

Scheme & Syllabus (1st Year)

Bachelor Degree in Engineering (Common to all Branches)

(With effect from 2021 Academic Year)

Out Come Based Education **With** **Choice Based Credit System**



P.D.A. College of Engineering, Aiwan-E-Shahi Area, Kalaburagi-585102, Karnataka
(An Autonomous Institution Affiliated to VTU, Belagavi.)

Grant-in- Aid Institution
(Government of Karnataka)
Accredited by NBA, New Delhi.
Approved by AICTE, New Delhi.

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POOJYA DODDAPPA APPA COLLEGE OF ENGINEERING, KALABURAGI Scheme of Teaching and Examination 2021 – 22 Choice Based Credit System (CBCS) (Effective from the academic year 2021 – 22)													
I SEMESTER B.E./B.Tech (PHYSICS GROUP)													
Sl. No.	Course and Course Code		Course Title	Teaching Department	Paper Setting Board	Teaching Hours/Week			Examination				Credits
						Theory Lecture	Tutorial	Practical/Drawing	Duration in hours	SEE Marks	CIE Marks	Total Marks	
1.	BS	21MA11	Calculus and Linear Algebra	Mathematics	Mathematics	3	-	--	03	50	50	100	3
2.	BS	21 PH12	Engineering Physics	Physics	Physics	3	-	--	03	50	50	100	3
3.	HU	21HU13	Technical English 1	Humanities	Humanities	2	--	--	02	50	50	100	2
4.	ES	21EE14	Basic Electrical Engineering	E and E Engineering	E and E Engineering	3	-	--	03	50	50	100	3
5.	ES	21ME15	Computer Aided Engineering and Drawing	Mechanical Engineering	Mechanical Engineering	2	--	2	03	50	50	100	3
6.	ES	21EC17	Basic Electronics	ECE Dept	ECE Dept	3	-	-	03	50	50	100	3
7.	BS	21PHL11	Engineering Physics Laboratory	Physics	Physics Dept	--	--	2	03	50	50	100	1
8.	ES	21EEL12	Basic Electrical Engineering Laboratory	E and E Engineering	E and E Engineering	--	--	2	03	50	50	100	1
9.	AE	21AE19X	Ability Enhancement/Skill Enhancement Course								100	100	1
Total						16	--	06	23	400	500	900	20
Note: BS: Basic Science, ES: Engineering Science, Hu: Humanities													

POOJYA DODDAPPA APPA COLLEGE OF ENGINEERING, KALABURAGI Scheme of Teaching and Examination 2021 – 22 Choice Based Credit System (CBCS) (Effective from the academic year 2021 – 22)													
I SEMESTER B.E./B.Tech (CHEMISTRY GROUP)													
Sl. No.	Course and Course Code		Course Title	Teaching Department	Paper Setting Board	Teaching Hours/Week			Examination				Credits
						Theory Lecture	Tutorial	Practical/Drawing	Duration in hours	SEE Marks	CIE Marks	Total Marks	
1	BS	21MA11	Calculus and Linear Algebra	Mathematics	Mathematics Dept.	3	-	--	03	50	50	100	3
2	BS	21CH12	Engineering Chemistry	Chemistry	Chemistry Dept.	3	-	--	03	50	50	100	3
3	HU	21HU13	Technical English-I	Humanities	Humanities	2	--	--	2	50	50	100	2
4	ES	21CS14	C Programming for Problem Solving	Computer Science & Engineering	Computer Science & Engineering	3	-	--	03	50	50	100	3
5	ES	21ME16	Mechanical Engineering Science	Mechanical Engg. Dept.	Mechanical Engineering	2	--	2	03	50	50	100	3
6	ES	21CV17	Engineering Mechanics	Civil Engineering	Civil Engineering	3	--	--	03	50	50	100	3
7	BS	21CHL11	Engineering Chemistry Laboratory	Chemistry	Chemistry Dept.	--	--	2	03	50	50	100	1
8	ES	21CSL12	Computer Programming Laboratory	Computer Science & Engineering	Computer Science & Engineering	--	--	2	03	50	50	100	1
9		21AE19X	Ability Enhancement/Skill Enhancement Course								100	100	1
Total						16	--	06	23	400	500	900	20

POOJYA DODDAPPA APPA COLLEGE OF ENGINEERING, KALABURAGI Scheme of Teaching and Examination 2019 – 20 Choice Based Credit System (CBCS) (Effective from the academic year 19 – 20)													
II SEMESTER B.E./B.Tech (PHYSICS GROUP)													
Sl. No.	Course and Course Code		Course Title	Teaching Department	Paper Setting Board	Teaching Hours/Week			Examination				Credits
						Theory Lecture	Tutorial	Practical/Drawing	Duration in hours	SEE Marks	CIE Marks	Total Marks	
1.	BS	21MA21	Differential Equations and Laplace Transforms	Mathematics Dept	Mathematics Dept	3	-	--	03	50	50	100	3
2.	BS	21 PH22	Engineering Physics	Physics Dept	Physics Dept	3	-	--	03	50	50	100	3
3.	ES	21EE24	Basic Electrical Engineering	E and E Engineering	E and E Engineering	3	-	--	03	50	50	100	3
4.	Hu	21HU23	Technical English-II	Humanities	Humanities	2	--	--	02	50	50	100	2
5.	ES	21ME25	Computer Aided Engineering and Drawing	Mechanical Engineering	Mechanical Engineering	2	--	2	03	50	50	100	3
6.	ES	21EC27	Basic Electronics	ECE Dept	ECE Dept	3	-	-	03	50	50	100	3
7.	BS	21PHL21	Engineering Physics Laboratory	Physics Dept	Physics Dept	--	--	2	03	50	50	100	1
8.	ES	21EEL22	Basic Electrical Engineering Laboratory	E and E Engineering	E and E Engineering	--	--	2	03	50	50	100	1
9.		21AE29X	Ability Enhancement / Skill based course								100	100	1
Total						16	--	06	23	400	500	900	20
Note: BS: Basic Science, ES: Engineering Science, Hu: Humanities													

POOJYA DODDAPPA APPA COLLEGE OF ENGINEERING, KALABURAGI

Scheme of Teaching and Examination 2021 – 22

Choice Based Credit System (CBCS)

(Effective from the academic year 2021 – 22)

II SEMESTER B.E./B.Tech (CHEMISTRY GROUP)

Sl. No.	Course and Course Code		Course Title	Teaching Department	Paper Setting Board	Teaching Hours/Week			Examination				Credits
						Theory Lecture	Tutorial	Practical/Drawing	Duration in hours	SEE Marks	CIE Marks	Total Marks	
	BS	21MA21	Differential Equations and Laplace Transforms	Mathematics Dept	Mathematics Dept.	3	-	--	03	50	50	100	3
	BS	21CH22	Engineering Chemistry	Chemistry Dept	Chemistry Dept.	3	-	--	03	50	50	100	3
	HU	21HU23	Technical English-II	Humanities	Humanities	2	--	--	2	50	50	100	2
	ES	21CS24	C Programming for Problem Solving	Computer Science & Engineering	Computer Science & Engineering	3	-	--	03	50	50	100	3
	ES	21ME26	Mechanical Engineering Science	Mechanical Engg. Dept.	Mechanical Engineering	2	--	2	03	50	50	100	3
	BS	21CV27	Engineering Mechanics	Civil Engg Dept	Civil Engg. Dept	3	--	--	03	50	50	100	3
	BS	21CHL21	Engineering Chemistry Laboratory	Chemistry Dept	Chemistry Dept.	--	--	2	03	50	50	100	1
	ES	21CSL22	Computer Programming Laboratory	Computer Science & Engineering	Computer Science & Engineering	--	--	2	03	50	50	100	1
		21AE29X	Ability Enhancement/Skill based Course								100	100	1
Total						16	--	06	23	400	500	900	20

PREFACE

Poojya Doddappa Appa College of Engineering, Kalaburagi was established in the year 1958 by Hyderabad Karnataka Education society (HKES), founded by Late Shri Mahadevappa Rampure. The KHE Society runs 48 education institutions.

The College campus is spread over 71 acres of land. The college was started with 50% central assistance and 50% state assistance. The initial intake was 120 with degree offered in three branches of engineering viz, Civil, Mechanical and Electrical Engineering. Now it houses 13 undergraduate courses, 10 post Graduate courses and 13 Research centers. All the courses are affiliated to Visvesvaraya Technological University, Belagavi. At present the total intake at UG level is 980 and at PG level is 193. There are 237 teachers in the College out of which 60 are getting salary from the State Government and rest of them are paid by the College management.

The college receives grant in aid funds from the state government. The National Board of Accreditation, New Delhi, accredited the College in the year 2005 for 09 UG courses out of which 08 courses were accredited for three years and 01 Course for 5 years. Six UG courses were accredited in the year 2009 for 03 years. Now the college has been accredited by NBA for 5 programs the accreditation is valid up to June 2022. Further 5 other program have applied and waiting for inspection by NBA.

The college is one among the 14 colleges selected under TEQIP, sponsored by World Bank. It has received a grant of Rs 10.45 Crores under this scheme for its development. The institution is selected for TEQIP phase II in year 2011 for four years. Institution received a grant of Rs 12.50 Crores under TEQIP phase-II scheme for its development. Further the college is selected for TEQIP phase III scheme and received a grant of Rs. 7 Crores under TEQIP Phase-III.

The College was granted autonomous status by the UGC for six years from 2009-10 to 2014-15. Granted the extension for 2014-15 to 2016-17 and further received the extension for 2017-18 to 2018-19.

Vision of the Institution

To be an institute of excellence in technical education and research to serve the needs of the industry and society at local and global levels.

Mission of the Institution

- To provide a high-quality educational experience for students with values and ethics that enables them to become leaders in their chosen professions.
- To explore, create and develop innovations in engineering and science through research and development activities.
- To provide beneficial service to national and multinational industries and communities through educational, technical and professional activities.

CALCULUS AND LINEAR ALGEBRA (Common to all branches) [As per Choice Based Credit System (CBCS) scheme] (From the academic year 2021-22)			
Course Code	21MA11	CIE Marks	50
Credits	03	SEE Marks	50
Contact Hours/Week (L-T-P)	3-0-0	Total Marks	100
Contact Hours	42	Exam Hours	03
Course Learning Objectives: This course (21MA11) will enable students to master the basic tools of differential & integral calculus, differential equations and elementary linear algebra and become skilled for solving problems in science and engineering.			
MODULE-I Differential Calculus-1 Polar curves - angle between the radius vector and tangent, angle between two curves, pedal equation. Curvature and radius of curvature in Cartesian and polar forms and simple examples. Taylor's and Maclaurin's series expansions for one variable (statements only) and examples. Evaluation of Indeterminate forms.			8 Hours
MODULE-II Differential Calculus-2:- Partial differentiation; Definition and simple problems, Euler's theorem (without proof) and examples, Total derivatives, differentiation of composite functions. Jacobians-Simple problems. Taylor's theorem for function of two variables (statement only) and simple examples. Maxima and minima for a function of two variables with illustrative examples			9 Hours
MODULE-III Integral Calculus-I Reduction formulae for the integration of $\sin^n x$, $\cos^n x$, $\tan^n x$ and $\sin^m x \cos^n x$ evaluation of these with standard limits- illustrative problems Tracing of curves: Cartesian, Parametric and Polar form. Evaluation of arc length, Surface area and Volume.			8 Hours
MODULE-IV Integral Calculus-II Multiple integrals: Evaluation of double and triple integrals. Evaluation of double integrals by change of order of integration and changing into polar co-ordinates. Applications to find area by double integration and volume by double and triple integration Beta and Gamma functions: definitions, Relation between beta and gamma functions and simple problems			9 Hours
MODULE-V Elementary Linear Algebra: Rank of a matrix-echelon form. Solution of system of linear equations – consistency. Gauss-elimination method, Gauss –Jordan method. Definition of Eigen values and Eigen vectors and simple examples Infinite Series: Convergence and divergence of infinite series- P-series test Comparison test, D'Alembert's ratio test, Cauchy's root test (without proof)- Illustrative examples.			8 Hours
Text Books: 1.B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 43 rd Ed.,2015.			

2.E. Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons, 10thEd.(Reprint),2016.

Reference books:

1. Early Transcendental Calculus- James Stewart, Thomson Books, 5e 2007
2. N.P.Bali and Manish Goyal: A Text Book of Engineering Mathematics, Laxmi Publishers, 7th Ed., 2010.
3. B.V.Ramana: "Higher Engineering Mathematics" 11th Edition, Tata McGraw-Hill, 2010.
4. Veerarajan T., "Engineering Mathematics for First year", Tata McGraw-Hill, 2008.
5. Thomas G.B. and Finney R.L. "Calculus and Analytical Geometry" 9th Edition, Pearson,

E-Books and Online resources:

- <http://ac.in/courses.php?disciplineID=111>
- [http://www.class-central.com/subject/math\(MOOCs\)](http://www.class-central.com/subject/math(MOOCs))
- <http://academicearth.org/>

Pedagogy (General Instructions):

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

1. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the delivered lessons shall develop student's theoretical and applied mathematical skills.
 2. State the need for Mathematics with Engineering Studies and Provide real-life examples
 3. Support and guide the students for self-study.
 4. You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress.
 5. Encourage the students for group learning to improve their creative and analytical skills.
 6. Show short related video lectures in the following ways: • As an introduction to new topics (pre-lecture activity).
 - As a revision of topics (post-lecture activity).
 - As additional examples (post-lecture activity).
 - As an additional material of challenging topics (pre-and post-lecture activity).
- As a model solution of some exercises (post-lecture activity).

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

Course Code	CO #	Course Outcome (CO): At the end of the course student will be able to:
21MA11	CO1	Apply the knowledge of calculus to solve problems related to polar curves and its applications and expand functions using Taylor's and Mechaurin's series.
	CO2	Apply the partial differentiation to calculate rate of change of multivariate functions and solve the problems related to composite functions and Jacobians
	CO3	Apply reduction formulae and solve the problem related to arc length, surface area and volume generated by revolving the curve

		CO4	Apply the concept of multiple integrals and their usage in computing the area and volume										
		CO5	Make use of matrix theory for solving system of linear equation and compute Eigen values and Eigen vectors										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	
CO1	3	1										1	
CO2	3	1										1	
CO3	3	2										1	
CO4	3	1										1	
CO5	3	1										1	
AVG	3	1.2										1	

Engineering Physics
(Common to all branches)
[As per Choice Based Credit System (CBCS) scheme]
(From the academic year 2021-22)

Course Code	21PH12/22	CIE Marks	50
Credits	03	SEE Marks	50
Contact Hours/Week (L-T-P)	3-0-0	Total Marks	100
Contact Hours	42	Exam Hours	03

Course Learning Objectives:

1. Depreciate the learning of phenomenon of electrical polarization and dielectrics Prescribe the effect of external electrical field on dielectric materials.
2. Develop the implications of Quantum theory on the classical free electron theory and introduces the concept of Fermi energy through the Fermi Dirac statistics.
3. Superconductors and its applications through different effects.
4. Annalyse the basic account of the functioning of laser systems with applications.
5. Explain the propagations of light through the optical fibre and the applications of optical fibres.
6. To familiarize students with the concepts of elasticity and recognize the elastic properties of materials for engg. Applications.

MODULE-I

Applied Optics:

Basic principles of lasers, Requisites of laser system. Condition for laser action. Boltzmann factor. Numerical. Construction and working of Nd-YAG and semiconductor lasers. Application of lasers: LIDAR, Industrial, Medical, and Holography: Principle of recording and reconstruction of images.

