



Mysore University  
School of Engineering  
ಮೈಸೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ  
ಸಾಂಸ್ಥಿಕ ಶಾಲೆ



University of Mysore  
**Mysore University School of Engineering**

Manasagangotri, Mysuru – 570 006

Mob:9845155757; email: [doddi43@gmail.com](mailto:doddi43@gmail.com)

**Prof. B. Shankar**  
**Chairman, BoS in Civil Environmental Engineering**

No. MUSE/ /2022-23 /2301

Dated 13 Sept. 2022

To  
The Registrar,  
(Syndicate Section)  
University of Mysore  
Crawford Hall  
Mysuru

ole

Sir,

Sub: **Proceeding of BoS in Civil Environmental Engineering-reg**  
Ref: No UA2 /134/2021-22 dated 08-09-2022

With reference to the above subject, I am herewith enclosing the **Proceeding of Board of Studies in BoS in Civil Environmental Engineering** held on **13.09.2022** at 10.00 AM along with (1) **Scheme, Syllabus and Regulations**, (2) **Panel of Examiners** for 2022-23 both **hard and soft copies**.

Yours faithfully,

(Prof. B. Shankar)

Chairman

BoS in Civil Environmental Engineering

**MYSORE UNIVERSITY**  
**SCHOOL OF ENGINEERING**  
**MANASAGANGOTRI**  
**MYSURU-06**

CC to: The Dy. Registrar, Academic, University of Mysore, Mysore

**CHAIRPERSON**  
**BOS IN CEE**  
**MUSE**  
**MGM-06**



**Proceeding of the Board of Studies in Civil Environmental Engineering of Mysore University School of Engineering held on 13<sup>th</sup> Sept. 2022 at 10.00 AM at Vijnana Bhavan, Manasagangotri, Mysuru – 570 006.**

**Members Present**

1. Prof. B. Shankar,	Chairman
2. Prof. Ananthapadmanabha T	Member
3. Prof. Nagaraj M K	Member
4. Prof. Naveen G M	Member
5. Dr. Punith B. Kotagi	Member
6. Prof. Manoj Kumar B	Member
7. Prof. Sadhashiva Murthy B M	Member
8. Prof. Anjaneyappa	Member

**Members Absent**

1. Dr. Asha G	Member
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The Chairman welcomed the members present in the meeting. The following agenda was taken up for discussion.

**Agenda 1: Scheme from III to VIII Semesters for B.E. in Civil Environmental Engineering.**

The Chairman explained that the Scheme has been framed on the lines of guidelines of AICTE/VTU and within the framework of NEP – 2020 from III to VIII. The Scheme to include the Basic Science Courses (BSC), Engineering Science Courses (ESC), Professional Core Courses(PCC), Professional Elective Courses (PEC), Open Elective Courses (OEC), Integrated Professional Core Courses (IPCC), Project Work, Internship (INT), Non-Credit Mandatory Courses (NCMC), Ability Enhancement Course (AEC), Universal Human Value Courses (UHV) and Languages. The Members of the Board examined and approved the Scheme for B.E.Civil Environmental Engineering from III Semester to VIII Semester within the ambit of 160 credits for the entire B.E. course. The Scheme is enclosed in the **Annexure I**.

**Agenda 2: Syllabus for III and IV semesters B.E. Civil Environmental Engineering**

The Members of the Board has examined, discussed and approved the Syllabus for III and IV semester B.E. Civil Environmental Engineering Course. The Syllabus is enclosed in the **Annexure II**.

**Agenda 3: Regulations Governing the B.E Courses of Mysore University School of Engineering.**

The Board has examined and discussed the draft Regulations Governing the B.E Courses of Mysore University School of Engineering(MUSE). The members of the Board taken note of VTU's implementation of NEP 2020. The Board also examined AICTE's letter dated 06.07.2022 for implementation of Credit Framework for the Movement from Professional/Vocational Education to Engineering and Technology and approve to incorporate the credit framework. The Board approved Regulations which governs B.E. courses of MUSE, UoM and enclosed in the **Annexure III**.

**Agenda 4: Panel of Examiners for 2022-23**

The Board has prepared and approved Panel of Examiners for the year 2022-23 (Annexure IV)

**Agenda 5: Any Other subject with the permission of Chair: Nil**

The meeting ended with a word of thanks.

*B. S. Shankar*  
(Prof. B. Shankar)  
Chairman  
BoS in Civil Environmental Engineering  
**CHAIRPERSON**  
**BOS IN CEE**  
**MUSE**  
**MGM - 06**

SI No	Name	Chairman/ Member	Signature
1	Prof. Shankar B	Chairman	<i>B. S. Shankar</i>
2	Prof. Ananthapadmanabha T	Member	<i>Ananthapadmanabha T</i>
3	Prof. Naveen G M	Member	<i>Naveen G M</i>
4	Dr. Punith B Kotagi	Member	<i>Punith B Kotagi</i>
5	Prof. M. K. Nagaraj	Member	<i>M. K. Nagaraj</i>
6	Prof. Anjaneyappa	Member	<i>Anjaneyappa</i>
7	Prof. B. Manoj Kumar	Member	<i>B. Manoj Kumar</i> 13/09/2022
8	Prof. B. M. Sadashiva Murthy	Member	<i>B. M. Sadashiva Murthy</i> 13/9/22



# MYSORE UNIVERSITY SCHOOL OF ENGINEERING

Scheme of Teaching and Examination 2021-2022 (As per NEP-2020)

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

(Effective from the academic year 2021-2022)

## B.E in CIVIL ENVIRONMENTAL ENGINEERING [CEE]



### III SEMESTER

Sl No	Course & Course Code		Course Title	Teaching Dept.	Paper Setting Board	Teaching Hours/week			Examination				Credits
						Theory Lectures	Tutorial	Practical/Drawing	Duration in Hours	CIE Marks	SEE Marks	Total Marks	
						L	T	P					
1	BSC	21MAT31	Engineering Mathematics-III	Basic Science	Basic Science	2	2	0	03	50	50	100	3
2	IPCC	21CV32	Surveying and Geomatics	CEE	CEE	3	0	2	03	50	50	100	4
3	IPCC	21CV33	Earth Resources Engineering	CEE	CEE	3	0	2	03	50	50	100	4
4	PCC	21CV34	Building Materials & Construction	CEE	CEE	3	0	0	03	50	50	100	3
5	IPCC	21CV35	Strength of Materials	CEE	CEE	3	0	2	03	50	50	100	4
6	PCC	21CVL36	Computer Aided Building Drawing	CEE	CEE	2	0	2	04	50	50	100	2
7	BSC	21CIV37	Environmental Studies	CEE	CEE	1	0	0	0	50	-	50	1
8	UHV	21UHV38	Universal Human Values and Professional Ethics	Basic Science	Basic Science	1	0	0	NA	50	-	50	1
<b>Total</b>						<b>18</b>	<b>02</b>	<b>08</b>	<b>19</b>	<b>400</b>	<b>300</b>	<b>700</b>	<b>22</b>

**Note:** BSC: Basic Science Courses, ESC: Engineering Science Courses, PCC: Professional Core Courses, IPCC: Integrated Professional Core Courses, UHV: Universal Human Values, HSMC: Humanity, Social Science and Management Courses. NCMC: Non-credit mandatory course, INT: Internship, Pro

### Course prescribed to lateral entry Diploma holders admitted to III semester of Engineering programs

9	NCMC	21MATDIP31	Additional Mathematics-1	Basic Science	Basic Science	2	2	0	03	50	50	100	0
10	NCMC	21KANDIP32	Technical Kannada	Basic Science	Basic Science	0	2	0	-	50	-	50	0

(a) The mandatory non-credit courses Additional Mathematics I and II prescribed for III and IV semesters respectively, to the lateral entry Diploma holders admitted to III semester of BE programs, shall attend the classes during the respective semesters to complete all the formalities of the course and appear for the University examination. In case, any student fails to register for the said course/ fails to secure the minimum 40% of the prescribed CIE marks, he/she shall be deemed to have secured F grade. In such a case, the student has to fulfil the requirements during subsequent semester/s to appear for SEE.

(b) These Courses shall not be considered for vertical progression, but completion of the courses shall be mandatory for the award of degree

#### Credit Definition:

- 1-hour lecture (L) per week per semester = **1 Credit**
- 2-hour tutorial (T) per week per semester = **1 Credit**
- 2-hour Practical/Drawing (P) per week per semester = **1 Credit**

- **Four-credit** courses are to be designed for **50** hours of Teaching-Learning process.
- **Three credit** courses are to be designed for **40** hours of Teaching-Learning process.
- **Two credit** courses are to be designed for **25** hours of Teaching-Learning process.
- **One credit** courses is to be designed for **15** hours of Teaching-Learning process.

**AICTE Activity Points to be earned by students admitted to BE/B.Tech., day college programme (For more details refer to Chapter 6, AICTE Activity Point Programme, Model Internship Guidelines):** Over and above the academic grades, every Day College regular student admitted to the 4 years Degree programme and every student entering 4 years Degree programme through lateral entry, shall earn 100 and 75 Activity Points respectively for the award of degree through AICTE Activity Point Programme. Students transferred from other Universities to the fifth semester are required to earn 50 Activity Points from the year of entry to UoM. The Activity Points earned shall be reflected on the student's eighth semester Grade Card. The activities can be spread over the years, anytime during the semester weekends and holidays, as per the liking and convenience of the student from the year of entry to the programme. However, the minimum hours' requirement should be fulfilled. Activity Points (non-credit) do not affect SGPA/CGPA and shall not be considered for vertical progression. In case students fail to earn the prescribed activity Points, an Eighth semester Grade Card shall be issued only after earning the required activity Points. Students shall be admitted for the award of the degree only after the release of the Eighth semester Grade Card.

