: 978-81-7409-195-5.

Reference Books:

1. Glyn James, Modern Engineering Mathematics, Prentice Hall, 4th Edition, 2015, ISBN: 978-0-273-73409-3

2. B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education (India) Private Limited, 4th Edition, 2016, ISBN: 978-0-07-063419-0.

3. H. K. Dass, Advanced Engineering Mathematics, S. Chand & Company Ltd., 28th Edition, 2012, ISBN: 81-219-0345-9.

4. N.P.Bali and Manish Goyal, A Text Book of Engineering Mathematics, Laxmi Publications (P) Ltd., 9th Edition, 2014, ISBN: 978-81-318-0832-0.

Assessment Pattern:

1.   **CIE- Continuous Internal Evaluation (25 Marks)**

Bloom's Category	Tests (20 Marks)	Assignment (5 Marks)
Remember	5	-
Understand	5	5
Apply	5	-
Analyze	2.5	-
Evaluate	2.5	-
Create	-	-

2. **SEE- Semester End Examination (25 Marks)**

Bloom's Category	Questions (25 Marks)
Remember	5
Understand	10
Apply	5
Analyze	2.5
Evaluate	2.5
Create	-

IV
Semester

APPLIED MATHEMATICS – IV

Course Code: 20CIV41A   **Credits : 03**

L:T:P:S   :   2:1:0:0   **CIE Marks : 50**

Exam Hours: 03   **SEE Marks : 50**

Course Outcomes: At the end of the Course, the Student will be able to do the following:

CO1	Solve initial value problems using appropriate numerical methods
CO2	Learn the concepts of Complex variables and transformation for solving Engineering Problems
CO3	Know the concepts of complex integration and its applications in the stability analysis of engineering problems
CO4	Gain ability to use probability distributions to analyze and solve real time problems
CO5	Apply the concept of sampling distribution to solve engineering problems
CO6	Use the concepts to analyze the data to make decision about the hypothesis

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	-	1	-	-	-	3	3
CO2	-	3	-	-	3	-	-	-	-	-	3	3
CO3	-	3	-	-	3	-	-	-	-	-	3	3
CO4	3	3	3	3	3	2	-	-	3	3	3	3
CO5	3	3	3	3	3	-	-	-	-	3	3	3
CO6	3	3	3	3	3	-	-	-	-	3	3	3

Module No.	Contents of the Module	Hours	CO's
1	**Numerical Methods:** Numerical solution of ordinary differential equations of first order and of first degree: Modified Euler's method and Runge-Kutta method of fourth-order-Problems. Milne's predictor and corrector methods-Problems. Numerical Solutions of second order ordinary differential equations by Runge-Kutta method of fourth-order-Problems.	9	CO1
2	**Complex Variables**: Functions of complex variables, Analytical functions, Cauchy-Riemann Equations in Cartesian and Polar forms, Harmonic functions and Construction of analytic functions-Problems using Milne-Thompson's method. **Applications:** Flow problems-Velocity potential, Stream functions and complex potential functions.	9	CO2
3	**Conformal Transformations and Complex Integrations:** $w = z^2$, $w = e^z$ and $w = z + (1/z)$. Cauchy's Theorem (with proof). Singularities, Poles and Residues, Residue theorem (without proof)-Problems.	9	CO3
4	**Probability distributions:** Random variables (discrete and continuous), probability density functions. Discrete Probability distributions: Binomial and Poisson distributions-Problems. Continuous Probability distributions: Exponential and Normal distributions-Problems.	9	CO4
5	**Sampling Theory**: Sampling, Sampling distributions, standard error, test of hypothesis of large samples for means and proportions, Central limit theorem (without proof), Confidence limits for means, Student's t-distribution, F-distribution and Chi-square distribution for test of goodness of fit for small samples.	9	CO5, CO6

Text Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley-India Publishers, 10th Edition, 2014, ISBN: 978-81-265-5423-2.

2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43rd Edition, 2014, ISBN: 978-81-7409-195-5.

Reference Books:

1. Glyn James, Modern Engineering Mathematics, Prentice Hall, 4th Edition, 2015, ISBN: 978-0-273-73409-3

2. B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education (India) Private Limited, 4th Edition, 2016, ISBN: 978-0-07-063419-0.

3. H. K. Dass, Advanced Engineering Mathematics, S. Chand & Company Ltd., 28th Edition, 2012, ISBN: 81-219-0345-9.

4. N.P.Bali and Manish Goyal, A Text Book of Engineering athematics, Laxmi Publications (P) Ltd., 9th Edition, 2014, ISBN: 978-81-318-0832-0.

Assessment Pattern:

1. CIE- Continuous Internal Evaluation (50 Marks).

Bloom's Category	Tests (25 Marks)	Assignment-1 (7.5 Marks)	Assignment-2 (7.5 Marks)	Quiz-1 (05 Marks)	Quiz-2 (05 Marks)
Remember	5	2.5	2.5	-	-
Understand	5	2.5	2.5	-	-
Apply	10	2.5	2.5	05	05
Analyze	2.5	-	-	-	-
Evaluate	2.5	-	-	-	-
Create	-	-	-	-	-

2. SEE- Semester End Examination (50Marks).

Bloom's Category	SEE Marks
Remember	10
Understand	10
Apply	20
Analyze	5
Evaluate	5
Create	-

LIFE SKILLS FOR ENGINEERS

Course Code : 20HSS422A
L: P: T: S : 3:0:0:0
Exam Hours : 3

Credits : 03
CIE Marks : 50
SEE Marks : 50

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

CO1	Relate "SMART GOALS" to personal and professional life
CO2	Articulate and communicate ideas and thoughts with clarity and focus
CO3	Develop critical and creative thinking skills for problem solving and decision making for leadership.
CO4	Analyze the importance of the concepts of personality development and grooming in corporate life
CO5	Determine personal and professional responsibility by using ownership task bar

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	3	3	3	3	3
CO2	-	-	-	-	-	3	3	3	3	1	3	3
CO3	-	-	-	-	-	3	3	3	3	3	2	3
CO4	-	-	-	-	-	-	3	3	3	3	2	3
CO5	-	-	-	-	-	3	2	3	3	2	3	3