Optical fibers; propagation mechanism. Acceptance angle, numerical aperture. Condition for propagation. Fractional index change, relation between NA and fractional index change, V-number. Types of optical fibers. Attenuation Co-efficient, Application of fiber optics: Endoscopy, Temperature sensor. Numericals

9 Hours

MODULE-II

Crystallography

Space lattice, lattice parameters, unit cell. Crystal systems, sketch of Bravias lattice. Miller indices - procedure for finding miller indices. Planes in cubic unit cell. Expression for interplanar distance. Packing factor for SC, BCC and FCC. Crystal structure of NaCl. Numerical. Bragg's law, Braggs X-ray diffractometer and application for determination of wavelength & crystal structure. Crystal imperfection-point, line & planar defects(Qualitative). Numericals.

8 Hours

MODULE-III

Elastic Properties Of Materials:

Review of stress, strain, Hooke's law, Elasticity, plasticity, strain hardening, strain softening and failure (fracture/fatigue).Different elastic moduli and derivation of their inter relationships, Poisson's

9Hours

ratio. Bending of beams: Neutral surface and neutral plane, expression for bending moment of a beam (Derivation), Application example: single cantilever (Derivation), I-Shaped grids & twisting couples. Numericals.			
MODULE-IV			
<u>Dielectric properties of materials:</u> Dielectric materials: polar and non-polar dielectrics. Dielectric constant and loss. Types of polarization mechanism. Equation for internal field in liquids and solids (1D case & 3D solid). Clausius-Mossotti equation. Description of solid, liquid & gaseous dielectrics with one example. Qualitative explanation of application of dielectrics in transformer. Numericals.			8 Hours
MODULE-V			
<u>Conductor and Superconductors:</u> Classification of solids, Electrical conduction, Classification of conducting materials. Concept of Fermi energy & Fermi level in solids, Expression for density of states. Fermi-Dirac statistics (Qualitative), Temperature dependence of resistivity in super conductors, Meissner effect, Types of super conductors, High temperature super conductors, applications of super conductors: Magnetic Levitation. Numerical			8 Hours
Text Books: 1. Engineering physics – S. P. Basavraj, Subhas Stores- 2011 Edition 2. V Rajendran, “Engineering Physics”, Tata McGraw Hill Company Ltd, New Delhi-2012 Reference books: 1. S Mani Naidu, “Engineering Physics”, Pearson India Limited-2014. 2. Engineering Physics-Gaur and Gupta-Dhanpat Rai Publications-2017 3. A Marikani, “Engineering Physics”, PHI Learning Private Limited Delhi-2013. 4. Wiley Precise Text, “Engineering Physics”, Wiley India Private Ltd, New Delhi. Book Series-2014. S. O. Pillai” Solid State Physics” New Age International Sixth Edition.			
Course outcomes: On completion of the course, the student will have the ability to:			
Course Code	CO #	Course Outcome (CO): At the end of the course student will be able to:	
21PH12/22	CO1	Analyze the working principle of laser and optical fibers, explain the construction and working of laser and types of optical fibers, formulate and evaluate the numerical aperture, summarise the application of laser and optical fibers. (PO-1)	
	CO2	Classify peculiar properties of crystal structure. Apply them in crystallography using X-ray diffraction technique. (PO-2)	
	CO3	Analyze elastic moduli in different cases, understand various types of oscillations and their implications and recognize the elastic properties of materials for engg. Applications.	
	CO4	Interpret the fundamental properties of dielectric and ferroelectric materials. Assess internal field for solids, Summarize its applications.	

	CO5		Categorize properties of materials on band theory and evaluate the density of states in solids. Discuss the properties of superconductors. Explore technological applications									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3										2
CO2	3	3										2
CO3	3	2										2
CO4	3	3										2
CO5	3	3										2
AVG	3	2.8										2
<p>Question paper pattern: The SEE question paper will be set for 100 marks and the marks scored by the student will be finally reduced to 50.</p> <ul style="list-style-type: none"> • The question paper will have ten full questions carrying 20 marks each. • There will be two full questions (with a maximum of four sub questions) from each module <p>The students will have to answer five full questions selecting one from each module</p>												

<p align="center">TECHNICAL ENGLISH - I (Common to all branches) [As per Choice Based Credit System (CBCS) scheme] (From the academic year 2021-22)</p>				
Course Code	21HU13	CIE Marks	50	
Credits	02	SEE Marks	50	
Contact Hours/Week (L-T-P)	2-0-0	Total Marks	100	
Contact Hours	28	Exam Hours	02	
<p>Course Learning Objectives: To enable the students to obtain the basic knowledge about Communication Skills - I in the following topics:-</p> <ul style="list-style-type: none"> . The Meaning, definition, importance, purpose, process, types, barriers and essential of communication. . Develop reading and understanding ability . Learn effective writing . Learn how to write different types of letter. . Case method of learning 				
<p align="center">MODULE-I INTRODUCTION TO COMMUNICATION: Meaning, Definition, Importance & Purpose of Communication, Process of Communication, Types of Communication, Communication network in an organization, 7c's of communication, Barriers to Communication and Essential of good Communication.</p>				6 Hours
<p align="center">MODULE-II READING AND UNDERSTANDING Reading Comprehension – Reading rate and reading comprehension, Paraphrasing, Interpretations of graphical information, Book reading and summarizing it.</p>				6 Hours
<p align="center">MODULE-III EFFECTIVE WRITING. Purpose of Writing, Clarity in Writing, Principle of Effective Writing. Better writing using personal Experiences – Describing a person, situation, memorable events etc</p>				5Hours
<p align="center">MODULE-IV DRAFTING OF LETTERS: Writing different types of letters – writing for employment, joining letter, complaints & follows up, Enquiries, representation etc. Official Communication – e-mail & Social Media</p>				6 Hours
<p align="center">MODULE-V CASE METHOD OF LEARNING: Understand Case method of learning, different type of cases, overcoming the difficulties of the case method, analyzing the case. Do's & Don'ts for case preparation.</p>				5 Hours
<p>Text Books:</p> <ol style="list-style-type: none"> 1. Scotofer, contemporary business communication, Biztant ra Hardcover – 23 January 1998 2. Chaturvedi P D & Mukesh chaturvedi - Business communication: Concepts, cases & 				

<p>applications- 2/e, 2nd Edition pearson education.</p> <p>3. Essential of Business communication – Rajendra Pal and J.S Korlhall – Sultan Chand & Sons, New Delhi.</p> <p>Reference books:</p> <p>1. 1 Business correspondence & report writing – R.C.Sharma, Krishna Mohan – Tata Megraww Hill Publising Company Ltd, New Delhi.</p> <p>2. Business Communcation – K.K. Sinha – Galgotia Publishing Company, New Delhi.</p> <p>E – BOOKS & ONLINE RESOURCES</p> <p>https://www.skillsyouneed.com/ips/communication-skills.html</p> <p>http://103.5.132.213:8080/jspui/bitstream/123456789/1122/1/Communication%20Skills.pdf</p> <p>https://www.skillsyouneed.com/docs/communication-skills-PV.pdf</p> <p>NPTEL/ SWAMYAM/MOOCs: TECHNICAL ENGLISH FOR ENGINEERS (8 Weeks)</p> <p>Prof AYSHA IQBAL , Department of HSS, IIT MADRAS</p>												
<p>Teaching methodology</p> <p>Teacher/ student -Centered Approach to Learning, ICT Tools, Group Assignment, Case Study</p>												
<p>Course Outcomes: On completion of this course, students are able to:</p>												
Course Code	CO #		Course Outcome (CO): At the end of the course student will be able to:									
21HU13	CO1		Explain about basic of Communication									
	CO2		Develop reading and understanding ability. ,									
	CO3		Learn effective writing									
	CO4		Learn how to write different types of letter									
	CO5		Analyze a Case study and solve									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						2.00		2.00	2.00	3.00		3.00
CO2						2.00		2.00	2.00	3.00		3.00
CO3						2.00		2.00	2.00	3.00		3.00
CO4						2.00		2.00	2.00	3.00		3.00
CO5						2.00		0.00	2.00	3.00		2.00
AVG						2.00		1.60	2.00	3.00		2.80

BASIC ELECTRICAL ENGINEERING (Common to all branches) [As per Choice Based Credit System (CBCS) scheme] (From the academic year 2021-22)			
Course Code	21EE14/24	CIE Marks	50
Credits	03	SEE Marks	50
Contact Hours/Week (L-T-P)	3-0-0	Total Marks	100
Contact Hours	42	Exam Hours	03
Prerequisite: Students should have the knowledge of 1. Ohms Law, Kirchhoff's Current and Voltage Law. 2. Fundamentals of AC and DC Circuits. 3. Basics of Magnetism. Course Learning Objectives: . 1. Understanding the concept and analysis of Single phase and Three phase AC circuits. 2. Study of construction and performance analysis of single phase transformer. 3. Study of construction and working principle of DC machines 4. Study of construction and working principle of Three phase AC Machines. 5. Study of Power Generation stations, Tariff, measuring instruments and electric safety measures.			
MODULE-I AC Circuits: Single Phase Circuits: AC terminologies, Analysis of R,L,C,R-L Series circuits, Disadvantages of low power factor, Measurement of power by VAW method. ThreePhase Circuits: Advantages, types of connections, Relation between phase & line values. 3 - phase power measurement by two-wattmeter method for balanced load.			9 Hours
MODULE-II Electromagnetism and Single Phase Transformer: Electromagnetism: Faraday Laws of Electromagnetic Induction, Fleming's rules, Lenz's law, types of EMF and numerical. Transformer: Principle, construction and working of single phase transformer, types (based on construction), EMF equation, losses, efficiency and Voltage regulation. (Numerical related to EMF equation and Efficiency)			9 Hours
MODULE-III DC Machines: DC generator: Principle, Construction, working, types and EMF equation. (Numerical on EMF equation) DC Motor: Principle, Working, back emf and its significance, torque equation, necessity of starter, 3-point starter. (Numerical on Torque & Voltage Equations)			8 Hours
MODULE-IV Three Phase AC Machines: Alternator: Principle of operation, types and constructional features, EMF equation of alternator.(Excluding the winding factors derivation) Numerical on EMF equation. Three phase Induction Motor: Construction, concept of rotating magnetic field, principle of operation, Star – Delta starter.(Numerical on Slip calculations only).			8 Hours
MODULE-V			

Generation, Tariff, Measuring Instruments and Electric Safety: Generation of Power: Block schematic representation of hydroelectric, thermal, nuclear and solar power generating stations (Self study component). Tariff: Objectives of Tariff, Desirable characteristics of Tariff, Three-part tariff. Measuring Instruments: Principle, Construction & working of Dynamometer type wattmeter & Single phase energy meter. Electric Safety: Necessity of earthing, plate & pipe earthing, Elementary discussion on Fuse & MCB. Electric Shock, Effects, Remedies & Precautions (Self study component).			7 Hours
Question paper pattern: Total ten questions will be asked, two from each module. The student has to answer five questions, selecting at least one from each module.			
Reference books: <ol style="list-style-type: none"> 1. J P Tiwari, "Basic Electrical Engineering", New age Publications, 2nd edition, 2011. 2. Rajendra Prasad "Fundamentals of Electrical Engineering", PHI 3rd edition, 2014. 3. B L Theraja & A K Theraja "Electrical Technology", Vol 1, 2nd edition. 4. B L Theraja & A K Theraja "ABC of Electrical Engineering", 2nd edition. 5. D.P. Kothari and Nagrath "Theory and Problems in electrical Engineering", PHI edition 2011. 6. V. N. Mittal and Arvind Mittal, "Basic Electrical Engineering" McGraw Hill. 7. R.V. Srinivasa Murthy "Basic Electrical Engineering" Sanguine Technical Publisher 2004. E- 			
Course Outcomes: On completion of this course, students are able to:			
Course Code	CO #	Course Outcome (CO): At the end of the course student will be able to:	
	CO1	State, illustrate electric circuits and solving the Networks	
21EE14/24	CO2	State, illustrate magnetic circuit, solving the networks and identify the parts, explain the construction, working and examine the performance of Transformer.	
	CO3	Identify the parts, explain the construction, working and examine the performance of DC Machines.	
	CO4	Recognize the parts, give the illustration of construction and compute the performance of AC machines.	
	CO5	Outline the Power Generating stations, analyze the tariff, synthesize the safety measures and explain the working of measuring instruments.	

Computer Aided Engineering Drawing (Common to all branches) [As per Choice Based Credit System (CBCS) scheme] (From the academic year 2021-22)			
Course Code	21ME15/25	CIE Marks	50
Credits	03	SEE Marks	50
Contact Hours/Week (L-T-P)	2-0-2	Total Marks	100
Contact Hours	28 (THEORY) + 28 (PRACTICAL)	Exam Hours	03
Course Learning Objectives: <ol style="list-style-type: none"> 1. To understand the fundamentals of orthographic projections of different object in first angle projections method, using BIS standard specifications. 2. To prove that Drawing is the best communication tool. 3. To improve the imaginary skills and logical thinking capabilities. 4. To visualize three dimensions of simple machine components, by drawing Isometric projections. 5. To understand section points, section planes, frustums, truncated solids and to mark their Development. 6. To understand the solid edge software and the connected tool used to mark 2D drawings on a System. 7. To have the basic exposure to solid modeling using 3D solid edge software package. 			
MODULE-I Introduction to CAD Software: Learning the drawing commands such as point, line, arc, circle, ellipse, rectangle, polygons etc. Modify commands such as copy, move, mirror, rotate, pattern, scale etc. Dimensions - linear, aligned, radial, angular etc.			2 Hours Practical
MODULE-II Orthographic projections: Projections of points in all the four quadrants, Projections of straight lines (located in First quadrant/first angle only), True and apparent lengths, True and apparent inclinations to reference planes (No application problems and midpoint problems). Projections of Plane Surfaces (First Angle Projection Only) : Projection of Planes such as triangle, square, rectangle, pentagon, hexagon and circle in simple positions inclined to both the planes; planes in different positions by change of position method only. (No problems on punched plates and composite plates).			8 Hours Theory+ 6 Hours Practical
MODULE-III Projections of Solids :(First angle Projection only) Projection of Solids such as cube, prism, pyramid, cylinder and cone (No problems on tetrahedron ,octahedrons, and freely suspended solids). selection criteria area.(No numericals).			8 Hours Theory+ 8 Hours Practical
MODULE-IV Development of Lateral Surfaces of Solids: Introduction, introduction to section planes and sectional views, Development of lateral surfaces of right regular prisms, cylinders,pyramids,cones and their frustums resting with base on HP only. (No problems on lateral surfaces of trays, tetrahedrons, spheres and transition pieces).			6 Hours Theory+ 6 Hours Practical

