SYLLABUS

(With effect from 2022 -23)

ಪಠ್ಯಕ್ರಮ

(ಶೈಕ್ಷಣಿಕ ವರ್ಷ 2022-23)

Bachelor Degree
In
Civil Engineering

III & IV Semester

Out Come Based Education
With
Choice Based Credit System

[National Education Policy Scheme]

P.E.S. College of Engineering, Mandya - 571 401, Karnataka
[An Autonomous Institution affiliated to VTU, Belagavi,
Grant – in – Aid Institution (Government of Karnataka),
Accredited by NBA (All UG Programs), NAAC and Approved by AICTE, New Delhi]

ಪಿ.ಇ.ಎಸ್. ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ
ಮಂಡ್ಯ–571 401, ಕರ್ನಾಟಕ
(ವಿ.ಟಿ.ಯು, ಬೆಳಗಾವಿ ಅಡಿಯಲ್ಲಿನ ಸ್ವಾಯತ್ತ ಸಂಸ್ಥೆ)
Ph : 08232- 220043, Fax : 08232 – 222075,Web : www.pescemandya.org

VISION

"PESCE shall be a leading institution imparting quality Engineering and Management education developing creative and socially responsible professionals."

MISSION

- *Provide state of the art infrastructure, motivate the faculty to be proficient in their field of specialization and adopt best teaching-learning practices.*
- *Impart engineering and managerial skills through competent and committed faculty using outcome based educational curriculum.*
- *Inculcate professional ethics, leadership qualities and entrepreneurial skills to meet the societal needs.*
- *Promote research, product development and industry-institution interaction.*

QUALITY POLICY

Highly committed in providing quality, concurrent technical education and continuously striving to meet expectations of stake holders.

CORE VALUES

***P**rofessionalism*
***E**mpathy*
***S**ynergy*
***C**ommitment*
***E**thics*

DEPARTMENT OF CIVIL ENGINEERING

The Civil Engineering Department was started in the year 1962 as one of the first branches in P.E.S. College of Engineering, Mandya with an intake of 40. The department has carved a niche for itself by offering the most competent instructional programs to the students. The department is running an undergraduate programme with an intake of 120 and it has started PG in CAD Structures with an intake of 18 in the year 2006. The department has been recognized as research centre under VTU, Belgaum. The department is accredited by NBA, New Delhi for five years (2004-2009). The department is well equipped with laboratories, computing facilities, independent library and other infrastructure. The department has well qualified and experienced teaching faculties. The department also takes up consultancy work pertaining to planning, structural designs of buildings, testing of materials, soil investigation.

Vision

To attain Excellence in imparting quality civil engineering education to meet the societal needs.

Mission

- Impart civil engineering and managerial skills with state of art infrastructure, competent and committed faculty using outcome based educational curriculum.
- Promote research, project management and consultancy
- Inculcate professional ethics, leadership qualities and entrepreneurial skills to meet the societal needs.

The Program Educational Objectives (PEOs)

- Apply technical competence in the field of Civil Engineering with a strong background in basic science and mathematics.
- Analyse and interpret data to design or evaluate civil engineering systems to satisfy societal needs with the use of modern tools including higher education.
- Function effectively as an individual and or to work in a team on multispecialized civil engineering projects with professional ethics and effective communication skills inculcating the habit of life-long learning.

Program Specific Outcomes (PSOs)

The Program specific outcomes have been derived from the PSC's defined by ASCE. By the time of graduation, Civil Engineering students will be able to

PSO1: Apply knowledge of basic science to analyze and solve problems in the core area of Civil Engineering such as Structural, Geotechnical, Transportation, Environmental, Hydraulics and Water resources engineering.

PSO2: Analyse, Plan, design, quality assessment and cost estimate of Civil Engineering structures with professional ethics.

PSO3: Work in a consulting organization or can be an entrepreneur to investigate and supervise Civil Engineering structures using modern tools and technology to provide sustainable solutions to meet the societal needs.

Programme Outcomes (PO)

Engineering program must demonstrate that their students attain the following outcomes:

1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **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.
4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern Tool Usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **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.
7. **Environment and Sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of need for sustainable development.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and Team Work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **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.

11. **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.
12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Bachelor of Engineering (III –Semester)										
Sl. No.	**Course Code**	**Course Title**	**Teaching Department**	**Hrs / Week**			**Credits**	**Examination Marks**		
				L	**T**	**P**		**CIE**	**SEE**	**Total**
1	P21MA301	Transform and Numerical Analysis	MA	2	2	-	3	50	50	100
2	P21CV302	Building Materials and Construction	CV	3	-	-	3	50	50	100
3	P21CV303	Concrete Technology	CV	3	-	-	3	50	50	100
4	P21CV304	Fluid Mechanics & Hydraulics	CV	3	-	2	4	50	50	100
5	P21CV305	Strength of Materials	CV	3	-	2	4	50	50	100
6	P21CVL306	Computer Aided Building Planning and Drawing	CV	-	-	2	1	50	50	100
7	P21KSK307	Samskrutika Kannada /	HSMC	-	2	-	1	50	50	100
	P21KBK307	Balake Kannada								
	OR									
	P21CIP307	Constitution of India and Professional Ethics	HSMC	-	2	-	1	50	50	100
8	P21HSMC308	Employability Enhancement Skills - III	HSMC	-	2	-	1	50	50	100
9.	P21AEC309	Innovation and Design Thinking	CV	-	2	-	1	50	50	100
Total							**21**			
10	P21MDIP301	Basic Engineering Mathematics - I	MA	2	2	-	0	100	-	100
11	P21HDIP308	Employability Enhancement Skills - I	HSMC	-	2	-	0	100	-	100

Bachelor of Engineering (IV –Semester)										
Sl. No.	**Course Code**	**Course Title**	**Teaching Department**	**Hrs / Week**			**Credits**	**Examination Marks**		
				L	**T**	**P**		**CIE**	**SEE**	**Total**
1	P21MA401	Applied Mathematical Methods	MA	2	2	-	3	50	50	100
2	P21CV402	Analysis of Structures	CV	3	-	-	3	50	50	100
3	P21CV403	Hydrology and Irrigation Engineering	CV	3	-	-	3	50	50	100
4	P21CV404	Geodetic Engineering (Integrated)	CV	3	-	2	4	50	50	100
5	P21CV405	Public Health Engineering (Integrated)	CV	3	-	2	4	50	50	100
6	P21CVL406	Concrete and Non-Destructive Testing Laboratory	CV	-	-	2	1	50	50	100
7	P21KSK407	Samskrutika Kannada /	HSMC	-	2	-	1	50	50	100
	P21KBK407	Balake Kannada								
	OR									
	P21CIP407	Constitution of India and Professional Ethics	HSMC	-	2	-	1	50	50	100
8	P21HSMC408	Employability Enhancement Skills - IV	HSMC	-	2	-	1	50	50	100
9	P21INT409	Internship – I	CV	-	-	-	1	-	100	100
Total							**21**			
10	P21MDIP401	Basic Engineering Mathematics - II	MA	2	2	0	0	100	-	100
11	P21HDIP408	Employability Enhancement Skills – II	HSMC	-	2	-	0	100	-	100

L –Lecture, T – Tutorial, P- Practical/ Drawing, CIE: Continuous Internal Evaluation, SEE: Semester End Examination

Transform and Numerical Analysis

[As per Choice Based Credit System (CBCS) & OBE Scheme]

SEMESTER – III

Course Code:	**P21MA301**	**Credits:**	**03**
Teaching Hours/Week (L:T:P):	**2-2-0**	**CIE Marks:**	**50**
Total Number of Teaching Hours:	**40**	**SEE Marks:**	**50**

Course Learning Objectives:

- Adequate exposure to basics of engineering mathematics so as to enable them to visualize the applications to engineering problems
- Analyze periodic phenomena using concept of Fourier series, series solution of Engineering problems
- Understand Fourier transforms of functions and use it to solve initial value, boundary value problems.
- Apply Z-Transform technique to Solve difference equations and Numerical Technique to estimate interpolation, Extrapolation and area - (All formulae without proof)-problems only
- Use mathematical IT tools to analyze and visualize the above concepts.

UNIT – I	**8 Hours**

Fourier Series: Introduction, periodic function, even and odd functions, properties. Special waveforms - square wave, half wave rectifier, saw-tooth wave and triangular wave. Dirichlet's conditions, Euler's formula for Fourier series (no proof). F urier series for functions of period 2L (all particular cases) – problems, Half Range Fourier series-Construction of Half range cosine and sine series and problems Practical harmonic analysis-Illustrative examples from engineering field.

Self-study component:	Derive Euler's formula, Fourier series in complex form.

UNIT – II	**8 Hours**

Partial differential equations (PDE's):
Formation of PDE's. Solution of non-homogeneous PDE by direct integration. Solutions of homogeneous PDE involving derivative with respect to one independent variable only, Method of separation of variables(first and second order equations).

Applications of PDE's: Various Possible solution of PDE's
Classification of second order PDE, various possible solutions for One- dimensional wave and heat equations, by the method of separation of variables. Solution of all these equations with specified boundary conditions (Boundary value problems). Illustrative examples from engineering field.

Self-study component:	Charpit's Method -simple problem. Various possible solutions of Two dimensional Laplace equation.

UNIT – III	**8 Hours**

Finite Differences and Interpolation: Forward and backward differences, Interpolation, Newton-Gregory forward and backward interpolation formulae, Lagrange's interpolation formula and Newton's divided difference interpolation formula (All formulae without proof)-problems only.

Numerical Differentiation: Derivatives using Newton-Gregory forward and backward interpolation formulae, Applications to Maxima and Minima of atabulated function. **Numerical Integration:** Newton-Cotes quadrature formula, Simpson's 1/3rd rule and Simpson's 3/8th rule. Weddle's rule (All rules without proof)-	
Self-study component:	Inverse Lagrange's Interpolation formula, Central differences.
UNIT – IV	**8 Hours**
Fourier Transforms: Infinite Fourier transforms. Properties- linearity, scaling, shifting and modulation (no proof), Fourier sine and cosine transforms. Inverse Fourier Transforms, Inverse Fourier cosine and sine transforms. Problems. Convolution theorem and Parseval's Identity (noproof)-problems.	
Self-study component:	Finite Fourier transform, Fourier transform of derivatives of functions
UNIT – V	**8 Hours**
Z - Transforms: Definition. Z-transforms of basic sequences and standard functions. Properties-linearity, scaling, Damping rule, first and second shifting, multiplication by *n*, initial and final value theorem (statement only)-problems. Inverse Z- transforms- problems. **Difference Equations:** Definition. Formation of Difference equations, Linear & simultaneous linear difference equations with constant coefficients-problems, Solutions of difference equations using Z- transforms.	
Self-study component:	Convolution theorem and problems, Application to deflection of a loaded string.
Course Outcomes: On completion of the course, student should be able to:	
CO1	**Analyze** engineering problems using the fundamental concepts in Fourier series, Fourier Transforms and Basics ideas of PDE's.
CO2	**Explain** various methods to find the Fourier constants, solution of PDE's, Estimation of interpolationand find the area, solution of difference equations.
CO3	**Apply** the acquired knowledge to construct the Half- range Fourier series, Finding Fourier transformsand Inverse Laplace transforms for some standard functions.
CO4	**Evaluate** Z-transform of various functions, solutions of differential equations with initial and boundaryconditions.

TEXT BOOKS

1. B.S. Grewal, Higher Engineering Mathematics (44th Edition 2018), Khanna Publishers, New Delhi.
2. E. Kreysizig, Advanced Engineering Mathematics, John Wiley and sons, 10th Ed. (Reprint) 2016.

REFERENCE BOOKS

1. V. Ramana: Higher Engineering Mathematics, McGraw –Hill Education,11th Ed..
2. H. C. Taneja, Advanced Engineering Mathematics, Volume I & II, I.K. International PublishingHouse Pvt. Ltd., New Delhi.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications,Reprint, 2010.

ONLINE RESOURCES

1. http://www.nptel.ac.in
2. https://en.wikipedia.org
3. https://ocw.mit.edu/courses/18-085-computational-science-and-engineering-i-fall-2008/resources/lecture-28- fourier-series-part-1/
4. https://www.thefouriertransform.com/
5. http://mcatutorials.com/mca-tutorials-numerical-methods-tutorial.php

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**2**	**2**										
CO2	**2**	**3**										
CO3	**3**	**2**										
CO4	**2**	**3**										
Strength of correlation: Low-1, Medium- 2, High-3												

BUILDING MATERIALS AND CONSTRUCTION

[As per Choice Based Credit System (CBCS) & OBE Scheme]

SEMESTER – III

Course Code:	**P21CV302**	**Credits:**	**03**
Teaching Hours/Week (L:T:P):	**3: 0:0**	**CIE Marks:**	**50**
Total Number of Teaching Hours:	**40**	**SEE Marks:**	**50**

Course Learning Objectives: This course will enable the students to:

- Explain different types of construction materials.
- Classify bonds in brick work, shoring, underpinning and types of flooring.
- Explain different types of roofs, stairs, doors, windows and ventilators.
- Explain purpose of plastering and methods of plastering, painting and finishes.

UNIT – I	**Building Materials**	**08 Hours**

Qualities of good building stones, dressing of stones, classifications of bricks, manufacture of bricks, qualities of good bricks, types of concrete blocks, Concept of aerated concrete blocks, types of tiles, qualities of good tiles & its uses, Classifications of timber as per Indian standards. Defects in timber, seasoning of timber, plywood and its uses.

Self-study component:	The students shall visit construction sites and learn to identify different types of building stones, bricks, stabilized mud blocks, concrete blocks. They shall visit timber depot and learn to identify different types of wood. Innovative methods of use of waste plastic blocks and tests on different types of blocks, also acceptance criteria as per codal provisions.

UNIT – II	**Foundation**	**08 Hours**

Preliminary investigation of soil, bearing capacity of soil, safe bearing capacity of soil, methods of determining bearing capacity, methods of improving bearing capacity. Concept of foundation, classification of foundations, Introduction to different types of foundations, masonry footings - basic numerical problems, isolated footings, combined and strap RCC footings, raft footing, foundation in black cotton soil (or expansive soil) .

Self-study component:	The students shall visit construction sites and learn to identify different types of foundations and details of super structures.

UNIT – III	**Masonry, Arches and Floors**	**08 Hours**

Masonry: Definition of terms used in masonry, bonds in brickwork, English bond, Flemish bond, reinforced brickwork, stone masonry, rubble masonry, coursed rubble masonry, composite masonry.
Arches: Masonry arches, classification, lintels, types and classifications, shoring, underpinning.
Floors: Types of flooring (materials and method of laying), mosaic, marble, polished granite, industrial flooring, vitrified flooring.

Self-study component:	Rattrap bond, factors affecting selection of flooring materials, epoxy flooring, Advances in flooring.

UNIT – IV	**Roofs, Stairs, Doors and Windows**	**08 Hours**

Roofs: Sloped roof (R.C.C. and tile roof), lean to roof, wooden truss (King post and Queen post trusses) steel trusses.

Stairs: technical terms in stairs, requirements of a good stair, geometric design of RCC dog legged and open well stairs. (Plan and sectional elevation of stairs),

Doors and Windows: Doors, paneled doors, flush doors, collapsible and rolling shutters, Types of windows- paneled, glazed, bay window, dormer window, louvered and corner window, ventilators

Self-study component:	Fixtures and fastenings, National Building Code, UPVC & Alluminum Windows.

UNIT – V	**Plastering, Painting and Finishes**	**08 Hours**

Plastering and painting: Purpose of plastering, materials of plastering, lime mortar, cement mortar, Ready mix mortar, methods of plastering, stucco plastering, Purpose of painting, types of paints, Introduction to VOC (Volatile Organic Compounds), application of paints to new surfaces, distemper, plastic emulsion, enamel, painting on iron and steel surfaces. Polishing of wood surface.

Finishes: Structural glazing, cladding & its types, architectural punning.

Miscellaneous topics: Water proofing, form work & scaffolding.

Self-study component:	Slip forming and damp proof construction.

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

COs	**Course Outcomes** with ***Action verbs*** for the Course topics	**Bloom's Taxonomy Level**	**Level Indicator**
CO1	**Identify** the preliminary requirements of building materials **(PO1, PO2, PSO1).**	Applying	L3
CO2	**Analyze** the different components of sub and super structures **(PO1, PO2, PSO1, PSO2).**	Analyzing	L4
CO3	**Examine** the concept of plastering, painting and finishes. **(PO1, PO2, PSO1, PSO2).**	Analyzing	L4
CO4	**Analyze** the concept of water proofing and form work. **(PO1, PO2, PSO1, PSO2).**	Analyzing	L4

Text Book(s):

1. B.C. Punmia, "Building Construction", 10th Edition, Laxmi Publications, New Delhi, 2007.
2. Sushil Kumar S, Building Construction, 20th Edition, Standard Publisher.
3. S. K Duggal, "Building Materials" 4th Edition, New Age International Publishers.