*[Signature]*

**DIRECTOR**  
Mysore University  
School of Engineering  
Manasagangotri, Mysuru - 05



# MYSORE UNIVERSITY SCHOOL OF ENGINEERING

Scheme of Teaching and Examination 2021-2022 (As per NEP-2020)  
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)  
(Effective from the academic year 2021-2022)



## B.E in CIVIL ENVIRONMENTAL ENGINEERING [CEE]

### IV SEMESTER

Sl No	Course & Course Code		Course Title	Teaching Dept.	Paper Setting Board	Teaching Hours/week			Examination				Credits
						Theory Lectures	Tutorial	Practical/Drawing	Duration in Hours	CIE Marks	SEE Marks	Total Marks	
1	BSC	21MAT41	Engineering Mathematics-IV	Basic Science	Basic Science	2	2	0	03	50	50	100	3
2	IPCC	21CV42	Fluid Mechanics & Hydraulics	CEE	CEE	3	0	2	03	50	50	100	4
3	IPCC	21CV43	Environmental Engineering I	CEE	CEE	3	0	2	03	50	50	100	4
4	PCC	21CV44	Analysis of Structures	CEE	CEE	3	0	0	03	50	50	100	3
5	IPCC	21CV45	Transportation Engineering	CEE	CEE	3	0	2	03	50	50	100	4
6	PCC	21CV46	Geographic Information System	CEE	CEE	2	0	2	03	50	50	100	2
7	HSMC	21CPH47	Constitution of India, Professional Ethics and Cyber Law	Basic Science	Basic Science	1	0	0	NA	50	-	50	1
8	AEC	21AEC48	Ability Enhance Course-II	CEE	CEE	1	0	0	NA	50	-	50	1
9	INT	21INT49	Summer Internship-I	(To be carried out during the intervening vacations of IV and V semesters)					-	-	-	-	-
<b>Total</b>						<b>18</b>	<b>02</b>	<b>08</b>	<b>18</b>	<b>400</b>	<b>300</b>	<b>700</b>	<b>22</b>

**Note:** BSC: Basic Science Courses, ESC: Engineering Science Courses, PCC: Professional Core Courses, IPCC: Integrated Professional Core Courses, HSMC: Humanity, Social Science and Management Courses. NCMC: Non-credit mandatory course, AEC: Ability Enhancement Course, INT: Internship.

**Summer Internship-I (21INT59):** shall be carried out at industrial (State and Central Government /Non-government organizations (NGOs)/Micro, Small and Medium Enterprise (MSME)/Innovation centers/ Incubation centers. The internship can also be Rural internship. All the students admitted shall have to undergo a mandatory internship of 04 weeks during the intervening vacation of IV and V semesters. A University Viva-Voce examination (Presentation followed by Question & Answer session) shall be conducted during V semester and the prescribed credit shall be included in the V 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 University 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.)  
Summer Internship-I: SEE shall be through seminar and viva-voce.

### Course prescribed to lateral entry Diploma holders admitted to III semester of Engineering programs

10	NCMC	21MATDIP41	Additional Mathematics-II	Basic Science	Basic Science	02	02	-	03	50	50	100	0
11	NCMC	21ENGDIP42	Technical English	Basic Science	Basic Science	-	2	-	-	50	-	50	0

(a) The mandatory non-credit courses Additional Mathematics I and II prescribed for III and IV semesters respectively, to the lateral entry Diploma holders admitted to III semester of BE programs, shall attend the classes during the respective semesters to complete all the formalities of the course and appear for the University examination. In case, any student fails to register for the said course/ fails to secure the minimum 40 % of the prescribed CIE marks, he/she shall be deemed to have secured F grade. In such a case, the student has to fulfil the requirements during subsequent semester/s to appear for SEE.

(b) These Courses shall not be considered for vertical progression, but completion of the courses shall be mandatory for the award of degree

#### Credit Definition:

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- **Three credit** courses are to be designed for **40** hours of Teaching-Learning process.
- **Two credit** courses are to be designed for **25** hours of Teaching-Learning process.
- **One credit** courses are to be designed for **15** hours of Teaching-Learning process.

**AICTE Activity Points:** In case students fail to earn the prescribed activity Points, an Eighth semester Grade Card shall be issued only after earning the required activity Points. Students shall be admitted for the award of the degree only after the release of the Eighth semester Grade Card.

## ENGINEERING MATHEMATICS-III (21MAT31)

Semester III			
No. of Teaching hour/Week	2	CIE Marks	50
No. of Tutorial hours/week	2	SEE Marks	50
Total No. of Lecture hours	40	Exam Hours	03
L:T:P	2:1:0	Credits	03

Modules	Course Content	Teaching Hours
<b>Module 1</b>	<b>Fourier Series:</b> Periodic functions, Dirichlet's condition. Fourier series of periodic functions period $2\pi$ and arbitrary period. Half range Fourier series. Application of Practical harmonic analysis.	<b>08 Hours</b>
<b>Module 2</b>	<b>Fourier Transforms:</b> Infinite Fourier transforms, Fourier sine and cosine transforms. Inverse Fourier transforms. Problems.	<b>08 Hours</b>
<b>Module 3</b>	<b>Difference Equations and Z-Transforms:</b> Difference equations, basic definition, z-transform-definition, Standard z-transforms, Damping and shifting rules, initial value and final value theorems (without proof) and problems, Inverse z-transform and applications to solve difference equations.	<b>08 Hours</b>
<b>Module 4</b>	<b>Partial Differential Equations (PDE's):</b> Formation of PDE's by elimination of arbitrary constants and functions. Solution of non-homogeneous PDE by direct integration. Homogeneous PDEs involving derivative with respect to one independent variable only. Solution of Lagrange's linear PDE. Derivation of one-dimensional heat equation and wave equation. Solution of one-dimensional heat equation and wave equation by the method of separation of variables.	<b>08 Hours</b>
<b>Module 5</b>	<b>Statistical Methods:</b> Correlation and regression-Karl Pearson's coefficient of correlation and rank correlation-problems. Regression analysis- lines of regression –problems. <b>Curve Fitting:</b> Curve fitting by the method of least squares-fitting the curves of the form- $y = ax + b$ , $y = ax^b$ and $y = ax^2 + bx + c$ .	<b>08 Hours</b>

### Course outcomes:

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

- Explain the basic concepts of Fourier Series, Fourier Transforms, Z-Transforms, Partial Differential Equations, Some concepts of statistical analysis and curve fitting.
- Apply the above concepts of the syllabus in their respective branches of engineering.
- Analyse the solutions of engineering problems using these concepts.

### Text and Reference Books:

1. E. Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons, 10th Ed.(Reprint), 2017.
2. B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 44th Ed., 2017.
3. Srimanta Pal &Subobh C Bhunia: "Engineering Mathematics", Oxford University Press, 3rd Reprint, 2016.
4. C.Ray Wylie, Louis C.Barrett : "Advanced Engineering Mathematics", 6th Edition, 2. McGrawHill Book Co., New York, 1995.

5. S.S.Sastry: "Introductory Methods of Numerical Analysis", 11th Edition, Tata McGraw-Hill, 2010
6. B.V.Ramana: "Higher Engineering Mathematics" 11th Edition, Tata McGraw-Hill, 2010.
7. N.P.Bali and Manish Goyal, "A Text Book of Engineering Mathematics", Laxmi Publications. Latest edition, 2014.
8. Chandrika Prasad and Reena Garg "Advanced Engineering Mathematics", Latest edition, Khanna Publishing, 2018.

## ADDITIONAL MATHEMATICS-I (21MATDIP31)

Semester III			
<b>No. of Teaching hour/Week</b>	2	<b>CIE Marks</b>	50
<b>No. of Tutorial hours/week</b>	2	<b>SEE Marks</b>	50
<b>Total No. of Lecture hours</b>	40	<b>Exam Hours</b>	03
<b>L: T:P</b>	2:1:0	<b>Credits</b>	00

<b>Modules</b>	<b>Course Content</b>	<b>Teaching Hours</b>
<b>Module 1</b>	<b>Introduction to Complex Variables:</b> Definitions and properties. Modulus and amplitude of a complex number, Argand's diagram, De-Moivre's theorem (without proof). <b>Vector Algebra:</b> Scalar and vectors. Addition and subtraction and multiplication of vectors- Dot and Cross products, problems.	<b>08 Hours</b>
<b>Module 2</b>	<b>Differential Calculus:</b> Review of successive differentiation-illustrative examples. Maclaurin's series expansions-Illustrative examples. Partial Differentiation: Euler's theorem-problems on first order derivatives only. Total derivatives-differentiation of composite functions. Jacobians of order two-Problems.	<b>08 Hours</b>
<b>Module 3</b>	<b>Vector Differentiation:</b> Differentiation of vector functions. Velocity and acceleration of a particle moving on a space curve. Scalar and vector point functions. Gradient, Divergence, Curl-simple problems. Solenoidal and irrotational vectorfields-Problems.	<b>08 Hours</b>
<b>Module 4</b>	<b>Numerical Methods:</b> Finite differences. Interpolation/extrapolation using Newton's forward and backward difference formulae (Statements only)-problems. Solution of polynomial and transcendental equations – Newton-Raphson and Regula-Falsi methods (only formulae)-Illustrative examples. Numerical integration: Simpson's one third rule and Weddle's rule (without proof) Problems.	<b>08 Hours</b>
<b>Module 5</b>	<b>Ordinary differential equations (ODE's).</b> Introduction-solutions of first order and first-degree differential equations: exact, linear differential equations. Equations reducible to exact and Bernoulli's equation.	<b>08 Hours</b>

**Course outcomes:** At the end of the course the students will be able to:

1. Explain the basic concepts of complex trigonometry, differential calculus and vector differentiation, Numerical methods, Ordinary Differential Equations of first order.
2. Apply the above concepts of the syllabus in their respective branches of engineering.
3. Analyse the solutions of engineering problems using these concepts

**Text and Reference Books:**

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43rd Edition, 2015
2. E. Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 10th Edition, 2016



3. N.P.Bali and Manish Goyal, A Text Book of Engineering Mathematics, Laxmi Publications, 6<sup>th</sup>Edition, 2014
4. RohitKhurana , Engineering Mathematics Vol.I, Cengage Learning, 1st Edition, 2015.