<p align="center">MODULE-V</p> <p>Isometric Projection :(Using Isometric Scale Only) Introduction, Isometric scale, Isometric projection of simple plane figures, Isometric projection of hexahedron(cube), right regular prisms, pyramids, cylinders, cones, spheres. Isometric view of combination of two simple solids.</p>		<p>6 Hours Theory+ 6 Hours Practical</p>															
<p>Text Books: 1) Engineering Drawing - N.D. Bhatt & V.M. Panchal, 48th edition, 2005-Charotar Publishing House, Gujarat. 2) A Primer on Computer Aided Engineering Drawing-2006, Published by VTU, Belgaum</p> <p>Reference books: 1. Computer Aided Engineering Drawing - S. Trymbaka Murthy, - I.K.International Publishing House Pvt. Ltd., New Delhi, 3rd revised edition- 2006. 2. Engineering Graphics - K.R.Gopalakrishna, 32nd edition, 2005- Subash Publishers Bangalore.</p> <p>Online resources: NPTEL/SWAYAM/MOOCs:</p>																	
<p>The topic or concept-wise pedagogy (Teaching Methodology) of the curriculum shall be specified in the content.</p> <p>Question paper pattern: 1. Module -1 is only for practice and not for examination. 2. The answer sheets will have to be jointly evaluated by the Internal & External examiners. 3. A maximum of THREE questions will be set as per the following pattern (No mixing of questions from different Modules). 4. Examination can be conducted in parallel batches, if necessary.</p>																	
<table border="1"> <thead> <tr> <th>Q No</th><th>From Chapters</th><th>Marks Alloted (SEE)</th></tr> </thead> <tbody> <tr> <td align="center">1</td><td>Module 2 (Choice between Points+St lines or Planes)</td><td align="center">15</td></tr> <tr> <td align="center">2</td><td align="center">Module 3</td><td align="center">20</td></tr> <tr> <td align="center">3</td><td align="center">Module 4 or Module 5</td><td align="center">15</td></tr> <tr> <td align="center" colspan="2">Total</td><td align="center">50</td></tr> </tbody> </table>			Q No	From Chapters	Marks Alloted (SEE)	1	Module 2 (Choice between Points+St lines or Planes)	15	2	Module 3	20	3	Module 4 or Module 5	15	Total		50
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1	Module 2 (Choice between Points+St lines or Planes)	15															
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Total		50															
<p>Course Outcomes: On completion of this course, students are able to:</p>																	
<table border="1"> <thead> <tr> <th>Course Code</th><th>CO #</th><th>Course Outcome (CO): At the end of the course student will be able to:</th></tr> </thead> <tbody> <tr> <td rowspan="5">21ME15/25</td><td align="center">CO1</td><td>Produce computer generated drawings using CAD software.</td></tr> <tr> <td align="center">CO2</td><td>Apply the knowledge of orthographic projections (Points, St lines and planes).</td></tr> <tr> <td align="center">CO3</td><td>Students will be able to visualize and draw projections of solids.</td></tr> <tr> <td align="center">CO4</td><td>Students will be able to visualize and draw development of Lateral Surfaces of</td></tr> <tr> <td align="center">CO5</td><td>Create isometric drawings of simple objects reading the orthographic project objects 3D drawings.</td></tr> </tbody> </table>			Course Code	CO #	Course Outcome (CO): At the end of the course student will be able to:	21ME15/25	CO1	Produce computer generated drawings using CAD software.	CO2	Apply the knowledge of orthographic projections (Points, St lines and planes).	CO3	Students will be able to visualize and draw projections of solids.	CO4	Students will be able to visualize and draw development of Lateral Surfaces of	CO5	Create isometric drawings of simple objects reading the orthographic project objects 3D drawings.	
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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	
CO1	3	2	2		3							2	
CO2	3	2	2		3							2	
CO3	3	2	2		3							2	
CO4	3	2	3		3							3	
CO5	3	2	3		3							3	
AVG	3	2	2		3							2	

BASIC ELECTRONICS (Common to all branches) [As per Choice Based Credit System (CBCS) scheme] (From the academic year 2021-22)			
Course Code	21EC17/27	CIE Marks	50
Credits	03	SEE Marks	50
Contact Hours/Week (L-T-P)	4-0-0	Total Marks	100
Contact Hours	42	Exam Hours	03
Course objectives: This course will enable students to: <ul style="list-style-type: none"> • Study fundamentals of semiconductors devices like diode, transistors and Operational Amplifier. • Study basics of communication systems and different modulation types. • Study Fundamentals of digital electronics. • Study different transducers and using a CRO for the measurement of signal parameters. • Build mathematical and numerical background for the design of electronic circuits • Equipped with the knowledge provided in this course can design and develop electronic circuits 			
MODULE-I Semiconductor Devices and applications: P-N Junction diode and characteristics, Rectifiers:Halfwave rectifier,fullwave rectifier,capacitor filter,Zener diode characteristics,zener voltage regulator. Bipolar Junction Transistor:Transistor biasing and it's needs,transistor currents,configurations,CE characteristics,common emitter amplifier.			9Hours
MODULE-II Field effect transistors and applications: JFET,characteristics,DC biasing of JFET ,DC load line analysis,JFET on an IC chip,advantage of FETs. MOSFET: De type mosfet, enhancement mosfet, characteristics of De type mosfet FET as a switch, FET amplifier and oscillators.			9 Hours
MODULE-III Basics of Communication Systems: Introduction, radio frequency spectrum,need for modulation,radio broadcasting,modulation:amplitude modulation,power relations in AM wave,frequency modulation,superhetrodyne AM receiver. Op-Amp Applications: Op-Amp basics, practical op-amp circuit (Inverting , Non Inverting, summer , integrator and Differentiator.)			8 Hours
MODULE-IV Digital Electronics: Number system, Number base conversions, Signed arithmetic: Binary addition &subtraction using 2's complement, Logics gates, Half Adder/Subtractor, Full Adder/Subtractor, Boolean algebra ,simplification of Boolean expressions, Realization of Boolean expressions using logic gates.			8 Hours
MODULE-V Electronic System: Block diagram of instrumentation system, Transducer: Strain Gauge, LVDT, Oscilloscope (CRO), CRO based measurements, Displays, Signal Generator case study: remote control and PA Systems.			8 Hours
Textbook: 1. Basic Electronics by B. L. Theraja, S. Chand Publications			

2. Electronic devices and circuit theory by R L Boylestad, Louis N, 6TH edition, PHI.

Reference Books:

1. Digital logic and computer design by M Morris Mano.
2. Electronics devices & circuits by David Bell, 5th Edition, Oxford University Press.
3. Electronic Devices by Thomas L. Floyd, 8th Edition, Pearson Education, Inc., 2007

Question paper pattern:

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

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

Course Code	CO	Course Outcome (CO): At the end of the course student will be able to:
21MA11	CO1	Understand the basics of semiconductor devices and their applications.
	CO2	Analyze biasing technique of JFET and MOSFET and their applications as a s amplifier and oscillator.
	CO3	Understand different modulation techniques and working of receiver circuit. A working of Op amp And it's Applications.
	CO4	To study number base conversion, understand laws of Boolean algebra, working different logic gates.
	CO5	Understand the working of different transducers and use a CRO as a measuring instrument.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3									2
CO2	3	3	2									2
CO3	3	3	2									2
CO4	3	2	2									2
CO5	3	2	2									2
AVG	3	2.4	2.2									2

: Engineering Physics Laboratory
(Common to all branches)
[As per Choice Based Credit System (CBCS) scheme]
(From the academic year 2021-22)

Course Code	21PHL11/21	CIE Marks	50
Credits	01	SEE Marks	50
Contact Hours/Week (L-T-P)	0-0-2	Total Marks	100
Contact Hours	28	Exam Hours	03

Course Objectives:

1. Characteristics of diode and conductivity of semiconductor
2. Information of impedance, identify passive components and transfer of resistance in electronic circuits.
3. Fundamental properties of light and emission of radiation with temperature along with the behavior of light in the phenomena of interference and diffraction.
4. Information of temperature dependence of resistivity.
5. Elastic properties of a material and Apprehend the concepts of interference of light, diffraction of light and Fermi energy
6. Understand the principles of operations of semiconductor devices such as semiconductor diode, and NPN transistor using simple circuits
7. Determine elastic moduli and moment of inertia of given materials with the help of suggested procedures
8. Recognize the resonance concept and its practical applications Understand the importance of measurement procedure, honest recording and representing the data, reproduction of final results

List of Experiments

1. Y-by single Cantilever Method
2. Co-efficiency of Viscosity by Stoke's method
3. Sonometer (Frequency of Ac)
4. Determination of Fermi Energy
5. Newton's Rings
6. Interference of Air wedge
7. Diffraction grating by minimum deviation method
8. Band Gap of Semiconductor
9. Transistor Characteristics
10. I-V Characteristics of Zener Diode.
11. Determination of Dielectric Constant using RC circuit.
12. Frequency response of series and parallel LCR circuit and study of quality factor.
13. Verification of Stefan's law.
14. Torsional pendulum
15. Fly wheel

Module

Module 3
Module 3
Module 4
Module 5
Module 1
Module 1
Module 1
Module 1 and
Module 5
General physics
General physics
Module 4
General physics
General physics
Module 3
Module 3

Reference Books:

<u>Sl No</u>	<u>Title</u>	<u>Author/s/ Editor</u>	<u>Publishers</u>
1	Laboratory Manual in Applied Physics	H.Sathyaseelan	New Age International Second Edition

Course outcomes: On completion of the course, the student will have the ability to:

Course Code	CO #	Course Outcome (CO): At the end of the course student will be able to:
21PHL11/21	CO1	Demonstrate the concept the physics theory course through a series of experiments
	CO2	Share responsibilities in small teams of four to five members for operating equipment and collecting data.
	CO3	Determine the properties on optics, electrical, electronics, modern physics and physics through series of experiments.
	CO4	Analyze the data and interpret the results
	CO5	Write a well organized laboratory report presenting the results on a clear way

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2							1			2
CO2	3	3							3			
CO3	3	2		2					1			1
CO4	3	2							2			1
CO5	3	3								3		
AVG	3	2.4		2					1.75	3		1.333

BASIC ELECTRICAL ENGINEERING LAB
(Common to all branches)
[As per Choice Based Credit System (CBCS) scheme]
(From the academic year 2021-22)

Course Code	21EEL12/22	CIE Marks	50
Credits	01	SEE Marks	50
Contact Hours/Week (L-T-P)	0-0-2	Total Marks	100
Contact Hours		Exam Hours	03

Sl.No.	List of Experiments
1	Verification of Kirchoff's Laws.
2	Demonstration of two way control of lamps.
3	Measurement of Power by three voltmeter method.
4	Measurement of power in an inductive circuit using two wattmeter.
5	Calibration of single phase energy meter.
6	Study of MCB.
7	Tube light connection.
8	Measurement of power in a 3 phase circuit using two-wattmeter method.
9	Load test on single phase transformer.
10	Brake load test on 3 phase induction motor.
11	Speed Control of Fan.

Course Outcomes: On completion of the course, the student will have the ability to:

Course Code	CO	Course Outcome (CO): At the end of the course student will be able to:
	CO1	Apply Kirchhoff's law for the analysis of DC circuits.
	CO2	Illustrate two ways control lamp and tube light connections.

21EEL12/2 2	CO3	Measure power in single-phase and three phase circuits and energy using single-energy meter.										
	CO4	Control load test on single-phase transformer to estimate losses and efficiency.										
	CO5	Conduct brake load test on 3-phase induction motor to estimate slip and efficiency load.										
Course Articulation Matrix for the Academic Year 2021-22												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3				3						1
CO2	3	3										
CO3	3	3										1
CO4	3	3				3						1
CO5	3	3				3						1
AVG	3	3				3						1

DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS

(Common to all branches)

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

(From the academic year 2021-22)

Course Code	21MA21	CIE Marks	50
Credits	03	SEE Marks	50
Contact Hours/Week (L-T-P)	3-0-0	Total Marks	100
Contact Hours	42	Exam Hours	03

Course Learning Objectives: This course (21MA21) will enable students to master the basic tools of differential & integral calculus, differential equations and elementary linear algebra and become skilled for solving problems in science and engineering.

<p style="text-align: center;">MODULE-I</p> <p style="text-align: center;">Ordinary differential equations(ODE's)of first order:-</p> <p>Linear and reducible to linear differential equation. Exact and reducible to exact differential equations. Applications of ODE's-orthogonal trajectories, Newton's law of cooling and L-R circuits. Nonlinear differential equations; introduction to general and singular solutions; solvable for p only; Clairaut's and reducible to Clairaut's equations only.</p>	8 Hours
<p style="text-align: center;">MODULE-II</p> <p style="text-align: center;">Ordinary Differential Equations (ODE's) of higher order:-</p> <p>Differential equation of higher order with constant coefficients and examples. Second order linear ODE's with constant coefficients by the method of variation of parameters; Cauchy's and Legendre homogeneous differential equations. Initial and boundary value problems. Applications to oscillations of a spring and L-C-R circuits.</p>	9 Hours
<p style="text-align: center;">MODULE-III</p> <p style="text-align: center;">Partial Differential Equations(PDE's):-</p> <p>Formation of PDE's by elimination of arbitrary constants and arbitrary functions. Solution of non-homogeneous PDE by direct integration method. Homogeneous PDEs involving derivative with respect to one independent variable only. Solution of PDE's by the method of separation of variable.</p> <p>Application of Partial Differential Equations(PDE's):-</p> <p>Introduction, derivation of one dimensional wave equation and heat equation, various possible solutions of one dimensional wave equation and heat equation and Laplace equation by the method of separation variables and examples.</p>	9 Hours
<p style="text-align: center;">MODULE-IV</p> <p style="text-align: center;">Vector Calculus:-</p> <p>Vector Differentiation: Scalar and vector fields. Gradient, directional derivative; divergence and curl physical interpretation; solenoidal and irrotational vector fields-Illustrative problems.</p> <p>Vector Integration: Line integrals, Greens Theorem, Gauss Divergence Theorem and Stokes Theorem (Only Statements) Illustrative examples. Applications to work done by a force and flux.</p>	8 Hours
<p style="text-align: center;">MODULE-V</p> <p style="text-align: center;">Laplace Transformations:</p> <p>Defination, Transforms of elementary functions. Laplace transform of Derivatives and</p>	8 Hours

integrals and problems, periodic function and Unit step function- Illustrative problems. Inverse Laplace transforms, properties - Illustrative problems, Solution of linear differential equations.	
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Text Books:

1. B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 43rd Ed.,2015.
2. E. Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons, 10thEd.(Reprint),2016.

Reference books:

1. Early Transcendental Calculus- James Stewart, Thomson Books, 5e 2007
2. N.P.Bali and Manish Goyal: A Text Book of Engineering Mathematics, Laxmi Publishers, 7th Ed., 2010.
3. B.V.Ramana: "Higher Engineering Mathematics" 11th Edition, Tata McGraw-Hill, 2010.
4. Veerarajan T.,” Engineering Mathematics for First year", Tata McGraw-Hill, 2008.
5. Thomas G.B. and Finney R.L.”Calculus and Analytical Geometry”9th Edition, Pearson,

E-Books and Online resources:

- <http://ac.in/courses.php?disciplineID=111>
- [http://www.class-central.com/subject/math\(MOOCs\)](http://www.class-central.com/subject/math(MOOCs))
- <http://academicearth.org/>

Pedagogy (General Instructions):

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

1. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the delivered lessons shall develop student’s theoretical and applied mathematical skills.
2. State the need for Mathematics with Engineering Studies and Provide real-life examples
3. Support and guide the students for self–study.
4. You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress.
5. Encourage the students for group learning to improve their creative and analytical skills.
6. Show short related video lectures in the following ways:
 - As an introduction to new topics (pre-lecture activity).
 - As a revision of topics (post-lecture activity).
 - As additional examples (post-lecture activity).
 - As an additional material of challenging topics (pre-and post-lecture activity).