Module No.	Module Contents	Hours	COs
1	Goal Setting: Importance of Goals: Achiever's goal - Creating SMART for personal and professional life, Right action at right time, career planning, overcoming fear and face uncertainty, Mind Mapping. Communication – Intellectual preparation/Idea generation.	6	CO1, CO2
2	You are the creator - Taking Ownership, Being Responsible and Accountable. Meaning of Ownership, Responsibility and Accountability, Practicing these philosophies in course, career. Social responsibility. Communication – Organising thought flow.	6	CO2, CO5
3	Self-Awareness and Self-Management: Emotional Intelligence, Know yourself- understanding personality, perception, techniques to understand self – Johari window and SWOT, reason for fall and opportunities to grow. Individual behaviour, attitude towards change and work in industry, being proactive and positive. Interpersonal skills - Knowing others, working well with others. Communication – Structured articulation	9	CO2, CO5
4	Leadership, meaning, self- motivation, coming out of comfort zone, mental preparation - accepting failure and resilience, decision making, thinking skills – critical and creative, six thinking hats, watchfulness - proactive risk management, problem solving mind set. Communication – Tips for Jam session, GD and Presentation.	9	CO2, CO3
5	Personality Development and Grooming: - Expectations from the industry, building personal presence, corporate grooming, corporate etiquettes, Personal branding and image management. Communication – Mock GD sessions	6	CO2, CO4

REFERENCE BOOKS:

1. The 7 – Habits of Highly Effective People, Stephen R Covey, Neha Publishers.
2. Seven Habits of Highly Effective Teens, Convey Sean, New York, Fireside Publishers, 1998.
3. Emotional Intelligence, Daniel Coleman, Bantam Book, 2006.
4. How to win friends and influence people Dale Carnegie
5. BHAGAVDGITA for college students   Sandeepa Guntreddy

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Tests	Assignments	Self-Study	Peer Evaluation
Marks (out of 50)	**10**	**15**	**15**	**10**
Remember	-	-	-	-
Understand	-	-	-	-
Apply	5	5	-	5
Analyze	-	-	5	-
Evaluate	-	-	-	
Create	5	10	10	5

SEE- Semester End Examination (50 Marks)

NOTE: Being a Life skills course we felt it would be suitable to do the final assessment through a structured group discussion which will provide an opportunity to test students in all levels of Bloom's Taxonomy.

Bloom's Category	Group Discussion
Remember	**5**
Understand	**10**
Apply	**10**
Analyse	**10**
Evaluate	**5**
Create	**10**

ENVIRONMENTAL SCIENCE AND AWARENESS

Course Code: 20HSS423A   **Credits: 0**

L: T: P: S: 0:0:0:0   **CIE Marks: 25**

Exam Hours: 02 Hrs   **SEE Marks: 25**

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

CO1	Explain the concepts of environment, ecosystem and biodiversity.
CO2	Differentiate the use of natural resources for sustainability.
CO3	Analyze the control measures of Environmental pollution, the role of Government and NGO in solving Socio-Environmental issues.
CO4	Apply the Environmental ethics, acts and amendments in protecting Environment and human health.

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	3	3	-	-	-	-	-	-	-
CO2	-	-	-	-	-	3	3	-	-	-	-	3	3	-
CO3	-	-	-	-	-	3	3	3	-	3	-	3	3	-
CO4	-	-	-	-	-	3	3	3	-	3	-	3	3	-

Module No.	Content of Module	Hrs	Cos
1	**Introduction to Environment, Ecosystem and biodiversity**: Environment - Components of Environment, Scope and importance of Environmental studies, Ecosystem: Types & Structure of Ecosystem, Energy flow in the ecosystem, Food chains – food webs & ecological pyramids. Biodiversity – Definition, Hot-spots of biodiversity, Threats to biodiversity, Conservation of biodiversity.	05	**CO1**
2	**Natural Resources:** Renewable and non-renewable resources – Natural resources and associated problems. Role of an individual in conservation of natural resources. Water conservation, rain water harvesting. Balanced use of resources for sustainable lifestyle – strategies.	04	**CO2**
3	**Environmental Pollution:** Definition, Causes, effects and control measures of Air Pollution, Water Pollution, Soil Pollution, Marine Pollution, Noise pollution, Thermal Pollution and Nuclear hazards. Role of an individual in prevention of pollution - Waste management – urban and industrial wastes.	04	**CO3**
4	**Social Issues and Environment:** Environmental ethics – issues and possible solutions. Environment protection act – Air (prevention and Control of pollution) act & Water (prevention and Control of pollution) act. Role of government: Swatch Bharat Abhiyan, National Mission for Clean Ganga (NMCG), River rejuvenation, Role of Non-governmental Organizations (NGOs), Global warming and climate change.	04	**CO3 & CO4**
5	**Human Population and Environment:** Population growth & explosion, Family welfare programme. Environment and human health, Human rights, Value education. Role of Technology in protecting environment and human health.	05	**CO4**

Text Books:

1. "Environmental Studies: Basic Concepts" by Ahluwalia, V. K. . The Energy and Resources Institute (TERI) Publication, 2nd edition, 2016. ISBN: 817993571X, 9788179935712.

2. "Textbook of Environmental Studies for Undergraduate Courses of all branches of Higher Education" by Bharucha, Erach for UGC, New Delhi, 2004. ISBN: 8173715408, 9788173715402.

Reference Books:

1. Handbook of Environmental Engineering by Rao Surampalli, Tian C. Zhang, Satinder Kaur Brar, Krishnamoorthy Hegde, Rama Pulicharla, Mausam Verma; McGraw Hill Professional, 2018. ISBN: 125986023X, 9781259860232

2. Environmental Science and Engineering by P. Venugopala, Prentice Hall of India Pvt. Ltd, New Delhi, 2012 Edition. ISBN: 978-81-203-2893-8.

3. Environmental Science- Working with the earth by G Taylor Miller Jr, Brooks Cole Thompson Publications, 10th Edition. ISBN: 10: 0534424082.