## SURVEYING AND GEOMATICS (21CV32)

Semester III			
No. of Teaching hour/Week	3	CIE Marks	50
No. of Practical hours/week	2	SEE Marks	50
Total No. of Lecture/Practical hours	50	Exam Hours	03
L: T:P	3:0:2	Credits	04

Modules	Course Content	Teaching Hours
<b>Module 1</b>	<p><b>Module 1:</b>  <b>Introduction to Surveying</b>  <i>Fundamentals of Maps:</i> Maps - types; scales-types; measuring distance; finding direction and use of symbols. Map projection - Latitude, Longitude and time, Topographical survey – Toposheets and Principles of topo sheet numbering, Analysis of landforms using maps.  <i>History of Surveying:</i> Definition of Surveying, Uses of Surveying, Basic principles of surveying, Classification of Surveys. Introduction to Chain surveying, Compass surveying, Plane table surveying and Theodolite surveying.  <b>Levelling:</b> Principles of levelling- booking and reducing levels; Types of levelling- differential, reciprocal levelling, profile levelling and cross sectioning. Numerical problems.  <b>Contouring:</b>Contours and their characteristics, Uses of contours.Introduction to areas and volumes</p>	<b>6 hours</b>
<b>Module 2</b>	<p><b>Curve Surveying:</b>Elements of simple and compound curves – Method of setting out of simple and compound curves, Elements of Reverse and Transition curve.</p>	<b>8 hours</b>
<b>Module 3</b>	<p><b>Modern Field Survey Systems (8 Hours):</b> Principle of Electronic Distance Measurement, Modulation, Types of EDM instruments, Total Station – Parts of a Total Station – Accessories –Advantages and Applications,  <b>Global Positioning Systems-</b> Segments, GPS measurements, errors and biases, Surveying with GPS, Co-ordinate transformation, accuracy considerations.            Introduction to DGPS, Dronesurveying and LiDAR</p>	<b>8 hours</b>
<b>Module 4</b>	<p><b>Photogrammetry Surveying:</b> Introduction, Basic concepts, perspective geometry of aerial photograph, relief and tilt displacements, terrestrial photogrammetry, flight planning; Stereoscopy; photographic mapping- mapping using paper prints, mapping using stereo plotting instruments, mosaics, map substitutes.</p>	<b>6 hours</b>
<b>Module 5</b>	<p><b>Remote Sensing and GIS:</b> Introduction –Electromagnetic Spectrum, interaction of electromagnetic radiation with the atmosphere and earth surface, remote sensing data acquisition: platforms and sensors; visual image interpretation.            Introduction to GIS, Digital Elevation Model (DEM),</p>	<b>10 hours</b>

## **LABORATORY EXPERIMENTS**

### **I. Chain Surveying**

1. Measure distance between two points using direct ranging and setting out perpendiculars.
2. Marking central line of a building using grid plan using chain and its accessories.

### **II. Levelling**

3. Determine difference in elevation between two points using differential levelling technique, using height of the instrument method and rise and fall methods.
4. Perform profile levelling and to draw the longitudinal section and cross section to determine the depth of cut and height of filling for a given formation level.

### **III Total station**

5. Contour surveying using total station.
6. Determine the elevation, Distance and gradient between two inaccessible points using total station.
7. Traversing using total station.

### **IV Curves**

8. Set out simple curves using linear methods-perpendicular offsets from long chord and offsets from chord produced methods.
9. Set out simple curve using Rankine's deflection angles method.
10. Set out compound curve by angular method.

### **V. GIS**

11. Generate thematic map using GIS Software

### **Course outcomes:**

At the end of the course the student will be able to:

1. Apply fundamental concepts of Surveying, Levelling, Total station, Remote Sensing and GIS to engineering and surveying activities
2. Evaluate principles and components of all types of surveying
3. Interpret the concepts of measurements in engineering problems
4. Demonstrate the application of Surveying in , Electronic Distance Measurement, Global Positioning System, Photogrammetry and Remote Sensing, and
5. Adopt GIS & remote sensing techniques for field measurements and other applications in Civil Engineering.

### **Text/Reference Books:**

1. Surveying Vol.I and Vol.II, Punmia B.C, 16th Edition, 2016, Laxmi Publications, (P) Ltd, New Delhi ISBN-10: 9788170088530 ISBN-10: 8170088836
2. Fundamentals of Remote Sensing, George Joseph, 3rd Edition, 2018, Universities press, ISBN10: 9386235463, ISBN-13: 978-9386235466.
3. Surveying Vol.I&II,, Duggal S.K, 8th Edition, 2017, Tata Mc Graw Hill Publishing Co., ISBN10: 9781259028991 ISBN-10: 978125902899
4. Remote sensing and Geographical information system, Anji Reddy, M, B.S. Publications, 2001.
5. Madhu, N, Sathikumar, R and Satheesh Gobi, Advanced Surveying: Total Station, GIS and Remote Sensing, Pearson India, 2006.
6. Manoj, K. Arora and Badjatia, Geomatics Engineering, Nem Chand & Bros, 2011

## EARTH RESOURCES ENGINEERING (21CV33)

Semester III			
<b>No. of Teaching hour/Week</b>	3	<b>CIE Marks</b>	50
<b>No. of Practical hours/week</b>	2	<b>SEE Marks</b>	50
<b>Total No. of Lecture/Practical hours</b>	50	<b>Exam Hours</b>	03
<b>L: T:P</b>	3:0:2	<b>Credits</b>	04

Modules	Course Content	Teaching Hours
<b>Module 1</b>	<b>Introduction, scope of earth science in Engineering</b> Geohazards and disasters, Mitigation and management Earths internal dynamics ,Plate tectonics, Earth quakes types, causes iso-seismal line, seismic zonation map, seismic proof structures, volcanic eruption, landslides, tsunamis, cyclones – Causes & management.	<b>10 Hours</b>
<b>Module 2</b>	<b>Earth Resources</b> Minerals -Industrial, rock forming and ore minerals. Physical properties, composition and uses Rocks as a construction materials- physical properties, texture, composition, applications for aggregate, decorative (facing/polishing), railway ballast, rocks for masonry work, monumental/architecture, rocks as aquifers, water bearing properties igneous, sedimentary.	<b>10 Hours</b>
<b>Module 3</b>	<b>Surface investigation for Civil Engineering projects</b> Weathering, type, causes, soil in-situ, drifted soil, soil profile, soil mineralogy , structure, types of soil, Black cotton soil v/s Lateritic soil; effects of weathering on monumental rocks, River morphology and basin investigation for engineering Projects like earthen dam, gravity dam, arch dam, features of river erosion, deposition and their influences on river valley projects, morphometric analysis of river basin, selection of site for artificial recharge,, interlinking of river basins, coastal process and landforms, sedimentation /siltation, erosion.	<b>10 Hours</b>
<b>Module 4</b>	<b>Subsurface investigation for deep foundation</b> Borehole data(and problems), Dip and strike, and outcrop problems(numerical problem geometrical/ simple trigonometry based), Electrical Resistivity meter, depth of water table, (numerical problems) seismic studies, faults, folds, unconformity, joints types, recognition and their significance in Civil engineering projects like tunnel project, dam project, , Ground improvements like rock bolting, rock jointing, grouting.	<b>10 Hours</b>
<b>Module 5</b>	<b>Introduction to Mining and Its Impact</b> Mining – definition and economic importance; Mine – definition, different types and classification; Mine life cycle; Mineral deposit – different types and their classification; Mineral resources of India; Modes of entry to a mine – shaft, incline, decline, adit and box-cut. Overview of surface mining: Types of surface mines, unit operations, basic bench geometry, applicability & limitations and advantages & disadvantages. Granite mining and Mining Impacts	<b>10 Hours</b>

## **LABORATORY EXPERIMENTS**

1. Evaluation of minerals based on physical properties for basic raw material for construction, industrial application (2 classes)
2. Investigation of rock based on physical, textural, and mineralogical properties for construction (2 classes)
3. Geologic maps studies (6 classes) Cross-section studies of Geological maps for suitability evaluation and subsurface investigation of geological conditions for Dams, tunnels water harvesting, aqua duct, bridges under conditions of Horizontal strata, inclined strata, Folded and Faulted beds, Unconformity, Intrusion relevant–; construction/ generation of Geological maps based on borehole data
4. Geospatial data analysis (3 classes)
  - Interpretation of topo sheets
  - Visual interpretation of FCCs (Geomorphology and Land use/land cover mapping) and TCCs,
5. Geophysical exploration – (2 classes)
  - Electrical resistivity methods for subsurface investigation – and its Interpretation, lateral and vertical sounding

### **Course outcomes:**

At the end of the course the student will be able to:

- Comprehend the relations between minerals and rocks based on their physical properties
- Assess the suitability of materials used in building construction
- Differentiate geological investigations necessary for the construction of dams, bridges, and tunnels and mining
- Demonstrate the groundwater investigation using resistivity methods
- Appraise the applications of Geospatial technology in Civil and Environmental Engineering.

### **Text and Reference Books:**

1. Engineering Geology, by Parthasarathy et al, Wiley publications
2. A textbook of Engineering Geology by ChennaKesavulu, Mac Millan India Ltd
3. Principle of Engineering Geology, by K.M. Bangar, Standard publishers
4. Physical and Engineering Geology, by S.K. Garg, Khanna publishers
5. Principles of Engineering Geology, by KVGK Gokhale, BS Publications
6. Introduction to Mining Engineering, Hartmann, 2<sup>nd</sup> edition.