● As a model solution of some exercises (post-lecture activity).												
Course Outcomes: On completion of this course, students are able to:												
Course Code	CO #	Course Outcome (CO): At the end of the course student will be able to:										
21MA21	CO1	Explain various physical models through first order and first degree ordinary differential equations and solve them by analytically										
	CO2	Explain various physical models through second and higher order ordinary differential equations and solve them analytically										
	CO3	Understand a variety of partial differential equations and solution by exact methods and apply methods of separation of variables to solve heat, wave, Laplace equations.										
	CO4	Illustrate the applications vector calculus to understand the solenoidal and irrotational vectors and also to exhibit the interdependence of line, surface and volume integrals.										
	CO5	Apply the knowledge of Laplace transform and inverse Laplace transform to solve differential equations.										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1										1
CO2	3	1										1
CO3	3	2										1
CO4	3	1										1
CO5	3	1										1
AVG	3	1.2										1
Method of Examination: Note:- The SEE question paper will be set for 100 marks and the marks scored by the student will be proportionately reduced to 50. <ul style="list-style-type: none"> The question paper will have ten full questions carrying equal marks. Each full question carries 20marks. There will be two full questions (with a maximum of four sub questions) from each module. Each full question will have sub question covering all the topics under a module. The students will have to answer five full questions, selecting one full question from each module. 												

ENGINEERING CHEMISTRY (Common to all branches) [As per Choice Based Credit System (CBCS) scheme] (From the academic year 2021-22)			
Course Code	21CH12/22	CIE Marks	50
Credits	03	SEE Marks	50
Contact Hours/Week (L-T-P)	3-0-0	Total Marks	100
Contact Hours	42	Exam Hours	03
Course Learning Objectives: *To recognize electrochemical process, evaluate electrodes and cells. *To introduce the principle of corrosion, common corrosion forms, corrosion control methods and material selection to reduce corrosion cost. *To provide a broad and fundamental knowledge of the polymer and their chemical and physical behaviour. Emphasis is on the processing technique along with the production of polymer. Towards the end the student is able to correlate structure-processing-properties relationship for polymers. *To study various types of conventional and non-conventional energy sources including solid liquid and gaseous fuels. *To provide knowledge of water quality, characteristics of water sources and purification of water			
MODULE-I ELECTROCHEMICAL ENERGY Introduction, Electrode potential and EMF– definition, sign-convention., and notations. Standard electrode potential, Measurement of single electrode potential and emf. Electrochemical series table. Derivation of Nernst equation. Classification of cells- primary, secondary and concentration cells.. Reference electrodes- calomel electrode. Ion-selective electrode-glass electrode, determination of pH using glass electrode. Numerical problems. Modern batteries – Construction working and application of Li-MnO ₂ and Ni – Metal Hydride battery Pedagogy: Chalk and talk method, power point presentation, solar Energy and Fuel cells, Handouts Self-Study Material: Recycling of Lithium-ion batteries			9 Hours
MODULE-II CORROSION SCIENCE & SURFACE COATING Definition, chemical and electrochemical mechanism. Types of corrosion – differential metal and differential aeration (pitting and water line), stress corrosion. Factors affecting the rate of corrosion. Corrosion control- Inorganic coating (Anodising and Phosphating) metal coating (Galvanization and tinning). Corrosion Inhibitors. Technological importance of metal finishing. Mechanism and difference between electroplating and electroless plating. Factors effecting electroplating and application of electroplating and electro-less plating. Electroplating of copper and electroless plating of nickel. Pedagogy: Chalk and talk method, power point presentation,-vedios Electroplating of coper and electro less plating of Nickel Self-Study Material: Electrochemical series, Organic coatings: paint, components of paints and their functions. Varnish, definition, differences between paints and varnishes.			8 Hours
MODULE-III POLYMER TECHNOLOGY			9 Hours

<p>Definition, classification with examples. Polymerization, types of polymerization (Addition and condensation) Mechanism of polymerization – Free radical with ethylene as an example. Methods of polymerization – Bulk , solution, suspension and emulsion polymerization. Glass transition temperature, factors effecting, structure and property relationship. Synthesis, properties and application of Teflon , Polyethylene HDPE, PMMA, Polyurethane . Elastomer- deficiencies of natural rubber and advantages of synthetic rubber. Synthesis and application of Neoprene, Butyl and Nitrile rubber. Adhesives- Manufacturing and application of epoxy resin. Conducting polymers- definition, Synthesis, mechanism and application of conduction in polyacetylene. Introduction to biodegradable polymers.</p> <p>Pedagogy: Chalk and talk method, power point presentation,</p> <p>Self-Study Material: Importance and disadvantages of non-biodegradable polymers, composites and nanomaterials.</p>	
<p style="text-align: center;">MODULE-IV FUELS & BATTERY TECHNOLOGY</p> <p>Introduction , definition, classification, characteristics of fuels, calorific value – definition, gross and net calorific value. Determination of calorific value of a solid / liquid fuels using Bomb Calorimeter. Petroleum cracking – Fluidized catalytic cracking. Reforming of petrol. Power alcohol, Unleaded petrol and Bio-fuels Numerical problems. Fuel cells – Construction and working of H₂ – O₂ and Me – alcohol – O₂ (CH₃OH-O₂) cells.</p> <p>Pedagogy: Chalk and talk method, power point presentation, videos on Knocking, Working of fuel cells. Solar cells. Handouts.</p> <p>Self-Study Material: Construction and working of Dry battery.</p>	8 Hours
<p style="text-align: center;">MODULE-V <u>INSTRUMENTAL METHODS, WATER and WASTE MANAGEMENT</u></p> <p>Instrumentation and application of potentiometry ,conductometry (strong acid and strong base, weak acid and strong base), Colorimetry –theory, Beer_Lambert,s Law and applications in uantitative analysis.</p> <p>Sources and Impurities in water, hardness and their types and Numerical Problems . BOD and COD, and their determination, numerical problems. Potable water- purification using chlorination, and reverse osmosis. Sources, characteristics and disposal methods of Solid waste and biomedical waste.</p> <p>Pedagogy: Chalk and talk method, power point presentation, Handouts</p> <p>Practical Topic: Conductometric titration of mixture of acids potentiometric estimation of FAS, Colorimetric estimation of copper,</p> <p>Self-Study Material: Principles of titrimetric analysis, requirement of titrimetric analysis, Classification of titrimetric analysis, Instrumental methods of analysis. Definitions of normality, molarity,ppm.</p>	8 Hours
<p>Text Books: Engg.Chemistry by R V Gadag and Nityanand Shetty Engg.Chemistry by J C Kuriacose and J Rajaram</p> <p>Reference books:</p> <ol style="list-style-type: none"> 1. Text book of Engg., chemistry by Jain and Jain. 2. Text book of Engg., chemistry by M.M Uppal. 3. Text book of Engg., chemistry by O.P Agrawal. 4. Principles of physical chemistry by Puri and Sharma. 5. Text book by polymer science by F.W.BillMeyer. 	

6. Text book by polymer science by Gouriker. 7. Text book by Instrumental method of analysis by B K Sharma. e-learning resources : : http://www.tndte.gov.in/site/wp-content/uploads/2016/08/Engineering-Chemistry.pdf . http://nptel.ac.in/courses.php . http://jntuk-coeerd.in/												
Course Outcomes: On completion of this course, students are able to:												
Course Code	CO #	Course Outcome (CO): At the end of the course student will be able to:										
21CH12/22	CO1	Demonstrate fundamentals of electrochemistry, recognize the electrochemical process and apply the concept of electrochemistry in industrial water electrolysis, electrolysis and electrosynthesis.										
	CO2	Detect type of corrosion & apply appropriate method for managing corrosion in industries.										
	CO3	Differentiate modern chemical method of synthesis of polymer and their applications .										
	CO4	Interpret the properties of Fuels commonly used and there economics, advantageous and limitations.										
	CO5	Evaluate the properties of potable water, solid waste & biomedical waste with the help of instrumental methods .										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2										
CO2	3	2										
CO3	3	2										
CO4	3	2										
CO5	3	2										
AVG	3	2										
Question paper Pattern : 1. Each module will have two questions covering the syllabus 2. Each question consists of sub divisions (maximum four) and maximum marks is 20 3. Students have to answer one full question from each module.												

TECHNICAL ENGLISH - II (Common to all branches) [As per Choice Based Credit System (CBCS) scheme] (From the academic year 2021-22)			
Course Code	21HU23	CIE Marks	50
Credits	02	SEE Marks	50
Contact Hours/Week (L-T-P)	2-0-0	Total Marks	100
Contact Hours	28	Exam Hours	02
Course Learning Objectives: To enable the students to obtain the basic knowledge about oral Communication Skills - II in the following topics:- <ul style="list-style-type: none"> . Meaning, Principles, Barriers and modes of Oral communication. . Developing Presentation skills . Learn Group Communication. . Learn Employment communication.. . Developing interpersonal communication skills 			
MODULE-I ORAL COMMUNICATION: Meaning, principles of successful oral communication, barriers to communication. modes of oral communication – listening as a communication skill, Non- verbal communication. Grapevine Communication – Meaning and Types of Grapevine.			5 Hours
MODULE-II PRESENTATION SKILLS : What is a presentation – Element of Presentation – Designing and delivering Presentation. Public Speaking, Effective power point presentation, body language , Non- verbal facial expressions, Eye Contact, audience research, questions from the audience, communication of emotional intelligence , creativity in oral communication. Communication through telephonic , videoconference & skype			6 Hours
MODULE-III GROUP COMMUNICATION : Group Discussion – Do and Don't in Group discussion, Group Presentation. Debate – Do and Don't in Debate. Group Communication- Meetings, Notice, Planning Meetings, objectives, timing, venue of meetings, leading meetings, Minutes of meeting, press conference.			6 Hours
MODULE-IV EMPLOYMENT COMMUNICATION : Writing Curriculum Vitae(CV), Interview – Types of interview, candidates preparation, Interviewers Preparation, time management, grooming and Just A Minute (JAM). Speaking for better communication – Speaking about yourself			6 Hours
MODULE-V			

INTERPERSONAL COMMUNICATION SKILLS :												5 Hours																																																																																																		
Advantage and Disadvantages of utilizing the team work, Characteristic of Successful teams, Stages of the development of a team, team roles, challenges in team working, forms of Non- Team behavior.Types and source of conflicts, the influence of various cultures on the solving of conflicts.																																																																																																														
Pre requisites: None																																																																																																														
Teacher/ student -Centered Approach to Learning, ICT Tools, Group Assignment, Case Study																																																																																																														
Pattern of question paper																																																																																																														
Solve all five full questions selecting atleast one question from each module																																																																																																														
Text Books:																																																																																																														
1 Murphy – Effective Business Communication – Mc Graw Hill. Publisher : McGraw Hill Education; 7th edition (1 July 2017)																																																																																																														
2.Nageshwar Rao and Rajendra Das – Business Skills – January 2010 ,HPH.																																																																																																														
3.Advance Business Communcation – Penrose, Rasberry, Myers, 5/e, cengage learning 2004.																																																																																																														
4.Prasad P. Communication Skills, S.K. Kataria & Sons. 4 th edition 2016 , published 2009																																																																																																														
Reference Books :																																																																																																														
1.Mc Grath – Basic Mangerial Skills – New Delhi – Prentic Hall India learning pvt ltd.																																																																																																														
2.Business Communcation – K.K. Sinha – Galgotio Publishing Company, New Delhi.																																																																																																														
3.Sen, leena Communication Skills, Prentice Hall of India, New Delhi.																																																																																																														
E – BOOKS & ONLINE RESOURCES																																																																																																														
https://www.skillsyouneed.com/ips/communication-skills.html																																																																																																														
http://103.5.132.213:8080/jspui/bitstream/123456789/1122/1/Communication%20Skills.pdf																																																																																																														
https://www.skillsyouneed.com/docs/communication-skills-PV.pdf																																																																																																														
NPTEL/ SWAMYAM/MOOCs: TECHNICAL ENGLISH FOR ENGINEERS (8 Weeks)																																																																																																														
Prof AYSHA IQBAL , Department of HSS, IIT MADRAS																																																																																																														
Course Outcomes: On completion of this course, students are able to:																																																																																																														
<table><tr><td>Course Code</td><td>CO #</td><td colspan="11">Course Outcome (CO): At the end of the course student will be able to:</td></tr><tr><td rowspan="5">21HU23</td><td>CO1</td><td colspan="11">Explain about basic of oral Communication</td></tr><tr><td>CO2</td><td colspan="11">Develop presentation skills.</td></tr><tr><td>CO3</td><td colspan="11">Learn group communication</td></tr><tr><td>CO4</td><td colspan="11">Learn Employment communication</td></tr><tr><td>CO5</td><td colspan="11">Develop interpersonal communication skills</td></tr></table>													Course Code	CO #	Course Outcome (CO): At the end of the course student will be able to:											21HU23	CO1	Explain about basic of oral Communication											CO2	Develop presentation skills.											CO3	Learn group communication											CO4	Learn Employment communication											CO5	Develop interpersonal communication skills																																		
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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12																																																																																																		
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CO2						2.00		2.00	2.00	3.00		3.00																																																																																																		
CO3						2.00		2.00	2.00	3.00		3.00																																																																																																		
CO4						2.00		2.00	2.00	3.00		3.00																																																																																																		
CO5						2.00		2.00	2.00	3.00		2.00																																																																																																		
AVG						2.00		2.00	2.00	3.00		2.80																																																																																																		

C PROGRAMMING FOR PROBLEM SOLVING (Common to all branches) [As per Choice Based Credit System (CBCS) scheme] (From the academic year 2021-22)			
Course Code	21CS14/24	CIE Marks	50
Credits	03	SEE Marks	50
Contact Hours/Week (L-T-P)	3-0-0	Total Marks	100
Contact Hours	42	Exam Hours	03
Course Learning Objectives: <ul style="list-style-type: none"> Learn the concepts of C Language. Develop skills to solve computational problems 			
MODULE-I Algorithms, Flowcharts and Operators: Algorithms, Flowcharts, Basic Structure of C Program, Executing a 'C' program. C tokens, Data types, Declaration of variables. Expressions, Managing Input/ Output and Operators: Arithmetic operators, relational operators, logical operators, assignment operators, increment/ decrement operators, conditional operators, bit wise operators, special operators. Evaluation of expression, precedence of arithmetic operators, type conversions in expression, operator precedence and associativity. Unformatted and Formatted Input and Output. Examples & exercises.			8 Hours
MODULE-II Control Statements: Decision Making with if statement, Simple if statement, the if else and nested if statements, the else if ladder, Switch statement, Unconditional control Statements. Decision Making and Looping: While statement, Do-While statement, For statement, jumps in loop. Examples & exercises.			8 Hours
MODULE-III Arrays: One dimensional Array, declaration, Initialization, Two dimensional Arrays notations and representations, manipulating with arrays, examples and exercises. Pointers: Accessing the address of a variable, Declaring pointer variables, Initializing of pointer variables, accessing a variable through its pointer ,pointer expressions, pointer arrays, pointer and character strings, arrays of pointer, pointer as function arguments, function returning pointer ,pointers to function, pointer and structure. Examples & exercises.			9 Hours
MODULE-IV Strings: Declaring and Initializing String Variables, Reading Strings from Terminal, Writing strings to Screen, Arithmetic Operations on Characters, String-handling functions, examples and exercises. Functions and Recursion : Need for User-defined Functions, A multi-function program, Elements of User-defined Functions, Definition of functions, Return value and their types, Function calls, Function declaration, Category of functions, Recursion, examples and exercises.			9 Hours
MODULE-V Structures and Unions: Initialization. Defining a Structures, Declaration of Structure			8 Hours

variables, Accessing Structure Members, Structure Initialization, Copying and comparing structure variables, operations on individual members Unions: Union, Size of Structures, bit fields , examples & exercises File Management: Defining and opening a file, closing file, input output operations on files, error handling during I/O operations. Examples & exercises.		
Question paper pattern: The question paper will have ten questions. There will be 2 questions from each module, covering all the topics from a module. The students will have to answer 5 full questions, selecting one full question from each module. Text Books: 1. E. Balagurusamy, “Programming in ANSI C”, Tata Mcgraw Hill Education Private Limited– V Edition, 2016 Reference books: 1. 1E Balagurusamy, Computing Fundamentals and C Programming, McGraw-Hill Education, Reprint 2 nd Edition 2008. 2. Herbert Schildt, “Complete Reference in C”,Fourth Edition, Tata McGraw Hill Publication, 2017 3. Yashwant P. Kanetakar, “Let us C”, Fifth Edition, BPB Publications, 2016. 4. Brian W Kernighan & Dennis M Ritchie “ The C Programming Language”, Prentice Hall Publisher, Second Edition, 2004. 5. Behrouz A.Forouzan and Richard F.Gilberg,“Computer Program: A structured programming Approach Using C.”, Third edition, Thomson Learning, 2005. E-Books and Online resources:		
Course Outcomes: On completion of this course, students are able to:		
Course Code	CO #	Course Outcome (CO): At the end of the course student will be able to:
21CS14/24	CO1	Develop Algorithm and flowcharts and understand the different data types and in C language
	CO2	Identify and use proper decision /control constructs for solving different type problems
	CO3	Apply arrays and pointers to develop programs for a given problem.
	CO4	Demonstrate the Strings and modular programming concepts
	CO5	Create a solutions for real world problem using Structures and file operations

