TITLE OF THE COURSE: ENGINEERING MATHEMATICS-IV
B.E., IV Semester, Civil Engineering

[As per Choice Based Credit System (CBCS) scheme]

Subject Code: 18 MAT41	**CIE:** 50
Number of Lecture Hours/Week: 04	**SEE:** 50
Total Number of Lecture Hours: 50	**Exam Hours:** 03

CREDITS – 04

Course Learning Objectives:

This course will enable students to:

- Learn Fourier series and Fourier transforms.
- Conversant with numerical methods to solve ordinary differential equations, complex analysis, joint probability distribution and stochastic processes arising in science and engineering.

Modules	HRS
MODULE-I **Fourier Series**: Periodic functions, Dirichlet's condition, Fourier Series of periodicfunctions wit h period 2π and with arbitrary period 2c. Fourier series of even and odd functions Half range Fourier Series, practical harmonic analysis(5 Assignment Problem).	**10 HRS**
MODULE-II **Fourier Transforms:** Infinite Fourier transforms, Fourier sine and cosine transforms. Inverse Fourier-transform (5 Assignment Problem). **Complex line Integrals:** Cauchy's Integration theorem, Cauchy integral formula, Laurent's Series, types of singularities. Residue, Poles, Cauchy's Residue theorem (without proof) and Problems. **Transformations:** Bilinear transformations and problems.	**10 HRS**
MODULE-III **Numerical Methods**: Numerical solution of ordinary differential equations of first order andfirst degree, Taylor's series method, modified Euler's-method Runge Kutta method of fourth order. Milne's and Adams- Bashforth predictor and corrector methods (No derivations of formulae). (5 Assignment Problem).	**10 HRS**
MODULE-IV **Numerical Methods: Numerical solution of second order ordinary differential equations, Runge- Kutta Method and Milne's Method,** Numerical solution of P.D.E: Numerical solution of Heat equation, Wave equation, problems. (5 Assignment Problem).	**10 HRS**
MODULE-V **Joint probability distribution:** Joint Probability distribution for two discrete random variables, expectation, covariance, correlation coefficient	**10 HRS**

Stochastic process: Stochastic processes, probability vector, stochastic matrices, fixed points, regular stochastic matrices, Markov chains, higher transition probability-simple problems. (5 Assignment Problem).

Course Outcomes: On completion of this course, students are able to:

- Know the use of periodic signals and Fourier series to analyze circuits and system communications.
- Explain the general linear system theory for continuous time signals and digital signal processing using the Fourier Transform.
- Solve first and second order ordinary differential equations arising in flow problems using single step and multistep numerical methods.
- Understand the analyticity, potential fields, residues and poles of complex potentials in field theory and electromagnetic theory.
- Describe bilinear transformation arising in aerofoil theory, fluid flow visualization and image processing.
- Solve problems on probability distributions relating to digital signal processing, information theory and optimization concepts of stability of design and structural engineering.
- Determine joint probability distributions and stochastic matrix connected with the multivariable correlation problems for feasible random events.
- Define transition probability matrix of a Markov chain and solve problems related to discrete parameter random process.

Question paper pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Text Books:

1. *B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 43rd Ed., 2015.*
2. *E. Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons,10th Ed., 2015.*

Reference Books:

1. N.P.Bali and Manish Goyal: A Text Book of Engineering Mathematics, Laxmi Publishers , 7th Ed., 2010.
2. B.V.Ramana: "Higher Engineering Mathematics" Tata McGraw-Hill, 2006.
3. H. K. Dass and Er. Rajnish Verma: "Higher Engineering Mathematics", S. Chand publishing, 1st edition, 2011.

Web Link and Video Lectures:

1. *http://nptel.ac.in/courses.php?disciplineID=111*
2. *http://www.khanacademy.org/*

http://www.class-central.com/subject/math

STRUCTURAL ANALYSIS – I

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER –IV

Subject Code: 18CV42	**CIE:** 50
Number of Lecture Hours/Week: 04	**SEE:** 50
Total Number of Lecture Hours: 50	**Exam Hours:** 03

CREDITS – 04

Course Objectives: This course will enable students to

1. Apply knowledge of mathematics and engineering for calculating slope and deflections of structural elements
2. Identify, formulate and solve engineering problems
3. Analyse structural systems and interpret data
4. Engage in lifelong learning with the advances in Structural Engineering.
5. To study the Horizontal and Normal thrust and Evaluate Buckling load for columns with different end conditions.