Reference Book(s):

1. P.C. Varghese. "Building Construction", Prentice Hall of India, New Delhi, 2007
2. W B Mackay, "Building Construction" Vol. 4, Pearson Publications.
3. Chudley "Construction Technology", 4th Edition. Pearson Publications.
4. Barry, "Construction of Buildings", 7th Edition, Wiley-black well Publications.
5. National Building Code, BIS, New Delhi.
6. S.C Rangwala., "Engineering Materials", 28th Edition, Charotar Publishing House, Anand, 1997.

Web and Video link(s):

1. Footings: https://www.youtube.com/watch?v=s6E2t_kW57M
2. Cost effective construction: https://www.youtube.com/watch?v=PmX0npteV3c
3. Arches: https://www.youtube.com/watch?v=2RZKK4LhUas
4. Flooring Association of India

E-Books/Resources:

- https://www.sciencedirect.com/journal/construction-and-building-materials

COURSE ARTICULATION MATRIX
(BUILDING MATERIALS AND CONSTRUCTION – P21CV302)

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	3											2		
CO2	2	2											2	2	
CO3	2	2											2	2	
CO4	2	3											2	2	

3 – HIGH, 2 – MEDIUM, 1 - LOW

CONCRETE TECHNOLOGY [As per Choice Based Credit System (CBCS) & OBE Scheme] SEMESTER – III			
Course Code:	**P21CV303**	**Credits:**	**03**
Teaching Hours/Week (L:T:P):	**3:0:0**	**CIE Marks:**	**50**
Total Number of Teaching Hours:	**40**	**SEE Marks:**	**50**

Course Learning Objectives: This course will enable the students to:

1. Cite the basic knowledge of science and engineering of concrete properties related to civil engineering problems.
2. Distinguish between coarse aggregate & fine aggregate and their properties.
3. Understand workability and its effects on strength of concrete.
4. Understand durability of hardened concrete
5. Describe chemical admixtures and mineral admixtures.
6. Explain hardened concrete and its strength properties.

UNIT – I	**CEMENT AND AGGREGATES**	**08 Hours**

CEMENT - chemical composition, physical and chemical properties, hydration of cement, manufacture of OPC with flow charts (Dry process), types of cement, tests on cement.

AGGREGATES: Fine aggregate – sieve analysis, specify gravity, bulking, moisture content, deleterious materials. Coarse aggregate – importance of size, shape and texture. Grading of aggregates - sieve analysis, specific gravity, flakiness and elongation index, crushing, impact and abrasion tests.

Self-study component:	Study of Cement test certificate, Deleterious materials

UNIT – II	**ADMIXTURES & MIX DESIGN PROCEDURE**	**08 Hours**

ADMIXTURES: Definition, Classification, Chemical admixtures – Plasticizers (action of plasticizers), Super Plasticizers, Accelerator, Retarders.

Mineral admixtures – Fly Ash, Blast Furnace Slag, Meta-Kaolin, GGBS, Rice husk ash.

MIX DESIGN PROCEDURE: Concept of Concrete Mix design, variables in proportioning, exposure conditions, Procedure of mix design (with admixture and without admixture) as per IS10262-2019, Numerical examples of Mix Design.

Self-study component:	Highlights of other methods of Mix Design as per other codes, Silica fume

UNIT – III	**FRESH PROPERTIES OF CONCRETE**	**08 Hours**

PROCESS OF MANUFACTURE OF CONCRETE – Batching, Mixing, Transporting, Placing, Compaction, Curing Of Concrete - need and Types of curing. Workability – Definition, Factors Affecting Workability, Measurement Of Workability By Slump, Compaction Factor, Vee-Bee Consistometer tests, Kelly ball test, Segregation and bleeding.

Self-study component:	Accelerated curing.

UNIT – IV	**HARDENED CONCRETE**	**08 Hours**

HARDENED CONCRETE: Factors affecting strength, w/c ratio, gel/space ratio, maturity concept, Effect of aggregate properties, bond strength- aggregate - cement bond strength. Assessment of compressive strength, tensile strength, and modulus of elasticity.

NON-DESTRUCTIVE TESTING OF CONCRETE - Rebound hammer, Ultra Sonic Pulse Velocity test, Cover meter test.

Self-study component:	Other NDT methods- Penetration & Pull out test

UNIT – V	DURABILITY	08 Hours

DURABILITY - Definition, significance of durability. Shrinkage - plastic shrinkage and drying shrinkage, Factors affecting shrinkage. Creep – Measurement of creep, factors affecting creep, effect of creep
Permeability of concrete, chemical attack, Sulphate attack, acid attack, efflorescence, corrosion in concrete, Thermal effect of concrete - thermal conductivity, thermal diffusivity, specific heat
Factors contributing to cracks in concrete - plastic shrinkage, settlement cracks.

Self-study component:	Construction joints and Expansion joints.

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

COs	Course Outcomes with *Action verbs* for the Course topics	Bloom's Taxonomy Level	Level Indicator
CO1	***Analyse*** and infer various properties of cement, cementitious materials, Fine and coarse aggregate asper codal provision and specifications. **(PO1, PSO1)**	Analyzing	L4
CO2	***Design*** the concrete mix for the given materials as per IS:10262-2019 provisions. **(PO3, PSO2)**	Create	L6
CO3	***Examine*** the manufacturing process and the quality of green concrete and the role of admixtures in concrete. **(PO2, PSO1)**	Analyzing	L4
CO4	***Analyse*** the properties of hardened concrete – Strength and Durability aspects. **(PO2, PSO2)**	Analyzing	L4

Text Book(s):

1. M.S. Shetty, "Concrete Technology" - Theory and Practice, S.Chand and Company, New Delhi, 2002.
2. Gambhir B L, Concrete Technology, Tata McGraw Hill, New Delhi.

Reference Book(s):

1. Neville, A M, Properties of concrete, ELBS Publications.
2. N. KrishnaRaju, Concrete Mix Design -, Sehgal - publishers
3. IS: 10262-2016 – Recommended guidelines for Concrete Mix design – BIS Publications.
4. Mehta PK, Properties of Concrete, ICI, Chennai
5. Concrete Technology (Trade, Technology &Industry), George White, Delmar Pu
6. Concrete: Microstructure, Properties, and Materials, P. Kumar Mehta , Paulo J. M. Monteiro, McGraw-Hill Education
7. A.R.Santakumar , Concrete Technology–Oxford University Press (2007)
8. Advanced Concrete Technology, Zongjin Li, Wiley:1 edition
9. Concrete Admixtures Handbook, Second edition by V.S Ramachandra.

Web links and Video Lectures (e-Resources):

Cement: https://nptel.ac.in/courses/105102012/1

Aggregates: https://nptel.ac.in/courses/105102012/6

Mineral admixtures: https://nptel.ac.in/courses/105102012/11

Chemical admixtures: https://nptel.ac.in/courses/105102012/9

https://nptel.ac.in/courses/105102012/10

Concrete mix design: https://nptel.ac.in/courses/105102012/14

Concrete production & fresh concrete: https://nptel.ac.in/courses/105102012/19

Engineering properties of concrete: https://nptel.ac.in/courses/105102012/23

Dimensional stability & durability: https://nptel.ac.in/courses/105102012/27

Durability of concrete: https://nptel.ac.in/courses/105102012/31

Special concretes: https://nptel.ac.in/courses/105102012/36

E-Books/Resources

https://archive.nptel.ac.in/courses/105/106/105106176/

https://archive.nptel.ac.in/courses/105/102/105102012/

COURSE ARTICULATION MATRIX
(CONCRETE TECHNOLOGY – P21CV303)

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

3 – HIGH, 2 – MEDIUM, 1 - LOW

FLUID MECHANICS AND HYDRAULICS

[As per Choice Based Credit System (CBCS) & OBE Scheme]

SEMESTER – III

Course Code:	**P21CV304**	**Credits:**	**04**
Teaching Hours/Week (L:T:P):	**3:0:2**	**CIE Marks:**	**50**
Total Theory Teaching Hours:	**40**	**SEE Marks:**	**50**
Total Laboratory Hours:	**24**		

Course Learning Objectives: This course will enable the students to:

- To gain knowledge on basic properties of fluid and their applications in engineering field.
- Explain the concepts and theories used in the fluid flow problems and to apply the concepts in real world.
- Establish the relationship among the variables involved in the physical problem by dimensional analysis.
- Understand the losses in pipes, quantifying discharge through notches and weirs.
- Working principles and the design criteria of various turbines and pump.

UNIT – I	**Fluid Properties, Pressure Measurements and Hydrostatics**	**8 Hours**

Fluid Properties: Definition of fluid, classification of fluids. Fluid Properties - Mass density, Specific volume, Specific weight, Relative density, Viscosity, Bulk Modulus & Compressibility, Surface tension, Capillarity. Engineering problems.

Fluid Pressure Measurements*:* Pascal's Law, Hydrostatic Law, Measurement of pressure using Manometers, Numerical Problems on Manometers.

Hydrostatics: Definition of total pressure, center of pressure, centroid. Equation for hydrostatic force and depth of center of pressure on vertical and Inclined plane surfaces. Engineering applications and problems.

Self-study component:	Total pressure and centre of pressure on curved plane surfaces.
Practical Topics: **(6 Hours)**	a. Determination of C_d for Venturimeter & Orificemeter. b. Determination of Hydraulic coefficients of a vertical orifice.

UNIT – II	**Fluid Kinematics and Fluid Dynamics**	**8 Hours**

Fluid Kinematics: Description of fluid flow, Lagrangian and Eulerian approaches, classification of flow, continuity equation, derivation of continuity equation in differential form, Numerical problems on continuity equation.

Fluid Dynamics: Derivation of Euler's equation and Bernoulli's equation with assumptions and limitations. Modification of Bernoulli's equation. Application of Bernoulli's equation – Venturimeter, Orificemeter and pitot tube. Engineering applications and problems.

Self-study component:	Velocity and Stream functions, Flow nets.
Practical Topics: **(6 Hours)**	a. Determination of Major Losses in pipes. b. Determination of Minor Losses in pipes.

UNIT – III	**Losses in Pipes and Flow Measurements**	**8 Hours**

Losses in Pipes: Concept of H.G.L, T.E.L. Equation for head loss due to friction (Darcy-Weisbach equation), Numerical Problems. Minor losses (types and equations only). Pipes in series, pipes in parallel and equivalent pipe. Numerical problems.

Flow Measurements: Classification of Orifice and Mouthpiece, Hydraulic co-efficients. Numerical problems. Classification of Notches and Weirs, discharge over rectangular notch, Triangular notch and Broad crested weir. Engineering applications and problems.

Self-study component:	Water Hammer, Pipe network, Ventilation of weirs.
Practical Topics: **(4 Hours)**	a. Determination of C_d for Rectangular and Triangular Notch. b. Determination of C_d for Ogee and Broad crested Weir.

UNIT – IV	**Dimensional Analysis and Impact of Jet on Vanes**	**8 Hours**

Dimensional Analysis: Introduction to dimensional analysis, units and dimensions, Dimensional homogeneity, Dimensions for various physical quantities. Methods of dimensional analysis - Raleigh's and Buckingham's method. Engineering applications and problems.

Impact of Jet on Vanes: Impulse Momentum equation, Impact of jet on stationary and moving vanes. (Single vane - vertical and curved vanes only), Numerical problems. Impact of jet on series of Flat vanes.

Self-study component:	Model analysis, Impact of jet on series of radially curved vanes.
Practical Topics: **(4 Hours)**	a. Determination of force excreted by a jet on flat & curved vanes. b. Determination of efficiency of Pelton wheel turbine.

UNIT – V	**Hydraulic Turbines and Centrifugal Pumps**	**8 Hours**

Hydraulic Turbines: General layout of a hydroelectric power plant, Classification of turbines. Construction & Working Principle of Pelton wheel & Francis turbine. Numerical Problems. Unit quantities of a turbine-definitions, equations, Engineering applications and problems.

Centrifugal Pumps: Definition, Classification of Pumps, components of centrifugal pump, work done and efficiencies of a centrifugal pump, Minimum starting speed, multistage centrifugal pumps. Numerical problems on centrifugal pumps.

Self-study component:	Characteristic curves of Hydraulic turbines, Cavitation in centrifugal pumps.
Practical Topics: **(4 Hours)**	a. Determination of efficiency of Francis / Kaplan turbine. b. Determination of efficiency of Centrifugal pump.

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

COs	**Course Outcomes** with ***Action verbs*** for the Course topics	**Bloom's Taxonomy Level**	**Level Indicator**
CO1	**Apply** the concepts of fluid flow in **understanding** fluid mechanics and hydraulic machines. **(PO1, PSO1)**	Applying	L3
CO2	**Analyze** and **identify** the various types of flows and their relationships in computing the discharge through pipes, notches and weirs. **(PO2, PSO2)**	Analyzing	L4
CO3	**Design** the Hydraulic turbines and centrifugal pump. **(PO3, PSO2)**	Creating	L6
CO4	**Investigate** the various fluid flow concepts by **conducting** experiments. **(PO4, PSO3)**	Analyzing / Evaluating	L5
CO5	Conduct experiments in a **team or as an individual** having impact for **lifelong learning**. **(PO9, PO12, PSO3)**	Creating	L6

Text Book(s):

1. R.K. Bansal- A text book of Fluid Mechanics and Hydraulic Machines- Laxmi Publications, 10th Edition, New Delhi.
2. P.N. Modi and S.M. Seth- Hydraulics and Fluid Mechanics, including Hydraulic machines, Standard Book House, 22nd Edition, New Delhi.
3. K Subramanya- Fluid Mechanics and Hydraulic Machines, Problems and Solutions, Tata McGrawhill, 2nd Edition, New Delhi.

Reference Book(s):

a. SC Gupta: Fluid Mechanics and Hydraulic Machines – Pearson Education, 1st Edition, India.
b. K R Arora: Hydraulics and Fluid Mechanics, Standard Book House, 1st Edition, New Delhi, India.
c. Victor L. Streeter, Benjamin Wyile E and Keith W. Bedford- Fluid Mechanics, Tata McGraw Hill publishing Co Ltd, 9th Edition, New Delhi.
d. C.S.P. Ojha, R. Berndtsson, and P.N. Chandramouli, "Fluid Mechanics and Machinery", Oxford University Publication, 2010.

Web and Video link(s):

1. Properties of Fluid: https://youtu.be/-d67xfgJV98
2. Hydrostatics: https://youtu.be/lJSUeEqGNY0
3. Application of Bernoulli's equation: https://youtu.be/dlsMHsM2V88
4. Losses in pipe fittings: https://youtu.be/pZh5_AWvBuU
5. Dimensional Analysis: https://youtu.be/zr15T9DUlwU

E-Books/Resources:

- https://searchworks.stanford.edu/view/10496310
- https://searchworks.stanford.edu/view/13576277
- https://searchworks.stanford.edu/view/11842972

COURSE ARTICULATION MATRIX
(FLUID MECHANICS & HYDRAULIC MACHINES – P21CV304)

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

3 – HIGH, 2 – MEDIUM, 1 - LOW

STRENGTH OF MATERIALS

[As per Choice Based Credit System (CBCS) & OBE Scheme]

SEMESTER – III

Course Code:	**P21CV305**	**Credits:**	**04**
Teaching Hours/Week (L:T:P):	**3:0:2**	**CIE Marks:**	**50**
Total Theory Teaching Hours: **Total Laboratory Hours:**	**40** **24**	**SEE Marks:**	**50**

Course Learning Objectives: This course will enable the students:

1. To understand the basic concepts of the stresses and strains for different materials and strength of structural elements.
2. To know the development of internal forces and resistance mechanism for one dimensional and two dimensional structural elements.
3. To analyse and quantify different internal forces and stresses induced due to various types of load on structural elements.
4. To calculate and understand the nature of deformations in structural elements subjected to various types of loads and boundary conditions.

UNIT – I **8 Hours**

Simple stress and strain: Introduction, Properties of Materials, Stress, Strain, Hook's law, and Poisson's ratio, stress - strain curve for ductile and brittle materials- elastic limit, yield point, ultimate strength, working stress and factor of safety, Principle of super position. Elongation of uniform bar, tapering bars of circular and rectangular cross sections subjected to external loads. Elongation of uniform bar due to self-weight.

Elastic constants and relationship between them. Volumetric strain, Expression for volumetric strain.

Compound bars subjected to external loads.

Thermal stresses and strains in uniform bars and compound bars.

Numerical problems on relevant topics.

Self-study component:	Stress – strain curve for High Yield strength Bars including salient features
Practical Topics: **(6 Hours)**	1. Tension test on HYSD bars. 2. Compression test on mild steel & cast iron.