MECHANICAL ENGINEERING SCIENCE (Common to all branches) [As per Choice Based Credit System (CBCS) scheme] (From the academic year 2021-22)				
Course Code	21ME16/26	CIE Marks	50	
Credits	03	SEE Marks	50	
Contact Hours/Week (L-T-P)	2-0-2	Total Marks	100	
Contact Hours	(28H.Theory+28H .Practical)	Exam Hours	03	
Course Learning Objectives: 1.Learn the fundamental concepts of energy, its source and conversion and basic concepts of thermodynamics. 2.Understand the, properties of steam and use of steam table. 3.Understand the working of IC engines and concepts of refrigeration. 4.Understand the working of conventional machine tools and welding process. 5.Learn the fundamentals of Mechatronics and its applications				
MODULE-I Energy source and basic thermodynamics: Energy sources like fossil fuels, Hydel, nuclear, solar, wind, environmental issues like global warming and ozone depletion, remedies of global warming. Basic concept of thermodynamics: Laws of thermodynamics.				5 Hours Theory
MODULE-II Properties of steam: Formation of steam at constant pressure (temperature enthalpy diagram). Use of steam tables to calculate enthalpy, internal energy etc (simple problems).				8 Hours Theory
MODULE-III IC Engines: Otto and diesel cycle, 2 stroke and 4stroke, petrol and diesel engines, simple problems. Refrigeration: Unit of Refrigeration, C.O.P, vapour compression system and vapour Absorption systems, properties of refrigerants.				7 Hours Theory+ 12 Hours Practical
MODULE-IV Conventional machining: lathe-principle of working, lathe operations, drilling M/C-principle of operation of radial drilling M/C, drilling operations. Joining process, principle of arc and gas welding. Milling machine, working principle of milling machine, classification of milling machine.				16 Hours Practical
MODULE-V Mechatronics: Definitions, systems of Mechatronics, measurements systems, control systems. Examples of open loop and closed loop control systems, microprocessor based controller. Computer Numerical Control (CNC): Introduction components of CNC,open loop and closed loop systems, advantages of CNC,CNC machining centers and turning centers. Robots: Robot anatomy, joints and links, common robot configurations. Applications of robots in material handling, processing and assembly and inspection.				8 Hours Theory
Text Books:				

1. A Text Book of Elements of Mechanical Engineering – KR Gopalkrishna, Subhash Publishers, Bengaluru.
2. Elements of Workshop Technology, Vol. I & II – SKH Choudrhy, AKH Chowdhary & Nirjar Roy, 11th Edn., Media Promoters & Publishers, Mumbai.

Reference books:

1. A Text Book of Elements of Heat Engines – RC Patel & CJ Karamchandani, Charotar Publishers, Anand.

E-Books and Online resources:

NPTEL/SWAYAM/MOOCs:

Pedagogy :-

The topic or concept-wise pedagogy (Teaching Methodology) of the curriculum shall be specified in the content.

Question paper pattern:

1. Total of Ten Questions with two from each MODULE to be set covering the entire syllabus.
2. Five full questions are to be answered choosing at least one from each MODULE.
3. Each question should not have more than 4 sub divisions.

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

Course Code	CO #	Course Outcome (CO): At the end of the course student will be able to:
21ME16/26	CO1	Identify the different sources of energy, their conversion process and thermodynamics.
	CO2	Learn the using steam tables various properties of steam
	CO3	Know the working of IC Engines and concept of refrigeration.
	CO4	Know the working of conventional machine tools and welding process.
	CO5	Understand important of mechatronics and its applications and Describe t manufacturing system.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1					3					2
CO2	3	3										
CO3	3	3	1				3					1
CO4	3	2	2				1					2
CO5	3	2	1				1					2
AVG	3	2.2	1.3				2					1.75

<p style="text-align: center;">ENGINEERING MECHANICS (Common to all branches) [As per Choice Based Credit System (CBCS) scheme] (From the academic year 2021-22)</p>			
Course Code	21CV17/27	CIE Marks	50
Credits	03	SEE Marks	50
Contact Hours/Week (L-T-P)	3-0-0	Total Marks	100
Contact Hours	42	Exam Hours	03
<p>Prerequisite: Physics and Mathematics</p> <p>Course Learning Objectives:</p> <p>To enable the Student to acquire the knowledge in the following topics</p> <ol style="list-style-type: none"> 1) Understanding and solving the problems involving forces, loads and reactions, Moments and its applications of concurrent force system. 2) Solving the problems of couples and equilibrium of bodies. 3) To determine support reactions and friction of rigid bodies on horizontal and inclined planes. 4) To determine the center of gravity and moment of inertia of planar sections. 5) To study the concept of work, power & energy. 			
<p style="text-align: center;">MODULE-I</p> <p>Introduction to Engineering Mechanics, force Systems, Basic concepts, Particle equilibrium; Rigid Body equilibrium; System of Forces; Coplanar Concurrent Forces, Composition and resolution of force systems, Resultant force, Moment of Forces and its Application; law of transmissibility of forces, Application based numerical examples</p>			8 Hours
<p style="text-align: center;">MODULE-II</p> <p>Varignon's theorem of moments Couple system, equivalent force couple system, composition of coplanar non concurrent force system, Resultant of Force System, Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of Coplanar Systems and conditions of equilibrium law of superposition of forces. Application based Numerical examples</p>			9 Hours
<p style="text-align: center;">MODULE-III</p> <p>Types of supports, types of loads, concept of statically determinate and indeterminate beams, support reactions for statically determinate beams. Friction, Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction; Impending motion on horizontal and inclined planes, wedge friction, ladder friction. Application based Numerical examples</p>			8 Hours
<p style="text-align: center;">MODULE-IV</p> <p>Centroid of plane figures, Centroid of simple figures from first principle, centroid of composite sections; Centre of Gravity and its implications; locating the centroid of triangle, semicircle, quadrant of a circle and sector of a circle, centroid of the simple built sections & composite sections, Moment of inertia concept, Moment of inertia of plane sections from first principles, Theorems of moment of inertia, Moment of inertia of standard sections and composite sections. Numerical examples</p>			9 Hours
<p style="text-align: center;">MODULE-V</p> <p>Work, Power & Energy, Introduction, Work of a force, Energy of a particle, principle of work & energy for a system of particles, Potential energy and conservative forces, principles of conservation of energy, Power. Application based Numerical example</p>			8 Hours

Question paper pattern:

Two questions to be set from each Module by intermixing (in total 10). Students have to answer any five full questions by selecting one question from each module.

Text Books:

1. S.S.Bhavikatti, "Elements of civil engineering", Vikas publishing house Pvt. Ltd., New Delhi.
2. Jagadeesh T.R. and Jayaram, "Elements of civil engineering", Sapna Book House, Bangalore.
3. A.K. Tayal, "Engineering mechanics (Statics & Dynamics)", Ninth edition, Umesh publications, New Delhi.

Reference books:

1. Timoshenko and Young, "Engineering Mechanics", McGraw Book Company, New Delhi.
2. Ferdinand P. Beer and E. Russell Johnston Jr., "Mechanics for Engineers: Statics" McGraw Book Company, New Delhi.
3. K.L. Kumar, "Engineering Mechanics", Tata-McGraw-Hill Publishing company, New Delhi.

E-Books and Online resources:

E books and online course materials:

www.civilenggebooks.com

Nptel link: <https://nptel.ac.in/courses/112/106/112106286/>

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

Course Code	CO	Course Outcome (CO): At the end of the course student will be able to:											
21CV17/27	CO1	Determine the resultant of coplanar concurrent force system											
	CO2	Determine the resultant of non-concurrent force system and analyze the equilibrium of forces											
	CO3	Determine support reactions and apply of laws of friction for solving engineering problems											
	CO4	Determine the center of gravity and moment of inertia of plane figures											
	CO5	Solve the numerical on work, power and energy											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	
CO1	3	3										3	
CO2	3	3										3	
CO3	3	3										2	
CO4	3	3										3	
CO5	3	3										3	
AVG	3	3										2.8	

ENGINEERING CHEMISTRY LABORATORY (Common to all branches) [As per Choice Based Credit System (CBCS) scheme] (From the academic year 2021-22)			
Course Code	21CHL11/21	CIE Marks	50
Credits	01	SEE Marks	50
Contact Hours/Week (L-T-P)	0-0-2	Total Marks	100
Contact Hours	28	Exam Hours	03
Course Learning Objectives: To enable the students to obtain the knowledge of Engineering Chemistry Practical in the following topics. <ul style="list-style-type: none"> Hardness Determination Analysis of alloy, metal and cement Determination of COD Estimation of strength of acids 			
<p style="text-align: center;">PART-A</p> <ol style="list-style-type: none"> Determination of total hardness of water using standard EDTA Determination of percentage of copper in brass Determination of iron using internal indicator method Determination of COD of waste water Determination of chloride in water by precipitation method <p style="text-align: center;">PART – B</p> <ol style="list-style-type: none"> Potentiometric method of estimating iron Colorimetric determination of copper Conductometric estimation of acid (HCl) using standard NaOH. Determination of dissociation constant (pKa) of weak acid. Determination of viscosity of Polymeric solution Ostwald viscometer. 			
Text Books: 1. Departmental Chemistry Manual. Reference books: 1. Text book of Quantitative analysis by A. I. Vogel. 2. Practical's of physical Chemistry by J. B. Yadav			
Examination Pattern : 1. Students have to perform two experiments one from part-A and one from part-B			
Course Outcomes: On completion of this course, students are able to:			
Course Code	CO	Course Outcome (CO): At the end of the course student will be able to:	
21CHL11/21	CO1	Explain the concepts engineering chemistry theory course through series of experiments	
	CO2	Share the responsibilities in small batches of 4-5 students in operating the instruments and conduct the experiments	
	CO3	Determine the properties by conducting series of experiments.(L3)	
	CO4	Analyze the data obtained from the experiments and interpret the results.(L4)	
	CO5	Write a well organized laboratory report.(L3)	

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

C PROGRAMMING FOR PROBLEM SOLVING LAB (Common to all branches) [As per Choice Based Credit System (CBCS) scheme] (From the academic year 2021-22)			
Course Code	21CSL12/22	CIE Marks	50
Credits	01	SEE Marks	50
Contact Hours/Week (L-T-P)	0-0-2	Total Marks	100
Contact Hours	28	Exam Hours	03
Prerequisites: NIL <ul style="list-style-type: none"> • Course Learning Objectives: • Develop C programs using appropriate data type, control / decision statement. • Learn the usage files and structures to solve real-life applications. 			
List of Programs			
<p style="text-align: center;">Part A</p> <ol style="list-style-type: none"> 1. Write a C program to print "Hello world" 2. Write a C Program to input integer, float and character values using one scanf() Statement in C 3. <u>printf() examples/variations in C</u> 4. Write a C program to find Sum, difference, product, quotient and remainder of two integer numbers 5. <u>C program to swap two numbers using four different methods</u> 6. Write a C program to print ASCII value of a character 7. Write a C program to calculate area of different shapes like triangle, Rectangle, square. 8. <u>Program to check whether number is EVEN or ODD</u> 9. <u>Program to calculate simple interest</u> 10. <u>Program to find largest number among three numbers</u> 11. <u>C program to convert temperature from Fahrenheit to Celsius and vice versa</u> 12. <u>C program to calculate X^N (X to the power of N) using pow function</u> 13. <u>C program to calculate HCF of two numbers</u> 14. <u>C program to print value in Decimal, Octal, Hexadecimal using printf</u> 15. Write a C program to print all Numbers from 1 to N using goto statement. 16. Write a C program to input an integer value and print with padding by Zeros in C. 17. Write a C program to input individual Characters using scanf() in C. 18. <u>C program to check a given character is an uppercase character or not without using the library function</u> 19. . Write a C program to read the content of a file using getc() function 20. Write a C program to declare, initialize an union ,example of union 			
<p style="text-align: center;">PART B</p> <ol style="list-style-type: none"> 1. Write a C program to find the roots of a quadratic equation using if else statement. 2. a. Write a C Program to check entered number is ZERO, POSTIVE or NEGATIVE and find sum of positive and negative for given N numbers using While and if statement. b. Write a C program to find Fibonacci series using do-while 3. Write a C program to find sum of series (Natural numbers/Factorial of numbers of all natural numbers) from 1 to N using for loop. Series:1/1!+2/2!+3/3!+4/4!.....N/N! 			