## BUILDING MATERIALS & CONSTRUCTION (21CV34)

SemesterIII			
<b>No. of Teaching hour/Week</b>	3	<b>CIE Marks</b>	50
<b>No. of Practical hours/week</b>	0	<b>SEE Marks</b>	50
<b>Total No. of Lecture hours</b>	40	<b>Exam Hours</b>	03
<b>L: T:P</b>	3:0:0	<b>Credits</b>	03

Modules	Course Content	Teaching Hours
<b>Module 1</b>	<p><b>Introduction to Building materials</b> Aggregates, Bricks, concrete blocks, Cement, Mortar, Concrete, Timber, steel, Glass, MDF, Ply wood.</p> <p><b>Painting:</b> Characteristics of an ideal paint, classification &amp; types of paints, painting on different surfaces, defects in painting, varnishing, distempering, white washing &amp; colour washing.</p> <p><b>Green and Smart Materials:</b> Passive Products &amp; Materials include glazing, insulation, paints &amp; coatings, adhesives &amp; sealants, fly-ash blocks, cement, concrete, composite wood, filler slabs, certified new wood, housekeeping chemicals, false ceiling materials, flooring materials, furniture, gypsum-based products, high reflective materials &amp; coatings, glass etc.</p>	<b>08 Hours</b>
<b>Module 2</b>	<p><b>Foundations</b> Introduction, Depth of footings, Strip footing, Isolated footing, Eccentrically loaded footings, Grillage foundations, Combined footings, Strap footing, Raft foundation, Foundations for black cotton soils, stepped footings, Adjacent footings.</p>	<b>08 Hours</b>
<b>Module 3</b>	<p><b>Masonry, Doors &amp; Windows</b> Stone masonry: Definition of terms, Classification of stone masonry, dressing of stones, joints in stone masonry. Brick Masonry: Terminologies, types of bonds: stretcher bond, header bond, English bond, Flemish bond, brick laying, defects in brick masonry, Thickness of a brick wall, buttresses, thresholds, window sills, corbels, copings, jambs. Concrete masonry, Hollow clay block masonry. Doors &amp; windows: Terminologies, Location of doors &amp; windows, size of doors, door frames, types of doors &amp; windows.</p>	<b>08 Hours</b>
<b>Module 4</b>	<p><b>Formwork &amp; scaffolding, Plastering &amp; pointing</b> Formwork: requirements, IS standards on form work, Loads on form work, shuttering for: columns-beam &amp; slab floor-stairs-walls. Shoring, under pinning, scaffolding. Plastering &amp; pointing: plastering, terminologies, tools for plastering, number of coats of plaster, methods of plastering, types of plaster finishes, defects in plastering, pointing.</p>	<b>08 Hours</b>
<b>Module 5</b>	<p><b>Green Building:</b> Concept of Green building, Principles of green buildings, Eco-friendly materials, Certification systems – Green Rating for Integrated Habitat Assessment (GRIHA) and Leadership in Energy and Environmental Design (LEED).</p>	<b>08 Hours</b>

**Course outcomes:**

At the end of the course the student will be able to:

- Assess the suitability of building and construction materials and green materials used construction
- Differentiate types of footings used for buildings.
- Describe the erection of masonry work along with doors & windows.
- Appreciate the process involved in formwork & scaffolding work and plastering, painting, plumbing & sanitary works.
- Gain Knowledge on Green Buildings

**Text and Reference Books:**

1. Building Construction, by W B McKay, Pearson Publications, 2013.
2. Building Construction, by Dr. B C Punmia, Lakshmi Publications, 11 th edition, 2016.
3. Building Construction, by Rangwala, Charotar Publications, 2016.
4. Building Construction, by Sushil Kumar, Standard publications, 20th edition.
5. Building Construction& Material, byGurucharan Singh, Standard Book House, 2019.
6. IGBC and NBC Codes & Specifications.

## STRENGTH OF MATERIALS (21CV35)

Semester III			
<b>No. of Teaching hour/Week</b>	3	<b>CIE Marks</b>	50
<b>No. of Practical hours/week</b>	2	<b>SEE Marks</b>	50
<b>Total No. of Lecture/Practical hours</b>	50	<b>Exam Hours</b>	03
<b>L: T:P</b>	3:0:2	<b>Credits</b>	04

Modules	Course Content	Teaching Hours
<b>Module 1</b>	<p><b>Simple Stresses and Strains:</b> Introduction, Properties of Materials, Stress, Strain, Hook's law, Poisson's Ratio, Stress – Strain Diagram for structural steel, Principles of superposition, Total elongation of tapering bars of circular and rectangular cross sections. Composite section, Volumetric strain, expression for volumetric strain, Elastic constants, relationship among elastic constants, Thermal stress and strains</p> <p><b>Compound stresses:</b> Introduction, Stress components on inclined planes, General two-dimensional stress system, Principal planes and stresses, maximum shear stresses and their planes (shear planes). Compound stress using Mohr's circle method.</p>	<b>10 Hours</b>
<b>Module 2</b>	<p><b>Bending moment and shear force diagrams in beams:</b> Definition of shear force and bending moment, Sign convention, Relationship between loading, shear force and bending moment, Shear force and bending moment equations, 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.</p>	<b>10 Hours</b>
<b>Module 3</b>	<p><b>Bending stress in beams:</b> 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, Problems</p> <p><b>Shear stress in beams:</b> Derivation of Shear stress intensity equations, Derivation of Expressions of the shear stress intensity for rectangular, triangular and circular cross sections of the beams. Problems on calculation of the shear stress intensities at various critical levels of T, I and Hollow rectangular cross sections of the beam.</p>	<b>10 Hours</b>
<b>Module 4</b>	<p><b>Torsion:</b> Twisting moment in shafts, simple torque theory, derivation of torsion equation, torsional rigidity, polar modulus, shear stress variation across solid circular and hollow circular sections, Problems</p> <p><b>Thin cylinders:</b> 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.</p> <p><b>Thick cylinders:</b> Concept of Thick cylinders Lamé's equations applicable to thick cylinders with usual notations,</p>	<b>10 Hours</b>



	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.	
<b>Module 5</b>	<p><b>Elastic stability of columns:</b> Introduction – Short and long columns, Euler’s theory on columns, Effective length, slenderness ratio, radii of gyration, buckling load, Assumptions, derivations of Euler’s Buckling load for different boundary conditions, Limitations of Euler’s theory, Rankine’s formula and related problems.</p> <p><b>Deflection of determinate Beams:</b> Introduction, Elastic curve –Derivation of differential equation of flexure, Sign convention, Slope and deflection using Macaulay’s method for statically determinate beams subjected to various vertical loads, moment, couple and their combinations. Numerical problems.</p>	<b>10 Hours</b>

### **LABORATORY EXPERIMENTS**

1. Dimensionality of bricks, Water absorption, Initial rate of absorption
2. Specific gravity of coarse and fine aggregate
3. Fineness modulus of Fine and Coarse aggregate
4. Compressive strength tests on building blocks (brick, solid blocks and hollow blocks)
5. Tension test on Mild steel and HYSD bars
6. Compression test on HYSD, Cast iron
7. Bending Test on Wood under two-point loading.
8. Shear Test on Mild steel – single and double shear
9. Impact test on Mild Steel (Charpy& Izod)

#### **Course outcomes:**

At the end of the course the student will be able to:

- Evaluate the behaviour when a solid material is subjected to various types of forces (namely Compressive, Tensile, Thermal, Shear, flexure, Torque, internal fluid pressure) and estimate stresses and corresponding strain developed. (L3)
- Estimate the forces developed and draw schematic diagram for stresses, forces, moments for simple beams with different types of support and are subjected to various types of loads (L3).
- Evaluate the behaviour when a solid material is subjected to Torque and internal fluid pressure and estimate stresses and corresponding strain developed. (L3)
- Distinguish the behaviour of short and long column and calculate load at failure & explain the behaviour of spring to estimate deflection and stiffness (L3)
- Examine and evaluate the mechanical properties of various materials under different loading conditions.

#### **Text and Reference Books:**

1. Timoshenko and Young, “Elements of Strength of Materials”, East West Press, 5th edition 2003
2. R. Subramanyam, “Strength of Materials”, Oxford University Press, 3rd Edition -2016
3. B.C Punmia Ashok Jain, Arun Jain, “Strength of Materials”, Laxmi Publications, 10th Edition-2018
4. S. Ramamrutham, “Strength of Materials”, Dhanpath Rai Publications, 20<sup>th</sup> edition, 2020.
5. S. S Rattan, “Strength of Materials”, Mc Graw Hill Publications, 3rd edition, 2017.