Modules	RBT LEVEL/ HRS
Module -1 **Introduction and Analysis of Plane Trusses:** Structural forms, Conditions of equilibrium, Compatibility conditions, Degree of freedom, Linear and non linear analysis, Static and kinematic indeterminacies of structural systems, Types of trusses, Assumptions in analysis, Analysis of determinate trusses by method of joints and method of sections.	**L2,L4, L5 10 Hours**
Module -2 **Deflection of Beams:** Definition of slope, Deflection and curvature, Sign conventions, Derivation of moment-curvature equation. Macaulay's method: Slope and deflection for standard loading cases and for determinate prismatic beams subjected to point loads, UDL, UVL and couple. Moment area method: Derivation, Mohr's theorems, Sign conventions, Application of moment area method for determinate prismatic beams, Beams of varying section, Use of moment diagram by parts. Conjugate beam method: Real beam and conjugate beam, conjugate beam theorems, Application of conjugate beam method of determinate beams of variable cross sections.	**L2,L4,L5 10 Hours**

Module -3 **Energy Principles and Energy Theorems:** Principle of virtual displacements, Principle of virtual forces, Strain energy and complimentary energy, Strain energy due to axial force, bending, shear and torsion, Deflection of determinate beams and trusses using total strain energy, Deflection at the point of application of single load, Castigliano's theorems and its application to estimate the deflections of trusses, bent frames, Special applications-Dummy unit load method.	**L2,L4,L5** **10 Hours**
Module -4 **Arches and Cable Structures:** Three hinged parabolic arches with supports at the same and different levels. Determination of normal thrust, radial shear and bending moment. Analysis of cables under point loads and UDL. Length of cables for supports at same and at different levels- Stiffening trusses for suspension.	**L2,L4,L5** **10 Hours**
Module -5 **Analysis of Two Hinged Arches:** Two hinged parabolic arch, Two hinged circular arch. **Columns and Struts:** Introduction, short and long columns. Euler's theory; Assumptions, Derivation for Euler's Buckling load for different end conditions, Limitations of Euler's theory. Rankine-Gordon's formula for columns.	**L2,L4,L5** **10 Hours**

Course outcomes: After studying this course, students will be able to:

1. Evaluate the forces in determinate trusses by method of joints and sections.
2. Evaluate the deflection of cantilever, simply supported and overhanging beams by different methods
3. Understand the energy principles and energy theorems and its applications to determine the deflections of trusses and bent frames.
4. Determine the stress resultants in arches and cables.
5. Determine the Horizontal and Normal thrust and Evaluate Buckling load for columns with different end conditions.

Question paper pattern:

1. The question paper will have ten questions.
2. Each full question consists of 10 marks.
3. There will be 2 full questions (with a maximum of four sub questions) from each module.
4. Each full question will have sub questions covering all the topics under a module.

The students will have to answer 5 full questions, selecting one full question from each module.

Text Books:

1. Reddy C S, Basic Structural Analysis, Tata McGraw Hill, New Delhi.
2. Muthu K U. etal, Basic Structural Analysis, 2nd edition, IK International Pvt.Ltd., New Delhi,2015.
3. Bhavikatti, Structual Analysis, Vikas Publishing House Pvt. Ltd, New Delhi, 2002.
4. Dr. D S Rajendra Prasad, Sapna Book house,2015.

Reference Books:

1. Hibbeler R C, Structural Analysis, Prentice Hall, 9th edition, 2014
2. Devadoss Menon, Structural Analysis, Narosa Publishing House, New Delhi,2008.
3. Prakash Rao D S, Structural Analysis, University Press Pvt. Ltd, 2007.

TITLE OF THE COURSE: Hydraulics and Hydraulic machines B.E., IV Semester, Civil Engineering [As per Choice Based Credit System (CBCS) scheme]	
Subject Code: 18CV43	**CIE:** 50
Number of Lecture Hours/Week: 04	**SEE:** 50
Total Number of Lecture Hours: 50	**Exam Hours:** 03

CREDITS – 04

Course Objectives: The objectives of this course is to make students to learn:
1. Principles of dimensional analysis to design hydraulic models and Design of various models.
2. Design the open channels of various cross sections including design of economical sections.
3. Energy concepts of fluid in open channel, Energy dissipation, Water surface profiles at different conditions.
4. The working principles of the hydraulic machines for the given data and analyzing the performance of Turbines for various design data.