<p>4. Write a C program to print following pyramid using for loop</p> <pre> 1 123 12345 1234567 123456789 </pre> <p>5. a. Write a C program to check whether a character is VOWEL or CONSONANT using switch b. Write a C program to calculate area of different shapes like square, rectangle, triangle using switch.</p> <p>6. Write a C program to find a smallest and Largest element in a one dimensional array.</p> <p>7. Write a C program to perform linear search and find position using array.</p> <p>8. Write a C program to read a Matrix, Print diagonal elements and find sum of diagonals.</p> <p>9. Write a C program to count the number of lines, words, character in a given text</p> <p>10. Write a C Program to compute the monthly pay of N Employees using each employee's name, basic Pay, DA HRA. The DA and HRA 80% and 30% of Basic Pay respectively. Gross salary is computed by adding DA, HRA to Basic Pay, Store all the details in an array of Structures and Print the name and Gross salary of Each employee</p> <p>11. Write a C program to find largest element using pointers and functions</p> <p>12. Write a C program to pass 2D array to a function and find product of two Matrices</p> <p>13. Write a C program to perform conversion of decimal number to binary number using recursive function.</p> <p>14. Consider the details of N faculty details consisting of Name, Employee Id, Department, address & salary. Create a file to store the above details. Retrieve the contents of file to perform the following details as</p> <p>i) Display the details of the faculty based on salary range entered.</p> <p>ii) Display the details of faculty based on employee id entered.</p> <p>iii) Write a C program to input a Domain name of email id and search for the same in the file, contact.txt, and update the existing email id with new one.</p>		
<p>Note:</p> <p>1. All the programming exercises shall be conducted using C programming language under UBUNTU Operating System.</p> <p>2. Part A programs for Practice.</p> <p>3. Part B Programs for SEE</p>		
Course Outcomes: On completion of this course, students are able to:		
Course Code	CO	Course Outcome (CO): At the end of the course student will be able to:
21CSL12/22	CO1	Identify the programming constructs and apply appropriate control / decision sta given problem
	CO2	Develop C programs to solve computational problems using Strings and Arrays.
	CO3	Develop application using pointer.
	CO4	Implement modular programming and user defined data types
	CO5	Develop solutions for real world problems using file operations

Course Title : Computer Hardware and Maintenance (Ability Enhancement Course) Common to all branches [As per Choice Based Credit System (CBCS) scheme] (From the academic year 2021-22)				
Course Code	21AE191/291	CIE Marks	100	
Credits	01	SEE Marks		
Contact Hours/Week (L-T-P)	0-0-2	Total Marks	100	
Contact Hours	14	Exam Hours	03	
Course Learning Objectives: Understand the basic concept and structure of Computer hardware. Identify the existing configuration of the computers & peripherals.				
MODULE-I Mother board –Functional description of mother board; Specification and variation, Types and features of Motherboard form factors- ATX, Micro-ATX, Mini-ITX, Nano-ITX, and Pico-ITX. Functional components of Motherboard: CPU and CPU socket-Types of sockets; Overview of micro architecture of INTEL and AMD CPU.				3 Hours
MODULE-II I/O devices and Interfaces Types of I/O devices and ports on a standard PC for connecting I/O devices. Function of serial port, parallel port, and brief principle of communication through these ports, types of devices that can be connected and interface standards.				2 Hours
MODULE-III Chipsets Function,Types and Features. Buses- System bus architecture,importance of POST; UEFI – why is it required, possible configurations through UEFI. IDE ports: Methods of adding SCSI drives. CMOS battery: Why? Its specifications. Impact of removing the battery from motherboard. Memory – Memory Units (B, KB, MB,GB, TB), memory locations RAM Technology- SDRAM, DDR,DDR2, DDR3, DDR4. Mass storage media- Hard drive, Principle of working, Causes of Hard drive failure; Signs of failure; Backup and recovery of data.				3 Hours
MODULE-IV Power supplies Need for SMPS, Specifications, Rating of SMPS based on type of motherboard and devices used (AT/ATX, Micro ATX, mini ATX, higher watts PSU for gaming PC),color coding adopted, Types of connectors used- ATX, ATX12V, Molex, SATA, PCIe. Symptoms of SMPS failure: Common problems from a faulty SMPS, Trouble shooting Power supplies.				3 Hours
MODULE-V Windows 8 /10 OS Installation: Windows versions history, Installation, understanding Windows environment, installation of network, installation of drivers for camera, printers etc. Creating user accounts Installation of MS-Office and other general software. Backup/Restore Windows partition with the bootable image.				3 Hours

Course Outcomes: On completion of this course, students are able to:		
Course Code	CO	Course Outcome (CO)
21AE191	CO1	Familiarize the Functional components of Motherboard
	CO2	Develop understanding of the I/O devices and Interfaces
	CO3	Identify the various Chipsets, Memory, RAM Technology Mass storage media
	CO4	Understand the features of Power supplies and troubleshoot of SMPS failure
	CO5	Install the Windows 8 /10 OS Installation

<p align="center"> Course Title : System and Database Administrator (Ability Enhancement Course) Common to all branches [As per Choice Based Credit System (CBCS) scheme] (From the academic year 2021-22) </p>			
Course Code	21AE192/292	CIE Marks	100
Credits	01	SEE Marks	
Contact Hours/Week (L-T-P)	0-0-2	Total Marks	100
Contact Hours	14	Exam Hours	
Prerequisite: NIL Course Learning Objectives: : To enable the students to obtain the knowledge of System and Database Administrator in the following topics. <ul style="list-style-type: none"> • System administrator roles and responsibility. • Managing the files and monitoring disk files. • Fundamentals of database. • Data presentation. 			
MODULE-I			
System administration, roles and responsibility of system administrator, configuring the system, security concepts and data backups.			3 Hours
MODULE-II			
Managing the files, maintaining the drive status, and monitoring the disk files.			3 Hours
MODULE-III			
Fundamentals of database: Introduction to database, securing the database.			2 Hours
MODULE-IV			
Microsoft access and Excel, dealing with formulas, maintain and managing the data in table format,			3 Hours
MODULE-V			
Data presentation: Introduction to graphs, presenting the data using power point and web tools.			3 Hours
Question paper pattern: <ol style="list-style-type: none"> 1. The question paper will have TEN questions. 2. There will be TWO questions in each module, covering all the topics. The student need to answer FIVE full questions, selecting ONE full question from each module.			
Text books: 1.Essential System Administration, by by Aeleen Frisch, 3rd Edition			
Reference Books: <ol style="list-style-type: none"> 1. Unix Linux System Administration Handbook by Evi Nemeth, Garth Snyder, Trent R. Hein, Ben Whaley, and Dan Mackin 2. Database Reliability Engineering by Laine Campbell and Charity Majors 			
Course Outcomes: On completion of this course, students are able to:			
Course Code	CO	Course Outcome (CO)	
21AE192	CO1	Understand roles and responsibility of system administrator,	
	CO2	Maintaining the drive status, and monitoring the disk files.	
	CO3	Understand the fundamentals of database and securing.	
	CO4	Understand the uses of Microsoft access and Excel	
	CO5	Apply power point and web tools for data representation	

Course Title : Electrical Safety (Ability Enhancement Course) Common to all [As per Choice Based Credit System (CBCS) scheme] (From the academic year 2021-22)			
Course Code	21AE193/293	CIE Marks	100
Credits	01	SEE Marks	
Contact Hours/Week (L-T-P)	2-0-0	Total Marks	100
Contact Hours	14	Exam Hours	
Prerequisite: NIL			
MODULE-I Electrical safety tips: Never put fingers or other objects in an outlet, Keep metal objects out of toasters, Never use anything with a cord or plug around water, Never pull a plug out by its cord, Stay away from substations and power lines, Don't climb on power poles, Never fly kites near power lines, Stay away from broken or fallen power lines, Never touch or climb trees that are near power lines, Never touch big, metal transformer boxes with warning signs, Obey warning signs			3 Hours
MODULE-II Precautions Against Electric Shocks: Unused wall outlets should be secured. Plastic inserts can be used but they can be pulled off and stuck in the mouth. Consider using safety outlets that prevent foreign objects from being inserted. You can also block outlets with the creative arrangement of furniture. If you're temporarily using extension cords, hide them behind furniture or use a hide-a-cord device. You can also put electrical tape over unused plug holes on cords. Put electrical devices such as DVD players on a shelf out of reach, or behind a barrier. Store bathroom and kitchen electrical appliances – like hair dryers and toasters – out of reach of curious children.			3 Hours
MODULE-III It's vitally important to take safety precautions when working with electricity. Safety must not be compromised and some ground rules need to be followed first. The basic guidelines regarding the safe handling of electricity documented below will help you while working with electricity. 1. Avoid water at all times when working with electricity. Never touch or try repairing any electrical equipment or circuits with wet hands. It increases the conductivity of the electric current. 2. Never use equipment with frayed cords, damaged insulation or broken plugs. 3. If you are working on any receptacle at your home then always turn off the mains. It is also a good idea to put up a sign on the service panel so that nobody turns the main switch ON by accident. 4. Always use insulated tools while working. 5. Electrical hazards include exposed energized parts and unguarded electrical equipment which may become energized unexpectedly. Such equipment always carries warning signs like “Shock Risk”. Always be observant of such signs and follow the safety rules established by the electrical code followed by the country you’re in.			3 Hours

6. Always use appropriate insulated rubber gloves and goggles while working on any branch circuit or any other electrical circuit. 7. Never try repairing energized equipment. Always check that it is de-energized first by using a tester. When an electric tester touches a live or hot wire, the bulb inside the tester lights up showing that an electrical current is flowing through the respective wire. Check all the wires, the outer metallic covering of the service panel and any other hanging wires with an electrical tester before proceeding with your work. 8. Never use an aluminum or steel ladder if you are working on any receptacle at height in your home. An electrical surge will ground you and the whole electric current will pass through your body. Use a bamboo, wooden or a fiberglass ladder instead. 9. Know the wire code of your country. 10. Always check all your GFCI's once a month. A GFCI (Ground Fault Circuit Interrupter) is a RCD (Residual Current Device). They have become very common in modern homes, especially damp areas like the bathroom and kitchen, as they help avoid electrical shock hazards. It is designed to disconnect quickly enough to avoid any injury caused by over current or short circuit faults.			
MODULE-IV Protection against Electrical Hazards: <ol style="list-style-type: none"> 1. Observe the system without touching it. The person may still be in contact with the electrical source. Touching the person may pass the current through you. 2. Call or have someone else call 911 or emergency medical help. 3. Turn off the source of electricity if possible. If not, move the source away from you and the affected person using a non-conducting object made of cardboard, plastic or wood. 4. Once the person is free of the source of electricity, check the person's breathing and pulse. If either has stopped or seems dangerously slow or shallow, begin cardiopulmonary resuscitation (CPR) immediately. 5. If the person is faint or pale or shows other signs of shock, lay him or her down with the head slightly lower than the trunk of the body and the legs elevated. 6. Don't touch burns, break blisters, or remove burned clothing. Electrical shock may cause burns inside the body, so be sure the person is taken to a doctor. 			3 Hours
MODULE-V Video Presentations on Electrical Safety.			3 Hours
Question paper pattern:: Total ten questions will be asked. Two from each module. The student has to answer five questions, selecting at least one from each module.			
Text books: 1. Essential System Administration, by by Aeleen Frisch, 3rd Edition			
Reference Books: <ol style="list-style-type: none"> 1. Electrical Safety Hand book, John Cadick, Mc-Graw Hill Publications, 4th edition. 2. National Electrical Safety Code, David J and Marne, Mc-Graw Hill Publications. 			
Course Outcomes: On completion of this course, students are able to:			
Course Code	CO	Course Outcome (CO)	

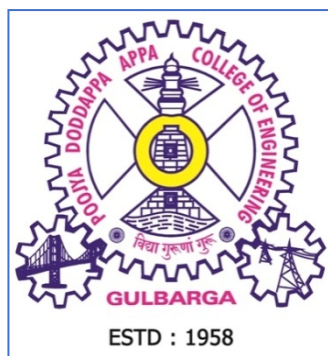
21AE193	CO1	Learn about Indian electrical safety standards
	CO2	Demonstrate the precautions need to be taken during electrical shock and hazards
	CO3	Learn about electrical safety rules.
	CO4	Understand about the protections against electrical hazards.
	CO5	Understand the safety standard in residential, commercial, and agricultural

SWAYAM Courses (Ability Enhancement Course) Common to all

Sl No.	Course Title	Course Code	Duration	Credits	Category	Level	Website
1	Innovation by Design	21AE194/294	04 Weeks	01	Multidisciplinary	Undergraduate	https://swayam.gov.in/
2	Leadership	21AE195/295	04 Weeks	01	Management Studies	Undergraduate	https://swayam.gov.in/
3	Awareness Programme on solar water pumping System(Upcoming)	21AE196/296	04 Weeks	01	Agricultural and Food Engineering	Undergraduate	https://swayam.gov.in/

Note:-

1. The students are to be registered to one of these course using the link(<https://swayam.gov.in/>)
As per the schedule
2. The course certificate is to be submitted to the concerned after completion.



Hyderabad Karnataka Education Society's
Poojya Doddappa Appa College of Engineering
(An Autonomous Institution & Affiliated to
Visvesvaraya Technological University, Belagavi)
Aiwan E-Shahi Area KALABURAGI 585 102 Karnataka India

CURRICULUM

FOR B.E.III SEMESTER AND IV SEMESTER

FOR THE ACADEMIC YEAR 2022-23

DEPARTMENT OF CIVIL ENGINEERING

About College:

Poojya Doddappa Appa College of Engineering (PDACE) is the first institution of Hyderabad Karnataka Education (HKE) Society, Kalaburagi, which was established in the year 1958. The foundation stone of this college was laid by the then Vice President of India Dr.Sarvapalli Radhakrishnan in 1958.

At present, PDA College of Engineering is offering 11 UG programs, 10 PG Programs and 12 Research centers, spreading and imparting technical education in North Karnataka Region. The college has state of the art laboratories, digitalized smart class rooms having highly qualified and experienced faculty with highest no. of Ph.D. and M. Tech degrees.

PDACE is the only Autonomous Institution in the region, which was sponsored under TEQIP I , TEQIP-II and TEQIP-III from World Bank and received grants of Rs.10.43 crores, Rs. 17.5 crores and 7 crores respectively. This is one among 12 institutions having TEQIP-I and TEQIP -II sponsorship. At present, college is selected in TEQIP-III as Mentor Institution for Bundelkhand Institute of Engineering & Technology, Jhansi.

The Vision and Mission of PDA College of Engineering are as mentioned below.

VISION

- To be an institute of excellence in technical education and research to serve the needs of the industry and society at local and global levels.

MISSION

- To provide a high-quality educational experience for students with values and ethics that enables them to become leaders in their chosen professions.
- To explore, create and develop innovations in engineering and science through research and development activities.
- To provide beneficial service to the national and multinational industries and communities through educational, technical and professional activities.

About Department of Civil Engineering

The Civil Engineering Department was established in the year 1958 with an intake of 60 students. In 1994 the intake was increased to 90 and further increased to 180 in the year 2014. Presently the department runs both UG and PG (Environmental Engineering and Structural Engineering) programs with intake of 180 in UG program and 18 in each PG program. Department is recognized as Research Centre by Visvesvaraya Technological University Belagavi in the year 2002 and at present 35 research scholars are pursuing their Ph.D. and seven research scholars have been awarded with Ph D degree.

The Department has signed MoU with various industries like Medini, Sharan Technical consultancy, Canter Technologies Pvt. Ltd, Sharan Chandra Consultant, JGD Consultants, Jalavahini Management Services Pvt. Ltd. Dharwad, Shah Technical Consultants Pvt. Ltd., PP Raju & Co., Design Consortium, KRIDL, Bharath Dal and Oil Industries, Ultratech, ACC, Alstom, Karnataka State Pollution Control Board & HCC. These MoUs have helped the students in getting exposure to industrial environment and also for conducting Industry Institute Interaction events.

The Vision, Mission and Program educational objectives of Civil Engineering Department are as follows:

VISION

- To be the preeminent department for imparting technical knowledge and skills in the Civil Engineering field to meet the social, industrial, environmental and research needs at local and global levels.

MISSION

- To provide technical education to meet the challenges in the profession through a well-structured curriculum.
- To inculcate innovation and research ideas for sustainable development with ethical background.
- To impart entrepreneurial skills for serving the needs of the society through technical and professional activities.
- To create Civil Engineering professionals to serve the needs of the industry at local and global levels.

PROGRAM EDUCATIONAL OBJECTIVES(PEO'S)

Program educational objectives are broad statements that describe the Career and Professional accomplishments that the program is preparing graduates to achieve. The program educational objectives of the B.E. in Civil Engineering Program at PDA College of Engineering, Kalaburagi are:

PEO1: To provide the knowledge of mathematics, science and engineering fundamentals for solving civil engineering problems.

PEO2: To enable the graduates to exhibit their technical knowledge and skills of recent practices to identify and solve civil engineering problems.

PEO3: To enable the graduates to conduct and interpret the results of laboratory/ field experiments in basic sciences, engineering sciences and civil engineering.

PEO4: To enable the graduate for pursuing higher education and lifelong learning.

PEO5: To enable the graduates to acquire communication, team work and entrepreneurial skills along with the values of professional ethics.

PROGRAM 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, review research literature, and analyse 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 modelling 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, and 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.

PROGRAM SPECIFIC OUTCOMES

The Civil Engineering graduates are able to:

PSO1: Plan, Analyze and Design buildings, Water supply and Sewerage systems, Hydraulic structures and Transportation infrastructure using sustainable materials and conceptual knowledge of Geotechnical engineering.