4. Elements of Environmental Science and Engineering by P. Meenakshi, Prentice Hall of India Pvt. Ltd, 2005 Edition. ISBN: 8120327748, 9788120327740.

CIE- Continuous Internal Evaluation (25 Marks)

Bloom's Category	Tests	Assignments	Quiz
Marks (Out of 25)	**15**	**5**	**5**
Remember	2	0	0
Understand	5	0	2
Apply	4	2	3
Analyze	4	3	0
Evaluate	0	0	0
Create	0	0	0

SEE – Semester End Examination (25 Marks)

Bloom's Category	Tests
Remember	5
Understand	10
Apply	5
Analyze	5
Evaluate	0
Create	0

Percentage Evaluation of Various Blooms' levels (50 Marks)

Bloom's Category	CIE	SEE	Total	%
Remember	2	5	7	**14**
Understand	7	10	17	**34**
Apply	9	5	14	**28**
Analyze	7	5	12	**24**
Evaluate				
Create				
Total	**25**	**25**	**50**	**100**

CONCRETE TECHNOLOGY

Course Code :19CIV43   **Credits   :03**

L:T:P:S   :3:0:0:0   **CIE Marks   :50**

Exam Hours : 3   **SEE Marks   :50**

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

CO1	Understand the basic properties of ingredients of concrete.
CO2	Understand the Rheology of fresh concrete and its manufacturing process
CO3	Design the concrete mix as per IS 10262:2019
CO4	Interpret the hardened and durability properties of concrete
CO5	Analyze the deterioration of concrete through tests
CO6	Interpret applications of special concrete

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	3	-	3	3	-	-	-	-	3	-	-
CO2	3	-	-	3	-	3	3	-	-	-	-	3	-	-
CO3	3	2	2	3	-	3	3	-	--	2	-	3	2	-
CO4	3	-	-	3	-	3	3	-	-	-	-	3	-	-
CO5	3	2	2	3	1	3	3	-	-	2	-	3	2	-
CO6	3	-	-	3	-	3	3	-	-	-	-	3	2	-

Module No.	Contents of Module	Hrs	Cos
1	**CONCRETE INGREDIENTS:** Hydraulic Cements: Manufacturing process, Chemical composition, types of cement, hydration of cement, testing of cement Aggregates: Properties, types of aggregates, classification of aggregates, importance of grading, specific gravity, bulking, moisture content, testing of aggregates, and recycled aggregates. Chemical admixtures: Plasticizers and super plasticizers accelerators, retarders and air entraining admixture. Mineral additives; fly ash, slag, silica fume, rice husk ash, Metakaolin and limestone powder.	**09**	**CO1**
2	**FRESH CONCRETE AND CONCRETE PRODUCTION:** Properties of fresh concrete; Workability, Factor affecting workability, measurement of workability, slump, compacting factor, Vee-Bee Cosnistometer and flow tests, Segregation and bleeding, shrinkage, Rheology of fresh concrete, its importance and Bingham parameters Process of manufacture of concrete: Batching, mixing, transportation, placing and compaction and curing by different methods	**09**	**CO2**
3	**MIX PROPORTIONING OF CONCRETE:** Concrete mix design: Concept of mix design, role of water to cement ratio, water content, other variables and exposure conditions, IS method, numerical problems.	**09**	**CO3**
4	**HARDENED PROPERTIES AND DURABILITY OF CONCRETE:** Engineering properties of concrete; Compressive strength and the factors affecting the strength, tensile strength, bond strength, modulus of rupture, Elasticity, factors affecting modulus of elasticity, poisons ratio, creep, provisions of IS 456 in quality control Durability: Significance of durability, mass transport in concrete, carbonation, chloride ingress Sulphate attack, freezing and thawing	**09**	**CO4 & CO5**
5	**IN-SITU TESTING AND SPECIAL CONCRETES:** Non–destructive testing; rebound hammer, ultrasonic pulse velocity, penetration and pull out test, principle, applications and limitations. Special concretes; Introduction to fiber reinforced concrete, high strength concrete, self-compacting concrete, geo polymer concrete and ready-mix concrete,	**09**	**CO5 & CO6**

TEXTBOOKS:

1. Properties of Concrete, AM Neville, ISBN-13: 978-0273755807, 5th edition ELBS, London.

2. Concrete Technology-Theory and Practice, M.S.Shetty, ISBN: 9788121900034, 1st edition, S. Chand and Company, New Delhi.

3. Concrete Technology – Theory and Practice, ML Gambhir, ISBN-13: 978- 1259062551, 5th edition, McGraw Hill Education.

REFERENCEBOOKS:

1. IS 10262:2019, Guidelines for concrete mix design proportioning, Bureau of Indian Standards, New Delhi, India.

2. Design of concrete mixes, N Krishna Raju , ISBN-13:978-8123902180, 4th edition, CBS Publisher

3. "Concrete Manual", Gambhir M.L, 4th edition, Dhanpat Rai & Sons, New Delhi

4. Current literature

CIE-Continuous Internal Evaluation (Theory 50 Marks)

Bloom's Category	Tests	Assignments	Quizzes	Curricular/ Co-curricular activities
Marks (out of 50)	**25**	**10**	**5**	**10**
Remember	10	-	-	-
Understand	10	-	5	-
Apply	-	-	-	5
Analyze	-	5	-	-
Evaluate	5	5	-	5
Create	-	-	-	-

SEE – Semester End Examination (Theory 50 Marks)

Bloom's Category	Tests
Remember	10
Understand	15
Apply	5
Analyze	-
Evaluate	5
Create	10

Percentage Evaluation of Various Blooms' levels

Bloom's Category	CIE	SEE	TOTAL	%
Remember	10	10	20	20
Understand	15	15	30	30
Apply	05	05	10	10
Analyze	05	05	10	10
Evaluate	-	05	05	05
Create	15	10	25	25
TOTAL	**50**	**50**	**100**	**100**