Module -1 **Dimensional analysis:** Dimensional analysis and similitude: Dimensional homogeneity, Non Dimensional parameter, Rayleigh methods and Buckingham pie theorem, dimensional analysis, choice of variables, examples on various applications. **Model analysis:** Model analysis, similitude, types of similarities, force ratios, similarity laws, model classification, Reynolds model, Froude's model, Euler's Model,Webber's model, Mach model, scale effects, Distorted models. Numerical problems on Reynold's, and Froude's Model.	**L1,L2,L3 10 HRS**
Module -2 **Open Channel Flow Hydraulics:** Boundry layer theory and its applications,Uniform Flow: Introduction, Classification of flow through channels, Chezy's and Manning's equation for flow through open channel, Most economical channel sections, Uniform flow through Open channels, Numerical Problems.	**L3,L4 10 HRS**
Module -3 **Non-Uniform Flow:** Specific Energy and Specific energy curve, Critical flow and corresponding critical parameters, Numerical Problems Hydraulic Jump, Applications of hydraulic jump Expressions for conjugate depths and Energy loss, Numerical Problems Gradually varied flow, Equation, Back water curve and afflux, Description of water curves or profiles, Mild, steep, critical, horizontal and adverse slope profiles, Numerical problems,	**L2,L3,L4 10 HRS**
Module -4 **Hydraulic Machines:** Introduction, Impulse-Momentum equation. Direct impact of a jet on a stationary and moving curved vanes, Introduction to concept of velocity triangles, impact of jet on a series of curved vanes- Problems	**L1,L2,L3 ,L4 10 HRS**

Turbines – Impulse Turbines: Introduction to turbines, General lay out of a hydroelectric plant, Heads and Efficiencies, classification of turbines. Pelton wheel components, working principle and velocity triangles. Maximum power, efficiency, working proportions.	
Module -5 **Reaction Turbines and Pumps:** Radial flow reaction turbines: (i) Francis turbine-Descriptions, working proportions . (ii) Kaplan turbine- Descriptions, working proportions . Draft tube theory and unit quantities. (No problems) Centrifugal pumps: Components and Working of centrifugal pumps, Types of centrifugal pumps, Work done by the impeller, Heads and Efficiencies, Minimum starting speed of centrifugal pump, Numerical problems, Multi-stage pumps.	**L1,L2,L3 ,L4 10 HRS**

Course outcomes:

After a successful completion of the course, the student will be able to:

1. Apply dimensional analysis to develop mathematical modeling and compute the parametric values in prototype by analyzing the corresponding model parameters
2. Design the open channels of various cross sections including economical channel sections
3. Apply Energy concepts to flow in open channel sections, Calculate Energy dissipation,
4. to calculate the force exerted by jet of water on vanes.
5. Design centrifugal pumps for the given data, and to know their operation characteristics under different operating condition, understanding principles of turbines and its working conditions.

Question paper pattern:

1. The question paper will have ten questions.
2. Each full question consists of 10 marks.
3. There will be 2 full questions (with a maximum of four sub questions) from each module.
4. Each full question will have sub questions covering all the topics under a module.

The students will have to answer 5 full questions, selecting one full question from each module.

Text Books:

1. P N Modi and S M Seth, “Hydraulics and Fluid Mechan ics, including Hydraulic Machines”, 20th edition, 2015, Standard Book House, New Delhi
2. R.K. Bansal, “A Text book of Fluid Mechanics and Hy draulic Machines”, Laxmi Publications, New Delhi
3. S K SOM and G Biswas, “Introduction to Fluid Mechan ics and Fluid Machines”,Tata McGraw Hill,New Delhi

Reference Books:

1. K Subramanya, “Fluid Mechanics and Hydraulic Machin es”, Tata McGraw Hill Publishing Co. Ltd.
2. Mohd. Kaleem Khan, “Fluid Mechanics and Machinery”, Oxford University Press
3. C.S.P. Ojha, R. Berndtsson, and P.N. Chandramouli, *“Fluid Mechanics and Machinery”*, Oxford University Publication – 2010
4. J.B. Evett, and C. Liu, *“Fluid Mechanics and Hydraulics* ”, McGraw-Hill Book