UNIT – II **8 Hours**

Compound stresses: Introduction, General two dimensional stress system, Normal stress and tangential stress on an inclined plane in a general 2-D stress system, Principal planes and principal stresses. Maximum shear stresses and their planes in 2-D stress system. Mohr's circle of stresses. Numerical Problems.

Thin cylinders: Introduction: Longitudinal, circumferential (hoop) stress in thin cylinders. Expressions for longitudinal and circumferential stresses. Efficiency of longitudinal and circumferential joints. Problems on estimation of change in length, diameter and volume when the thin cylinder subjected to internal fluid pressure.

Thick cylinders: Concept of Thick cylinders Lame's equations applicable to thick cylinders with usual notations, calculation of longitudinal, circumferential and radial stresses – simple numerical examples. Sketching the variation of radial stress (pressure) and circumferential stress across the wall of thick cylinder.

Self-study component:	Thin cylinders with hemispherical ends.
Practical Topics: **(6 Hours)**	Hardness tests on ferrous and non-ferrous metals by, 1.Brinell's Hardness test 2.Rockwell Hardness test 3. Vickers Hardness test.

UNIT – III	**8 Hours**

Bending moment and shear force diagrams in beams: Definition of shear force and bending moment, Sign convention, Relationship between loading, shear force and bending moment, development of Shear Force Diagram(SFD) and Bending Moment Diagram (BMD) with salient values for cantilever, simply supported and overhanging beams for point loads, UDL(Uniformly Distributed Load), UVL(Uniformly Varying Load) and Couple.
Deflection of determinate beams: Introduction, Elastic curve, differential equation of deflection curve, sign convention, determination of Slope and deflection using Macaulay's method for statically determinate beams subjected to various vertical loads, moment and their combinations. Numerical problems.

Self-study component:	SFD and BMD for beams with internal hinges.
Practical Topics: **(4 Hours)**	1. Bending test on wood under two-point loading. **2.** Tests on bricks

UNIT – IV	**8 Hours**

Bending stress in beams: Introduction – Bending stress in beam, Pure bending, Assumptions in simple bending theory, derivation of Simple bending equation (Bernoulli's equation), modulus of rupture, section modulus, Flexural rigidity, Bending stress distribution in rectangular, T, I and hollow rectangular sections (symmetrical about one-axis). Problems.
Shear stress in beams: Derivation of Shear stress equations, Derivation of Expressions of the shear stress for rectangular, triangular and circular cross sections of the beams. Problems on calculation of the shear stress at various critical levels of Rectangular, T, I and Hollow rectangular cross sections of the beam.

Self-study component:	Beams of Uniform strength in bending.
Practical Topics: **(4 Hours)**	1.Single and Double Shear test on mild steel 2.Tests on Tiles

UNIT – V	**8 Hours**

Torsion of prismatic circular shafts: Introduction- pure torsion, torsion equation of circular shafts, strength and stiffness equations, torsional rigidity and polar modulus for solid and hollow circular shafts, power transmitted by solid and hollow circular shaft and problems.
Elastic stability of columns: Introduction, short and long columns, failure of short and long columns, effective length, slenderness ratio, radius of gyration and buckling load or crippling load, assumptions and derivation of equations for Euler's buckling load for different end conditions (Both ends hinged, one end fixed and the other end free, Bothe ends fixed and One end fixed and the other is hinged), limitations of Euler's theory and Numerical problems. Rankine's theory and related problems.

Self-study component:	Torsion in composite shafts, Buckling loads by Perry-Robertson formula
Practical Topics: **(4 Hours)**	1.Impact test on mild steel (Charpy and Izod) 2.Tests on hollow and solid building blocks

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

COs	Course Outcomes with *Action verbs* for the Course topics	Bloom's Taxonomy Level	Level Indicator
CO1	***Examine*** the basic concepts of the stresses and strains in materials under load and understand the relevant properties of engineering materials. **(PO1, PO2, PSO1)**	Analyzing	L4
CO2	***Evaluate*** the internal forces and identify resistance mechanism for one dimensional and two dimensional structural elements subjected to various types of loads that are axial, flexural and torsional in nature. **(PO1, PO2, PSO1)**	Evaluating	L5
CO3	***Analyze*** the deformations induced in structural elements subjected to various types of loads. **(PO1, PO2, PSO1, PSO2)**	Analyzing	L4
CO4	Understand the engineering properties of materials under tension, compression, impact, bending and shear by ***experimentations.*** **(PO1, PO2, PO4, PSO1, PSO3)**	Applying	L3
CO5	***Estimate*** the hardness properties of ferrous and non- ferrous metals by suitable ***experiments*** and to understand the various tests to be conducted on building materials such as bricks, building blocks and tiles. **(PO1, PO2, PO4, PSO1, PSO3)**	Applying and Evaluating	L3 & L5

Text Book(s):

1. "Strength of Materials and Theory of Structures", Punmia B C, Jain R K, Volume 1 &Volume 2, Laxmi publications, New Delhi.
2. "Strength of Materials" in SI Units, B.S. Basavarajaiah, P. Mahadevappa, University Press (India) Pvt. Ltd., 3rd Edition,2010
3. "A Textbook of Strength of Materials", R K Bansal, 6th Edition, Laxmi Publications, 2018.

Reference Book(s):

1. "Elements of Strength of Materials" D.H. Young, S.P. Timoshenko, East West Press Pvt. Ltd., 5th Edition (Reprint2014).
2. "Mechanics of Materials", Ferdinand P. Beer, E. Russell Johnston and Jr. John T. De Wolf, Tata McGraw-Hill, Third Edition, SI Units
3. "Strength of Materials" S.S. Rattan, McGraw Hill Education (India) Pvt. Ltd., Third Edition (Sixth reprint2013).
4. "Analysis of Structures" Vazirani, V N, Ratwani M M. and S K Duggal, Volume I, 17th Edition, Khanna Publishers, New Delhi.

Web and Video link(s):

1. Strength of Materials by Prof. S.K. Bhattacharyya, IIT Kharagpur https://nptel.ac.in/courses/105105108/
2. Advanced Strength of Materials by Prof. S.K. Maiti, IIT Bombay https://archive.nptel.ac.in/course.html
3. Strength of Materials video course by IIT Roorkee https://nptel.ac.in/courses/112107147/

E-Books/Resources:

1. Strength of Materials by Prof. S.K. Bhattacharyya, IIT Kharagpur
   https://nptel.ac.in/courses/105105108/
2. Strength of Materials by Prof. M.S. Sivakumar, IIT Madras
   https://archive.nptel.ac.in/courses/112/106/112106141/
3. Strength of Materials by Dr. Satish C Sharma, IIT Roorkee
   https://nptel.ac.in/courses/112107146/

COURSE ARTICULATION MATRIX
(STRENGTH OF MATERIALS – P21CV305)

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

3 – HIGH, 2 – MEDIUM, 1 - LOW

COMPUTER AIDED BUILDING PLANNING AND DRAWING

[As per Choice Based Credit System (CBCS) & OBE Scheme]

SEMESTER – III

Course Code:	**P21CVL306**	**Credits:**	**01**
Teaching Hours/Week (L:T:P):	**0:0:2**	**CIE Marks:**	**50**
Total Number of Teaching Hours:	**26**	**SEE Marks:**	**50**

Course Objectives: Provide students with a basic understanding

1. Achieve skill sets to prepare computer aided engineering drawings
2. Understand the details of construction of different building elements.
3. Visualize the completed form of the building and the intricacies of construction based on the engineering drawings.

UNIT - 1	**04 Hours**

Introduction to AUTO CAD software and its applications: Use of drawings, editing and annotation tools. Introduction to the use of layers, blocks and dimension text leader. Presentation and plotting with AUTO CAD.

UNIT - 2	**06 Hours**

Drawings Related to Different Building Elements:

Following drawings are to be prepared for the data given using CAD Software

a) Stepped wall footing.
b) Bonds in brick masonry- English & Flemish
c) Lintel and chajja (SUNSHADE).
d) Fully paneled and flush doors
e) Half paneled and half-glazed window

Note: Students should sketch to dimension the above in a sketch book before doing the computer drawing.

UNIT - 3	**10 Hours**

Building Drawings: Principles of planning, planning regulations and building bye-laws, factors affecting site selection, Functional planning of residential and public buildings, design aspects for different public buildings.Recommendations of NBC.

- Drawing of Plan, elevation and sectional elevation for Single and double storey residential building.

Note:

- Students should sketch to dimension the above in a sketch book before doing the computer drawing.
- One compulsory field visit/exercise to be carried out.

Single line diagrams to be given in the examination.

UNIT - 4	**06 Hours**

Layout and Inter connectivity diagrams:

- Electrical LAYOUT, plumbing and sanitary LAYOUT for: Single and double storey residential building.

Functional design of building using inter connectivity diagrams (bubble diagram), development of line diagram only for i) Primary health centre, ii) Primary school building, iii) College canteen iv) Office building.

Note: Students should sketch to dimension the above in a sketch book before doing the computer drawing.
One compulsory field visit/exercise to be carried out.

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

COs	Course Outcomes with *Action verbs* for the Course topics	Bloom's Taxonomy Level	Level Indicator
CO1	Prepare, read and interpret the drawings and apply in a professional set up. **(PO1, PO5, PSO1, PSO3)**	Applying	L3
CO2	Know the procedures of submission of drawings and develop working and submission drawings for building. **(PO1, PO5, PSO1, PSO3)**	Applying	L3
CO3	Plan and design a residential or public building as per the given requirements. **(PO1,PO3,PSO2,PSO3)**	Create	L6

Question paper pattern:

- There will be one full question from unit-2 and unit-4 with each full question carrying fifteen marks. Students have to answer any one question.
- There will be one compulsory question from unit- 3 carrying thirty-five marks.

Text Book(s):

1. MG Shah, CM Kale, SY Patki, "Building drawing with an integrated approach to Built Environment Drawing" , Tata McGraw Hill Publishing co. Ltd., New Delhi
2. Gurucharan Singh, "Building Construction", Standard Publishers, & distributors, New Delhi.
3. Malik R S and Meo G S, "Civil Engineering Drawing", Asian Publishers/Computech Publications Pvt Ltd.

Reference Book(s):

1. Time Saver Standard by Dodge F. W., F. W. Dodge Corp.
2. IS: 962-1989 (Code of practice for architectural and building drawing).
3. National Building Code, BIS, New Delhi.
4. Building Planning And Drawing, 7th Edition, Dr. N Kumaraswamy and A.Kameshwara Rao

Web and Video link(s):

- https://m.youtube.com/watch?v=cmR9cfWJRUU
- https://m.youtube.com/watch?v=ONapRVyXn2E
- https://m.youtube.com/watch?v=hO865EIE0p0

E-Books/Resources:

https://bookauthority.org/books/best-cad-ebooks

COURSE ARTICULATION MATRIX (COMPUTER AIDED BUILDING PLANNING AND DRAWING – P21CVL306)															
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2				2								2		2
CO2	2				2								2		2
CO3	2		2											2	2
3 – HIGH, 2 – MEDIUM, 1 - LOW															

Employability Enhancement Skills (EES) - III
[As per Choice Based Credit System (CBCS) & OBE Scheme]
SEMESTER – III

Course Code:	**P21HSMC308**	**Credits:**	**01**
Teaching Hours/Week (L:T:P):	**0:2:0**	**CIE Marks:**	**50**
Total Number of Teaching Hours:	**28**	**SEE Marks:**	**50**

Course Learning Objectives: This course will enable students to:

- Build Personal Branding, team binding.
- Present the data using presentation skills in a better manner.
- Understand the importance of stress management, Entrepreneurship & Business skills.
- Usage of various voices in a sentence and critical reasoning.
- Explain the basic concepts in boat and stream, geometry and trigonometry problems.
- Calculations involving Permutations and combinations, probability and logarithms.
- Explain concepts behind logical reasoning modules of analytic, syllogisms, venn diagrams and puzzles.

UNIT – I	**8 Hours**

Soft Skills: Personal Branding, Synergy between Teams (Online and Offline), Interview skills, Stress Management, Entrepreneurship & Business skills.

Verbal Ability: Active voice and passive voice, critical reasoning.

Self-Study: Corporate ethics and Mannerism

UNIT – II	**10 Hours**

Quantitative Aptitude: Boats and streams, Geometry & Trigonometry, Permutations and combinations, Probability & Logarithms.

Self-Study: Pipes and cisterns

UNIT – III	**10 Hours**

Logical Reasoning: Analytical reasoning, Syllogisms, clocks and calendars, Venn diagram, puzzles.

Self-Study: Binary logic

Course Outcomes: On completion of this course, students are able to:	
CO – 1:	Exhibit amplified level of confidence to express themselves in English
CO – 2:	Develop the presentation skills, entrepreneurial skills by managing stress at various levels.
CO – 3:	Solve the problems based on Boats and streams, Geometry & Trigonometry, Permutations and combinations, Probability & Logarithms.
CO – 4:	Solve logical reasoning problems based on Analytical reasoning, Syllogisms, clocks and calendars, cases and Venn diagram, puzzles.

Text Book(s):

1. Word Power Made Easy New Revised and Expanded Edition, First Edition, Norman Lewis, Goyal Publisher.
2. Essential English Grammar by Raymond Murphy, Cambridge University Press, new edition
3. The 7 habits of Highly Effective People by Stephen R. Covey
4. Quantitative aptitude by Dr. R. S Agarwal, published by S.Chand private limited.
5. Verbal reasoning by Dr. R. S Agarwal , published by S. Chand private limited.

Reference Book(s):

1. Quantitative Aptitude by Arun Sharma, McGraw Hill Education Pvt Ltd
1. 2. CAT Mathematics by Abhijith Guha, PHI learning private limited.

Web and Video link(s):

1. NPTEL Course: Soft skills by By Prof. Binod Mishra, IIT Roorkee

https://onlinecourses.nptel.ac.in/noc21_hs76/preview

COURSE ARTICULATION MATRIX [Employability Enhancement Skills (EES) - III]

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	-	-	-	-	-	-	-	-	2	3	-	2
CO-2	-	-	-	-	-	-	-	-	2	3	2	2
CO-3	2	-	-	-	-	-	-	-	-	-	-	-
CO-4	2	-	-	-	-	-	-	-	-	-	-	-

Innovation and Design Thinking
[As per Choice Based Credit System (CBCS) & OBE Scheme]
SEMESTER – III

Course Code	**P21AEC309**	**Credits**	**01**
Teaching Hours/Week (L: T:P: S)	**0:2:0**	**CIE Weightage**	**50%**
Total Hours of Pedagogy	**25**	**SEE Weightage**	**50%**
Exam Hour	**01**	**Total Marks**	**100**

Course Category: Foundation

Preamble: This course provides an introduction to the basic concepts and techniques of engineering and reverses engineering, the process of design, analytical thinking and ideas, basics and development of engineering drawing, application of engineering drawing with computer aide.

Course objectives:
- To explain the concept of design thinking for product and service development
- To explain the fundamental concept of design thinking
- To discuss the methods of implementing design thinking in the real world.

Module-1

Understanding Design Thinking
Definition of design - Design Vs Engineering Design– Difference between Design and Engineering Design– The General Design process Model – Design to Design thinking - Time line of Design thinking.

Module-2

Features of Design Thinking
Venn diagram of design thinking– Design thinking resources – Design thinking process Models – Design thinking methodologies

Module-3

Models to Do Design Thinking
Different kinds of thinking – 5 Stage d.School Process - 5 stages of Stanford – Empathize – Define- Ideate – Prototype – Test – Iterate - Applications of Design Thinking.

Module-4

Design thinking for Engineering - Concept models for comparing design thinking and engineering systems thinking - The Distinctive Concept Model - The Comparative Concept Model - The Inclusive Concept Model - The Integrative Concept Model.

Module-5

Design Thinking Tools and Methods - Purposeful Use of Tools and Alignment with Process - What Is: Visualization - What Is: Journey Mapping - What Is: Value Chain Analysis - What Is: Mind Mapping - What If: Brainstorming - What If: Concept Development - What Wows: Assumption Testing - What Wows: Rapid Prototyping - What Works: Customer Co-Creation - What Works: Learning Launch.

Course Outcomes:

Upon the successful completion of the course, students will be able to:

CO Nos.	Course Outcomes	Knowledge Level (Based on revised Bloom's Taxonomy)
CO1	Understanding Design Thinking process	L2
CO2	Appreciate various design process procedure	L2
CO3	Generate and develop design ideas through different Technique.	L2
CO4	Identify the significance of reverse Engineering to Understand products	L3
CO5	Practice the methods, processes, and tools of Design Thinking	L2

Suggested Learning Resources:

Text Books :

1. John.R.Karsnitz, Stephen O'Brien and John P. Hutchinson, "Engineering Design",Cengagelearning (International edition) Second Edition, 2013.
2. Roger Martin, "The Design of Business: Why Design Thinking is the Next Competitive Advantage",Harvard Business Press , 2009.