ANALYSIS OF DETERMINATE STRUCTURES

Course Code: 19CIV44   **Credits   : 3**

L: T: P: S: 2:1:0:0   **CIE Marks: 50**

Exam Hours: 03   **SEE Marks: 50**

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

CO1	Understand different forms of structure and apply the principles of statics to analyse them
CO2	Apply strain energy concepts to beams frames and truss problems
CO3	Analyse beams by Macaulay's concept.
CO4	Apply Moment area and Conjugate beam methods for beam problems
CO5	Analyse the cables and arches
CO6	Understand the concept of influence line diagram and their application

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	-	-	1	-	-	-	-	-	-	2	3
CO2	3	3	3	-	-	-	-	-	-	-	-	-	-	3
CO3	3	3	3	2	-	-	-	-	-	-	-	-	-	3
CO4	3	3	3	2	-	-	-	-	-	-	-	-	-	3
CO5	3	3	3	-	-	1	-	-	-	-	-	-	2	3
CO6	3	3	3	3	-	-	-	-	-	-	-	-	2	3

Module No.	Module Content	Hrs	Cos
1	**INTRODUCTION TO STRUCTURAL SYSTEMS:** Classification of structures, Forms of structures, Linear and Non linear structures, one, two, three dimensional structural systems, Determinate and indeterminate structures, Static and Kinematic Indeterminacy. Types of trusses, Assumptions in analysis-Analysis of determinate trusses by method of joint sand method of sections.	7	CO1
2	**BY ENERGY CONCEPT AND THEOREMS** Strain energy and complimentary strain energy, Strain energy due to axial load, bending moment and shear force, Principle of virtual work, Theorem of minimum potential energy, Deflection of determinate beams and trusses using total strain energy, Castigliano's theorems and their applications in the analysis of beams and frames, Application of Unit load methods to trusses.	11	CO2
3	**DEFLECTION OF BEAMS** Introduction – Definitions of slope, deflection, Elastic curve derivation of differential equation of flexure, Sign convention Slope and deflection of beams subjected to point loads, UDL and Couple by using Macaulay's method Slope and Deflection of determinate beams for standard loading cases by Moment are a method and Conjugate beam method, Numerical	09	CO3 & CO4
4	**ARCHES AND CABLES** Three hinged circular and parabolic arches with supports 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 levels and at different levels).	09	CO5
5	**ROLLING LOAD AND INFLUENCE LINES:** Concept of influence lines, ILD for reactions, SF and BM for determinate beams ILD for axial forces in determinate trusses. Maximum BM and SF in determinate beams using rolling loads concepts.	09	CO6

TEXTBOOKS:

1. Bhavikatti, S S" Structural Analysis" Vol. I &II, Vikas Publishing House Pvt. (ISBN:9788125942696),4th Edition, 2010

2. Vaidyanathan. R & Perumal.P, "Structural Analysis" Vol. I & II", Laxmi Publications, (ISBN:978-81-318-0781-1), 3rd Edition, 2007.

3. Pandit G.S and GutaS.P.,"Theory of Structures", Vol.–I, Tata Mc Graw Hill, New Delhi, (ISBN:9780074634936), 10thEdition, 2014

REFERENCEBOOKS:

1. Reddy C.S.,"Basic Structural Analysis",Tata Mc Graw Hill, New Delhi, (ISBN:9780070702769), 4th Edition, 2011.

2. D S Rajendra Prasad, "Structural Analysis 1", Sapna Book House, Bengaluru, ISSN:9788128020148, 2012

3. Thandava moorthy, "Structural Analysis", Oxford University Press Higher Education, (ISBN:9780198069188),3rdEdition, 2012.

4. Devdas Menon,"Structural Analysis", Narosa Publishing House, (ISBN:978-81-7319-750-5), 2014

5. VazraniV.N., Ratwani M.M.,"Structural Analysis" Vol. I & II, Khanna Publishers, (ISBN:978-81-7409-140-8), 13th Edition, 2013.

6. Negi L.S and Jangid R.S, "Structural Analysis", Tata Mc Graw Hill, New Delhi, 6th Edition, 2003.

7. Gambir.M.L., "Fundamentals of Structural Mechanics and Analysis" ,PHI Learning Pvt. Ltd, New Delhi, (ISBN:9788120342361), 2011.

CIE – Continuous Internal Evaluation (50 Marks)

Bloom's	Tests	Assignments	Quizzes
Marks (out of 50)	**25**	**15**	**10**
Remember	0	0	0
Understand	5	0	5
Apply	10	5	5
Analyze	10	10	0
Evaluate	0	0	0
Create	0	0	0

SEE – Semester End Examination (50 Marks)

Bloom's Category	Tests (Theory)
Remember	0
Understand	10
Apply	20
Analyze	20
Evaluate	
Create	

Percentage Evaluation of Various Blooms' levels (100 Marks)

Bloom's Category	CIE	SEE	Total	%
Remember	0	0	0	0
Understand	10	10	20	20
Apply	20	20	40	40
Analyze	20	20	40	40
Evaluate	0	0	0	0
Create	0	0	0	0
Total	**50**	**50**	**100**	**100**

HIGHER SURVEYING

Course Code: 19CIV45   **Credits   : 3**

L: T: P: S: 3:0:0:0   **CIE Marks: 50**

Exam Hours: 03   **SEE Marks: 50**

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

CO1	Understand the concepts of setting out the curves by linear and angular methods.
CO2	Explain the principle and methods of hydrographic survey and apply them predict the tides
CO3	Describe the functional components of field astronomy.
CO4	Recognize the basics of Photogrammetric and GIS
CO5	Explain working principle and use modern surveying instruments.
CO6	Establish control points for setting out various construction projects.