TITLE OF THE COURSE: Building Materials & Construction Technology
B.E.,IV Semester, Civil Engineering
[As per Choice Based Credit System (CBCS) scheme]

Course Code: 18 CV44	**CIE Marks: 50**
Number of Lecture Hours/Week: 04	**SEE Marks: 50**
Total Number of Lecture Hours: 50	**Exam Hours:03**

Credits – 04

Course Objectives: This course will develop a student;

1. In recognizing the good materials to be used for the construction work
2. In investigation of soil condition, Deciding and design of suitable foundation for different structures
3. In supervision of different types of masonry
4. In selection of materials, design and supervision of suitable type of floor and roof.

To gain knowledge about doors, windows, plastering, painting, damp proofing, scaffolding, shoring, underpinning and to take suitable engineering measures.

MODULE	RBT LEVELS/ HRS
Module-1 **Building Materials**: **Stone** as building material; Requirement of good building stones, Dressing of stones, Deterioration and Preservation of stone work. **Bricks;** Classification, Manufacturing of clay bricks, Types of Kilns and Clamps. Field and laboratory tests on bricks; compressive strength, water absorption, efflorescence, dimension and warpage. **Blocks:** Cement Concrete blocks, Stabilized Mud Blocks, Sizes, requirement of good blocks. **Mortar:** types and requirements. **Timber** as construction material **Advanced construction material:** Autoclaved Aerated block (AAC) manufacturing process and uses, Laminates , types and its application.	**L1,L2 10HRS**
Module-2 **Foundation:** Preliminary investigation of soil, safe bearing capacity of soil Function and requirements of good foundation , types of foundation , introduction to spread, combined , strap, mat and pile foundation **Masonry:** Definition and terms used in masonry. Brick masonry, characteristics and requirements of good brick masonry, Bonds in brick work, Header, Stretcher, English, Flemish bond, Stone masonry, Requirements of good stone masonry,	**L1,L2,L3 10HRS**

Classification, characteristics of different stone masonry, Joints in stone masonry. Types of walls; load bearing, partition walls, cavity walls. **Lintels and Arches**: Definition, function and classification of lintels, Balconies, chejja and canopy. Arches; Elements and Stability of an Arch.	
Module-3 **Doors, Windows and Ventilators**: Location of doors and windows, technical terms, Materials for doors and windows, Paneled door, Flush door, Collapsible door, Rolling shutter, PVC Door, Paneled and glazed Window, Bay Window, French window. Ventilators. Sizes as per IS recommendations **Roofs:** Requirement of good roof, Types of roof, Elements of a pitched roof, Trussed roof, King post Truss, Queen Post Truss, Steel Truss, Different roofing materials, R.C.C. Roof.	**L2,L3,L5** **10HRS**
Module-4 **Floors:** Floors; Requirement of good floor, Components of ground floor, Selection of flooring material, Laying of Concrete, Mosaic, Marble, Granite, Tile flooring, Cladding of tiles. **Stairs:** Definitions, technical terms and types of stairs, Requirements of good stairs. Geometrical design of RCC doglegged and open-well stairs. **Formwork:** Introduction to form work, scaffolding, shoring, under pinning. **Plastering and Pointing** : purpose, materials and methods of plastering and pointing, defects in plastering-Stucco plastering, lathe plastering	**L2,L3,L4,L5** **10HRS**
Module-5 **Plumbing:** Introduction-plumbing services, water meter, valves, Storage Tanks, general principles of house drainage, pipes and traps, sanitary fittings, system of plumbing **Damp proofing**- causes, Effects and methods. **Paints**- Purpose, types, ingredients and defects, Preparation and applications of paints to new and old plastered surfaces, wooden and steel surfaces.	**L1,L2** **10HRS**
Course outcomes: After a successful completion of the course, the student will be able to: 1. Select suitable materials for buildings and adopt suitable construction techniques. 2. Adopt suitable repair and maintenance work to enhance durability of buildings. 3. Adopt suitable Doors, Windows and Roofs materials to give good aesthetic looks of the buildings. 4. Select suitable stairs for suitable building, and even flooring materials along with plastering. Select advanced plumbing, Damp proofing and Paints materials to reduce maintenance cost.	
Text Books: 1. Sushil Kumar "Building Materials and construction", 20th edition, reprint 2015,Standard Publishers 2. Dr. B.C.Punmia, Ashok kumar Jain, Arun Kumar Jain, "Building Construction, Laxmi Publications (P) ltd., New Delhi. Rangawala S. C. "Engineering Materials", Charter Publishing House, Anand, India.	