References:

1. Jake knapp, John keratsky and Braden kowitz "Sprint how to solve big problems and test new ideas in just five days"
2. Tim Brown "Change by design"
3. Steve Krug "Don't make me think; Revisited"
4. Roger martin "The design of Business"
5. Yousef Haik and Tamer M.Shahin, "Engineering Design Process", CengageLearning, SecondEdition, 2011.
6. Idris Mootee, "Design Thinking for Strategic Innovation: What They Can't Teach You at Businessor Design School", John Wiley & Sons 2013.
7. Hasso Plattner, Christoph Meinel and Larry Leifer (eds), "Design Thinking: Understand – Improve – Apply", Springer, 2011

Basic Engineering Mathematics - I
[As per Choice Based Credit System (CBCS) & OBE Scheme]
SEMESTER – III (Lateral Entry: Common to all branches)

Course Code:	**P21MDIP301**	**Credits:**	**00**
Teaching Hours/Week (L:T:P):	**2-2-0**	**CIE Marks:**	**100**
Total Number of Teaching Hours:	**40**	**SEE Marks:**	**-**

Course Learning Objectives: The mandatory learning course **P21MADIP301**viz., **Basic Engineering Mathematics-I** aims to provide basic concepts of complex trigonometry, vector algebra, differential & integral calculus, vector differentiation and various methods of solving first order differential equations**.**

UNIT – I	**8 Hours**

Complex Trigonometry: Complex Numbers: Definitions & properties. Modulus and amplitude of a complex number, Argand's diagram, De- Moivre's theorem (without proof).

Vector Algebra: Scalar and vectors. Vectors addition and subtraction. Multiplication of vectors (Dot and Cross products). Scalar and vector triple products-simple problems.

Self-study component:	De-Moivre's theorem (without proof). Roots of complex number - Simple problems.

UNIT – II	**8 Hours**

Differential Calculus: Polar curves –angle between the radius vector and the tangent pedal equation- Problems. Taylor's series and Maclaurin's seriesexpansions- Illustrative examples.

Partial Differentiation: Elementary problems. Euler's theorem for homogeneous functions of two variables. Total derivatives-differentiation of composite and implicit function.

Self-study component:	Review of successive differentiation. Formulae for n^{th} derivatives of standard functions- Liebnitz's theorem (without proof). Application to Jacobians, errors & approximations.

UNIT – III	**8 Hours**

Integral Calculus: reduction formulae for $sin^n x$, $cos^n x$, *and* $sin^m x cos^m x$ and evaluation of these with standard limits-Examples. Applications of integration to area, length of a given curve, volume and surface area of solids of revolution.

Self-study component:	Differentiation under integral sign (Integrals with constants limits)-Simple problems.

UNIT – IV	**8 Hours**

Vector Differentiation: Differentiation of vector functions. Velocity and acceleration of a particle moving on a space curve. Scalar and vector point functions. Gradient, Divergence, Curl and Laplacian (Definitions only).

Self-study component:	Solenoidal and irrotational vector fields-Problems.

UNIT – V	8 Hours

Ordinary differential equations (ODE's): Introduction-solutions of first order and first degree differential equations: homogeneous, exact, linear differential equations of order one and equations reducible to above types.

Self-study component:	Applications of first order and first degree ODE's - Orthogonal trajectories of Cartesian and polar curves. Newton's law of cooling, R-L circuits- Simple illustrative examples from engineering field.

Course Outcomes: After the successful completion of the course, the students are able to

CO1	**Explain** the fundamental concepts –in complex numbers and vector algebra to analyze the problemsarising in related area of engineering field.
CO2	**Identify** – partial derivatives to calculate rate of change of multivariate functions.
CO3	**Apply** - the acquired knowledge of integration and differentiation to evaluate double and triple integrals to compute length surface area and volume of solids of revolution and indentify velocity, acceleration of a particle moving in a space.
CO4	**Find** analytical solutions by solving first order ODE's which arising in different branches of engineering.

TEXT BOOKS

1. B.S. Grewal, Higher Engineering Mathematics (44th Edition), Khanna Publishers, New Delhi.
2. B.V. Ramana, Higher Engineering Mathematics, Tata McGraw Hill publications, New Delhi, 11thReprint, 2010.

REFERENCE BOOKS

1. Erwin Kreyszig, Advanced Engineering Mathematics (Latest Edition), Wiley Publishers, New Delhi.
2. H. C. Taneja, Advanced Engineering Mathematics, Volume I & II, I.K. International PublishingHouse Pvt. Ltd., New Delhi.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint,2010.
4. V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, Affiliated East–West press, Reprint 2005.
5. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**										
CO2	**3**	**2**										
CO3	**2**	**3**										
CO4	**2**											
CO5	**3**											
Strength of correlation: Low-1, Medium- 2, High-3												

Employability Enhancement Skills (EES) - I

[As per Choice Based Credit System (CBCS) & OBE Scheme]

SEMESTER - III

Course Code:	**P21HDIP308**	**Credits:**	**01**
Teaching Hours/Week (L:T:P):	**0:2:0**	**CIE Marks:**	**100**
Total Number of Teaching Hours:	**28**	**SEE Marks:**	**-**

Course Learning Objectives: This course will enable students to:

- Get introduced to some of the concepts of soft skills and enhance communication skills
- Recognize common mistakes done by an individual in the course of his / her communication
- Write effective emails
- Identify their strengths, weakness, opportunities and threats
- Understand the basic rules of sentence structures
- Understand the correct usage of parts of speech, tenses and articles
- Explain divisibility roles, properties of various types of numbers
- Explain application of percentage in our daily life
- Describe the concepts of profit, loss, discounts
- Explain concepts behind logical reasoning modules of arrangements and blood relations

UNIT – I	**10 Hours**

Soft Skills: LSRW, Listening, communication skills (verbal and non-verbal skills), public speaking, Email writing, SWOT Analysis

Self-Study: Motivation and Time Management

UNIT – II	**10 Hours**

Verbal Ability: Parts of Speech - Prepositions, Adjectives and Adverbs ; Tenses, Articles, Idioms and Phrasal verbs, Subject verb agreement, Synonyms and Antonyms

Self-Study: Para jumbles and one word substitution

UNIT – III	**8 Hours**

Quantitative Aptitude: Number system, Percentage, Profit & Loss
Logical Reasoning: Blood Relations and Arrangements

Self-Study: Speed Maths

Course Outcomes: On completion of this course, students are able to:	
CO – 1:	Exhibit amplified level of confidence to express themselves in English
CO – 2:	Understand the correct usage of tenses and articles
CO – 3:	Increase the number of words in his/her day to day
CO – 4:	Solve logical reasoning problems based on blood relations and arrangements
CO - 5:	Solve the problems based on number system, percentage and profit & loss

Text Book(s):

1. Word Power Made Easy New Revised and Expanded Edition, First Edition, Norman Lewis, Goyal Publisher.
2. Essential English Grammar by Raymond Murphy, Cambridge University Press, new edition
3. The 7 habits of Highly Effective People by Stephen R. Covey
4. Quantitative aptitude by Dr. R. S Agarwal, published by S.Chand private limited.
5. Verbal reasoning by Dr. R. S Agarwal , published by S. Chand private limited.

Reference Book(s):

1. Quantitative Aptitude by Arun Sharma, McGraw Hill Education Pvt Ltd
2. CAT Mathematics by Abhijith Guha, PHI learning private limited.

Web and Video link(s):

1. Improve Your English Communication Skills Specialization https://www.coursera.org/specializations/improve-english

COURSE ARTICULATION MATRIX [Employability Enhancement Skills (EES) - I]

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	-	-	-	-	-	-	-	-	2	3	-	2
CO-2	-	-	-	-	-	-	-	-	-	2	-	2
CO-3	-	-	-	-	-	-	-	-	-	2	-	2
CO-4	2	-	-	-	-	-	-	-	-	-	-	-
CO-5	2	-	-	-	-	-	-	-	-	-	-	-

Applied Mathematical Methods
[As per Choice Based Credit System (CBCS) & OBE Scheme]
SEMESTER – IV (COMMON TO CV, MEC, IP, AUT)

Course Code:	**21MA401A**	**Credits:**	**03**
Teaching Hours/Week (L:T:P):	**2-2-0**	**CIE Marks:**	**50**
Total Number of Teaching Hours:	**40**	**SEE Marks:**	**50**

Course Learning Objectives:

- Adequate exposure to basics of engineering mathematics so as to enable them to visualize the applications to engineering problems.
- Analyze the concept of complex variables in terms real variables
- Understand the concept of statistical methods to fit curves of samples and correlation and regression analysis
- To have a insight into numerical techniques to find solution of equations having no annalistic solutions
- Provide insight into develop probability distribution of discrete and continuous random variables Testing hypothesis of sample distribution
- Special functions familiarise the power series solution to analyse the problems in ordinary differential equations

UNIT – I	**8 Hours**

Calculus of complex functions: Introduction to functions of complex variables. Definitions of limit, continuity and differentiability, Analytic functions: Cauchy- Riemann equations in Cartesian and polar forms (no proof) and consequences.Applications to flow problems. Construction ofanalytic functions: Milne-Thomson method-Problems.
Conformal transformations: Introduction. Discussion of transformations پ = ن2, پ = ۱ن, پ = z+1/z , (ن ≠ 0). Bilineartransformations- Problems.

Self-study component:	Derivation of Cauchy- Riemann equation in Cartesian and polar Forms.

UNIT – II	**8 Hours**

Complex integration: complex line integrals. Cauchy theorem, Cauchy integral formula. Taylor's and Laurent's series (Statements only) and illustrative examples. Singularities, poles and residues. (Statement only).Examples.
Curve Fitting: Curve fitting by the method of least squares, fitting thecurves of the forms ب = ۱ن + b , ب = ۱b پ , y = ۱e^bx ۱۰۰ ب = ۱ن^2+ ۱ن +c **Statistical Methods:** Correlation and regression-Karl Pearson's coefficientof correlation and rank correlation- problems, Regression analysis, lines ofregression, problems.

Self-study component:	Contour integration Type-I & Type-II.

UNIT – III	**8 Hours**

Solution of algebraic and transcendental equations: Introduction, Bisection method, Regula-Falsi & Newton-Raphson method :- Illustrative examples only.
Numerical solution of ordinary differential equations (ODE's): Numerical solutions of ODE's of first order and first degree – Introduction. Taylor's series method. Modified Euler's method, Runge - Kutta method of fourth order (All formulae without proof)**.** Illustrative examples only.
Numerical methods for system of linear equations- Gauss-Jacobi and Gauss- Seidel iterative methods. Determination of largest eigen value and

Self-study component:	Solution of equations using secant method, Picards method.

UNIT – IV	**8 Hours**

Random variables and Probability Distributions: Review of random variables. Discrete and continuous random variables-problems. Binomial, Poisson, Exponential and Normal distributions (with usual notation of meanand variance)-:problems.
Joint Probability Distributions : Introduction, Joint probability and Joint distribution of discrete random variables and continuous random variables

Self-study component:	Geometric and Gamma distributions- problems.

UNIT – V	**8 Hours**

Special functions: Power series solution of a second order ODE, Series solution-Frobenius method. Series solution of Bessel's differential equation leading to $J_n(x)$. Expansions for $J_1(x)$ *and* $J_{-1}(x)$.. Series solutions of

Legendre's differential equation leading to $P_n(x)$ - Legendre's polynomials.
Rodrigue's formula (No Proof) - simple illustrative examples

Self-study component:	Basics of Power series; analytic, singular point and basic recurrence relations.

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

CO1	**Apply** the concepts of an analytic function and their properties to solve the problems arising in engineering field
CO2	**Use** the concept of correlation and regression analysis to fit a suitable mathematical model for thestatistical samples arise in engineering field
CO3	**Explain** various numerical techniques to solve equations approximately having no analytical solutions.
CO4	**Interpret** discrete and continuous probability distributions in analyzing the probability models and solveproblems involving Markov chains.
CO5	**Estimate** the series solutions of ordinary difference equation.

TEXT BOOKS

1. B.S. Grewal, Higher Engineering Mathematics (44th Edition 2018), Khanna Publishers, New Delhi.
2. E. Kreysizig, Advanced Engineering Mathematics, John Wiley and sons, 10th Ed. (Reprint) 2016.

REFERENCE BOOKS

1. V. Ramana: Higher Engineering Mathematics, McGraw –Hill Education,11th Ed..
2. H. C. Taneja, Advanced Engineering Mathematics, Volume I & II, I.K. International PublishingHouse Pvt. Ltd., New Delhi.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications,Reprint, 2010.

ONLINE RESOURCES

1. http://www.nptel.ac.in
2. https://en.wikipedia.org
3. http://mcatutorials.com/mca-tutorials-numerical-methods-tutorial.php
4. https://www.iitg.ac.in/physics/fac/charu/courses/ph503/book.pdf

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**2**	**3**										
CO2	**3**	**2**										
CO3	**3**	**3**										
CO4	**2**	**3**										
CO5	**3**	**3**										
Strength of correlation: Low-1, Medium- 2, High-3												

ANALYSIS OF STRUCTURES

[As per Choice Based Credit System (CBCS) & OBE Scheme]

SEMESTER – IV

Course Code:	**P21CV402**	**Credits:**	**03**
Teaching Hours/Week (L:T:P):	**3:0:0**	**CIE Marks:**	**50**
Total Number of Teaching Hours:	**40**	**SEE Marks:**	**50**

Course Learning Objectives: This course will enable the students:

1. To determine slopes and deflections of beams using various methods.
2. To analyze pin jointed trusses, arches and cables under the action of loads and to carryout analysis of beams subjected to moving loads using Influence line diagrams.
3. To understand the basic concepts of analysis of indeterminate structure and to analyze continuous beams, sway and non-sway frames using slope deflection method, moment distribution method, Kani's method and Matrix methods.

UNIT – I	**08 Hours**

Deflection of Beams: Moment area method- Moment Area Theorems-Statements and derivation, sign convention; Application of moment area method to determinate slope and deflection in prismatic beams and beams of varying cross section.

Conjugate beam method – Introduction, support conditions for the conjugate beams, Application of conjugate beam method to determine slope and deflection in prismatic beams and beams of varying cross section.

Self-study component:	Numerical problems on beams with couples

UNIT – II	**08 Hours**

Analysis of Plane trusses: Introduction, assumptions, different types of trusses, methods of analysis of simple plane trusses, Numerical problems using Method of joints.

Energy Principles and Energy Theorems: Principle of virtual displacements, Principle of virtual forces, Strain energy and complementary energy, Strain energy due to axial force, bending, shear and torsion. Deflection of determinate beams and trusses using total strain energy, Castigliano's theorems, application of Castigliano's theorems to calculate deflection of trusses.

Self-study component:	Introduction to method of section, Unit load method for determining deflections.

UNIT – III	**08 Hours**

Influence line diagram and rolling loads: Introduction to influence line diagram, uses, construction of ILD for support reactions, shear force and bending moments in simply supported beam subjected to series of point loads and UDL shorter than span.

Analysis of Arches: Three-hinged circular and parabolic arches with supports at the same and different levels; Determination of normal thrust, radial shear and bending moment.

Analysis of Cables: Analysis of cables under point loads and UDL, Length of cables with supports at the same and different levels. Cable passing over pulley and saddle.

Self-study component:	Stiffening trusses for suspension cables.

UNIT – IV	08 Hours

Introduction to analysis of indeterminate structures: Stability and determinacy of structures, Degree of static and kinematic indeterminacy in structures. Numerical problems.

Slope Deflection Method: Introduction, sign convention, Development of Slope-deflection equations and Analysis of Beams and Orthogonal Rigid jointed plane frames (non-sway and sway) with kinematic redundancy less than or equal to three. (Members to be axially rigid)

Moment Distribution Method: Introduction, Distribution factor, Analysis of continuous beams and orthogonal rigid jointed plane frames (non-sway only) with kinematic redundancy less than/equal to three (Members to be axially rigid).

Self-study component:	Analysis of sway frames by moment distribution method, analysis of 2-hinged arches.

UNIT – V	08 Hours

Kani's Method: Introduction, Basic Concept, Analysis of Continuous beams and orthogonal rigid jointed plane frames (non-sway only). Analysis of rigid jointed plane frame with symmetry considerations (non-sway only).

Introduction to Matrix method of analysis:
Introduction, Axes and coordinates, Flexibility matrix and Stiffness matrix, Analysis of continuous beams using Flexibility Matrix Method and Stiffness Matrix Method by system approach with indeterminacy ≤ 3.

Self-study component:	Analysis of sway frames by Kani's method, introduction to analysis of indeterminate beams by consistent deformation method.