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	-	-	-	-	-	-	-	3	3	3
CO2	3	3	-	3	-	-	-	-	-	-	-	3	3	3
CO3	3	3	-	3	-	-	-	-	-	-	-	3	3	3
CO4	3	3	2	3	3	-	-	-	-	-	-	3	3	3
CO5	3	3	-	-	3	-	-	-	-	-	-	3	3	3
CO6	3	3	2	3	3	1	1	1	1	1	-	3	3	3

Module No	Content of Module	Hrs	Cos
1	**Curves** – Necessity – Types, **Simple curves**, Elements, Designation of curves, Setting out simple curves by linear methods.Setting out curves by Rankines deflection angle method. **Compound curves** Elements Design of compound curves Setting out of compound curves. **Reverse curves** between two parallel straights (Equal radius and unequal radius).	09	CO1
2	**Hydrographic survey**- Introduction, shoreline survey, soundings, methods of locating soundings, reduction of sounding, plotting of soundings, three point problem mechanical solution, by station pointer method & analytical solution & analytical problems, Tides, prediction of tides.	09	CO2
3	**Introduction to Field Astronomy:** Earth, celestial sphere, earth and celestial coordinate systems, spherical triangle, astronomical triangle, Napier's rule.	09	CO3
4	**Aerial Photogrammetry and Remote sensing** **Introduction**, Uses, Aerial photographs, Definitions, Scale of vertical and tilted photograph (simple problems), Ground Co-ordinates (simple problems), Relief Displacements (Derivation), Ground control. Procedure of aerial survey overlaps and mosaics, Stereoscope Parallax (Derivation). Remote Sensing – Concept, Application and its Limitations; Geographic Information System (GIS)	09	CO4
5	**Advanced Surveying Instruments:** Introduction to Total station, advantages and disadvantages, features, setting-up of total station GPS: Concepts, definitions, segments of GPS, equipments, methods, differential GPS, errors, applications. introduction to LIDAR **Construction survey** Introduction, control for setting out horizontal & vertical control Project surveys- reconnaissance, preliminary & final survey, setting out work of building foundation trench, tunnel alignment & setting out-surface alignment & measurement, transferring the levels underground.	09	CO5 & CO6

TEXT BOOKS:

1. 'Surveying' Vol 2 and Vol 3 - B.C. Punmia, Er. Ashok Kr. Jain, Dr. Arun Kumar Jain, Laxmi Publications, New Delhi. Edition: 16th (2016), ISBN: 8170088836.

2. 'Higher Surveying' A.M. Chandra New age international (P) Ltd, 3rd Edition (2015), ISBN 978-81-224-3812-3

3. Elements of Photogrammetry – Paul R Wolf, McGraw International, 4th Edition, 2014

REFERENCE BOOKS:

1. Fundamentals of Surveying - Milton O. Schimidt – Wong, Thomson Learning.

2. Fundamentals of Surveying - S.K. Roy – Prentice Hall of India, 2nd Edition, ISBN978-81-203-4198.

3. Surveying, Arther Bannister et al., Pearson Education, India, 7th Edition (2006), ISBN 9788131700662

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Tests	Assignments	Quizzes
Marks (out of 50)	**25**	**15**	**10**
Remember	05	-	-
Understand	05	-	-
Apply	10	05	05
Analyze	05	10	05
Evaluate	-	-	-
Create	-	-	-

SEE – Semester End Examination (50 Marks)

Bloom's Category	Tests
Remember	10
Understand	10
Apply	20
Analyze	10
Evaluate	-
Create	-

Percentage Evaluation of Various Blooms' levels

Bloom's Category	CIE	SEE	TOTAL	%
Remember	05	10	15	15
Understand	05	10	15	15
Apply	20	20	40	40
Analyze	20	10	30	30
Evaluate	-	-	-	-
Create	-	-	-	-
TOTAL	50	50	100	100

APPLIED HYDRAULICS AND MACHINERY

Course Code : 19CIV46   **Credits**   **: 3**

L: T: P :S   : 2:1:0:0   **CIE Marks**   **: 50**

Exam Hours: 03   **SEE Marks**   **: 50**

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

CO1	Understand the concepts of open channel flow.
CO2	Design open channels for most economical sections.
CO3	Apply knowledge of the basics of impulse momentum equation.
CO4	Understand the working principle and Design of turbines.
CO5	Analyse the working of pumps.
CO6	Develop the skill for working with fluid systems

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	-	-	-	-	-	-	-	-	3	-
CO2	3	3	3	3	-	-	-	-	-	-	-	-	3	-
CO3	**3**	**3**	**3**	**3**	-	-	-	-	-	-	-	-	3	-
CO4	3	3	3	3	-	-	-	-	-	-	-	-	3	-
CO5	3	3	3	3	-	-	-	-	-	-	-	-	3	-
CO6	3	3	3	3	-	-	-	-	-	-	-	-	3	-

Module No	Content of Module	Hrs	Cos
1	**FLOW IN OPEN CHANNELS-**Definition of channel, difference between pipe and open channel flow, classification, types of flows, geometric properties of open channels, Uniform flow in open channels, Chezy's & Manning's formula, Most economical open sections- rectangular, trapezoidal, circular sections- derivations & problems. Specific Energy, definitions, Specific Energy curve, condition for Maximum discharge & Minimum specific energy, critical flow in rectangular sections, problems	10	C01, CO2
2	**FLOW IN OPEN CHANNELS (NON-UNIFORM FLOW)-**Definition, Types of Non- Uniform flows, Gradually Varied flow-derivation & Problems, Classification of channel bottom slopes. Hydraulic jump, and hydraulic jump in a rectangular channel, types & applications	08	C01
3	**IMPACT OF JET ON FLAT VANES-**Introduction to Impulse – momentum equation and its applications, Force exerted by a jet on a fixed target, Derivations, Force exerted by a Jet on a moving target, Derivations. **IMPACT OF JET ON CURVED VANES-**Force exerted by a jet on a series of curved vanes, Concept of velocity triangles, Equation for work done & efficiency, Problems o force exerted by a Jet on a series of curved vanes.	09	C03
4	**TURBINES-**Definition, classification. Pelton turbine, theory, equation for work done & efficiency, problems. Kaplan turbine, Introduction, Components, Working and Velocity triangles, Properties of the Turbine, Discharge of the Turbines, Number of Blades-Problems. Draft Tube: Types, efficiency of a Draft tube. Introduction to Cavitation in Turbines	09	C04
5	**PUMPS-**Definition, classification general principle, Centrifugal pumps- priming, work done minimum starting speed, problem **FLUID SYSTEM-** Working of Hydraulic press, Hydraulic ram, Hydraulic lift, Hydraulic crane.	09	C05, C06

Text Books

1. P.N.Modi & S.M.Seth , "Hydraulics & Fluid Mechanics", Standard Book House, New Delhi, (ISBN: 8190089374), 15th edition.