## COMPUTER AIDED BUILDING DRAWINGS (21CVL36)

Semester III			
No. of Lecture hour/Week	02	CIE Marks	50
No. of Practical hours/week	02	SEE Marks	50
Total No. of Lecture hours	26	Exam Hours	03
L: T:P	2:0:2	Credits	02

Sl No.	Course Content	
<b>Module 1</b>	<p><b>Drawing Basics:</b> Selection of scales for various drawings, thickness of lines, dimensioning, abbreviations and conventional representations as per IS: 962.</p> <p><b>Simple Engineering Drawings with CAD</b>            Drawing Tools: Lines Circle, Arc, Poly line, Multiline, Polygon, Rectangle, Spline, Ellipse.            Modify tools: Erase, Copy, Mirror, Offset, Array, Move, Rotate, Scale, Stretch, Lengthen, Trim, Extend, Break, Chamfer and Fillet.            Using Text: Single line text, Multiline text, Spelling, Edit text.            Special Features: View tools, Layers concept, Dimension tools, Hatching, Customizing Toolbars, Working with multiple drawings.</p>	<b>8 hours</b>
<b>Module 2</b>	<p><b>Drawings of Different Building Elements:</b> Following drawings are to be prepared for the data given using CAD Software</p> <p>a) Cross section of Foundation, masonry wall, RCC columns with isolated &amp; combined footings.            b) Different types of staircases – Dog legged, Open well,            c) Lintel and chajja.            d) RCC Slabs and beams.</p>	<b>8 hours</b>
<b>Module 3</b>	<p><b>Building Drawings :</b>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 including electrical, plumbing and sanitary services using CAD software for</p> <ol style="list-style-type: none"> <li>1. Single and double story residential building.</li> <li>2. Hostel building.</li> <li>3. Hospital building.</li> <li>4. School building.</li> </ol> <p>Submission drawing (sanction drawing)of two storied residential building with access to terrace including all details and statements as per the local bye-laws Industry Applications : 3D Modelling and Rendering, 2D Animation, Construction site Simulation</p> <p><b>Environmental Engineering Drawings</b></p> <ol style="list-style-type: none"> <li>e) Septic Tank and sedimentation Tank.</li> <li>f) Layout plan of Rainwater recharging and harvesting system.</li> <li>g) Layout of Typical Water Supply System.</li> <li>f) Drawing of Hydraulic Profile for Water Treatment Unit.</li> </ol> <p><b>Note:</b> Students shall sketch to dimension the above in a sketch book before doing the computer drawing and undertake one compulsory field visit/exercise. (Single line diagrams are given in the examination).</p>	<b>10 hours</b>

## **Course Outcomes**

At the end of the course the student will be able to

1. Understand the basics of CAD Drawing and
2. Prepare, read and interpret the drawings in a professional set up.
3. Know the procedures of submission of drawings and Develop working and submission drawings for building.
4. Build the skills on elements of building Plan and design of residential or public building as per the given requirements including 2D and 3D Animation.
5. Prepare layout plans of environmental engineering using CAD

## **Text Books:**

- MG Shah, CM Kale, SY Patki, “Building drawing with an integrated approach to Built Environment Drawing”, Tata McGraw Hill Publishing co. Ltd, New Delhi.
- Gurucharan Singh, “Building Construction”, Standard Publishers, & distributors, New Delhi.
- Malik RS and a Meo GS, “Civil Engineering Drawing”, Asian Publishers/Computech Publication Pvt Ltd.
- Time Saver Standard by Dodge F.W, F.W Dodge Corp.
- IS: 962-1989 (Code of practice for architectural and building drawing).
- National Building Code, BIS, New Delhi.

## ENVIRONMENTAL STUDIES [21CIV37]

Semester III			
<b>No. of Teaching hour/Week</b>	1	<b>CIE Marks</b>	50
<b>No. of Tutorial hours/week</b>	-	<b>SEE Marks</b>	-
<b>Total No. of Lecture hours</b>	16	<b>Exam Hours</b>	-
<b>L: T:P</b>	1:0:0	<b>Credits</b>	01

Modules	Course Content	Teaching Hours
<b>Module 1</b>	<p><b>Introduction:</b> Environment - Components of Environment  <b>Ecosystem:</b> Types &amp; Structure of Ecosystem, Balanced ecosystem Human Activities – Food, Shelter, And Economic &amp; Social Security.  <b>Impacts:</b> Impacts of Agriculture &amp; Housing Impacts of Industry, Mining &amp; Transportation Environmental Impact Assessment, Sustainable Development.</p>	<b>03 Hours</b>
<b>Module 2</b>	<p><b>Natural Resources, Water resources</b> – Availability &amp; Quality aspects, Water borne diseases &amp; water induced diseases, Fluoride problem in drinking water Mineral resources, Forest Wealth Material Cycles – Carbon Cycle, Nitrogen Cycle &amp; Sulphur Cycle.  <b>Energy</b> – Different types of energy, Conventional sources &amp; Non-Conventional sources of energy Solar energy, Hydro electric energy, Wind Energy, Nuclear energy, Biomass &amp; Biogas Fossil Fuels, Hydrogen as an alternative energy.</p>	<b>04 Hours</b>
<b>Module 3</b>	<p><b>Environmental Pollution</b> – Water Pollution, Noise pollution, Land Pollution, Public Health Aspects.  <b>Global Environmental Issues:</b> Population Growth, Urbanization, Land Management, Water &amp; Waste Water Management</p>	<b>03 Hours</b>
<b>Module 4</b>	<p><b>Air Pollution &amp; Automobile Pollution:</b> Definition, Effects – Global Warming, Acid rain &amp; Ozone layer depletion, controlling measures.  <b>Solid Waste Management,</b> E –Source, Segregation, Transportation, and Waste Treatment and Management  <b>&amp; Biomedical Waste Management</b> - Sources, Characteristics &amp; Disposal methods.</p>	<b>03 Hours</b>
<b>Module 5</b>	<p>Applications of GIS &amp; Remote Sensing and Smart Technologies in Environmental Engineering Practices.  <b>Environmental Legislations:</b> Acts, Rules &amp; Regulations, Role of government, Legal aspects, Role of Nongovernmental Organizations (NGOs), Environmental Education &amp; Women Education.</p>	<b>03 Hours</b>

### Course outcomes:

After Studying this course, students will be able to

1. Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale.
2. Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment.
3. Demonstrate Solid Waste Management.
4. Apply knowledge and technology in environmental practices
5. Build inquisitiveness to protect environment through societal interventions

**Text Books:**

1. Benny Joseph (2005), "Environmental Studies", Tata McGraw – Hill Publishing Company Limited.
2. R.J.Ranjit Daniels and Jagadish Krishnaswamy, (2009), "Environmental Studies", Wiley India Private Ltd., New Delhi.
3. R Rajagopalan, "Environmental Studies – From Crisis to Cure", Oxford University Press, 2005,
4. Aloka Debi, "Environmental Science and Engineering", Universities Press (India) Pvt. Ltd. 2012.

# UNIVERSAL HUMAN VALUE & PROFESSIONAL ETHICS

[21UHV38]

Semester III			
<b>No. of Teaching hour/Week</b>	1	<b>CIE Marks</b>	50
<b>No. of Tutorial hours/week</b>	-	<b>SEE Marks</b>	-
<b>Total No. of Lecture hours</b>	16	<b>Exam Hours</b>	-
<b>L: T:P</b>	1:0:0	<b>Credits</b>	01

Modules	Course Content	Teaching Hours
<b>Module 1</b>	<b>Introduction to Value Education:</b> Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education) Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity – the Basic Human Aspirations, Happiness and Prosperity – Current Scenario, Method to Fulfil the Basic Human Aspirations	<b>03 Hours</b>
<b>Module 2</b>	<b>Harmony in the Human Being:</b> Understanding Human being as the Co-existence of the Self and the Body, Distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self, Understanding Harmony in the Self, Harmony of the Self with the Body, Programme to ensure self-regulation and Health	<b>03 Hours</b>
<b>Module 3</b>	<b>Harmony in the Family and Society:</b> Harmony in the Family – the Basic Unit of Human Interaction, 'Trust' – the Foundational Value in Relationship, 'Respect' – as the Right Evaluation, Other Feelings, Justice in Human-to-Human Relationship, Understanding Harmony in the Society, Vision for the Universal Human Order	<b>03 Hours</b>
<b>Module 4</b>	<b>Harmony in the Nature/Existence:</b> Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature, Realizing Existence as Co-existence at All Levels, The Holistic Perception of Harmony in Existence	<b>03 Hours</b>
<b>Module 5</b>	<b>Implications of the Holistic Understanding – a Look at Professional Ethics:</b> Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics Holistic Technologies, Production Systems and Management Models-Typical Case Studies, Strategies for Transition towards Value-based Life and Profession	<b>04 Hours</b>

### Course outcomes:

The course and further follow up is expected to positively impact common graduate attributes like:

- Holistic vision of life
- Socially responsible behaviour and Environmentally responsible work
- Ethical human conduct
- Having Competence and Capabilities for Maintaining Health and Hygiene

- Appreciation and aspiration for excellence (merit) and gratitude for all

**Textbook/ Reference Books**

1. The Textbook “A Foundation Course in Human Values and Professional Ethics”, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034- 447-1 b.
2. The Teacher’s Manual for “A Foundation Course in Human Values and Professional Ethics”, R R Gaur, R Asthana

## ENGINEERING MATHEMATICS-IV [21MAT41]

Semester IV			
<b>No. of Teaching hour/Week</b>	2	<b>CIE Marks</b>	50
<b>No. of Tutorial hours/week</b>	2	<b>SEE Marks</b>	50
<b>Total No. of Lecture hours</b>	40	<b>Exam Hours</b>	03
<b>L:T:P</b>	2:1:0	<b>Credits</b>	03

Modules	Course Content	Teaching Hours
<b>Module 1</b>	<p><b>Calculus of complex functions:</b> Review of function of a complex variables, limits, continuity, and differentiability. Analytic functions: Cauchy-Riemann equations in Cartesian and polar forms and consequences.</p> <p><b>Construction of analytic functions:</b> Milne-Thomson method-Problems.</p>	<b>08 Hours</b>
<b>Module 2</b>	<p><b>Conformal transformations:</b> Introduction. Discussion of transformations: <math>w = z^2</math>, <math>w = e^z</math>, <math>w = z + \frac{1}{z}</math>, (<math>z \neq 0</math>).</p> <p>Bilinear transformations- Problems.</p> <p><b>Complex integration:</b> Line integral of a complex function- Cauchy's theorem and Cauchy's integral formula and problems.</p>	<b>08 Hours</b>
<b>Module 3</b>	<p><b>Numerical Solutions of Ordinary Differential Equations (ODE's):</b> Numerical solution of ODE's of first order and first degree- Taylor's series method, Modified Euler's method. Runge -Kutta method of fourth order, Milne's predictor and corrector method (No derivations of formulae)-Problems.</p> <p>Numerical Solution of Second Order ODE's - Runge-Kutta method and Milne's predictor and corrector method. (No derivations of formulae).</p>	<b>08 Hours</b>
<b>Module 3</b>	<p><b>Probability Distributions:</b> Review of basic probability theory. Random variables (discrete and continuous), probability mass/density functions. Binomial, Poisson, exponential and normal distributions- problems (No derivation for mean and standard deviation)-Illustrative examples.</p>	<b>08 Hours</b>
<b>Module 5</b>	<p><b>Joint probability distribution:</b> Joint Probability distribution for two discrete random variables, expectation and covariance.</p> <p><b>Sampling Theory:</b> Introduction to sampling distributions, standard error, Type-I and Type-II errors. Test of hypothesis for means, student's t-distribution, Chi-square distribution as a test of goodness of fit.</p>	<b>08 Hours</b>

**Course outcomes:** At the end of the course the students will be able to:

- Explain the concepts of integral calculus, Higher order differential equations, Laplace transforms, Probability and Linear Algebra.
- Apply the above concepts of the syllabus in their respective branches of engineering.
- Analyse the solutions of engineering problems using these concepts.