Reference Books:

1. S.K.Duggal, "Building Materials", (Fourth Edition)New Age International (P) Limited, 2016 National Building Code(NBC) of India
2. P C Vergese, "Buliding Materials", PHI Learning Pvt. Ltd
3. Building Materials and Components, CBRI, 1990, India
4. Jagadish.K.S, "Alternative Building Materials Technology", New Age International, 2007.
5. M. S. Shetty, "Concrete Technology", S. Chand & Co. New Delhi.

BUILDING MATERIAL TESTING LAB

[As per Choice Based Credit System (CBCS) scheme] SEMESTER – IV

Subject Code: 18 CVL45	**CIE:** 50
Number of Lecture Hours/Week:03	**SEE:** 50
Total Number of Lecture Hours:40	**Exam Hours:03**

CREDITS – 01

Course Objectives: The objectives of this course is to make students to learn:

1. Ability to apply knowledge of mathematics and engineering in calculating the mechanical properties of structural materials.
2. Ability to function on multi-disciplinary teams in the area of materials testing.
3. Ability to use the techniques, skills and modern engineering tools necessary for engineering.
4. Understanding of professional and ethical responsibility in the areas of material testing.
5. Ability to communicate effectively the mechanical properties of materials.

SL.NO	EXPERIMENT NAME	
1	Tension test on mild steel and HYSD bars	**L2,L3,L5**
2	Compression test on mild steel and wood.	**L1,L2,L3,L5**
3	Bending Test on Wood Under single and two point loading.	**L1,L2,L3,L5**
4	Shear Test on Mild steel- single and double shear.	**L1,L2,L3,L5**
5	Impact test on Mild Steel (Charpy & Izod).	**L1,L2,L3,L5**
6	Hardness tests on ferrous and non-ferrous metals- Brinell's, Rockwell and Vicker's.	**L1,L2,L3**,L5
7	Compression and water absorption tests on Bricks and Tiles.	**L1,L2,L3,L5**
8	Tests on Fine aggregates-Moisture content, Specific gravity, Bulk density, Sieve analysis and Bulking.	**L1,L2,L3,L5**
9	Tests on Coarse aggregates-Absorption, Moisture content, specific gravity, Bulk density and Sieve analysis.	**L1,L2,L3,L5**
10	Torsion test on Mild Steel and HYSD bar.	**L1,L2,L3,L5**
11	Demonstration of Strain gauges and Strain indicators.	**L1,L2,L3,L5**

NOTE: All tests to be carried out as per relevant latest BIS Codes

Course outcomes: After successful completion of the course, the students will be able to:

1. Reproduce the basic knowledge of mathematics and engineering in finding the strength in tension, compression, shear and torsion.
2. Identify, formulate and solve engineering problems of structural elements subjected to flexure.
3. Evaluate the impact of engineering solutions on the society and also will be aware of contemporary issues regarding failure of structures due to unsuitable materials.

Question paper pattern:

- Group experiments - Tension test, compression test and bending test.
- Individual Experiments - Remaining tests.
- Two questions are to be set - One from group experiments and the other as individual experiment.
- Instructions as printed on the cover page of answer script for split up of marks to be strictly followed.

Reference Books:

1. Davis, Troxell and Hawk, "Testing of Engineering Materials", International Student Edition – McGraw Hill Book Co. New Delhi.
2. M L Gambhir and Neha Jamwal, "Building and construction materials-Testing and quality control", McGraw Hill education(India)Pvt. Ltd., 2014
3. Fenner, " Mechanical Testing of Materials", George Newnes Ltd. London.
4. Holes K A, "Experimental Strength of Materials", English Universities Press Ltd. London.
5. Suryanarayana A K, "Testing of Metallic Materials", Prentice Hall of India Pvt. Ltd.New Delhi.
6. Kukreja C B, Kishore K. and Ravi Chawla "Material Testing Laboratory Manual",Standard Publishers & Distributors 1996.
7. Relevant **latest IS Codes**

TITLE OF THE COURSE: Surveying Practice –II Lab
B.E., IV Semester, Civil Engineering
[As per Choice Based Credit System (CBCS) scheme]

Course Code: 18CVL46	**CIE Marks: 50**
Number of Lecture Hours/Week :03	**SEE Marks :50**
Total Number of Hours:40	**Exam Hours :03**

Credits – 01

Course Objectives: The objectives of this course is to make students to:

1. Apply the basic principles of engineering surveying and measurements
2. Follow effectively field procedures required for a professional surveyor
3. Use techniques, skills and conventional surveying instruments necessary for engineering practice.