2. R.K.Bansal, "A text book of Fluid Mechanics", Laxmi Publications, New Delhi, (ISBN-13: 978-8131808153), 9 th edition.

3. K.L.Kumar, S, "Fluid Mechanics". Chand & Company Ltd, New Delhi, (ISBN: 8121901006, 9788121901000).8th edition.

Reference Books

1. R K Rajput, "Fluid Mechanics and Hydraulic Machines", S Chand & Company, (ISBN: 9788121916660, 8121916666), New Delhi,

2. Fluid Mechanics- Victor L Streeter & E. Benjamin Wylie, Mc-Graw Hill publications, ISBN: 0070622246.

3. Fluid Mechanics- Frank M White, Sixth Edition, the Mc-Graw Hill Companies, ISBN: 9780073398273

CIE: Continuous internal evaluation (50 marks)

Bloom's Category	Tests	Assignments	Quizzes
Marks (out of 50)	**25**	**15**	**10**
Remember	5	5	-
Understand	5	-	5
Apply	10	5	5
Analyze	5	5	-
Evaluate	-	-	-
Create	-	-	-

SEE: Semester End Examination (50 Marks)

Bloom's Category	Tests (Theory)
Remember	5
Understand	5
Apply	25
Analyze	15
Evaluate	
Create	

Percentage Evaluation of various Blooms levels (50+50)

	Theory		%	TOTAL
Blooms category	**CIE**	**SEE**		
Remember	10	5	15	15
Understand	10	5	15	15
Apply	20	25	45	45
Analyze	10	15	25	25
Evaluate	-	-	-	-
Create	-	-	-	-
Total	**50**	**50**	**100**	**100**

HIGHER SURVEYING LAB

Course Code: 19CIV47   **Credits: 1.5**

L: T: P: S: 0:0:1.5:0   **CIE Marks: 25**

Exam Hours: 03   **SEE Marks: 25**

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

CO1	Use plane table for traverse surveying
CO2	Set the curve by linear and angular methods.
CO3	Understand the working principle of Total station and GPS and, to determine the area of field using Total station
CO4	Locate the positions of column for a structure.

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	-	-	-	-	3	3	-	3	3	3
CO2	3	3	3	3	-	-	-	-	3	3	-	3	3	3
CO3	3	3	3	3	2	-	-	-	3	3	-	3	3	3
CO4	3	3	3	3	2	-	-	-	3	3	-	3	3	3

Experiment No	Experiments	Hrs	COs
1	Radiation method of plane tabling.	3	**CO1**
2	Intersection method of plane tabling.	3	**CO1**
3	Setting out simple curves using linear methods – perpendicular offsets from long chord.	3	**CO2**
4	Setting out simple curves using linear methods – perpendicular offsets from chords produced.	3	**CO2**
5	Setting out simple curves using Rankine's deflection angles method.	3	**CO3**
6	Setting out compound curve with angular methods with using theodolite only.	3	**CO3**
7	Setting out reverse curve.	3	**CO3**
8	Co-ordinates measurement by using GPS.	3	**CO3**
9	Study of Total Station.	3	**CO3**
10	Determine the area of the given ground by using Total Station.	3	**CO3**
11	Locate the column positions in the field.	3	**CO4**

TEXT BOOKS:

1. 'Surveying' Vol 2 and Vol 3 - B.C. Punmia , Er. Ashok Kr. Jain, Dr.Arun Kumar Jain, Laxmi Publications, New Delhi. Edition: 16th (2016), ISBN: 8170088836.

2. 'Higher Surveying' A.M. Chandra New age international (P) Ltd, 3rd Edition (2015), ISBN 978-81-224-3812-3

3. Elements of Photogrammetry – Paul R Wolf, McGraw International, 4th Edition, 2014

REFERENCE BOOKS:

1. Fundamentals of Surveying - Milton O. Schimidt – Wong, Thomson Learning.

2. Fundamentals of Surveying - S.K. Roy – Prentice Hall of India, 2nd Edition, ISBN 978-81-203-4198.

3. Surveying, Arther Bannister et al., Pearson Education, India, 7th Edition (2006), ISBN 9788131700662

CIE- Continuous Internal Evaluation (25 Marks)

Bloom's Category	Test
Marks (out of 25)	**25**
Remember	05
Understand	05
Apply	10
Analyze	5
Evaluate	
Create	

SEE: Semester End Examination (25 Marks)

Bloom's Category	Test	Test
Marks (out of 25)	**25**	**25**
Remember	05	05
Understand	05	05
Apply	10	10
Analyze	5	5
Evaluate		
Create		

Percentage Evaluation of Various Blooms' levels

Bloom's Category	CIE	SEE	TOTAL	%
Remember	5	5	10	20
Understand	5	5	10	20
Apply	10	10	20	40
Analyze	5	5	10	20
Evaluate				
Create				
TOTAL	**25**	**25**	**50**	**100**

APPLIED HYDRAULICS AND MACHINERY LAB

Course Code: 19CIV48

L: T: P:S: 0:0:1.5:0

Exam Hours: 03

Credits   :1.5

CIE Marks   : 25

SEE Marks   : 25

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

CO1	Interpret the fluid flow phenomena observed in open channel flow.
CO2	Compute the flow of water passing through a pipe, channel and a tank.
CO3	Understand the concepts of impulse momentum and the working of fluid systems
CO4	Analyse the working of turbines and pumps

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	-	-	-	-	3	-	-	-	3	3
CO2	3	3	3	3	-	-	-	-	3	-	-	-	3	3
CO3	3	3	3	3	--	-	-	-	3	-	-	-	3	3
CO4	3	3	3	3	--	-	-	-	3	-	-	-	3	3

LIST OF EXPERIMENTS

Experiment no.	Content of Experiment	Cos
1	To study hydraulic jump	CO1
2	To find the coefficient of discharge of rectangular and trapezoidal notch	CO2
3	To find the coefficient of mouthpiece	CO2
4	Calibration of dead weight of pressure gauge	CO3
5	To determine the coefficient of impact of jet on flat vanes	CO3
6	To determine the coefficient of impact of jet on inclined and curved vanes	CO3
7	To study the efficiency ofpelton turbines.	CO4
8	To study the efficiency of Kaplan turbines.	CO4
9	To study the efficiency of Centrifugal pump	CO4
10	To determine the minor losses in a pipe line.	CO2