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

COs	Course Outcomes with *Action verbs* for the Course topics	Bloom's Taxonomy Level	Level Indicator
CO1	***Evaluate*** slope and deflections of beams using various approaches. **(PO1, PO2, PSO1, PSO2, PSO3)**	Evaluating	L5
CO2	***Analyze*** pin jointed trusses, arches and cables under the action of loads and to extend the analysis to beams under moving loads using ILD. **(PO1, PO2, PSO1, PSO2, PSO3)**	Analyzing	L4
CO3	Understand the basic concepts of ***analysis*** of indeterminate structure and to analyze continuous beams, sway and non-sway frames using various approaches. **(PO1, PO2, PSO1, PSO2, PSO3)**	Analyzing	L4

Text Books:

1. "Theory of structures" S.P. Gupta, G.S. Pandit and R. Gupta, Volume 1, Tata Mc-Graw Hill, New Delhi.
2. "Basic Structural Analysis", Reddy C.S. – Second Edition, Tata McGraw Hill Publication Company Ltd.
3. "Structural Analysis", L S Negi and R S Jangid, Tata McGraw-Hill Publishing Company Ltd.

Reference Book(s):

1. "Structural Analysis" D.S. PrakashRao., A Unified Approach, University Press.
2. "Theory of Structures", S.P. Gupta, G.S. Pandit and R. Gupta, Volume 2, Tata McGraw Hill Publication Company Ltd.
3. "Indeterminate Structural Analysis" J. Sterling Kinney, Oxford and IBH Publishing Co.
4. "Intermediate Structural Analysis" C.K. Wang., McGraw Hill Publications.
5. "Structural Analysis-II", S.S. Bhavikatti – Vikas Publishers, New Delhi.

Web and Video link(s):

1. Structural Analysis I, Prof. Amit Shaw, IIT Kharagpur https://nptel.ac.in/courses/105105166 https://nptel.ac.in/courses/105105109
2. Matrix method of Structural analysis, Prof. Biswanath Banjerjee, Prof. Amit Shaw, IIT Kharagpur https://archive.nptel.ac.in/courses/105/105/105105180/

E-Books/Resources:

1. Structural Analysis I, Prof. Amit Shaw, IIT Kharagpur https://archive.nptel.ac.in/courses/105/105/105105166/
2. 2.Structural Analysis II, Prof. L S Ramachandra, Prof. Sudhir Kumar Bri, IIT Kharagpur https://nptel.ac.in/courses/105105109
3. 3.Matrix method of Structural analysis, Prof. Biswanath Banjerjee, Prof. Amit Shaw, IIT Kharagpur (https://archive.nptel.ac.in/courses/105/105/105105180/)
4. 4.Structural analysis I, Dr. Siddhartha Ghosh, Dr. R.S. Jangid, IIT Bombay (https://archive.nptel.ac.in/courses/105/101/105101085/)

COURSE ARTICULATION MATRIX
(ANALYSIS OF STRUCTURES – P21CV402)

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

3 – HIGH, 2 – MEDIUM, 1 - LOW

HYDROLOGY AND IRRIGATION ENGINEERING

[As per Choice Based Credit System (CBCS) & OBE Scheme]

SEMESTER – IV

Course Code:	**P21CV403**	**Credits:**	**03**
Teaching Hours/Week (L:T:P)	**3:0:0**	**CIE Marks:**	**50**
Total Number of Teaching Hours:	**40**	**SEE Marks:**	**50**

Course Learning Objectives: This course will enable the students to:

- Understand the concepts of Hydrological process such as precipitation, evaporation, evapotranspiration and infiltration.
- Estimation of runoff and use of unit hydrograph.
- Explain the systems of Irrigation and compute crop water requirements.
- Design the stable canals and types of canals involved in conveyance of water.

UNIT – I	**Hydrology and Precipitation**	**08 Hours**

Hydrology: Introduction, Global water distribution and India's water availability. Hydrologic Cycle – General and Qualitative (Horton's) representation, Climatic seasons of India.

Precipitation: Forms and types. Measurement of Rainfall, Raingauge density, Optimum number of Raingauges, computation of mean rainfall, estimation of missing rainfall data, Numerical problems. Consistency of rainfall data – double mass curve method. Presentation of Rainfall data, mass curve and rainfall hyetographs.

Self-study component:	Formation of Precipitation, Radar measurement of rainfall.

UNIT – II	**Evaporation, Evapotranspiration and Infiltration**	**08 Hours**

Evaporation: Definition, Factors affecting evaporation, measurement of evaporation using ISI standard pan, estimation using Mayer's and Rowher's formula. Engineering applications and problems.

Evapotranspiration: Definition, AET and PET, factors affecting evapotranspiration, estimation of evapotranspiration using Blaney-Criddle equation. Engineering applications and problems.

Infiltration: Definition, Infiltration capacity, Measurement of infiltration using Double ring infiltrometer, Infiltration indices – Φ-Index and W-index. Engineering applications and problems.

Self-study component:	Reservoir evaporation and its control.

UNIT – III	**Runoff and Hydrographs**	**08 Hours**

Runoff: Definition, Concept of catchment, factors affecting runoff, Stream patterns, Classification of watersheds and streams. Estimation of runoff using Khosla's method.

Hydrographs: Definition, components of hydrograph, base flow separation, unit hydrograph, assumption, application and limitations, derivation from simple storm hydrographs, conversion of UH of different durations. Engineering applications and problems.

Self-study component:	Rainfall-runoff relationship using regression analysis.

UNIT – IV	**Irrigation and Water Requirement of crops**	**08 Hours**

Irrigation: Definition, necessity of Irrigation, Advantages and Disadvantages of irrigation, System of Irrigation: surface and groundwater, flow irrigation, lift irrigation, drip irrigation and sprinkler irrigation.

Water requirement of crops: Duty, delta and base period, relationship between them, factors affecting duty of water crops and crop seasons in India, Soil-moisture-irrigation relationship, frequency of irrigation. Engineering applications and problems.

Self-study component:	Methods to improve duty of water, Irrigation efficiency.

UNIT – V	Canals and its Design	08 Hours

Canals: Definition, Classification of canals, Alignment of canals, Cross section of Irrigation canals, Definition of gross command area, cultural command area, intensity of irrigation, time factor, crop factor.

Design: Design of stable channels in India, Regime channel, Kennedy's theory, Lacey's theory. Design problems. Comparison of Kennedy's and Lacey's theory.

Self-study component:	Losses of water in canals, Maintenance of canals.

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

COs	**Course Outcomes** with ***Action verbs*** for the Course topics	**Bloom's Taxonomy Level**	**Level Indicator**
CO1	***Apply*** the concepts of water resources in **understanding** Hydrology and Irrigation engineering. **(PO1, PSO1)**	Applying	L3
CO2	***Analyze*** and ***identify*** the various dynamic aspects of Hydrological cycle and their relationships in solving complex problems of engineering field. **(PO2, PSO2)**	Analyzing	L4
CO3	***Analyze*** and ***identify*** the various types of Irrigation systems, crop water requirements and its conveyance to the agricultural fields. **(PO2, PSO2)**	Analyzing	L4
CO4	***Design*** the stable channels in India by Kennedy's and Lacey's theory. **(PO3, PSO2)**	Creating	L6

Text Book(s):

1. K Subramanya – Engineering Hydrology. McGraw Hill Education, 4th Edition, New Delhi.
2. P Jaya Rami Reddy – A Textbook of Hydrology, Lakshmi Publications, 3rd Edition, New Delhi.
3. Santosh Kumar Garg – Irrigation Engineering and Hydraulic Structures, Khanna Publications, Vol. 2, New Delhi.
4. Dr. P N Modi – Irrigation Water Resources and Water Power Engineering, Standard Book House, 11th Edition, New Delhi.

Reference Book(s):

1. Ven Chow, David Maidment and Larry Mays – Applied Hydrology, McGraw Hill Education, 1st Edition, India.
2. B C Punmia, Ashok Kumar Jain, Arun Kumar Jain and Pande Brij Basi Lal – Irrigation and Water Power Engineering, Laxmi Publications, 17th Edition, New Delhi, India.
3. R K Sharma – Irrigation Engineering (including Hydrology), S Chand Publication, Revised Edition 2007, India.

Web and Video link(s):

1. Hydrologic cycle and concept of catchment: https://youtu.be/iWb-V7dV7XM
2. Evaporation: https://youtu.be/4RZF1L70mRY
3. Estimation of Infiltration: https://youtu.be/caklKXXrHW4

4. Numerical examples on UH & DRH: https://youtu.be/FHY1BRmcFXU
5. Crop water requirement: https://youtu.be/e7pckUDQ9oI

E-Books/Resources:

1. https://searchworks.stanford.edu/view/6332733
2. https://searchworks.stanford.edu/view/550141
3. https://searchworks.stanford.edu/view/13795811

COURSE ARTICULATION MATRIX
(HYDROLOGY AND IRRIGATION ENGINEERING – P21CV403)

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3												3		
CO2		2												2	
CO3		2												2	
CO4			2											2	

3 – HIGH, 2 – MEDIUM, 1 - LOW

GEODETIC ENGINEERING

[As per Choice Based Credit System (CBCS) & OBE Scheme]

SEMESTER – IV

Course Code:	**P21CV404**	**Credits:**	**04**
Teaching Hours/Week (L:T:P):	**3–0–2**	**CIE Marks:**	**50**
Total Theory Teaching Hours: **Total Laboratory Hours:**	**40** **24**	**SEE Marks:**	**50**

Course Learning Objectives: This course will enable the students to:

- Provide basic knowledge about principles of surveying for location, design and construction of engineering projects.
- Develop skills for using surveying instruments including, levelling instruments, plane tables, theodolite, compass
- Make students to familiar with cooperative efforts required in acquiring surveying data and applying fundamental concepts to eliminate errors and set out the works.
- Provide information about new technologies that are used to abstracting the information of earth surface.

UNIT – I	**Introduction**	**8 Hours**

Introduction: Definition of surveying, classification of surveys, basic principles of surveying, Reconnaissance survey – Field Book.

Compass Surveying: Meridians and bearings, principle, working and use of prismatic compass, Surveyor's compass, magnetic bearing, true bearings, whole circle bearing and reduced bearing, Calculation of bearings and interior angles, local attraction-numerical problems.

Plane Table Surveying: Plane table and accessories, advantages and disadvantages of plane table survey, method of plotting - radiation, intersection, traversing.

Self-study component:	Dip and Declination with Numericals.
Practical Topics: **(6 Hours)**	**1.** Introduction to surveying instruments (major and minor) ii) preparation of a chart of conventional symbols and tape. **2.** To set regular geometric figures (Hexagon and Pentagon) using chain, tape and compass. **3.** Plane table : Setting, orientation, radiation, intersection

UNIT – II	**Levelling, Area & Volume, Contouring**	**8 Hours**

Introduction to Levelling: Principles and basic definitions – Types of Levels – Types of adjustments, Simple, Differential, Fly, Reciprocal, Profile, Cross sectioning – Book of levels – Rise & fall and H. I methods (Numericals)

Area and Volume Measurement: Measurement of area- by dividing the area into geometrical figures, area from offsets, mid ordinates, mid ordinate rule, trapezoidal and Simpsons one third rule, area from co-ordinates.

Contouring: Contours and their characteristics, methods of contouring, direct and indirect methods.

Self-study component:	Interpolation techniques and uses of contours.

Practical Topics: (6 Hours)	1. Determination of elevation of various points by plane of collimation method and rise & fall method and L-Section and cross section of the road. 2. Conduct block leveling and draw Counter plan of given area (with necessary drawing)	
UNIT – III	**Theodolite Surveying**	**8 Hours**
Theodolite Survey : Theodolite and types, fundamental axes and relationship, parts of a transit theodolite, uses of theodolite, temporary adjustments of a transit theodolite, measurement of horizontal angles, method of repetitions and reiterations. **Trigonometric Levelling:** Determination of elevation of objects when the base is accessible and inaccessible by single plane and double plane method, distance and difference in elevation between two inaccessible objects by double plane method. Numerical problems.		
Self-study component:	Measurements of vertical angles by theodolite.	
Practical Topics: (4 Hours)	1. Measurement of horizontal angle using theodolite: i) Repetition and ii) Reiteration. **2.** Trigonometrical levelling: Single plane method and Double plane method	
UNIT – IV	**Curve Surveying**	**8 Hours**
Simple curves: Curves - Necessity, types, simple curves, elements, designation of curves, Setting out simple curves by linear methods (numerical problems on offsets from long chord & chord produced method), setting out curves by Rankine's deflection angle method (numerical problems). **Compound curve:** Compound curves, elements of Compound curves,design of compound curves, setting out of compound curves.(No derivations) **Curve Setting -Reverse, Transition curves:** Reverse curve between two parallel and non-parallel straights (Equal radius and unequal radius), Numerical problems.(No derivations) **Transition curves**: Characteristics, length of transition curve (Numerical problems),		
Self-study component:	Types of vertical curves (Theory)	
Practical Topics: (4 Hours)	1. To set out simple curves using Rankine's deflection angles method. 2. Setting compound curve using theodolite	
UNIT – V	**Modern Surveying**	**8 Hours**
Total Station: Introduction, basic concepts, measurement of distance using phase difference, components of total station, adjustments, Errors, accuracy, effect of atmospheric conditions. Advantages, limitations anduses of total station. **Remote sensing:** Introduction, components and working principle and area of application. Advantages and disadvantages, types of remote sensing, Different types of platforms, Types of remote sensors. **Global Positioning Systems:** Global positioning systems, segments of GPS, working principle, Hand held GPS and differential GPS, methods of GPS surveying, Errors and accuracy, Advantages and disadvantages and applications of GPS.		
Self-study component:	Introduction to GIS, components and flow diagram of GIS, applications of GIS. Drone Survey	

Practical Topics: **(4 Hours)**	1. Introduction to total station, components, temporary adjustments. 2. Measure Horizontal and vertical distance using Total Station.

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

COs	Course Outcomes with *Action verbs* for the Course topics	Bloom's Taxonomy Level	Level Indicator
CO1	***Classify*** surveying with measurement of angles by compass and area by plane table. **(PO1, PSO1)**	Analyzing	L4
CO2	***Assess*** the data of levelling, contour plans and theodolite surveying to ***interpret*** the elevation and distances. **(PO1, PO2, PSO1)**	Evaluating	L5
CO3	***Choose*** different curves for roads and railways and ***explain*** the principles and techniques of modern surveying equipments and their applications. **(PO3, PO5, PSO2)**	Applying	L3
CO4	***Make use of*** linear and angular measurements for traverse by compass and plane table survey and ***Solve*** for levels and draft necessary drawings. **(PO1, PO4, PSO2)**	Applying	L3
CO5	***Apply*** the techniques and skill of surveying to compute distance and elevation using trigonometric survey and ***Construct*** curves by various methods. **(PO1, PO4, PSO2)**	Applying	L3

Text Book(s):

1. Surveying, Vol-1 and Vol-2 - B.C. Punmia ,Laxmi Publications, New Delhi.
2. Plane Surveying, Vol-1 and Vol-2-A.M. Chandra, Newage International ® Ltd.
3. Advanced Surveying: Total Station, GPS, GIS & Remote Sensing by Pearson 2017 by Gopi Satheesh, R.Sathikumar, N. Madhu
4. Textbook of Remote Sensing and Geographical Information System 4th edition BS Publications by M. Anji Reddy

Reference Book(s):

1. Surveying Vol.I& II, S. K. Duggal, McGraw Hill Education; Fourth edition (2017)
2. Surveying and Levelling, R. Subramanian , second edition, 2012, Oxford University Press;
3. Fundamentals of Surveying - Milton O. Schimidt - Wong, Thomson Learning
4. Surveying and Levelling 2nd edition by R K Bansal.

Web and Video link(s):

https://www.youtube.com/channel/UCD9xFiECDPnQiVdjj-UvsRg/playlists

E-Books/Resources:

- https://searchworks.stanford.edu/view/2652850

COURSE ARTICULATION MATRIX (GEODETIC ENGINEERING – P21CV404)															
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2												1		
CO2	1	1											1		
CO3			2		2									2	
CO4	2			2										1	
CO5	2			2										2	
3 – HIGH, 2 – MEDIUM, 1 - LOW															

PUBLIC HEALTH ENGINEERING

[As per Choice Based Credit System (CBCS) & OBE Scheme]

SEMESTER – IV

Course Code:	**21CV405**	**Credits:**	**04**
Teaching Hours/Week (L:T:P):	**3:0:2**	**CIE Marks:**	**50**
Total Theory Teaching Hours: **Total Laboratory Hours:**	**40** **24**	**SEE Marks:**	**50**

Course Learning Objectives: This course will enable the students to:

1. Analyze the variation of water demand and to estimate water requirements for a community.
2. Study of distribution systems of water supply and illustration of its layout.
3. Analysis of physical, chemical & biological characteristics of wastewater
4. Understand and design of different unit operations involved in water and waste water treatment processes.
5. Study drinking water quality standards and to illustrate qualitative analysis of water.