PSO2: Conduct survey and Laboratory experiments/ field investigations and interpret the data for application to real life problems.

PSO3: Prepare detailed estimate of civil Engineering works and Execute the civil Engineering Projects with optimum resources using effective communication skills and Professional ethics

	III semester										
Sl. No	Category	Subject Code	Subject Title	Credits	HOURS /WEEK			EXAMINATION			
					L	T	P	Duration in hours	CIE Marks	SEE Marks	Total Marks
1	BS	21MA31	Numerical Analysis & Statistical Methods	3	3			3	50	50	100
2	PC	21CV32	Strength Of Material	3	3			3	50	50	100
3	PC	21CV33	Fluid Mechanics	3	3			3	50	50	100
4	PC	21CV34	Surveying	3	3			3	50	50	100
5	HSMS	21KAK35	Samskrutika Kannada	1	2			1.5	50	50	100
		21KAN35	Balake Kannada						50	50	100
			OR					OR			
		21HU35	Constitution of India, Professional Ethics and Cyber Law					3	50	50	100
6	Internship	21INT36	Summer Internship – I	2				--	50	-	50
7	AEC	21CVAE36A	Ability Enhancement Course (AutoCAD)	1				3	50	50	100
8	UHV	21UHV36B	Courses On Universal Human Values	1		2		2	50	50	100
9	PC	21CVL31	Fm Lab	1			2	3	50	50	100
10	PC	21CVL32	Surveying Lab	1			2	3	50	50	100
11	PC	21CVL33	Building Planning & Drawing	2	1		2	4	50	50	100
TOTAL				21					550	500	1050

IV semester

Sl. No	Category	Subject Code	Subject Title	Credits	HOURS/ WEEK			EXAMINATION			
					L	T	P	Duration in hours	CIE Marks	SEE Marks	Total Marks
1	PC/BS	21CV41	Structural Analysis	3	3		--	3	50	50	100
2	ES	21CV42	Concrete Technology	2	2		-	3	50	50	100
3	PC	21CV43	Water Resources Engineering	3	3		--	3	50	50	100
4	PC	21CV44	Building Materials & Construction Technology	3	3		--	3	50	50	100
5	HSMS	21KAK45	Samskrutika Kannada	1	2		--	1.5	50	50	100
		21KAN45	Balake Kannada					OR			
			OR								
		21HU45	Constitution Of India, Professional Ethics and Cyber Law					3			
6	AEC	21CVAE46A	Ability Enhancement Course (Life Sciences) (Environmental Science)	1	1			1.5	50	50	100
7	AEC	21CVAE46B	Ability Enhancement Courses (Total Station Survey)	2	--		2	3	50	50	100
8	UHV	21UHV46C	Courses On Universal Human Values	1	--	2		2	50	50	100
9	PC	21CVL41	Geology Lab	1	--		2	3	50	50	100
10	PC	21CVL42	SOM Lab	1	--		2	3	50	50	100
11	PC	21CVL43	Concrete Lab	1	--		2	3	50	50	100
TOTAL				19					550	550	1100

Course Title: Numerical Analysis & Statistical Methods		
Course Code	21MA31	CREDIT: 03
Lecture Hours/Week	3 Hrs. (Theory)	SEE: 50
Total Lecture Hours: 42	CIE: 50	SEE: 03 Hours
Prerequisite: Differential calculus, Integral calculus and Differential equations.		
<p>Course Learning Objectives: To enable the students to obtain the knowledge of Engineering Mathematics in the following topics</p> <ol style="list-style-type: none"> 1. Numerical methods to solve algebraic and Transcendental equations 2. Interpolation methods, Numerical differentiation and Numerical integration 3. Numerical solutions ordinary differential equations 4. Curve fitting by the method of least squares and correlation 5. Introduction to theories of functions of complex variables and contour integration 		
Modules		Teaching Hours
<p align="center">Module-I</p> <p>Solution of Algebraic and Transcendental Equations: Bisection method, Newton's-Raphson method and Regula falsi method.</p> <p>Finite differences: Forward and Backward differences, Interpolation, Newton's Forward and Backward interpolation formulae and examples. Langrange's interpolation and inverse interpolation formulae and examples. (All formulae and rules without proof).</p> <p>RBT Levels: L1, L2 & L3</p>		9 hours
<p align="center">Module II</p> <p>Numerical differentiation: Numerical differentiation using Newton's forward and backward interpolation formulae and problems.</p> <p>Numerical integration: Introduction, Trapezoidal rule, Simpson's $1/3^{\text{rd}}$, Simpson's $3/8^{\text{th}}$ rule and Weddle's rule. (all rules without proof).</p> <p>Numerical solutions of first order and first degree ordinary differential equations: Taylors series method, Runge –Kutta method of fourth order, modified Euler's method and Milne's-Thomson's predictor and corrector methods and problems.(all formulae without proof RBT Levels: L1, L2 & L3</p>		9 hours
<p align="center">Module III</p>		8 hours

<p>Statistical methods:</p> <p>Curve fitting by the method of least squares: Straight-line, second-degree parabola and the curves of the form $y = ab^x$, $y = ax^b$ and $y = ae^{bx}$.</p> <p>Correlation and lines of regression, angle between two regression lines and Rank correlation</p> <p>RBT Levels: L1, L2 & L3</p>	
<p style="text-align: center;">Module IV</p> <p>Functions of Complex variables: Introduction, limit, continuity, differentiability—Definitions. Analytic function, Cauchy-Riemann equations in Cartesian and polar forms. Applications of analytic function. Conformal transformation. Discussion of transformations: $W=z^2$, $W=e^z$. Bilinear transformations and problems</p> <p>RBT Levels: L1, L2 & L3</p>	8 hours
<p style="text-align: center;">Module V</p> <p>Complex integration: line integrals, Cauchy's theorem, Cauchy's integral formula. Taylor's and Laurent's series (Statements only). Singularities, poles, residues, Cauchy's residue theorem. (Statement only) and problems</p> <p>RBT Levels: L1, L2 & L3</p>	9 hours
<p>Assessment and Evaluation</p> <p>The Scheme of Assessment will have two parts, namely;</p> <ol style="list-style-type: none"> I. Continuous Internal Assessment (CIE) and II. Semester End Examination (SEE) <p>Assessment and Evaluation of each Course shall be for 100 marks. Continuous Internal Assessment (CIE) and Semester End Examination (SEE) of UG Engineering programs shall carry 50:50 marks respectively (i.e., 50 marks internal assessment; 50 marks semester end examination).</p> <p>The 50 marks of internal assessment shall comprise of: Internal Test 40 marks and Assignments / Seminars / Slip test / Quizzes etc. 10 marks</p> <p>There shall be three Internal Tests conducted as per the calendar of events. The students shall attend all the Tests compulsorily.</p>	
<p>Question paper pattern:</p> <p>The SEE question paper will be set for 100 marks and the marks scored by the student will be proportionately reduced to 50.</p> <ul style="list-style-type: none"> • The question paper will have ten full questions carrying equal marks. • Each full question carries 20marks. • There will be two full questions (with a maximum of four sub questions) from each module. 	

- Each full question will have sub question covering all the topics under a module.

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

Text book:

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

Reference books:

1. Early Transcendental Calculus- James Stewart, Thomson Books, 5e 2007
2. N.P.Bali and Manish Goyal: A Text Book of Engineering Mathematics, Laxmi Publishers, 7th Ed., 2010.
3. B.V.Ramana: "Higher Engineering Mathematics" 11th Edition, Tata McGraw-Hill, 2010.
4. Statistical Methods Authored By Gupta S.P. Publisher: Sultan Chand & Sons. Publishing Year: 2021
5. Fundamentals of Mathematical Statistics Authored By Gupta S.C.& Kapoor V.K. Publisher: Sultan Chand & Sons. Publishing Year: 2020

Course outcomes:

On completion of the course, the student will have the ability to:

Course Code	CO #	Course Outcome (CO)
21MA31	CO1	Solve algebraic and transcendental equations by numerical methods and computation of interpolating polynomials using given data.
	CO2	Compute derivatives of the functions numerically using given data and Evaluate integrations numerically. Apply numerical methods to solve ordinary differential equations.
	CO3	Apply the method of least square to estimate the parameters in regression model
	CO4	Understand C-R equations, analytic functions and its properties
	CO5	Evaluation of complex integrals using the residue theorem and represent functions as Taylor's and Laurent's series.

Course Title: STRENGTH OF MATERIALS		
Course Code	21CV32	CREDIT: 03
Lecture Hours/Week	3 Hrs. (Theory)	SEE: 50
Total Lecture Hours: 42	CIE: 50	SEE: 03 Hours
Prerequisite: Elements of Civil Engineering and Engineering mechanics.		
Course objectives: To enable the student to acquire the knowledge in the following topics <ol style="list-style-type: none"> 1. To understand the behavior of materials under stress and strain. 2. To analyse an element subjected to compound stress to assess the various stresses in thin and thick cylinders. 3. To understand the concept of shear force and bending moments for beams subjected to various system. 4. To evaluate the bending and shear stress in beam to understand the behavior and design of columns. 5. Strength evaluation and design of circular shaft subjected to torsion and to evaluate the deflection of beams. 		
Modules		Teaching Hours
Module I SIMPLE STRESSES AND STRAINS: Introduction to various strengths of material, concept and definition of stress and strain, types of stresses and strains, Assumptions in strength of materials, stress-strain diagrams for mil for mild steel, ferrous and non-ferrous materials, St Venant's Principle, Hook's Law, Modulus of Elasticity, Poission's ratio, Deformation of bars of uniform cross section, varying cross section. Elongation due to self-weight. Compound bars, Temperature stresses, Elastic constants and their relationship, volumetric strain, application problems.		10 hours
Module II COMPOUND STRESSES: Determination of stresses on oblique/inclined plane due to uniaxial, biaxial and general 2D stresses, (Analytical method), Determination of Principal Planes and Principal Stresses, Maximum Shear Stress and their plane (Analytical method)		8 hours

<p>THIN AND THICK CYLINDERS:</p> <p>THIN CYLINDERS: Determination of Longitudinal and Circumferential/Hoop's stress, change in dimensions and volume</p> <p>THICK CYLINDERS: Assumptions, Lami's equation derivation and problems, radial pressure and hoop stress distribution diagrams.</p>	
<p style="text-align: center;">Module III</p> <p>SHEAR FORCE AND BENDING MOMENT IN BEAMS:</p> <p>Introduction to types of loads, beams and support with reaction. Definition of Shear force and bending moment, sign conventions. Relationship between load intensity, bending moment and shear force. Shear force diagram (SFD) and Bending moment diagram (BMD) for simply supported beams (both without overhang and with overhangs) and cantilever beams, beams subjected to point loads, UDL, UVL, Couples and their combinations.</p>	8 hours
<p style="text-align: center;">Module IV</p> <p>BENDING STRESSES AND SHEAR STRESSES IN BEAMS.</p> <p>BENDING STRESSES: Assumptions, Bernoulli's theory of Pure Bending, relationship between bending moment, bending stress and radius of curvature, Moment of Resistance, Section Modulus, flexural rigidity, Modulus of rupture. Bending stress diagram for rectangular, circular, 'I', 'T' and 'L' sections (simple problems)</p> <p>SHEAR STRESS: Expression for transverse shear stressing beams, Shear stress diagram for rectangular, circular, 'I', 'T' and 'L' sections.</p> <p>TORSION OF CIRCULAR SHAFTS:</p> <p>Equation for theory of pure Torsion, Assumptions, Torsion equation for circular shaft, Strength and stiffness, torsional rigidity, polar modulus, strengths of solid and hollow shafts, power transmitted by solid and hollow shafts.</p>	8 hours
<p style="text-align: center;">Module V</p> <p>ELASTIC STABILITY OF COLUMNS AND STRUTS.</p> <p>Introduction to short and long columns. Definition of effective length, slenderness ratio, radius of gyration, buckling/critical load. Assumption and derivation of Euler's Buckling load for different end conditions. Problems and limitations of "Euler's theory. Rankine's theory, numerical problems.</p> <p>DEFLECTION OF BEAMS:</p>	8 hours

Definition of stiffness, elastic curve, deflection in simple bending, relation between curvature, slope and deflection. Double Integration method for cantilever and simply supported beams for point load, UDL, UVL and couple, Macaulay's method, numerical problems.

Question paper pattern:

Two questions to be set from each Module by intermixing (in total 10). Students have to answer any five full questions by selecting one question from each module.

Text books:

1. S.S.Bhavikatti "Strength of Materials", New age Publications
2. B.S. Basavarajaiah, P Mahadevappa "Strength of Materials" in SI Units, University Press (India) Pvt. Ltd., 3rd Edition (2010)
3. Shesha Prakash MN and Suresh GS, Mechanics of Materials, Prentice Hall, New Delhi, 2011
4. R.Subramanian "Strength of Materials" Oxford University Press. 3rd Edition (2016)

Reference Books:

1. D.H. Young, S.P. Timoshenko "Elements of Strength of Materials" East West Press Pvt. Ltd., 5th Edition (Reprint 2014)
2. S.S. Rattan "Strength of Materials" McGraw Hill Education (India) Pvt. Ltd., 2nd Edition (Sixth reprint 2013).

E books and online course materials:

www.civilenggebooks.com

Course outcomes:

On completion of the course, the student will have the ability to:

Course Code	CO #	Course Outcome (CO)
21CV32	CO1	To Understand about simple stress and strains with their relationship. determine the deformation of composite bars due to loads and temperature stress.
	CO2	To explain about the compound (complex) stress for 2D elements both by analytical and graphical methods. To determine principal stresses and their planes, evaluate different stresses acting on thin and thick cylinder.
	CO3	To analyze and draw SFD and BMD for beams with various end conditions and loads.
	CO4	To estimate and draw the bending stress, and shear stress diagram in the beams of various cross sections
	CO5	To determine the torsion and design the shafts to evaluate to slope and deflection of beams subjected to various loads by double integration and Maculay's method. To determine bulking loads for columns with different end conditions.

FLUID MECHANICS

Course Code	21CV33	CREDIT:03
Lecture Hours/Week	3 hrs (Theory)	SEE: 50 Marks
Total Lecture Hours: 42	CIE: 50 Marks	SEE:03Hours:

Prerequisite: Engineering Mathematics, Engineering Mechanics.

Course objectives:

To enable the student to acquire the knowledge in the following topics

1. Distinction between solid, fluid, liquid and gas. Classify the fluids and measurements of pressure by various types of manometers.
2. Hydrostatic forces on vertical, inclined and curved surfaces. Dynamics of fluid flow
3. Types of flows in pipes and head loss in pipe due to friction and bends. Impact of Jets
4. Measurement of flow through orifice, notches and weirs. Pumps
5. Analyse Open Channel flow, Dimensions & Model studies

Modules	Teaching Hours
<p style="text-align: center;">Module I</p> <p>Scope and importance of the subject. Definition of fluid, distinction between a solid and a fluid, distinction between a liquid and a gas, Fluid continuum. Fluid properties and classification of Fluids: Mass density, specific volume, specific weight, relative density, viscosity, Newton's Law, compressibility, surface tension and capillarity and their units (SI systems)</p> <p>Pressure at a point in a static fluid – Pascal's law – Hydrostatic Pressure law, Atmospheric pressure, Absolute, gauge, and vacuum pressure, Simple U-tube manometer, U-tube Differential manometers, inverted U-tube monometer.</p>	8 hours
<p style="text-align: center;">Module II</p> <p>Hydrostatics: Hydrostatics Forces on vertical & inclined plane surfaces, Hydrostatic forces on curved surfaces and center of pressure, pressure diagrams. Applications of total pressure and center of pressure on Dams, Roller gates, Tainter gates, sector gates, Sluice gates and pressure diagrams.</p> <p>Dynamics of Fluid Flow: Euler's equation of motion in one dimension – Integration of Euler's equation, Bernoulli's equation, Limitations and modifications of Bernoulli's equation – Applications of Bernoulli's equation, Pitot tubes, Venturi meter</p>	8 hours

Module III

Flow Through pipes: Types of flows in pipes, Reynolds's experiments – Reynold's number Laminar & turbulent flows, fluid friction in pipes - Head loss due to friction (Darcy Weisbach equation) Friction factors for commercial pipes, Minor losses in pipes, pipes in series, equivalent pipe and pipes in parallel, Introduction to Impulse – momentum equation and its application on pipe bend.