## **Text and Reference Books:**

### **Text Books:**

1. Erwin Kreyszig, *Advanced Engineering Mathematics*, Latest edition, Wiley Publications.
2. B.S. Grewal, *Higher Engineering Mathematics*, Latest edition, Khanna Publishers.
3. B.V. Ramana, *Higher Engineering Mathematics*, Latest edition, Tata McGraw Hill.

### **Reference Books:**

1. Srimanta Pal & Subodh C. Bhunia: "*Engineering Mathematics*" Oxford University Press, 3rd Reprint, 2016.
2. N.P Bali and Manish Goyal: "*A textbook of Engineering Mathematics*" Laxmi Publications, Latest edition.
3. H.K.Dass and Er. Rajnish Verma: "*Higher Engineering Mathematics*" S.Chand Publication (2014).

## ADDITIONAL MATHEMATICS-II (21MATDIP41)

Semester IV			
<b>No. of Lecture hour/Week</b>	2	<b>CIE Marks</b>	50
<b>No. of Tutorial hours/week</b>	1	<b>SEE Marks</b>	50
<b>Total No. of Lecture hours</b>	40	<b>Exam Hours</b>	03
<b>L: T:P</b>	2:1:0	<b>Credits</b>	00

Modules	Course Content	Teaching Hours
<b>Module 1</b>	<b>Integral Calculus:</b> Review of elementary integral calculus. Reduction formulae for $\sin^n x, \cos^n x$ (with proof) and $\sin^m x \cos^n x$ (without proof) and evaluation of these with standard limits-Examples. Double integrals-Simple examples. Beta and Gamma functions- Simple problems	<b>08 Hours</b>
<b>Module 2</b>	<b>Higher order ODE's:</b> Linear differential equations of second and higher order equations with constant coefficients. Homogeneous /non-homogeneous equations. Inverse differential operators. [Particular Integral restricted to $R(x) = e^{ax}, \sin ax / \cos ax$ for $f(D)y = R(x)$ ].	<b>08 Hours</b>
<b>Module 3</b>	<b>Laplace Transform:</b> Definition and Laplace transforms of elementary functions (statements only)-problems. Inverse Laplace Transform: Inverse Laplace transforms by method of partial fractions, Convolution theorem to find the inverse Laplace transforms. Solution of linear differential equations using Laplace transforms.	<b>08 Hours</b>
<b>Module 4</b>	<b>Introduction to Probability:</b> Introduction. Sample space and events. Axioms of probability. Addition and multiplication theorems. Conditional probability, Bayes's theorem, problems.	<b>08 Hours</b>
<b>Module 5</b>	<b>Linear Algebra:</b> Introduction - rank of matrix by elementary row operations - Echelon form. Consistency of system of linear equations - Gauss elimination method. Eigen values and Eigen vectors of a square matrix. Problems.	<b>08 Hours</b>

**Course outcomes:** At the end of the course the students will be able to:

- Explain the concepts of integral calculus, Higher order differential equations, Laplace transforms, Probability and Linear Algebra.
- Apply the above concepts of the syllabus in their respective branches of engineering.
- Analyse the solutions of engineering problems using these concepts.

**Text Books:**

1. Erwin Kreyszig, *Advanced Engineering Mathematics*, Latest edition, Wiley Publications.
2. B.S. Grewal, *Higher Engineering Mathematics*, Latest edition, Khanna Publishers.

3. B.V. Ramana, *Higher Engineering Mathematics*, Latest edition, Tata McGraw Hill.
4. Srimanta Pal & Subodh C. Bhunia: "*Engineering Mathematics*" Oxford University Press, 3rd Reprint, 2016.

**Reference Books:**

1. N.P Bali and Manish Goyal: "*A textbook of Engineering Mathematics*" Laxmi Publications, Latest edition.
2. H.K.Dass and Er. Rajnish Verma: "*Higher Engineering Mathematics*" S.Chand Publication (2014).

## FLUID MECHANICS & HYDRAULICS (21CV42)

Semester IV			
<b>No. of Teaching hour/Week</b>	3	<b>CIE Marks</b>	50
<b>No. of Practical hours/week</b>	2	<b>SEE Marks</b>	50
<b>Total No. of Lecture/Practical hours</b>	50	<b>Exam Hours</b>	03
<b>L: T:P</b>	3:0:2	<b>Credits</b>	04

Modules	Course Content	Teaching Hours
<b>Module 1</b>	Fluids and their properties, Fluid pressure measurements, Pascal's law, Measurement of pressure using manometer, Total pressure and centre of pressure on vertical and inclined plane surfaces.	<b>10 Hours</b>
<b>Module 2</b>	Kinematics- Types of fluid flow, continuity equation in Cartesian coordinates, flow nets, Dynamics- Euler's equation of motion, Bernoulli's equation, Application-Venturimeter, Orificemeter, Pitot tube	<b>10 Hours</b>
<b>Module 3</b>	Classification of orifice and mouth piece, Hydraulic coefficients, Discharge over Rectangular, Triangular and Cipoletti notch. Flow through pipes-Major and minor losses, pipes in series and parallel, concepts of water hammer and surge tanks	<b>10 Hours</b>
<b>Module 4</b>	Open Channel Hydraulics- Classification of Flow through channels, Most economical channel sections: Rectangular, Triangular and Circular. Uniform flow, Specific energy. Non-Uniform flow- Hydraulic jump, Analysis of GVF equation.	<b>10 Hours</b>
<b>Module 5</b>	Impact of jet on curved vanes, momentum equation, Impact of jet on stationary and moving curved vanes. Turbines- Pelton wheel and components, Velocity triangle Reaction turbine-Francis turbine, Working proportions. Centrifugal Pumps-Work done and efficiency, Multi stage pumps	<b>10 Hours</b>

### **LABORATORY EXPERIMENTS**

1. Determination of Cd for Venturimeter or Orificemeter
2. Determination of Hydraulic coefficients of small vertical orifice
3. Calibration of Triangular notch
4. Determination of Major & Minor losses in pipes
5. Determination of Cd for ogee or broad crested weir
6. Determination of force exerted by a jet on flat and curved vanes
7. Determination of efficiency of centrifugal pump
8. Determination of efficiency of Kaplan or Francis turbine
9. Determination of efficiency of Pelton wheel turbine

### **Course outcomes:**

After studying this course, students will able to:

1. Understand fundamental properties of fluids and solve problems on Hydrostatics.
2. Apply Principles of Mathematics to represent Kinematics and Bernoulli's principles.
3. Compute discharge through pipes, notches and weirs.
4. Design of open channels of various cross sections.

5. Design of turbines for the given data and understand their operation characteristics.

**Text and Reference Books:**

1. P.N.Modi and S.M.Seth-Hydraulics and Fluid Mechanics, including Hydraulic machines, standard Book House,New Delhi
  2. K Subramanya- Fluid Mechanics and Hydraulic Machines, Tata McGrawhill, New Delhi
  3. R.K. Bansal- A text book of Fluid Mechanics and Hydraulic Machines- Laxmi Publications, New Delhi
  4. Victor L. Streeter, Benjamin Wyile E and Keith W. Bedford- Fluid Mechanics ,Tata McGraw Hill publishing Co Ltd,New Delhi
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## ENVIRONMENTAL ENGINEERING – I (21CV43)

Semester IV			
<b>No. of Teaching hour/Week</b>	3	<b>CIE Marks</b>	50
<b>No. of Practical hours/week</b>	2	<b>SEE Marks</b>	50
<b>Total No. of Lecture/Practical hours</b>	50	<b>Exam Hours</b>	03
<b>L: T:P</b>	3:0:2	<b>Credits</b>	04