TEXT BOOKS

1. P.N.Modi&S.M.Seth , "Hydraulics & Fluid Mechanics", Standard Book House, New Delhi, (ISBN: 8190089374),15th edition.

2. R.K.Bansal, "A text book of Fluid Mechanics", Laxmi Publications, New Delhi, (ISBN-13: 978-8131808153), 9th edition.

3. K.L.Kumar, S, "Fluid Mechanics". Chand & Company Ltd, New Delhi, (ISBN: 8121901006, 9788121901000).8th edition.

Reference Books

1. R K Rajput, "Fluid Mechanics and Hydraulic Machines", S Chand & Company, (ISBN: 9788121916660, 8121916666), New Delhi.

2. Fluid Mechanics- Victor L Streeter & E. Benjamin Wylie, Mc-Graw Hill publications, ISBN: 0070622246.

3. Fluid Mechanics- Frank M White, Sixth Edition, the Mc-Graw Hill Companies, ISBN: 9780073398273

CIE- Continuous Internal Evaluation (25 Marks)

Bloom's Category	Tests
Remember	5
Understand	10
Apply	10
Analyze	-
Evaluate	-
Create	-

SEE: Semester End Examination (25 Marks)

Bloom's Category	Tests
Remember	5
Understand	10
Apply	10
Analyze	-
Evaluate	-
Create	-

PERCENTAGE EVALUATION OF VARUIOUS BLOOM LEVEL (25+25)

	THEORY		
Bloom's Category	**CIE**	**SEE**	**TOTAL**
Remember	5	5	10
Understand	10	10	20
Apply	10	10	20
Analyze	-	-	-
Evaluate	-	-	-
Create	-	-	-

MINI PROJECT-I (Building Planning & Drawing)

Course Code : 19CIV49   **Credits** : 03

L: T:P:S : 0:0:2:0   **CIE Marks : 25**

Exam Hours. : 02   **SEE Marks : 25**

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

CO1	Use basic tools of AUTOCAD and functional requirements of building planning
CO2	Understand the basic requirements and bye laws for building planning and to prepare interconnectivity diagram.
CO3	Design and Prepare functional drawings of buildings as per specifications.
CO4	Prepare service layouts and to develop drafting skills for buildings

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	3	-	-	-	-	3	-	3	3	-
CO2	3	-	-	-	-	3	2	2	-	3	-	3	-	3
CO3	3	3	2	3	3	3	2	2	-	3	-	3	3	3
CO4	3	3	2	3	3	3	2	2	-	3	-	3	3	3

Experiment No.	Content of Exercise	Hrs	Cos
	PART-A		
1	**Basics Of AutoCAD:**"Drafting" and „Modify" Tools	12	CO1
2	**Functional Requirements Building Planning:** Guidelines for building drawings, Scales, definition of terms used in building.	3	CO2
3	Specification for residential and public building, bye laws, setback distances and calculation of carpet area, plinth area and floor area ratio.	3	CO2, CO3
4	Generating inter connectivity diagrams (bubble diagram), development of line diagram for public buildings (Primary health centre, school building, College canteen, Office building (Manual and CAD)	15	CO2
5	For a given single line diagram, preparation of water supply, sanitary and electrical layouts	15	CO4
6	Development of plan, elevation, section and schedule of openings from the given line diagram of two bed room, single storeyed residential buildings (Manual and CAD)	15	CO4
7	Development of plan, elevation, section and schedule of openings from the given line diagram of two storeyed residential building.(Manual and CAD)	15	CO4
	PART B MINI PROJECT		

Student should develop mini project on the topics mentioned below or similar applications using above concepts.

Preparing a set of construction drawings considering byelaws and regulations, centre line drawing, schedule of openings, electrical drawing, water supply and sanitary detailing, Services like staircases, lifts, HVAC, acoustics, fire fighting etc. with respect to:

 a. Residential Building.

 b. Commercial Building.

 c. Public Building.

Conduct of Practical Examination:

All laboratory experiments are to be included for practical examination.

Experiment distribution: Students are allowed to pick one experiment from the lot and are given equal opportunity.

Change of experiment is allowed only once and marks allotted for procedure part to be made zero.

Marks Allocations:

 a. For Part-A: Procedure + Execution + Viva-Voce: 4+18+3 =25 Marks.

 b. For Part-B: Procedure + Execution + Viva: 2+21+2 =25 Marks.

TEXT BOOKS:

1. **"Building Drawing"**, Shah M.H and Kale C.M, Tata Mc Graw Hill Publishing co. Ltd., New Delhi.4th Edition, 2007, ISBN 0074638769

2. **"Building Planning Designing and scheduling",** Gurucharan Singh, Standard Publishers & distributors, New Delhi.2006, ISBN 8180140059, 978818014005

3. **"Building Planning and Drawing"** Dr. H.J Shah**,** Charotar Publishing house PVT Ltd**, (2007),** ISBN 9788185594743, 8185594740

REFERENCE BOOKS:

1. National Building Code, BIS, New Delhi.

2. Civil Engineering Drawing and House Planning, B.P Verma

CIE- Continuous Internal Evaluation (25 Marks)

Bloom's Category	Tests
Marks (out of 25)	25
Remember	2.5
Understand	5
Apply	5
Analyze	5
Evaluate	2.5
Create	5

SEE: Semester End Examination (25 Marks)

Bloom's Category	Test (Practical)
Remember	2.5
Understand	2.5
Apply	2.5
Analyze	5
Evaluate	5
Create	7.5

Percentage Evaluation of Various Bloom's levels

Bloom's Category	CIE	SEE	TOTAL	%
Remember	2.5	2.5	5	10
Understand	5	2.5	7.5	15
Apply	5	2.5	7.5	15
Analyze	5	5	10	20
Evaluate	2.5	5	7.5	15
Create	5	7.5	12.5	25
TOTAL	**25**	**25**	**50**	**100**