UNIT – I	**Water supply - Introduction & Water treatment**	**8 Hours**

Introduction: Water: Need for protected water supply, Demand of Water: Types -domestic demand, industrial, institutional, and commercial demand, public use and fire demand estimation. Per capita demand - factors affecting per capita demand, Variations in demand of water. Methods of population forecasting and numerical problems. Drinking water standards- BIS & WHO guidelines.

Water Treatment: Objectives, Unit flow diagrams – significance of each unit, Aeration process- Limitations and types

Self-study component:	Design period – factors governing the design period
Practical Topics: **(6 Hours)**	1. Determination of Solids in Sewage: Total Solids, Suspended Solids, Dissolved Solids, Volatile Solids, Fixed Solids, Settleable Solids 2. Determination of Alkalinity, Acidity and pH. 3. Determination of Calcium, Magnesium and Total Hardness.

UNIT – II	**Sedimentation & Filtration**	**8 Hours**

Sedimentation - Theory, settling tanks - types and design with numerical problems, Coagulation and flocculation, types of coagulants.

Filtration: Theory of filtration, types of filters - slow sand & rapid sand filters, also its operation, cleaning & design without under drainage system (numerical problems)

Self-study component:	Combined coagulation cum sedimentation tanks. Filter - pressure filters.
Practical Topics: **(6 Hours)**	1. Jar Test for Optimum Dosage of Alum 2. Turbidity determination by Nephelometer 3. Determination of Nitrates, Fluorides & Iron by spectrophotometer.

UNIT – III	**Disinfection & Distribution systems**	**8 Hours**

Disinfection: Methods of disinfection with merits and demerits. Breakpoint chlorination. Water Softening: Lime soda & Zeolite process

Distribution systems: requirement of a good distribution system, layout of distribution systems, methods of distribution systems, Distribution reservoirs – functions, types

Self-study component:	Fluoridation and de-fluoridation. Systems of supply

Practical Topics: **(4 Hours)**	1. Determination of percentage of available chlorine in bleaching powder 2. Determination of Residual Chlorine and Chlorine Demand.

UNIT – IV	**Wastewater – Introduction & Preliminary Treatment**	**8 Hours**

Introduction: Need for sanitation, types of sewerage systems and their suitability
Treatment of municipal waste water: Waste water characteristics- physical, chemical, and biological. Sampling-significance and techniques. Significance of BOD & COD, Numerical problems on BOD
Treatment Process: flow diagram for municipal waste water Treatment unit operations and process Preliminary Treatment: Screens: types, disposal. Grit chamber, oil and grease removal

Self-study component:	Self-cleansing and non- scouring velocity
Practical Topics: **(4 Hours)**	1. Determination of Dissolved Oxygen. 2. Determination of BOD.

UNIT – V	**Wastewater treatment processes**	**8 Hours**

Treatment process: Primary & secondary settling tanks (no numerical). Suspended growth system - conventional activated sludge process and its modifications. Attached growth system – trickling filter (numerical), Principle of septic tank, stabilization ponds, oxidation ditch, Sludge digesters (aerobic and anaerobic),

Self-study component:	Self-purification phenomenon, oxygen sag curve.
Practical Topics: **(4 Hours)**	1. Determination of chlorides 2. Determination of COD

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

COs	**Course Outcomes** with ***Action verbs*** for the Course topics	**Bloom's Taxonomy Level**	**Level Indicator**
CO1	***Apply*** knowledge of mathematics to forecast population, to **determine** total quantity of water required to meet demands of community and ***understand*** various treatment processes of domestic water and municipal water. **(PO1, PSO1)**	Applying	L3
CO2	***Analyze*** the drinking water quality parameters & sewage characteristics of a community from public health consideration as per standards and ***illustrate*** ideal distribution system for the community. **(PO2, PSO2)**	Analyzing	L4
CO3	***Design*** the various units of water treatment plant & municipal water treatment plant. **(PO3, PSO2)**	Creating	L6
CO4	***Validate*** the experiment data by comparing the obtained results with the concerned guidelines and **assess** health safety of the society **(PO4, PO6, PSO3)**	Evaluating	L5
CO5	***Manage*** efficiently as an individual or lead a team and ***develop*** lifelong learning. **(PO9, PO12, PSO3)**	Creating	L6

Text Book(s):

1. S.K.Garg, Environmental Engineering vol-I, Water supply Engineering –,Khanna Publishers, New Delhi 2010.
2. B.C. Punmia& Ashok Jain,Environmental Engineering vol-I-Water supply Engineering, Lakshmi Publications (P) Ltd, New Delhi 2010.
3. S.K.Garg, Environmental Engineering vol-II, Water supply Engineering –,Khanna Publishers, New Delhi 2017
4. B.C. Punmia& Ashok Jain, Environmental Engineering vol-II- Water supply Engineering, Lakshmi Publications (P) Ltd, New Delhi 2016.

Reference Book(s):

1. Howard S. Peavey, Donald R. Rowe, George T, "Environmental Engineering" – Tata McGraw Hill, New York, Indian Edition, 2013 Publishers, New Delhi, 2009.
2. CPHEEO Manual on Water supply and treatment Engineering, Ministry of Urban Development, Government of India, New Delhi.

Web and Video link(s):

- https://youtu.be/yDnrv-oGSBc
- https://youtu.be/K4Vty0cmybI
- https://youtu.be/bCKm9KkcQtw
- https://youtu.be/mVmErXpIp64
- https://youtu.be/qXUwy5OnX9Q
- https://youtu.be/QyLdA_qhUog
- https://youtu.be/rKTwjvx7E8A
- https://youtu.be/PEX_0DebrSQ

COURSE ARTICULATION MATRIX
(PUBLIC HEALTH ENGINEERING– P21CV405)

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

3 – HIGH, 2 – MEDIUM, 1 - LOW

CONCRETE AND NON-DESTRUCTIVE TESTING LABORATORY

[As per Choice Based Credit System (CBCS) & OBE Scheme]

SEMESTER – IV

Course Code:	**P21CVL406**	**Credits:**	**01**
Teaching Hours/Week (L:T:P):	**0:0:2**	**CIE Marks:**	**50**
Total Number of Teaching Hours:	**26**	**SEE Marks:**	**50**

Course Objectives:

1. Identify the functional role of ingredients of concrete and apply this knowledge to mix design philosophy
2. Characterize the physical properties of cement and correlate with the specifications of relevant IS codes.
3. Ascertain and measure the engineering properties of fresh concrete and hardened concrete.
4. Ascertain and measure the engineering properties of Self compacted concrete
5. Able to determine the strength of structural elements by non-destructive testing methods.

SL.NO	**EXPERIMENTS**
1	Testing of cement: Specific gravity of cement, Normal Consistency, Setting time, Soundness test, fineness, Compression strength test.
2	Tests on aggregates – fine and coarse – Specific Gravity, Sieve Analysis, Moisture Content, as per Codal Requirements.
3	Concrete mix design by IS code method as per 10262-2019 & 456-2000.
4	Tests on fresh concrete: Workability tests–Slump cone test, Compaction factor test, Vee-bee Consistometer test.
5	Tests on hardened concrete: Compression strength, Split tensile Strength, flexural strength.
6	Tests on special Concrete: SELF COMPACTING CONCRETE. (S.C.C.) Fresh concrete: Slump test, Flow tests (V Funnel Test, L Box Test, U Box Test, Flow table test – T50, J-Ring test) as per EFNARC.
7	Non-destructive tests: Schmidt Rebound hammer test, Ultra sonic Pulse velocity test, Corrosion Analysis test, Cover Meter and Rebar Detectors test, core cutter test

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

COs	**Course Outcomes** with ***Action verbs*** for the Course topics	**Bloom's Taxonomy Level**	**Level Indicator**
CO1	Recall the fundamental definitions and examine and evaluate properties of cement (**PO1, PSO1)**	Applying	L3
CO2	Determine the properties of fresh concrete and hardened concrete for conventional concrete and fresh properties of self-compacting concrete **(PO1, PO2, PSO1)**	Applying	L3
CO3	Design the concrete mix for the given materials as per codal provisions **(PO1, PO3, PSO1)**	Creating	L6
CO4	Determine the Strength of structural elements and their behaviour by using NDT equipment. **(PO1, PO2, PO5, PSO2)**	Analyzing	L4

Text Book(s):

1. Concrete Technology, Theory and Practice : M. S. Shetty & A K Jain , 8th Edition, S. Chand Publishing.
2. "Neville, A.M., Properties of concrete": ELBS, London
3. Concrete Technology, THIRD EDITION, Tata McGraw-Hill Education, 2004

Reference Book(s):

1. M L Gambhir, "Concrete manual", Dhanpat Rai and sons- New Delhi
2. N. Krishnaraju, "Concrete Mix deisgn: Sehgal – Publishers

Web and Video link(s):

- Cement: https://nptel.ac.in/courses/105102012/1
- Concrete production and fresh concrete: https://nptel.ac.in/courses/105102012/19
- Engineering properties of concrete https://nptel.ac.in/courses/105102012/23
- Concrete mix design: https://nptel.ac.in/courses/105102012/14
- Special concrete: https://nptel.ac.in/courses/105102012/36

COURSE ARTICULATION MATRIX
(CONCRETE AND NON-DESTRUCTIVE TESTING LABORATORY – P21CVL406)

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO 12	PS O1	PS O2	PS O3
CO1	3												1		
CO2	2	1											1		
CO3	1		3										2		
CO4	1	1			2									2	

3 – HIGH, 2 – MEDIUM, 1 - LOW

Employability Enhancement Skills (EES) - IV
[As per Choice Based Credit System (CBCS) & OBE Scheme]
SEMESTER – IV

Course Code:	**P21HSMC408**	**Credits:**	**01**
Teaching Hours/Week (L:T:P):	**0:2:0**	**CIE Marks:**	**50**
Total Number of Teaching Hours:	**28**	**SEE Marks:**	**50**

Course Learning Objectives: This course will enable students to:

- Solve problems on ages, mixtures and alligations and progressions.
- Understand the concepts of Data interpretation, crypt arithmetic and data sufficiency.
- Understand the basic concepts of C programming language.
- Apply programming constructs of C language to solve the real-world problem.
- Explore user-defined data structures like arrays, structures and pointers in implementing solutions to the problems.
- Design and Develop solutions to problems using functions.

UNIT – I	**10 Hours**

Quantitative Aptitude: Problems on Ages, Mixtures and Alligations, Progressions.
Logical Reasoning: Data Interpretation, Cryptarithmetic, Data sufficiency.

Self-Study: Sequential output tracing

UNIT – II	**08 Hours**

C Programming: Data types and Operators, Control statements, Looping, Arrays and Strings

Self-Study: Pre-processors

UNIT – III	**10 Hours**

C Programming: Functions, Recursion, Structure, Pointers, Memory management.

Self-Study: Enum and Union

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

CO – 1:	Solve the problems based on ages, Mixtures, alligations and progressions.
CO – 2:	Apply suitable programming constructs of C language to solve the given problem.
CO – 3:	Design and Develop solutions to problems using functions and recursion.

Text Book(s):

1. Quantitative aptitude by Dr. R. S Agarwal, published by S.Chand private limited.
2. Exploring C by Yashavant Kanetkar, 2nd edition, BPB Publications
3. 3. Test Your C Skills by Yashavant Kanetkar, 2nd edition, BPB Publications

Reference Book(s):

1. Quantitative Aptitude by Arun Sharma, McGraw Hill Education Pvt Ltd
2. Reema Thareja, Programming in C, 2nd Edition, Oxford University Press, 2016.
3. Schaum's outlines, Programming with C, Byron Gottfried, 3rdEdition, Tata McGraw-Hill Publication, 2017.

Web and Video link(s):

1. NPTEL Course: Problem Solving through Programming in C, Prof. Anupam Basu, IIT Kharagpur

https://nptel.ac.in/courses/106/105/106105171/

COURSE ARTICULATION MATRIX [Employability Enhancement Skills (EES) - IV]

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	2	-	-	-	-	-	-	-	-	-	-	-
CO-2	-	2	1	-	-	-	-	-	3	1	2	2
CO-3	-	1	2	-	-	-	-	-	-	2	-	1

Internship - I

[As per Choice Based Credit System (CBCS) & OBE Scheme]

SEMESTER – IV

Course Code:	**P21INT409**	**Credits:**	**01**
Teaching Hours/Week (L:T:P):	**0 : 0 : 0**	**CIE Marks:**	**-**
Internship duration	**2 weeks**	**SEE Marks:**	**100**

All the students registered to II year of BE shall have to undergo a mandatory internship of 02 weeks during the intervening vacation of II and III semesters or III and IV semester. Internship shall include Inter / Intra Institutional activities. A Semester End Examination (Presentation followed by question-answer session) shall be conducted during IV semester and the prescribed credit shall be included in IV semester. The internship shall be considered as a head of passing and shall be considered for the award of degree. Those, who do not take up / complete the internship shall be declared fail and shall have to complete during subsequent Semester End Examination after satisfying the internship requirements. (The faculty coordinator or mentor has to monitor the students' internship progress and interact to guide them for the successful completion of the internship.)

List of Activities

1. Activities concerned with the works of Indian scholars like Charaka and Susruta, Aryabhata, Bhaskaracharya, Chanakya, Madhava, Patanjali, Panini and Thiruvalluvar, among numerous others. (Reference NEP 2020, page 04)
2. Activities such as training with higher Institutions or Soft skill training organized by Training and Placement Cell of the respective institutions.
3. Contribution at incubation/ innovation /entrepreneurship cell of the institute.
4. Participation in conferences/ workshops/ competitions etc.
5. Learning at Departmental Lab/Tinkering Lab/ Institutional workshop.
6. And working for consultancy/ research project with-in the institute. [Serial numbers 2 to 6, AICTE Internship Policy.pdf page 8]
7. Learning MS Word, Excel, Microsoft equations, MS drawing tools, MS Power point, etc.
8. Coding.
9. Mini-projects using commercially available assembled electronic products.
10. Debates, quizzes, and group discussions: On technica
11. Essay competitions: Both in Kannada and English on technical topics already studied.
12. Survey and study of published literature on the assigned topic: Technical paper survey, Preparation of synopsis. Exposure to technical paper publications.
13. Athletics and Sports.
14. Photography.
15. Short film production: Contemporary aspects, Technical aspects etc.
16. Music Competition (Vocal and Instrumental): Classical – Indian and western, Sugama- Sangeetha (Bhava Geethegalu), Folk songs, film songs etc.
17. Internship in Disaster Management. [AICTE APH 2021-22 pdf page166]

18. Solar energy connected activities that help common man. [AICTE APH 2021-22 pdf page166]
19. Working with Smart City Administration.
20. Hackathon (it is a design sprint-like event in which computer programmers and others involved in software development, including graphic designers, interface designers, project managers, and others, often including domain experts, collaborate intensively on software projects).
21. Industrial Safety, Fire Safety, Electrical Safety, Chemical Process Safety, Food Safety etc.
22. Internship and project work in Indian Knowledge System related Areas / Topics.
23. Industrial visits / small scale Industries / Factories / Cottage Industries / substation visit / short project tour, etc., and submission of report.

Documents to be submitted by Students for Internship Evaluation

I. Student's Diary

The main purpose of writing a daily diary is to cultivate the habit of documenting and to encourage the students to search for details. It develops the students' thought process and reasoning abilities. The students shall record in the daily training diary the day to day account of the observations, impressions, information gathered and suggestions given, if any, and activities carried out. It should contain the sketches and drawings related to the observations made by the students. The daily training diary should be signed after every day or at least twice a week by the Faculty/ in charge of the section (external expert) where the student has been working.

The student's Diary should be submitted by the students along with attendance record. It shall be evaluated on the basis of the following criteria:

- **(i)** Regularity in the maintenance of the diary.
- **(ii)** Adequacy and quality of information recorded.
- **(iii)** Drawings, sketches, and data recorded.
- **(iv)** Thought process and recording techniques used.
- **(v)** Organization of the information.

II. Internship Report

After completion of the Internship, the student shall prepare, with daily dairy as a reference, a comprehensive report in consultation with the evaluators to indicate what he has observed and learned in the training period along with the internship outcomes. The training report should be signed by the Evaluator.

The Internship report shall be evaluated on the basis of the following criteria and/or other relevant criteria pertaining to the activity completed.

- **(i)** Originality.
- **(ii)** Adequacy and purposeful write-up.
- **(iii)** Organization, format, drawings, sketches, style, language etc.
- **(iv)** Variety and relevance of learning experience.