Experiments:

1. To conduct profile levelling and cross section levelling using dumpy level/autolevel. **L3**
2. To carry out block levelling and plotting**.** **L3**
3. Determination of horizontal distance and elevation when the base is accessible(single plane method). **L4**
4. Determination of horizontal distance and elevation when the base is in-accessible(single plane method). **L4**
5. To determine tacheometric constants using horizontal line of sight. **L4**
6. To set-out simple curve by long chord method. **L3,L4**
7. To set-out simple curve by rankines method. **L4**
8. To set-out compound curve. **L4**
9. To carry out profile levelling & cross section levelling using total station. **L4**
10. To carry out block levelling by using total station. **L4**
11. Demonstration on box sextant, hand level and planimeter. **L3**

Course outcomes: After a successful completion of the course, the student will be able to:

1. Apply the basic principles of engineering surveying for linear and angular measurements.
2. Comprehend effectively field procedures required for a professional surveyor.
3. Use techniques, skills and conventional surveying instruments necessary for engineering practice.

Question paper pattern:

- All are individual experiments.
- Instructions as printed on the cover page of answer script for split up of marks to be strictly followed.
- All exercises are to be included for practical examination.

Reference Books:

1. B.C. Punmia, **"Surveying Vol.1"**, Laxmi Publications pvt. Ltd., New Delhi 2009.
2. Kanetkar T P and S V Kulkarni , **Surveying and Levelling Part I**, Pune VidyarthiGrihaPrakashan, 1988
3. S.K. Duggal, **"Surveying Vol.1"**, Tata McGraw Hill Publishing Co. Ltd. New Delhi.-2009.
4. K.R. Arora, **"Surveying Vol. 1"** Standard Book House, New Delhi. – 2010 & Distributors

TITLE OF THE COURSE: Fluid Mechanics-II Lab
B.E., IV Semester, Civil Engineering
[As per Choice Based Credit System (CBCS) scheme]

Course Code: 18CVL47	**CIE Marks: 50**
Number of Lecture Hours/Week :03	**SEE Marks: 50**
Total Number of Hours :40	**Exam Hours: 03**

Credits – 01

Course Objectives: This course will enable students to;
1. Calibrate flow measuring devices.
2. Determine the force exerted by jet of water on vanes.
3. Understand the fluid flow pattern.
4. To determine the force exerted by jet of water on vanes.

Experiments:

1. Determination of efficiency of Francis turbine. **L1,L2**
2. Determination of efficiency of Kaplan turbine. **L1,L2**
3. Determination of efficiency of centrifugal pump. **L1,L2**
4. Calibration of dead weight pressure gauge. **L1,L2**
5. Calibration of hydraulic Jump. **L1,L2**
6. Experimental determination of force exerted by a jet on flat, inclined and curved plates. **L1,L2**
7. Experimental determination of operating characteristics of pelton turbine**.** **L1,L2**
8. Demonstration Experiments: Reynold's experiment to understand laminar and turbulent flow , **L1,L2**
9. Flow Visualization, Calibration of Sutro-weir. **L1,L2**

Course outcomes: During the course of study students will develop understanding of:
1. Properties of fluids and the use of various instruments for fluid flow measurement.
2. Working of hydraulic machines under various conditions of working and their characteristics.