BASIC APPLIED MATHEMATICS-II

Course Code : 20DMAT41A   **Credits : 00**

L:T:P:S: 0:0:0:0   **CIE Marks : 25**

Exam Hours : 02   **SEE Marks : 25**

Course Outcomes: At the end of the Course, the Student will be able to do the following:

CO1	Gain knowledge of basic operations of vectors
CO2	Use curl and divergence of a vector function in three dimensions
CO3	Develop the ability to solve higher order Linear differential equations
CO4	Know the basic concepts of Laplace transform to solve the Periodic and Step functions and also solve initial and boundary value problems using Laplace transform method

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	-	-	-	-	-	-	3	3
CO2	3	3	3	3	-	1	-	-	-	-	3	3
CO3	3	3	3	3	3	-	3	-	-	3	3	3
CO4	3	3	3	3	3	-	3	-	-	3	3	3

Module No.	Contents of the Module	Hours	CO'
1.	**Vectors:** Definition of scalar and vector, Vector addition, Subtraction and Multiplication-Dot product, Cross product, Scalar triple product. Orthogonal, Co-planar and Angle between vectors-Problems.	5L	CO1
2.	**Vector Differentiation:** Velocity and Accelerations, Vector differential operator-Gradient of a scalar function, Divergence of a vector function, Curl of a vector function-Problems. Solenoidal and irrotational vector fields-Problems.	5L	CO2
3.	**Linear differential equations with constant coefficients:** Solution of initial and boundary value problems, Inverse differential operator techniqu for the functions-e^{ax}, $Sin(ax+b)$ and $Cos(ax+b)$.	5L	CO3
4.	**Laplace Transform:** Definition and Laplace transforms of elementary functions-Problems. Properties of Laplace transforms (without proof), Periodic functions (without proof), Heaviside function (without proof) - Problems.	5L	CO4
5.	**Inverse Laplace Transform:** Inverse Laplace Transform by partial fractions, completing the square method-Problems. Solution of linear differential equations using Laplace Transforms-Problems.	5L	CO4

Text Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley-India Publishers, 10th Edition, 2014, ISBN: 978-81-265-5423-2.

2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43rd Edition, 2014, ISBN: 978-81-7409-195-5.

Reference Books:

1. Glyn James, Modern Engineering Mathematics, Prentice Hall, 4th Edition, 2015, ISBN: 978-0-273-73409-3

2. B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education (India) Private Limited, 4th Edition, 2016, ISBN: 978-0-07-063419-0.

3. H. K. Dass, Advanced Engineering Mathematics, S. Chand & Company Ltd., 28th Edition, 2012, ISBN: 81-219-0345-9.

4. N.P.Bali and Manish Goyal, A Text Book of Engineering Mathematics, Laxmi Publications (P) Ltd., 9th Edition, 2014, ISBN: 978-81-318-0832-0.

Assessment Pattern:

1. CIE- Continuous Internal Evaluation (25 Marks)

Bloom's Category	Tests (20 Marks)	Assignment (5 Marks)
Remember	5	-
Understand	5	5
Apply	5	-
Analyze	2.5	-
Evaluate	2.5	-
Create	-	-

2. SEE- Semester End Examination (25 Marks)

Bloom's Category	Questions (25 Marks)
Remember	5
Understand	10
Apply	5
Analyze	2.5
Evaluate	2.5
Create	-

APPENDIX A

Outcome Based Education

Outcome-based education (OBE) is an educational theory that bases each part of an educational system around goals (outcomes). By the end of the educational experience each student should have achieved the goal. There is no specified style of teaching or assessment in OBE; instead classes, opportunities, and assessments should all help students achieve the specified outcomes.

There are three educational Outcomes as defined by the National Board of Accredition:

Program Educational Objectives: The Educational objectives of an engineering degree program are the statements that describe the expected achievements of graduate in their career and also in particular what the graduates are expected to perform and achieve during the first few years after graduation. [nbaindia.org]

Program Outcomes: What the student would demonstrate upon graduation. Graduate attributes are separately listed in Appendix C

Course Outcome: The specific outcome/s of each course/subject that is a part of the program curriculum. Each subject/course is expected to have a set of Course Outcomes

Mapping of Outcomes

COURSE OUTCOME
↓
PROGGRAM OUTCOME
↓
PROGRAM EDUCATIONAL OBJECTIVES
↓
DEPARTMENTAL MISSION
↓
DEPARTMENTAL VISION
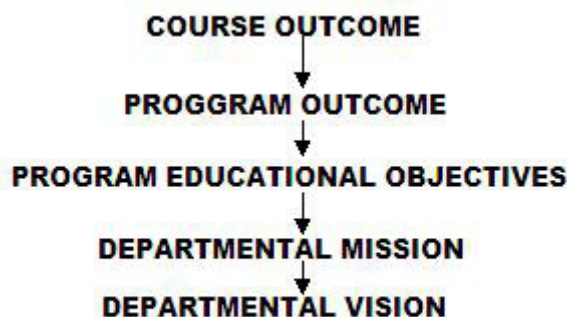
APPENDIX B

The Graduate Attributes of NBA

Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialisation to the solution of complex engineering problems.

Problem analysis: Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

Conduct investigations of complex problems: The problems that cannot be solved by straightforward application of knowledge, theories and techniques applicable to the engineering discipline that may not have a unique solution. For example, a design problem can be solved in many ways and lead to multiple possible solutions that require consideration of appropriate constraints/requirements not explicitly given in the problem statement (like: cost, power requirement, durability, product life, etc.) which need to be defined (modeled) within appropriate mathematical framework that often require use of modern computational concepts and tools.

Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

Life-long learning: Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

APPENDIX C

BLOOM'S TAXONOMY

Bloom's taxonomy is a classification system used to define and distinguish different levels of human cognition—i.e., thinking, learning, and understanding. Educators have typically used Bloom's taxonomy to inform or guide the development of assessments (tests and other evaluations of student learning), curriculum (units, lessons, projects, and other learning activities), and instructional methods such as questioning strategies.

[eduglosarry.org]