Modules	Course Content	Teaching Hours
<b>Module 1</b>	<p><b>Introduction:</b> Water: Need for protected water supply, Demand of Water: Types of water demands -domestic demand, industrial, institutional and commercial demand, public use and fire demand estimation, factors affecting per capita demand, Variations in demand of water, Peak factor.</p> <p><b>Design period</b> and factors governing design period. Methods of population forecasting and numerical problems.</p> <p>Physico-chemical characteristics of water (Analysis to be conducted in laboratory session). Sampling.</p>	<b>10 Hours</b>
<b>Module 2</b>	<p><b>Water Treatment:</b> Objectives, Unit flow diagrams – significance of each unit, Aeration process- Limitations and types</p> <p><b>Sedimentation</b> - Theory, settling tanks, types and design, Coagulation and flocculation, types of coagulants,(Optimization of coagulant to be carried out in the laboratory), Clari-flocculator.</p> <p><b>Filtration:</b> mechanism, theory of filtration, types of filters: slow sand, rapid sand and pressure filters. Operation and cleaning. Design of slow and rapid sand filter without under drainage system</p>	<b>10 Hours</b>
<b>Module 3</b>	<p><b>Disinfection:</b> Methods of disinfection with merits and demerits. Breakpoint of chlorination (Analysis to be conducted in laboratory session) Softening: Lime soda and Zeolite process.</p> <p><b>Wastewater:</b></p> <p><b>Introduction:</b> Need for sanitation, methods of sewage disposal, types of sewerage systems.</p> <p><b>Treatment of municipal waste water:</b></p> <p>Waste water characteristics (Analysis to be conducted in laboratory session): sampling, significance and techniques, physical, chemical and biological characteristics, Numericals on BOD.</p>	<b>10 Hours</b>
<b>Module 4</b>	<p><b>Treatment Process:</b> flow diagram for municipal waste water Treatment unit operations and process, Screens: types, disposal. Grit chamber, oil and grease removal. Primary and secondary settling tanks, Suspended growth system - conventional activated sludge process and its modifications.</p>	<b>10 Hours</b>
<b>Module 5</b>	<p>Attached growth system – trickling filter, Trickling filters, bio-towers and rotating biological contactors. SBBR, SBR, MBR.</p>	<b>10 Hours</b>

### LIST OF DRAWINGS

1. Drawing of Distribution Systems for simple network.
2. Drawing of Flocculator and Sedimentation Units (Circular and Rectangular)
3. Plan and Sectional Elevation, Clariflocculator.
4. Drawing of Rapid Sand Filters (Plan and Section).
5. Layout showing hydrants, valves, bends and chlorination point in water treatment plant.

### **LABORATORY EXPERIMENTS**

1. Determination of Acidity and Alkalinity
2. Determination of Calcium, Magnesium and Total Hardness.
3. Determination of Dissolved Oxygen / BOD / COD.
4. Determination of Chlorides.
5. Determination of percentage of available chlorine in bleaching powder sample, Determination of Residual Chlorine and chlorine demand.
6. Determination of Solids in Sewage: (i) Total Solids, (ii) Suspended Solids, (iii) Dissolved Solids, (iv) Volatile Solids, Fixed Solids (v) Settleable Solids.
7. Determination of optimum coagulant dosage using Jar test apparatus.
8. Determination Nitrates and Iron by spectrophotometer

#### **Course outcomes:**

- After studying this course, students will able to:
- Estimate average and peak water demand for a community.
- Evaluate water quality and environmental significance of various parameters and plan suitable treatment system.
- Design the different units of water treatment plant
- Understand and design the various units of wastewater treatment plant
- Acquire capability to conduct experiments and estimate the concentration of different parameters and compare the obtained results with the concerned guidelines and regulations.

#### **Text and Reference Books:**

1. Howard S. Peavy, Donald R. Rowe, George T, "Environmental Engineering" - Tata McGraw
2. Hill, New York, Indian Edition, 2013
3. S. K. Garg, Environmental Engineering vol-I, Water supply Engineering – M/s Khanna Publishers, New Delhi 2010
4. B.C. Punmia and Ashok Jain, Environmental Engineering I-Water Supply Engineering, Laxmi Publications (P) Ltd., New Delhi 2010.
5. B C Punmia, "Environmental Engineering vol-II", Laxmi Publications 2nd, 2016

## ANALYSIS OF STRUCTURES (21CV44)

Semester IV			
No. of Teaching hour/Week	3	CIE Marks	50
No. of Tutorial hours/week	0	SEE Marks	50
Total No. of Lecture hours	50	Exam Hours	03
<b>L: T:P</b>	3:0:0	<b>Credits</b>	03

Modules	Course Content	Teaching Hours
<b>Module 1</b>	<p><b>Deflection of Beams:</b>  <i>Moment area method</i>– Derivation, Mohr’s theorems, Sign convention; Application of moment area method to determinate prismatic beams, beams of varying cross section; Use of moment diagram by parts;  <i>Conjugate beam method</i>– Real beam and conjugate beam, conjugate beam theorems; Application of conjugate beam method to determinate beams of varying cross sections.</p>	<b>10 Hours</b>
<b>Module 2</b>	<p><b>Energy Principles and Energy Theorems:</b>  <i>Principle of virtual displacements</i>; <i>Principle of virtual forces</i>, 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; Deflection at the point of application of single point load;  <i>Castigliano’s theorems</i>, application of Castigliano’s theorems to calculate deflection of trusses, frames; Special application – Dummy unit load method.</p>	<b>10 Hours</b>
<b>Module 3</b>	<p><b>Arches and Cables:</b>            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 under point loads and UDL; Length of cables with supports at the same and different levels; Stiffening trusses for suspension cables.</p>	<b>10 Hours</b>
<b>Module 4</b>	<p><b>Slope Deflection Method:</b>            Introduction, sign convention, development of slope deflection equation; Analysis of continuous beams including settlement of supports; Analysis of orthogonal rigid plane frames including sway frames with kinematic indeterminacy up to 3</p>	<b>10 Hours</b>
<b>Module 5</b>	<p><b>Matrix Methods of Structural Analysis:</b>            Definition of stiffness and flexibility methods, comparison to classical methods.  <b>Stiffness Method:</b> Stiffness matrix, Analysis of continuous beams and plane trusses using system approach; Analysis of simple orthogonal plane frames using system approach with kinematic indeterminacy up to 3.</p>	<b>10 Hours</b>

### Course outcomes:

At the end of the course the student will be able to:

1. Evaluate slope and deflections in beams using geometrical methods.
2. Determine deflections in trusses and frames using energy principles.
3. Analyze arches and cables for stress resultants.



4. Apply slope deflection method in analyzing indeterminate structures and construct bending moment diagram.
5. Analyze continuous beams, frames and trusses using stiffness matrix method of analysis.

**Reference Books:**

1. Reddy, C.S., “Basic Structural Analysis”, 3rd ed., Tata McGraw-Hill Education Pvt. Ltd., New Delhi, 2011.
2. Hibbeler, R.C., “Structural Analysis”, 9th edition, Pearson publications, New Delhi, 2012.
3. Thandavamoorthy, T.S., “Structural Analysis”, 6th edition., Oxford University press., New Delhi, 2015.
4. Charles Head Norris, John Benson Wilbur and SenolUtku., “Elementary Structural Analysis”, 4th edition, Tata McGraw-Hill Education Pvt. Ltd., New Delhi, 2003.
5. Hall, A. and Kabaila, A.P., “Basic Concepts of Structural Analysis”, Pitman Publishing, London, John Wiley & Sons, New York, 1977.
6. Wang, C.K., “Intermediate Structural Analysis”, McGraw-Hill International Book Co., 1985.

## TRANSPORTATION ENGINEERING (21CV45)

Semester IV			
<b>No. of Teaching hour/Week</b>	3	<b>CIE Marks</b>	50
<b>No. of Tutorial hours/week</b>	2	<b>SEE Marks</b>	50
<b>Total No. of Lecture hours</b>	50	<b>Exam Hours</b>	03
<b>L: T:P</b>	3:0:2	<b>Credits</b>	04

Modules	Course Content	Teaching Hours
<b>Module 1</b>	<b>Principles of Transportation Engineering:</b> Importance of transportation, Different modes of transportation. Characteristics of road transport, Importance of Roads in India, Current Road development Programmes in India. Highway Development and Planning: Highway Development in India, Highway Planning, Planning Surveys and Interpretation, Highway Planning in India. Highway Alignment and Project preparation: Highway Alignment, Engineering Surveys for Highway Alignment, Drawings and Reports, Highway Projects, Preparation of Detailed Project Report	<b>08 Hours</b>
<b>Module 2</b>	<b>Highway Geometric Design of horizontal alignment elements:</b> Cross sectional elements, Sight distance, Design of Horizontal alignment, Design of vertical alignment. Pavement Design: Pavement types, component parts of flexible and rigid pavements and their functions, ESWL and its determination (Graphical method only)-Examples.	<b>08 Hours</b>
<b>Module 3</b>	<b>Pavement Materials:</b> Sub grade soil-grade soil -desirable properties-HRB soil classificationdetermination of CBR and modulus of sub grade reaction with Problems. Aggregates-Desirable properties. Bituminous Binders & Mixes- Types, desirable properties. Pavement Quality concrete- Materials, Requirements. Pavement Construction: General features, Embankment and Subgrade, Construction of Flexible pavements, Construction of CC pavements	<b>08 Hours</b>
<b>Module 4</b>	<b>Highway Drainage:</b> Significance and requirements, Surface drainage system and Design-Examples, sub surface drainage system, design of filter materials, Types of cross drainage structures, their choice and location. Highway Economics: Highway user benefits, VOC using charts only-Examples, Economic analysis - annual Cost method-Benefit Cost Ratio method-NPV-IRR methods- Examples, Highway financing-BOT-BOOT concepts	<b>08 Hours</b>
<b>Module 5</b>	<b>Elements of Traffic Engineering</b> – Traffic characteristics, Traffic Engineering Studies and Analysis, Traffic Regulation and Control. Elements of Railways and Airport Engineering - Railways: Introduction, classification of routes; railway gauge, coning of wheels and canting of rails, train resistance and hauling power; track components: rails, sleepers, fastenings, ballast and formation. Airports: Introduction, Layout of an airport with component parts and functions of each, Aircraft Characteristics – Airport Classifications, - Site selection- regional Planning. Orientation of runway by using wind rose diagram with examples	<b>08 Hours</b>

### Lab Experiments

1. Tests on Aggregates a. Aggregate Crushing value b. Los Angeles abrasion test c. Aggregate impact test d. Aggregate shape tests (combined index and angularity number)
2. Tests on Bituminous Materials a. Penetration test b. Ductility test c. Softening point test d. Specific gravity test

3. Tests on Soil a. Wet sieve analysis b. CBR test
4. Tests on Bituminous Mixes a. Marshall Method (Demo Experiment)

### **Course outcome**

At the end of the course the student will be able to:

1. Acquire the capability of proposing a new alignment or re-alignment of existing roads, conduct necessary field investigation for generation of required data.
2. Evaluate the engineering properties of the materials and suggest the suitability of the same for pavement construction.
3. Design road geometrics, structural components of pavement and drainage.
4. Evaluate the highway economics by few select methods and also will have a basic knowledge of various highway financing concepts.