Question paper pattern:
· All experiments are to be included in the examination except demonstration exercises.
· Candidate to perform experiment assigned to him
· Marks are to be allotted as per the split up of marks shown on the cover page of answer script

Reference Books:
1. Sarbjit Singh , *Experiments in Fluid Mechanics* - PHI Pvt. Ltd.- New Delhi
2. Mohd. Kaleem Khan, "Fluid Mechanics and Machinery", Oxford University Press
3. Hydraulics and Fluid Mechanics' – Dr. P.N. Modi & D r S.M. Seth, Standard Book House-New Delhi. 2009 Edition

Kannada Kali-4

[As per Choice Based Credit System (CBCS) Scheme]
(Effective From The Academic Year 2019-20)

SEMESTER - IV

Subject Code	**18KK46**	CIE Marks	50
Number of Lecture Hours/Week	03	SEE Marks	50
Total Number of Lecture Hours	42	Exam Hours	03
CRIDETS – 1			

Module 1	**Teaching Hours**
Lesson 1. Conversation 1, Conversation 2, Conversation 3, Vocabulary, Exercises. **Lesson 2.** Conversation 1, Conversation 2, Conversation 3, Vocabulary, Exercises.	**10**
Module 2	
Lesson 3. Conversation 1, Conversation 2, Conversation 3, Vocabulary, Exercises. **Lesson 4.** Conversation 1, Conversation 2, Conversation 3, Vocabulary, Exercises.	**8**
Module 3	
Lesson 5. Conversation 1, Conversation 2, Conversation 3, Vocabulary, Exercises.	**8**

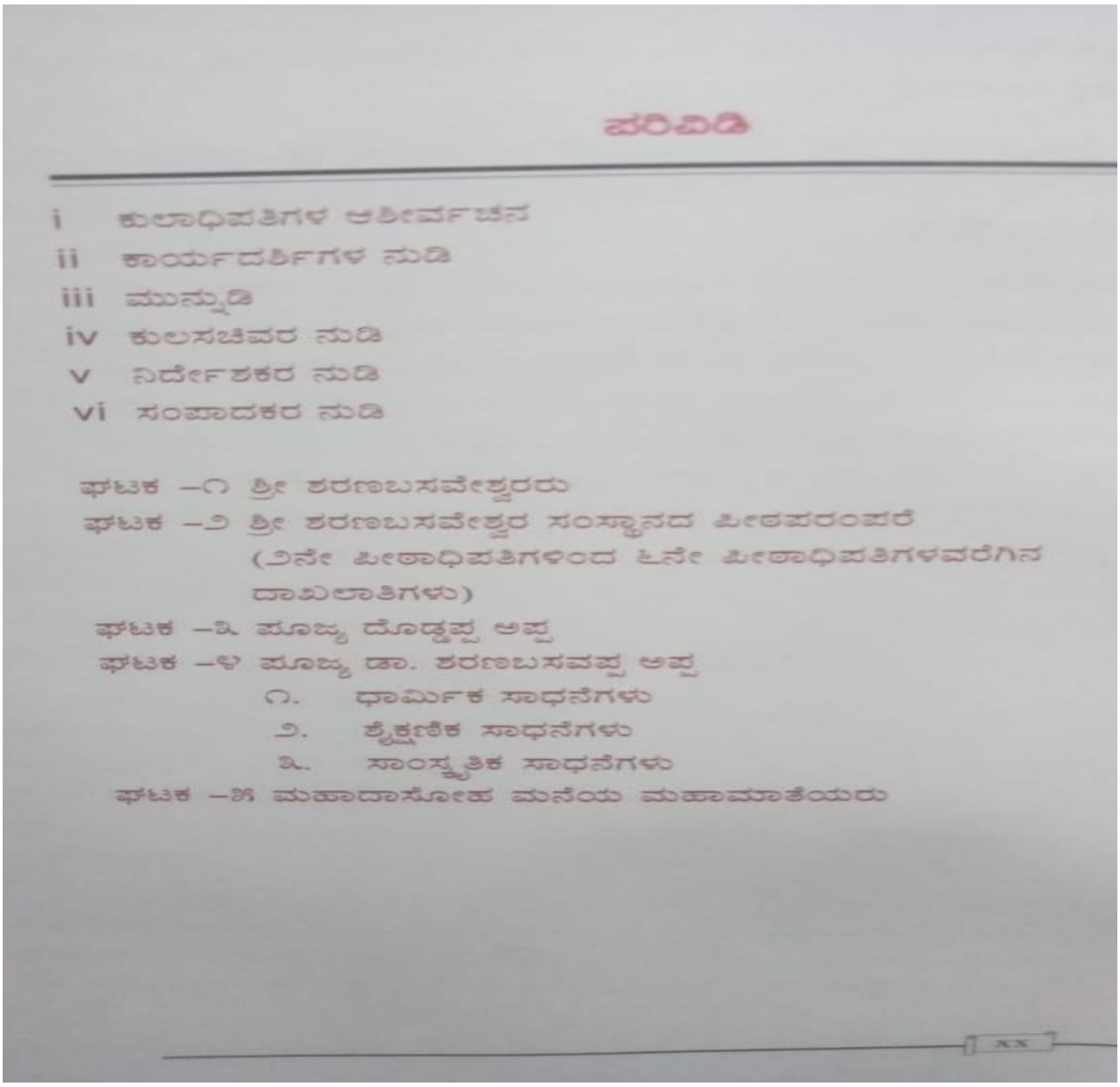
Lesson 6. Conversation 1, Conversation 2, Conversation 3, Vocabulary, Exercises.	
Module 4	
Lesson 7. Conversation 1, Conversation 2, Conversation 3, Vocabulary, Exercises. **Lesson 8.** Conversation 1, Conversation 2, Conversation 3, Vocabulary, Exercises.	**8**
Module 5	
Lesson 9. Conversation 1, Conversation 2, Conversation 3, Vocabulary, Exercises. **Lesson 10.** Conversation 1, Conversation 2, Conversation 3, Vocabulary, Exercises.	**8**