Practical applications relationships with basic theory and concepts taught in the course.

Table – 1: Intra and Inter Institute Activities and Assessment Rubrics					
Sl No	**Sub Activity Head**	**Performance/ Appraisal**	**Assessment Rubrics (Allotted marks decide the letter grade)**	**Proposed Document as Evidence**	**Evaluated by**
1	Inter/Intra Institutional Workshop/ Training.	Excellent	80 to 100	**(i)** Student's Diary and **(ii)** Internship Report along with the certificate issued from relevant authorized Authority	**i)** Institute Faculty together with External Expert if any. **(ii)** Training and Placement Officer. **(iii)** Physical Education Officer or the concerned in charge Officer of the Activity
		Good	79 to 60		
		Satisfactory	59 to 40		
		Unsatisfactory and fail	<39		

Basic Engineering Mathematics - II [As per Choice Based Credit System (CBCS) & OBE Scheme] SEMESTER – IV (Lateral Entry: Common to all branches)			
Course Code:	**P21MDIP401**	**Credits:**	**00**
Teaching Hours/Week (L:T:P):	**2-2-0**	**CIE Marks:**	**100**
Total Number of Teaching Hours:	**40**	**SEE Marks:**	**-**

Course objective: The mandatory learning course **P21MADIP401** viz., **BASIC ENGINEERING MATHEMATICS-II** aims to provide essential concepts of linear algebra, introductory concepts of second & higher order differential equations along with various techniques/ methods to solve them, Laplace & inverseLaplace transforms and elementary probability theory.

UNIT – I	**8 Hours**

Linear Algebra: Introduction - Rank of matrix by elementary row operations - Echelon form of a matrix. Consistency of system of linear equations - Gauss elimination method. Gauss-Jordan and LU decomposition methods. Eigen values and Eigen vectors of a square matrix.

Self-study component:	Application of Cayley-Hamilton theorem (without proof) tocompute the inverse of a matrix-Examples.

UNIT – II	**8 Hours**

Higher order ODE's: Linear differential equations of second and higher order equations with constant coefficients. Homogeneous /non-homogeneous equations. Inverse differential operators. and variation of parameters. Solution of Cauchy's homogeneous linear equation and Legendre's linear differential equation.

Self-study component:	Method of undetermined coefficients

UNIT – III	**8 Hours**

Multiple Integrals: Double and triple integrals-region of integration. Evaluation of double integrals by change of order of integration.

Vector Integration: Vector Integration: Integration of vector functions. Concept of a line integrals, surface and volume integrals. Green's, Stokes's and Gauss theorems (without proof) problems.

Self-study component:	Orthogonal curvilinear coordinates.

UNIT – IV	**8 Hours**

Laplace transforms: Laplace transforms of elementary functions. Transforms of derivatives and integrals, transforms of periodic function and unit step function-Problems only. Inverse Laplace transforms: Definition of inverse Laplace transforms. Evaluation of Inverse transforms by standard methods.

Self-study component:	Application to solutions of linear differential equations and simultaneous differential equations.

UNIT – V	**8 Hours**

Probability: Introduction. Sample space and events. Axioms of probability. Addition and multiplication theorems. Conditional probability – illustrative examples.

Self-study component:	State and prove Bayes's theorem.

Course Outcomes: After the successful completion of the course, the students are able to

CO1	**Apply** matrix theory for solving systems of linear equations in the different areas of linear algebra.
CO2	**Solve** second and higher order differential equations occurring in of electrical circuits, damped/un-damped vibrations.
CO3	**Identify** - the technique of integration to evaluate double and triple integrals by change of variables, and vector integration technique to compute line integral
CO4	**Explore** the basic concepts of elementary probability theory and, apply the same to the problems ofdecision theory.

TEXT BOOKS

1. B.S. Grewal, Higher Engineering Mathematics (44th Edition), Khanna Publishers, New Delhi.
2. B.V. Ramana, Higher Engineering Mathematics, Tata McGraw Hill publications, New Delhi, 11thReprint, 2010.

REFERENCE BOOKS

1. Erwin Kreyszig, Advanced Engineering Mathematics (Latest Edition), Wiley Publishers, New Delhi.
2. H. C. Taneja, Advanced Engineering Mathematics, Volume I & II, I.K. International Publishing HousePvt. Ltd., New Delhi.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint,2010.
4. V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, Affiliated East–Westpress, Reprint 2005.
5. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005

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

Strength of correlation: Low-1, Medium- 2, High-3

Employability Enhancement Skills (EES) - II
[As per Choice Based Credit System (CBCS) & OBE Scheme]
SEMESTER – IV

Course Code:	**P21HDIP408**	**Credits:**	**01**
Teaching Hours/Week (L:T:P):	**0:2:0**	**CIE Marks:**	**100**
Total Number of Teaching Hours:	**28**	**SEE Marks:**	**-**

Course Learning Objectives: This course will enable students to:

- Get introduced to the concepts of teamwork and leadership
- Understand the importance of professional etiquettes
- Describe the reading with comprehension
- Explain the purpose, plan and ways to identify specific details in a paragraph for better comprehension
- Form grammatically correct sentences
- Explain the basic concepts in calculating simple interest and compound interest
- Explain concepts behind logical reasoning modules of direction sense, coding & decoding, series and visual reasoning

UNIT – I	**10 Hours**

Soft Skills: Etiquette, Presentation Skills, Introduction to Body Language, Interpersonal and Intrapersonal Skills, Team work, Leadership skills, Extempore

Self-Study: Concepts of Sympathy and Empathy

UNIT – II	**10 Hours**

Verbal Ability: Verbal Analogies, Sentence completion & correction, Reading comprehension

Self-Study: Paragraph sequencing

UNIT – III	**8 Hours**

Quantitative Aptitude: Simple & Compound Interest, Ratio & Proportion, Time & Work
Logical Reasoning: Direction Sense, Coding and Decoding, Series, Visual reasoning

Self-Study: Directions and Pythagoras Theorem, differences between mirror and water images

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

CO – 1: Exhibit amplified level of confidence to express themselves in English

CO – 2: Critical awareness of the importance of teamwork and development of the skills for building effective teams

CO – 3: Solve the questions under reading comprehension confidently with higher accuracy

CO – 4: Solve the problems based on interest, ratio & proportion, time & work

CO – 5: Solve logical reasoning problems based on direction sense, coding & decoding and series

Text Book(s):

1. Word Power Made Easy New Revised and Expanded Edition, First Edition, Norman Lewis, Goyal Publisher.
2. Essential English Grammar by Raymond Murphy, Cambridge University Press, new edition
3. The 7 habits of Highly Effective People by Stephen R. Covey
4. Quantitative aptitude by Dr. R. S Agarwal, published by S.Chand private limited.
5. Verbal reasoning by Dr. R. S Agarwal , published by S. Chand private limited.

Reference Book(s):

1. Quantitative Aptitude by Arun Sharma, McGraw Hill Education Pvt Ltd
2. CAT Mathematics by Abhijith Guha, PHI learning private limited.

Web and Video link(s):

1. Teamwork Skills: Communicating Effectively in Groups
   https://www.coursera.org/learn/teamwork-skills-effective-communication

COURSE ARTICULATION MATRIX [Employability Enhancement Skills (EES) - II]

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	-	-	-	-	-	-	-	-	2	3	-	2
CO-2	-	-	-	-	-	-	-	-	3	1	2	2
CO-3	-	-	-	-	-	-	-	-	-	2	-	1
CO-4	2	-	-	-	-	-	-	-	-	-	-	-
CO-5	2	-	-	-	-	-	-	-	-	-	-	-

BE – III / IV Semester – Common to all

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ

ವಿಷಯ ಸಂಕೇತ (**Course Code**)	**P21KSK307/407**	ನಿರಂತರ ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನ ಅಂಕಗಳು	**50**
ಒಂದು ವಾರಕ್ಕೆ ಬೋಧನಾ ಅವಧಿ **Teachin Hours / Week (L:T:P)**	**0-2-0**	ಸೆಮಿಸ್ಟರ್ ಅಂತ್ಯದ ಪರೀಕ್ಷೆಯ ಅಂಕಗಳು	**50**
ಒಟ್ಟು ಬೋಧನ ಅವಧಿ	**25 ಗಂಟೆಗಳು**	ಒಟ್ಟು ಅಂಕಗಳು	**100**
ಕ್ರೆಡಿಟ್ಸ್ (**Credits**)	**1**	ಪರೀಕ್ಷೆಯ ಅವಧಿ	**01 ಗಂಟೆ**

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಪಠ್ಯದ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು:

೧. ವೃತ್ತಿಪರ ಪದವಿ ವಿದ್ಯಾರ್ಥಿಗಳಾಗಿರುವುದರಿಂದ ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡದ ಸಾಂಸ್ಕೃತಿಯ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.

೨. ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಪ್ರಧಾನ ಭಾಗವಾದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ಸಾಂಕೇತಿಕವಾಗಿ ಪರಿಚಹಯಿಸಿ ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಾಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಅರಿವು ಹಾಗೂ ಆಸಕ್ತಿಯನ್ನು ಮೂಡಿಸುವುದು.

೩. ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯವನ್ನು ಹಾಗೂ ಅವರುಗಳ ಸಾಧಿಸಿದ ವಿಷಯಗಳನ್ನು ಪರಿಚಯಿಸುವುದು

೪. ಕನ್ನಡ ಶಬ್ದಸಂಪತ್ತಿನ ಪರಿಚಯ ಮತ್ತು ಕನ್ನಡ ಭಾಷಿಯ ಬಳಕಿ ಹಾಗೂ ಕನ್ನಡದಲ್ಲಿ ಪತ್ರ ವ್ಯವಹಾರವನ್ನು ತಿಳಿಸಿಕೊಡುವುದು.

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವ್ಯವಸ್ಥೆ (Teaching-Learning Process – General Instructions):

These are sample Strategies, which teacher can use to accelerate the attainment of the course outcomes.

೧. ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡವನ್ನು ಬೋಧಿಸಲು ತರಗತಿಯಲ್ಲಿ ಶಿಕ್ಷಕರು ಪ್ರಸ್ತುತ ಪುಸ್ತಕ ಆಧಾರಿಸಿ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನವನ್ನು ಅನುಸರಿಸುವುದು. ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ತಯಾರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಪ್ರೇರೇಪಿಸುವುದು ಮತ್ತು ತರಗತಿಯಲ್ಲಿ ಅವುಗಳನ್ನು ಚರ್ಚಿಸಲು ಅವಕಾಶ ಮಾಡಿಕೊಡುವುದು.

೨. ಇತ್ತೀಚಿನ ತಂತ್ರಜ್ಞಾನದ ಅನುಕೂಲಗಳನ್ನು ಬಳಸಿಕೊಳ್ಳುವುದು – ಅಂದರೆ ಕವಿ–ಕಾವ್ಯ ಪರಿಚಯದಲ್ಲಿ ಕವಿಗಳ ಚಿತ್ರಣ ಮತ್ತು ಲೇಖನಗಳು ಮತ್ತು ಕಥೆ ಕಾವ್ಯಗಳ ಮೂಲ ಅಂಶಗಳಿಗೆ ಸಂಬಂಧಪಟ್ಟ ಧ್ವನಿ ಚಿತ್ರಗಳು, ಸಂಭಾಷಣೆಗಳು, ಈಗಾಗಲೇ ಇತರ ವಿಮರ್ಶಕರು ಬರೆದಿರುವ ವಿಮರ್ಶಾತ್ಮಕ ವಿಷಯಗಳನ್ನು ಟಿಪಿಟಿ, ಡಿಜಿಟಲ್ ಮಾಧ್ಯಮಗಳ ಮುಖಾಂತರ ವಿಶ್ಲೇಷಿಸುವುದು.

೩. ನವೀನ ಮಾದರಿಯ ಸಾಹಿತ್ಯ ಬೋಧನೆಗೆ ಸಂಬಂಧಪಟ್ಟ ವಿಧಾನಗಳನ್ನು ಶಿಕ್ಷಕರು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಅನುಕೂಲವಾಗುವ ರೀತಿಯಲ್ಲಿ ಅಳವಡಿಸಿಕೊಳ್ಳಬಹುದು.

ಘಟಕ – ೧ ಲೇಖನಗಳು

೧. ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ – ಹಂಪ ನಾಗರಾಜಯ್ಯ

೨. ಕರ್ನಾಟಕದ ಏಕೀಕರಣ : ಒಂದು ಅಪೂರ್ವ ಚರಿತ್ರೆ – ಜಿ. ವೆಂಕಟಸುಬ್ಬಯ್ಯ

೩. ಆಡಳಿತ ಭಾಷೆಯಾಗಿ ಕನ್ನಡ – ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ ಮತ್ತು ಪ್ರೋ. ವಿ. ಕೇಶವಮೂರ್ತಿ

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	**ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವಿಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.**

ಘಟಕ – ೨ ಆಧುನಿಕ ಪೂರ್ವದ ಕಾವ್ಯ ಭಾಗ	
೧. ವಚನಗಳು: ಬಸವಣ್ಣ, ಅಕ್ಕಮಹದೇವಿ, ಅಲ್ಲಮಪ್ರಭು, ಆಯ್ದಕ್ಕಿ ಮಾರಯ್ಯ, ಜೇಡರದಾಸಿಮಯ್ಯ, ಆಯ್ದಕ್ಕಿ ಲಕ್ಕಮ್ಮ. ೨. ಕೀರ್ತನೆಗಳು: ಅದರಿಂದೇನು ಫಲ ಇದರಿಂದೇನು ಫಲ – ಪುರಂದರದಾಸರು ತಲ್ಲಣಿಸದಿರು ಕಂಡ್ಯ ತಾಳು ಮನವೇ – ಕನಕದಾಸರು ೩. ತತ್ವಪದಗಳು: ಸಾವಿರ ಕೊಡಗಳ ಸುಟ್ಟು – ಶಿಶುನಾಳ ಶರೀಫ	
ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	**ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವಿಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.**
ಘಟಕ – ೩ ಆಧುನಿಕ ಕಾವ್ಯಭಾಗ	
೧. ಡಿವಿಜಿ ರವರ ಮಂಕುತಿಮ್ಮನ ಕಗ್ಗದಿಂದ ಆಯ್ದ ಕೆಲವು ಭಾಗಗಳು ೨. ಕುರುಡು ಕಾಂಚಾಣ: ದಾ.ರಾ. ಬೇಂದ್ರೆ ೩. ಹೊಸಬಾಳಿನ ಗೀತೆ: ಕುವೆಂಪು	
ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	**ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವಿಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.**
ಘಟಕ – ೪ ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯ	
೧. ಡಾ. ಸರ್. ಎಂ. ವಿಶ್ವೇಶ್ವರಯ್ಯ: ವ್ಯಕ್ತಿ ಮತ್ತು ಐತಿಹ್ಯ – ಎ ಎನ್ ಮೂರ್ತಿರಾವ್ ೨. ಕರಕುಶಲ ಕಲೆಗಳು ಮತ್ತು ಪರಂಪರೆಯ ವಿಜ್ಞಾನ: ಕರೀಗೌಡ ಬೀಚನಹಳ್ಳಿ	
ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	**ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವಿಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.**
ಘಟಕ – ೫ ಕಥೆ ಮತ್ತು ಪ್ರವಾಸ ಕಥನ	
೧. ಯುಗಾದಿ: ವಸುಧೇಂದ್ರ ೨. ಮೆಗಾನೆ ಎಂಬ ಗಿರಿಜನ ಪರ್ವತ: ಹಿ.ಚಿ. ಬೋರಲಿಂಗಯ್ಯ	
ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	**ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವಿಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.**

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಕಲಿಕೆಯಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಆಗುವ ಪರಿಣಾಮಗಳು (Course Outcomes)

೧. ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡದ ಸಂಸ್ಕೃತಿಯ ಪರಿಚಯವಾಗುತ್ತದೆ.
೨. ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳು ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಆಸಕ್ತಿಯು ಮೂಡುತ್ತದೆ.
೩. ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯವಾಗುತ್ತದೆ.
೪. ಕನ್ನಡ ಭಾಷಾಭ್ಯಾಸ, ಸಾಮಾನ್ಯ ಕನ್ನಡ ಹಾಗೂ ಆಡಳಿತ ಕನ್ನಡದ ಪದಗಳ ಪರಿಚಯವಾಗುತ್ತದೆ.

ಮೌಲ್ಯಮಾಪನದ ವಿಧಾನ (Assessment Details – both CIE and SEE)

(methods of CIE – MCQ, Quizzes, Open book test, Seminar or micro project)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The student has to obtain a minimum of 40% marks individually both in CIE and 35% marks in SEE to pass. Theory Semester End Exam (SEE) is conducted for 50 marks (01 hour duration). Based on this grading will be awarded.