### **Text Books**

1. S K Khanna and C E G Justo, "Highway Engineering", Nem Chand Bros, Roorkee.
2. L R Kadiyali, "Highway Engineering", Khanna Publishers, New Delhi.
3. R Srinivasa Kumar, "Highway Engineering", University Press.
4. K. Subramaniam, "Transportation Engineering", SciTech Publications, Chennai.
5. Saxena Subhash C and Satyapal Arora, "A Course in Railway Engineering", Dhanpat Rai and Sons, Delhi.
6. Chandra S. and Agarwal M.M. "Railway Engineering", Oxford University Press India.
7. Khanna S K, Arora M G and Jain S S, "Airport Planning and Design", Nem Chand and Bros.
8. Khanna S.K. and Justo C.E.G. Highway Material Testing, Nem Chand & Bros

## GEOGRAPHIC INFORMATION SYSTEM (21CV46)

Semester IV			
<b>No. of Lecture hour/Week</b>	02	<b>CIE Marks</b>	50
<b>No. of Practical hours/week</b>	02	<b>SEE Marks</b>	50
<b>Total No. of Lecture hours</b>	40	<b>Exam Hours</b>	03
<b>L: T:P</b>	2:0:2	<b>Credits</b>	03

Modules	Course Content	Teaching Hours
<b>Module 1</b>	<b>Geographic Information System-</b> Introduction, Functions and advantages, sources of data for GIS. Database – Types, advantages and disadvantages. Data Analysis.-overlay operations, network analysis, spatial analysis. Outputs and map generation. GPS- components and working principles.	<b>05 Hours</b>
<b>Module 2</b>	<b>Applications of GIS, Remote Sensing and GPS:</b> Water Resources engineering and management (prioritization of river basins, water perspective zones and its mapping), Highway and transportation (highway alignment, Optimization of routes, accident analysis), Environmental Engineering 2 (Geostatistical analysis of water quality, rainfall).	<b>05 Hours</b>
<b>Module 3</b>	<b>Applications of GIS, Remote Sensing and GPS:</b> Urban Planning & Management, urban sprawl, Change detection studies, forests and urban area, floods, drainage system agriculture, Disaster Management.	<b>05 Hours</b>
<b>Module 4</b>	<b>QGIS Introduction:</b> Definition of GIS and its use. Introduction to a free and open source desktop geographic information system software. Types of data (vector and raster formats), web services, useful commands and utilities for geo-processing, extending its capabilities to digital satellite image processing and analysis. <b>About QGIS</b> Characteristics of QGIS Start using QGIS. QGIS TOOLS QGIS Configuration, General tools, Working with projections QGIS Browser. <b>WORKING WITH RASTER DATA</b> Introduction, Display raster data, Raster calculator, Working with images, Practical exercises: Working with raster data and operations with images.	<b>10 Hours</b>
<b>Module 5</b>	<b>CREATE MAPS AND RELATED PRODUCTS:</b> Creation tools, Graphic elements, Atlases generation, and Graphic output creations. Practical exercises: Map creation with QGIS. Teaching-Learning Process Chalk and talk, PowerPoint Presentation & PBL <b>RELATIONAL DATABASE MANAGEMENT SYSTEMS AND SPATIAL DATA.</b> Database design, Database connections, Table joins Spatial joins, generate new statistics and new data using table and spatial data information. Practical exercises: Creation of thematic maps like population data of taluk, Watershed map with drainage and water bodies, Highway with other 2 road intersection details	<b>15 Hours</b>

**Course Outcomes:**

At the end of this course student will be able to:

1. Understand principles Geographical Information Systems (GIS) data acquisition and its applications.
2. Apply GIS technologies in various fields of engineering and social needs for creating a feasible solution in the different fields of application of GIS
3. Use open source software for civil environmental engineering applications of various tools in QGIS software
4. Create thematic layers with attribute data and generate maps using QGIS for decision making

**Reference Books:**

1. Geographic Information System-An Introduction, Tor Bernharadsen, 2009, 3rd Edition, Wiley India Pvt. Ltd. New Delhi, ISBN - 9788126511389.
2. Principles of Remote sensing and Image Interpretation, Lillesand and Kiefer, 2011, 6th Edition, John Wiley Publishers, New Delhi, ISBN – 8126532238. Web links and Video Lectures (e-Resources):
3. <https://docs.qgis.org/3.16/pdf/en/QGIS-3.16-DesktopUserGuide-en.pdf> for QGIS manual
4. NPTEL Lectures

**CONSTITUTION OF INDIA, PROFESSIONAL ETHICS & CYBER  
LAW (21CPH47)**

**Semester IV (Common to all branches)**

<b>No. of Lecture hour/Week</b>	1	<b>CIE Marks</b>	50
<b>No. of Tutorial hours/week</b>	0	<b>SEE Marks</b>	00
<b>Total No. of Lecture hours</b>	16	<b>Exam Hours</b>	00
<b>L: T:P</b>	1:0:0	<b>Credits</b>	01

<b>Modules</b>	<b>Course Content</b>	<b>Teaching Hours</b>
<b>Module 1</b>	<b>Introduction to Indian Constitution:</b> 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. Salient features of India Constitution.	<b>03 Hours</b>
<b>Module 2</b>	<b>Fundamental Rights (FR's), Directive Principles of State Policy (DPSP's) and Fundamental Duties (FD's):</b> 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 in Nation building.	<b>03 Hours</b>
<b>Module 3</b>	<b>Union Executive:</b> Parliamentary System, Union Executive – President, Prime Minister, Union Cabinet, Parliament - LS and RS, Parliamentary Committees, Important Parliamentary Terminologies. Supreme Court of India, Judicial Reviews and Judicial Activism.	<b>03 Hours</b>
<b>Module 4</b>	<b>State Executive &amp; Elections, Amendments and Emergency Provisions:</b> State Executive, Election Commission, Elections & Electoral Process. Amendment to Constitution (Why and How) and Important Constitutional Amendments till today. Emergency Provisions.	<b>03 Hours</b>
<b>Module 5</b>	<b>Professional Ethics:</b> Definition of Ethics & Values. Professional & Engineering Ethics. Positive and Negative aspects of Engineering Ethics. <b>Cyber Laws:</b> Salient features of the IT Act, 2000, various authorities under IT Act and their powers. ; Penalties & Offences, amendments. <b>Computer &amp; Cyber Security:</b> (a) Types of Attacks, (b) Network Security (c) Overview of Security threats, (d) Hacking Techniques, (e) Password cracking (f) Insecure Network connections, (g) Malicious code (h) Concept of Fire wall Security	<b>04 Hours</b>

**Course Outcomes:**

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

- Have constitutional knowledge and legal literacy.

  
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- Understand Engineering and Professional ethics and responsibilities of Engineers.
- Understand cyber threats & cyber laws, acts and their powers.

**Reference Books:**

1. Shubham Singla, „Constitution of India, Professional Ethics & Human Rights“, CENGAGE Publications 2018.
2. Cyber Law & Cyber Crimes by Advocate Prashant Mali; Snow White publications, Mumbai.
3. Cyber Law in India by Farooq Ahmad; Pioneer Books.

## ABILITY ENHANCEMENT COURSE II (21AEC48)

### Semester IV (Common to all branches)

No. of Lecture hour/Week	1	CIE Marks	50
No. of Tutorial hours/week	0	SEE Marks	00
Total No. of Lecture hours	16	Exam Hours	00
L: T:P	1:0:0	Credits	01

Modules	Course Content	Teaching Hours
Module 1	<b>Technical Report Writing:</b> Introduction to Technical writing process, Understanding of writing process, Introduction to various Technical Report writing.	03 Hours
Module 2	<b>Art of condensation and Paragraph Writing:</b> Introduction and importance, Types and principles of condensation. Importance of paragraph writing, Features and its construction styles.	03 Hours
Module 3	<b>Business Report Writing:</b> Introduction, Definition and Salient features of Business reports. Significance and types of report writing. (Formal and Informal). Resume building and Types of resumes. (Samples of resumes)	03 Hours
Module 4	<b>Technical Articles and Proposals:</b> Nature and significance, Types of technical Articles Journal articles and conference papers. Elements of technical articles. Introduction to technical proposal writing, Purpose, importance, structure and types of technical proposals.	04 Hours
Module 5	<b>Social media posts and Blog Writing:</b> Ethics and practices of social media posts, Principles and fundamentals, Guiding principles for composition of articles, some common pitfalls. Maintaining common etiquette. Blogs and Blog writings strategies.	03 Hours

#### Course Outcomes:

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

- Effectively communicate in technical matters.
- Practice preparation of gist, abstract and notes from a technical article.
- Prepare a business proposals and reports.
- Write and respond in social media and write blogs.

#### Reference Books:

1. Sanjay Kumar and Pushpalata, „Communication Skills“, Oxford University Press. 2018.
2. M. Ashraf Rizvi, „Effective Technical Communication“, McGraw Hill, 2018.
3. Gajendra Singh Chauhan and et.al. „Technical Communication“, Cengage Publication, 2018.
4. Meenakshi Raman and Sangeeta Sharma, Technical Communication Principles and Practice, Oxford University Press, 2018.

  
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