Mahadasohi

[As per Choice Based Credit System (CBCS) Scheme]
(Effective From The Academic Year 2019-20)

SEMESTER - IV

Subject Code	**18MD46**	CIE Marks	50
Number of Lecture Hours/Week	03	SEE Marks	50
Total Number of Lecture Hours	42	Exam Hours	03
CRIDETS – 1			



SHARNBASVA UNIVERSITY, KALABURAGI

ADDITIONAL MATHEMATICS - II
(B.Tech. III semester Common to all branches)
(A Bridge course for Lateral Entry students of IV Sem. B.Tech.)

[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2019-20)

Course Code : 19MATDIP41
Contact Hours/Week : 03
Total Hours:40
Semester : IV

CIE Marks : 00
SEE Marks: 100
Exam Hours:03
Credits: 00

Course Learning Objectives:
This course will enable students to:
- Solve first order differential equations. .
- Solve second and higher order differential equations.
- Understand and solve the partial differential equation.
- To acquire the knowledge of elementary probability theory.
- Know the basic concepts of evaluation of double and triple integrals.

MODULE-I

Differential Equation-1:-
Solution of first order and first degree differential equations: Variable separable, Homogeneous, Exact and Reducible to exact differential equation, Linear differential equation. Applications of first order first degree differential equations: Newton's law of cooling.

8 - Hours

MODULE-II

Differential Equations-2:- Solution of second & higher order Ordinary linear differential equation with constant co-efficients. Method of variation of parameters. Solution of homogeneous LDE by Power series solution Method.

8 - Hours

MODULE-III

Partial Differential Equations(PDE's):- Formation of PDE by eliminating arbitrary constant & functions, Solution of Non-homogeneous PDE by direct integration, solution of homogeneous PDE with respect to one independent variable only. Derivation of one dimensional wave equation and heat equation and Various possible solution of wave & heat equations by methods of separation of variables.

8 - Hours

MODULE-IV

Improper Integrals: Beta and gamma functions and its properties and examples.

SHARNBASVA UNIVERSITY, KALABURAGI

Evaluation of double integral over a specific region, changing the order of integration , changing into polar form.

8 - Hours

MODULE-V

Probability: Introduction , Sample space and Events. Axioms of Probability, Addition & Multiplication theorems. Conditional probability- illustrative examples. Baye's theorem- examples.

8 – Hours

Course Outcomes:

On completion of this course, students are able to:

- Solve first order differential equations in the different areas of Engineering.
- Solve second and higher order differential equations occurring in of electrical circuits, damped/un-damped vibrations.
- Solve second order partial differential equations in the different areas in the real world.
- Recall basic concepts of elementary probability theory and, solve problems related to the decision theory, synthesis and optimization of digital circuits.
- To find the surface area and volume of 3D objects.

Question paper pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four subquestions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Text Book:

B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 43rd Ed., 2015.

Reference Books:

1. E. Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons, 10th Ed., 2015.
2. N.P.Bali and Manish Goyal: A Text Book of Engineering Mathematics, Laxmi Publishers,7th Ed., 2007.

Dr. Suresh

Dr. Ashok patil

Swami (Sharanayya Swami)