Continuous Internal Evaluation:

Two Tests each of **40 Marks (duration 01 hour)**

Two assignments each of **10 Marks**

CIE methods / question paper is designed to attain the different levels of Blomm's taxonomy as per the outcome defined for the course.

ಸೆಮಿಸ್ಟರ್ ಅಂತ್ಯದ ಪರೀಕ್ಷೆಯು ಈ ಕೆಳಗಿನಂತಿರುತ್ತದೆ – Semester end Exam

SEE will be conducted as per the scheduled timetable, with common question papers for the subject,

1. The question paper will have 25 questions. Each question is set for 02 marks.
2. SEE Pattern will be in MCQ Model for 50 marks. Duration of the exam is 01 hour.

ಪಠ್ಯ ಪುಸ್ತಕ:

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ
ಡಾ. ಹಿ.ಚಿ. ಬೋರಲಿಂಗಯ್ಯ ಮತ್ತು ಎಲ್. ತಿಮ್ಮೇಶ,
ಪ್ರಸಾರಾಂಗ, ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ

BE – III / IV Semester – Common to all

ಬಳಕೆ ಕನ್ನಡ – Balake Kannada (Kannada for Usage) **ಕನ್ನಡ ಕಲಿಕೆಗಾಗಿ ನಿಗದಿಪಡಿಸಿದ ಪಠ್ಯಪುಸ್ತಕ – (Prescribed Textbook to Learn Kannada)**			
ವಿಷಯ ಸಂಕೇತ (**Course Code**)	**P21KBK307/407**	ನಿರಂತರ ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನ ಅಂಕಗಳು	**50**
ಒಂದು ವಾರಕ್ಕೆ ಬೋಧನಾ ಅವಧಿ **Teachin Hours / Week (L:T:P)**	**0-2-0**	ಸೆಮಿಸ್ಟರ್ ಅಂತ್ಯದ ಪರೀಕ್ಷೆಯ ಅಂಕಗಳು	**50**
ಒಟ್ಟು ಬೋಧನ ಅವಧಿ	**25 ಗಂಟೆಗಳು**	ಒಟ್ಟು ಅಂಕಗಳು	**100**
ಕ್ರೆಡಿಟ್ಸ್ (**Credits**)	**1**	ಪರೀಕ್ಷೆಯ ಅವಧಿ	**01 ಗಂಟೆ**

ಬಳಕೆ ಕನ್ನಡ ಪಠ್ಯದ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು (Course Learning Objectives):

- To create the awareness regarding the necessity of learning local language for comfortable and healthy life.
- To enable learners to Listen and understand the Kannada language properly.
- To speak, read and write Kannada language as per requirement.
- To rain the learners for correct and polite conservation.

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವ್ಯವಸ್ಥೆ (Teaching-Learning Process – General Instructions):

These are sample Strategies, which teacher can use to accelerate the attainment of the course outcomes.

೧. ಬಳಕೆ ಕನ್ನಡವನ್ನು ತರಗತಿಯಲ್ಲಿ ಶಿಕ್ಷಕರು ಬೋಧಿಸಲು ವಟಿಯು ಸೂಚಿಸಿರು ಪಠ್ಯಪುಸ್ತಕವನ್ನು ಉಪಯೋಗಿಸಬೇಕು.

೨. ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್ ಗಳನ್ನು ತಯಾರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಉತ್ತೇಜಿಸುವುದು ಮತ್ತು ತರಗತಿಯಲ್ಲಿ ಅವುಗಳನ್ನು ಚರ್ಚಿಸಲು ಅವಕಾಶ ಮಾಡಿಕೊಡುವುದು.

೩. ಪ್ರತಿ ವಿದ್ಯಾರ್ಥಿ ಪುಸ್ತಕವನ್ನು ತರಗತಿಯಲ್ಲಿ ಬಳಸುವಂತೆ ನೋಡಿಕೊಳ್ಳುವುದು ಮತ್ತು ಪ್ರತೆ ಪಾಠ ಮತ್ತು ಪ್ರವಚನಗಳ ಮೂಲ ಅಂಶಗಳಿಗೆ ಸಂಬಂಧಪಟ್ಟಂತೆ ಪೂರಕ ಚಟುವಟಿಕೆಗಳಿಗೆ ತೊಡಗಿಸತಕ್ಕದ್ದು.

೪. ಡಿಜಿಟಲ್ ತಂತ್ರಜ್ಞಾನದ ಮುಖಾಂತರ ಇತ್ತೀಚೆಗೆ ಡಿಜಿಟಲೀಕರಣಗೊಂಡಿರುವ ಭಾಷೆ ಕಲಿಕೆಯ ವಿಧಾನಗಳನ್ನು ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ಮುಖಾಂತರ ಚರ್ಚಿಸಲು ಕ್ರಮಕೈಗೊಳ್ಳುವುದು. ಇದರಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ತರಗತಿಯಲ್ಲಿ ಹೆಚ್ಚು ಏಕಾಗ್ರತೆಯಿಂದ ಪಾಠ ಕೇಳಲು ಮತ್ತು ಅಧ್ಯಯನದಲ್ಲಿ ತೊಡಗಲು ಅನುಕೂಲವಾಗುತ್ತದೆ.

೫. ಭಾಷಾಕಲಿಕೆಯ ಪ್ರಯೋಗಾಲಯದ ಮುಖಾಂತರ ಬಹುಬೇಗ ಕನ್ನಡ ಭಾಷೆಯನ್ನು ಕಲಿಯಲು ಅನುಕೂಲವಾಗುವಂತೆ ಕಾರ್ಯಚಟುವಟಿಕೆಗಳನ್ನು ಮತ್ತು ಕ್ರಿಯಾ ಯೋಜನೆಗಳನ್ನು ರೂಪಿಸುವುದು.

Module - 1

1. Introduction, Necessity of learning a local language. Methods to learn the Kannada language.
2. Easy learning of a Kannada Language: A few tips. Hints for correct and polite conservation, Listening and Speaking Activites
3. Key to Transcription.
4. ವೈಯಕ್ತಿಕ, ಸ್ವಾಮ್ಯಸೂಚಕ / ಸಂಬಂಧಿತ ಸಾರ್ವನಾಮಗಳು ಮತ್ತು ಪ್ರಶ್ನಾರ್ಥಕ ಪದಗಳು –Personal Pronouns, Possessive Forms, Interrogative words

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	**ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವಿಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.**

Module - 2	
೧. ನಾಮಪದಗಳ ಸಂಬಂಧಾರ್ಥಕ ರೂಪಗಳು, ಸಂದೇಹಾಸ್ಪದ ಪ್ರಶ್ನೆಗಳು ಮತ್ತು ಸಂಬಂಧವಾಚಕ ನಾಮಪದಗಳು – Possessive forms of nouns, dubitive question and Relative nouns ೨. ಗುಣ, ಪರಿಮಾಣ ಮತ್ತು ವರ್ಣಬಣ್ಣ ವಿಶೇಷಣಗಳು, ಸಂಖ್ಯಾವಾಚಕಗಳು Qualitative and Colour Adjectives, Numerals ೩. ಕಾರಕ ರೂಪಗಳು ಮತ್ತು ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು – ಸಪ್ತಮಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯ – (ಆ, ಅದು, ಅವು, ಅಲ್ಲಿ) Predictive Forms, Locative Case	
ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	**ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವಿಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.**
Module - 3	
೧. ಚತುರ್ಥಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯದ ಬಳಕೆ ಮತ್ತು ಸಂಖ್ಯಾವಾಚಕಗಳು – Dative Cases, and Numerals ೨. ಸಂಖ್ಯಾಗುಣವಾಚಕಗಳು ಮತ್ತು ಬಹುವಚನ ನಾಮರೂಪಗಳು – Ordinal numerals and Plural markers ೩. ನ್ಯೂನ / ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾಪದಗಳು ಮತ್ತು ವರ್ಣ ಗುಣವಾಚಕಗಳು – Defective / Negative Verbs and Colour Adjectives	
ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	**ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವಿಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.**
Module - 4	
೧. ಅಪ್ಪಣೆ / ಒಪ್ಪಿಗೆ, ನಿರ್ದೇಶನ, ಪ್ರೋತ್ಸಾಹ ಮತ್ತು ಒತ್ತಾಯ ಅರ್ಥರೂಪ ಪದಗಳು ಮತ್ತು ವಾಕ್ಯಗಳು Permission, Commands, encouraging and Urging words (Imperative words and sentences) ೨. ಸಾಮಾನ್ಯ ಸಂಭಾಷಣೆಗಳಲ್ಲಿ ದ್ವಿತೀಯ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ಸಂಭವನೀಯ ಪ್ರಕಾರಗಳು Accusative Cases and Potential Forms used in General Communication ೩. "ಇರು ಮತ್ತು ಇರಲ್ಲ" ಸಹಾಯಕ ಕ್ರಿಯಾಪದಗಳು, ಸಂಭಾವ್ಯಸೂಚಕ ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾ ಪದಗಳು – Helping Verbs "iru and iralla", Corresponding Future and Negation Verbs ೪. ಹೋಲಿಕೆ (ತರತಮ), ಸಂಬಂಧ ಸೂಚಕ ಮತ್ತು ವಸ್ತು ಸೂಚಕ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಪದಗಳ ಬಳಕೆ – Comparative, Relationship, Identification and Negation Words	
ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	**ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವಿಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.**
Module - 5	
೧. ಕಾಲ ಮತ್ತು ಸಮಯದ ಹಾಗೂ ಕ್ರಿಯಾಪದಗಳ ವಿವಿಧ ಪ್ರಕಾರಗಳು – ifferint types of forms of Tense, Time and Verbs ೨. ದ್, –ತ್, –ತು, –ಇತು, –ಆಗಿ, –ಅಲ್ಲ, –ಗ್, –ಕ್, ಇದೆ, ಕ್ರಿಯಾ ಪ್ರತ್ಯಯಗಳೊಂದಿ ಭೂತ, ಭವಿಷ್ಯತ್ ಮತ್ತು ವರ್ತಮಾನ ಕಾಲ ವಾಕ್ಯ ರಚನೆ – Formation of past, Future and Present Tense Sentences with Verb Forms ೩. Kannada Vocabulary List : ಸಂಭಾಷಣೆಯಲ್ಲಿ ದಿನೋಪಯೋಗಿ ಕನ್ನಡ ಪದಗಳು – Kannada Words in Conversation	
ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	**ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವಿಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.**

ಬಳಕೆ ಕನ್ನಡ ಪಠ್ಯದ ಕಲಿಕೆಯಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಆಗುವ ಅನುಕೂಲಗಳು ಮತ್ತು ಫಲಿತಾಂಶಗಳು : Course Outcomes (Course Skill Set): At the end of the Couse, The Students will be able

1. To understand the necessity of learning of local language for comfortable life.
2. To Listen and understand the Kannada language properly.
3. To speak, read and write Kannada language as per requirement.
4. To communicate (converse) in Kannada language in their daily life with kannada speakers.
5. To speak in polite conservation.

(**Assessment Details – both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and aearned the credits allotted to each subject / course if the student secures not less than 35% (18 Marks out of 50) in the semester – end examination (SEE), and a minimum of 40% (40 maeks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation:

Two Tests each of **40 Marks (duration 01 hour)**

Two assignments each of **10 Marks**

CIE methods / question paper is designed to attain the different levels of Blomm's taxonomy as per the outcome defined for the course.

ಸೆಮಿಸ್ಟರ್ ಅಂತ್ಯದ ಪರೀಕ್ಷೆಯು ಈ ಕೆಳಗಿನಂತಿರುತ್ತದೆ – Semester end Exam (SEE)

SEE will be conducted as per the scheduled timetable, with common question papers for the subject,

1. The question paper will have 25 questions. Each question is set for 02 marks.
2. SEE Pattern will be in MCQ Model for 50 marks. Duration of the exam is 01 hour.

ಪಠ್ಯ ಪುಸ್ತಕ (Text book) :

ಬಳಕೆ ಕನ್ನಡ

ಲೇಖಕರು: ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ,

ಪ್ರಸಾರಾಂಗ, ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ

BE – III / IV Semester – Common to all

Constitution of India and Professional Ethics (CIP)			
Course Code	**P21CIP307/407**	**CIE Marks**	**50**
Teachin Hours / Week (L:T:P)	**0-2-0**	**SEE Marks**	**50**
Total Hours of Pedagogy	**25 Hours**	**Total Marks**	**100**
Credits	**1**	**Exam Hours**	**01 Hour**

Course Objectives: This course will enable the students

a. To know the fundamental political structure & codes, procedures, powers, and duties of Indian government institutions, fundamental rights, directive principles, and the duties of citizens.

b. To understand engineering ethics and their responsibilities, identify their individual roles and ethical responsibilities towards society.

Teaching-Learning Process (General Instructions)
These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

- ✓ Teachers shall adopt suitable pedagogy for effective teaching - learning process. The pedagogy shall involve thecombination of different methodologies which suit modern technological tools and software's to meet the present requirements of the Global employment market.
  - (i) Direct instructional method (Low /Old Technology),
  - (ii) Flipped classrooms (High/advanced Technological tools),
  - (iii) Blended learning (combination of both),
  - (iv) Enquiry and evaluation based learning,
  - (v) Personalized learning,
  - (vi) Problems based learning through discussion,
  - (vii) Following the method of expeditionary learning Tools and techniques,

1. Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adapted so that the delivered lesson can enhance the students in theoretical applied andpractical skills in teaching of 21CIP39/49 in general.

Module - 1

Introduction to Indian Constitution: Definition of Constitution, Necessity of the Constitution, Societies before and after the Constitution adoption. Introduction to the Indian constitution, Making of the Constitution,Role of the Constituent Assembly. Preamble of Indian Constitution & Key concepts of the Preamble. Salientfeatures of India Constitution.

Teaching-Learning Process	Chalk and talk method, Videos, Power Point presentation to teach. Creating real time stations in classroom discussions, Giving activities and assignments (Connecting Campus & community withadministration real time situations).

Module - 2	
Fundamental Rights (FR's), Directive Principles of State Policy (DPSP's) and Fundamental Duties (FD's): Fundamental Rights and its Restriction and limitations in different Complex Situations. DPSP's and its present relevance in Indian society. Fundamental Duties and its Scope and significance inNation building.	
Teaching-Learning Process	Chalk and talk method, Videos, Power Point presentation to teach. Creating real time stations in classroom discussions, Giving activities and assignments (Connecting Campus & community withadministration real time situations).
Module - 3	
Union Executive: Parliamentary System, Union Executive – President, Prime Minister, Union Cabinet, Parliament - LS and RS, Parliamentary Committees, Important Parliamentary Terminologies. Supreme Courtof India, Judicial Reviews and Judicial Activism.	
Teaching-Learning Process	Chalk and talk method, Videos, Power Point presentation to teach. Creating real time stations in classroom discussions, Giving activities and assignments (Connecting Campus & community withadministration real time situations).
Module - 4	
State Executive & Elections, Amendments and Emergency Provisions: State Executive, Election Commission, Elections & Electoral Process. Amendment to Constitution (Why and How) and Important Constitutional Amendments till today. Emergency Provisions.	
Teaching-Learning Process	Chalk and talk method, Videos, Power Point presentation to teach. Creating real time stations in classroom discussions, Giving activities and assignments (Connecting Campus & community withadministration real time situations).
Module - 5	
Professional Ethics: Definition of Ethics & Values. Professional & Engineering Ethics. Positive andNegative aspects of Engineering Ethics. Clash of Ethics, Conflicts of Interest. The impediments to Responsibility. Professional Risks, Professional Safety and liability in Engineering. Trust & Reliability inEngineering, Intellectual Property Rights (IPR's).	
Teaching-Learning Process	Chalk and talk method, Videos, Power Point presentation to teach. Creating real time stations in classroom discussions, Giving activities and assignments (Connecting Campus & community withadministration real time situations).

Course outcome (Course Skill Set)

At the end of the course the student should :

CO 1: Have constitutional knowledge and legal literacy.

CO 2: Understand Engineering and Professional ethics and responsibilities of Engineers.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks that is 20 marks. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE and SEE taken together

Continuous Internal Evaluation:

Two Tests each of **40 Marks (duration 01 hour**)

Two assignments each of **10 Marks**

The average of two tests, two assignments, and quiz/seminar/group discussion will be out of 50 marks

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per theoutcome defined for the course.

Semester End Examination:

SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject.

- The question paper will have 25 questions. Each question is set for 02 marks.
- SEE Pattern will be in MCQ Model (Multiple Choice Questions) for 50 marks. Duration of the examination is 01 Hour.

Textbook:

1. **"Constitution of India & Professional Ethics"** Published by Prasaranga or published onVTU website with the consent of the university authorities VTU Belagavi.