Impact of jets on vanes: Force exerted by a jet on a fixed target, Derivations. Force exerted by a jet on a moving target, Derivations. Force exerted by a jet on a series of curved vanes. Force exerted by a jet on hinged plate. Problems on above derivations.

8 hours

Module IV

Flow measurements: Flow through a small orifice. Hydraulic coefficients and experimental methods of determination. Flow through large rectangular orifices, submerged orifices. Flow through mouth pieces, external cylindrical mouth piece, hydraulic co-efficient, flow through internal or re-entrant Borda's mouth piece. Classification of Notches & weirs, Flow over rectangular Notch, Triangular Notch or weir Trapezoidal Notch, stepped Notch, Velocity of approach, Francis formula Flow, Cipolletti weir or Notch, Broad crested, ogee weir, submerged weir, effect on discharge over a rectangular weir due to error in the measurement of head. Definition of pump, difference between pump & turbine, classification, Description & general principle of working, priming & methods. Work done & efficiencies of a centrifugal pump. .

9 hours

Module V

Open channel flow: Introduction to open channels, classification, difference between pipe flow & open channel flow, types of flow, geometric properties of open channels, Uniform flow in open channels, Chezy's and Manning's formulae, Problems on uniform flow, Most economical section of open channel flow, Derivation of conditions for most economical rectangular, triangular and trapezoidal sections. Problems on most economical sections. Most economical circular channels derivations and problems,

Dimensional analysis & model similitude: Introduction to Dimensional Analysis unit & dimensions, Table of Dimensions, Dimensional Homogeneity, Methods of Analysis, Rayleigh's & Buckingham's method. Problems on Rayleigh's & Buckingham's methods, Model Studies, Introduction, Similitude, Dimensionless parameters. Types of models. Froude's models theory & problems. Reynolds models, Problems, Scale effects.

9 hours

Question paper pattern:

Two questions to be set from each Module by intermixing (in total 10). Students have to answer any five full questions by selecting one question from each module.

Text books:

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

Reference Books:

1. Victor L Streeter, Benjamin Wylie E and Keith W Bedford, “Fluid Mechanics”, Tata McGraw Hill Publishing Co Ltd., New Delhi, 2008(Ed).
2. K Subramanya, “Fluid Mechanics and Hydraulic Machines”, Tata McGraw Hill Publishing Co. Ltd.
3. K Subramanya, “Fluid Mechanics and Hydraulic Machines-problems and solutions”, Tata McGraw Hill Publishing Co. Ltd.
4. J. F. Douglas, J. M. Gasoriek, John Swaffield, Lynne Jack, “Fluid Mechanics”, Pearson, Fifth Edition.
5. Mohd. Kaleem Khan, “Fluid Mechanics and Machinery”, Oxford University Press.

E books and online course materials:

www.civilenggebooks.com

Course outcomes:

On completion of the course, the student will have the ability to:

Course Code	CO #	Course Outcome (CO)	Blooms Level
21CV33	CO1	Identify basic properties of Fluids, measurement of fluid pressure	C2
	CO2	Analyze fluid pressure forces and design sluice gates, roller gates etc. Apply Bernoulli's equation & its application on fluid flow problems	C4
	CO3	Analyze fluid flow through pipes, impact of jets on fluid machines.	C3
	CO4	Apply fluid flow phenomenon in flow measurement through orifices, mouth piece, notches and weirs	C2
	CO5	Identify basic principles of flow through open channels and organize the design parameters based on model studies.	C3

SURVEYING		
Subject Code	21CV34	Credit 03
Number of Lecture Hours/Week	3Hours (Theory)	SEE: 50
Total Hours: 42	CIE: 50	SEE Hours: 03
Prerequisite: Mathematics.		
Course objectives: To enable the student to acquire the knowledge in the following topics <ol style="list-style-type: none"> 1. Understand the concept of surveying and leveling. 2. Identify the components of surveying and leveling. 3. Interpret the different measurement techniques for various applications. 4. Apply principles of surveying for solving relevant engineering problems. 		
Modules		Teaching Hours
Module-1 INTRODUCTION: Surveying, Objectives and importance of surveying. Classification of surveys. Principles of surveying. Units of measurements, Surveying measurements and errors, types of errors, precision and accuracy. Topographic maps. CHAIN SURVEY- Fundamental terms, chain types & Tape types, booking of chain survey work, Field book, entries, Conventional symbols, Obstacles in chain survey. MEASUREMENT OF DIRECTIONS: Compass survey: Basic definitions; Types of meridians, bearings and their types, magnetic and true bearings. Prismatic and surveyor's compasses, temporary adjustments, declination and Dip. Quadrantal bearing system, whole circle bearing system, local attraction and numerical problems, latitudes and departures-consecutive coordinate method.		9 Hours
Module-2 LEVELING: Principles of levelling, Fundamental axes and parts of a dumpy level, temporary adjustments and permanent adjustments i.e., two peg test only and objectives, Types of leveling - Simple leveling, Profile leveling and Cross sectioning, fly leveling. Computation of levels using Rise and fall method and Height of instrument method - comparison, Arithmetic checks. Numerical problems.		9 Hours
Module-3 CONTOUR SURVEY: Contours and their characteristics, Methods of contouring - direct and indirect methods (squares and cross section methods), contour interpolation, Uses of		8 Hours

contours. AREAS AND VOLUMES: Computation of area and volume by trapezoidal, Simpson rules and prismoidal formulae. Planimeter- Principle, working and uses, Digital Planimeter.	
<p style="text-align: center;">Module-4</p> <p>THEODOLITE SURVEY: Theodolite and types, Fundamental axes and their relationship, parts of Vernier transit theodolite, uses of theodolite, Temporary adjustments, measurement of horizontal angles (Repetition and Reiteration methods) and vertical angles.</p> <p>TRIGONOMETRIC LEVELLING: Determination of Heights and Distances of an accessible and Inaccessible object by single plane and double plane methods, Numerical problems.</p>	8 Hours
<p style="text-align: center;">Module-5</p> <p>CURVES:</p> <p>SIMPLE CURVES: Types, Elements, Designation of curves, setting out of simple curves by linear methods (numerical problems on offsets from long chord & chord produced method), Setting out curves by Rankine's deflection angle method (No derivation), Numerical problems.</p> <p>COMPOUND CURVES: Elements, Design of compound curves, Setting out of compound curves, numerical problems (Case - 1 only).</p> <p>REVERSE CURVE: Between two Parallel straights (numerical problems on Equal radius and unequal radius).</p>	8 Hours
<p>Reference Books:</p> <ol style="list-style-type: none"> 1. Surveying Vol I and Vol II, Punmia B.C, 16th Edition, 2016, Laxmi Publications, (P) Ltd, New Delhi ISBN- 10: 9788170088530 ISBN-10; 817008883 2. Plane surveying, Chandra A.M, 2^d Edition, 2015, New age International (P) Ltd., ISBN- 10: 8122438806 3. Surveying Vol I& II, Duggal S.K, gth Edition, 2017, Tata Mc Craw Hill Publishing Co, ISBN- 10: 9781259028991 ISBN-10: 978125902899 4. Surveying, Vol I& I, Arora K.R, 2016, Standard Book House, ISBN-10: 8189401246 ISBN- 10: 8189401238 5. Surveying vol. I and II S.K. Duggal, 4th Edition, Tata McGraw Hill – Publishing Co. Ltd., New Delhi. 	
<p>E books and online course materials: www.civilenggebooks.com</p>	

Course outcomes:**On completion of the course, the student will have the ability to:**

Course Code	CO	Course Outcome (CO)	Bloom Level
21CV34	CO1	Possess the knowledge of principles of surveying, methodologies and the techniques of measurement.	C2
	CO2	Understand use of leveling instruments and techniques of leveling operations and its applications.	C3
	CO3	Acquire Knowledge about contouring and calculate the areas and volumes.	C3
	CO4	Use of Theodolite in execution of different civil engineering problems determination of Height of inaccessible object using Trigonometric Levelling.	C3
	CO5	To set out the simple, compound and reverse curves.	C3

SAMSKRUTHIKA KANNADA

Subject Code	21KSK36	Credit 01
Number of LectureHours/Week	1 Hours(Theory)	SEE: 50
Total Hours: 14	CIE: 50	SEE Hours: 1.5 Hrs

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಪಠ್ಯಪುಸ್ತಕ

(ಕನ್ನಡ ಮಾತೃಭಾಷೆಯ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ)

(ಕನ್ನಡಿಗರಿಗಾಗಿ - for Kannadigas - Common to all branches)

[As per Outcome Based Education (OBE) and Choice Based Credit System (CBCS) scheme]

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು:

- ಪದವಿ ವಿದ್ಯಾರ್ಥಿಗಳಾಗಿರುವುದರಿಂದ ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡದ ಜೊತೆಗೆ ಕ್ರಿಯಾತ್ಮಕ ಕನ್ನಡವನ್ನು, ಕನ್ನಡ ಸಾಹಿತ್ಯ, ಸಂಸ್ಕೃತಿ ಮತ್ತು ನಾಡು ನುಡಿಯ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.
- ಕನ್ನಡದಲ್ಲಿ ತಾಂತ್ರಿಕ ವಿಜ್ಞಾನಗಳ ವಿಷಯಕ್ಕೆ ಸಂಬಂಧಿಸಿದ ಹಲವಾರು ವಿಷಯಗಳನ್ನು ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.
- ಕನ್ನಡ ಭಾಷಾಭ್ಯಾಸ, ಸಾಮಾನ್ಯ ಕನ್ನಡ ಹಾಗೂ ಆಡಳಿತ ಕನ್ನಡದ ಪದಗಳ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.

ಪರಿವಿಡಿ

ಭಾಗ - ಒಂದು ಲೇಖನಗಳು

ಕನ್ನಡ ನಾಡು, ನುಡಿ ಮತ್ತು ಸಂಸ್ಕೃತಿಗೆ ಸಂಬಂಧಿಸಿದ ಲೇಖನಗಳು

೧. ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ : ಹಂಪ ನಾಗರಾಜಯ್ಯ
೨. ಕರ್ನಾಟಕದ ಏಕೀಕರಣ : ಒಂದು ಅಪೂರ್ವ ಚರಿತ್ರೆ - ಜಿ. ವೆಂಕಟಸುಬ್ಬಯ್ಯ
೩. ಆಡಳಿತ ಭಾಷೆಯಾಗಿ ಕನ್ನಡ - ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ ಮತ್ತು ಪ್ರೊ. ವಿ. ಕೇಶವಮೂರ್ತಿ *

ಭಾಗ - ಎರಡು

ಕಾವ್ಯ ಭಾಗ (ಆಧುನಿಕ ಪೂರ್ವ)

೪. ವಚನಗಳು : ಬಸವಣ್ಣ, ಅಕ್ಕಮಹಾದೇವಿ, ಅಲ್ಲಮಪ್ರಭು, ಆಯ್ಯಕ್ಕಿ ಮಾರಯ್ಯ, ಜೇಡರ ದಾಸಿಮಯ್ಯ, ಆಯ್ಯಕ್ಕಿ ಲಕ್ಕಮ್ಮ.
೫. ಕೀರ್ತನೆಗಳು : ಅದರಿದೇನು ಫಲ ಇದರಿದೇನು ಫಲ - ಪುರಂದರದಾಸ ತಲ್ಲಣಿಸದಿರು ಕಂಡ್ಯ ತಾಳು ಮನವೆ - ಕನಕದಾಸ
೬. ತತ್ವಪದಗಳು : ಸಾವಿರ ಕೊಡಗಳ ಸುಟ್ಟು - ಶಿಶುನಾಳ ಷರೀಫ ಶಿವಯೋಗಿ - ಬಾಲಲೀಲಾ ಮಹಾಂತ ಶಿವಯೋಗಿ

೭. ಜನಪದ ಗೀತೆ : ಬೀಸುವ ಪದ, ಬಡವರಿಗೆ ಸಾವ ಕೊಡಬೇಡ

ಭಾಗ - ಮೂರು

ಕಾವ್ಯ ಭಾಗ (ಆಧುನಿಕ)

೮. ಮಂಕುತಿಮ್ಮನ ಕಗ್ಗ : ಡಿ.ವಿ.ಜಿ.

೯. ಕುರುಡು ಕಾಂಚಾಣಾ : ದ.ರಾ. ಬೇಂದ್ರೆ

೧೦. ಹೊಸಬಾಳಿನ ಗೀತೆ : ಕುವೆಂಪು

೧೧. ಹೆಂಡತಿಯ ಕಾಗದ : ಕೆ.ಎಸ್. ನರಸಿಂಹಸ್ವಾಮಿ

೧೨. ಮಬ್ಬಿನಿಂದ ಮಬ್ಬಿಗೆ : ಜಿ.ಎಸ್. ಶಿವರುದ್ರಪ್ಪ

೧೩. ಆ ಮರ ಈ ಮರ : ಚಂದ್ರಶೇಖರ ಕಂಬಾರ

೧೪. ಚೋಮನ ಮಕ್ಕಳ ಹಾಡು : ಸಿದ್ಧಲಿಂಗಯ್ಯ

ಭಾಗ - ನಾಲ್ಕು

ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿ ಪರಿಚಯ, ಕಥೆ ಮತ್ತು ಪ್ರವಾಸ ಕಥನ

೧೫. ಡಾ. ಸರ್ ಎಂ ವಿಶ್ವೇಶ್ವರಯ್ಯ - ವ್ಯಕ್ತಿ ಮತ್ತು ಐತಿಹ್ಯ : ಎ ಎನ್ ಮೂರ್ತಿರಾವ್

೧೬. ಯುಗಾದಿ : ವಸುಧೇಂದ್ರ

೧೭. ಮೆಗಾನೆ ಎಂಬ ಗಿರಿಜನ ಪರ್ವತ : ಹಿ.ಚಿ. ಬೋರಲಿಂಗಯ್ಯ

ಭಾಗ - ಐದು

ವಿಜ್ಞಾನ ಮತ್ತು ತಂತ್ರಜ್ಞಾನ

೧೮. ಕರಕುಶಲ ಕಲೆಗಳು ಮತ್ತು ಪರಂಪರೆಯ ವಿಜ್ಞಾನ : ಕರೀಗೌಡ ಬೀಚನಹಳ್ಳಿ

೧೯. 'ಕ' ಮತ್ತು 'ಬ' ಬರಹ ತಂತ್ರಾಂಶಗಳು ಮತ್ತು ಕನ್ನಡದ ಟೈಪಿಂಗ್*

೨೦. ಕನ್ನಡ - ಕಂಪ್ಯೂಟರ್ ಶಬ್ದಕೋಶ*

೨೧. ತಾಂತ್ರಿಕ ಪದಕೋಶ : ತಾಂತ್ರಿಕ ಹಾಗೂ ಪಾರಿಭಾಷಿಕ ಕನ್ನಡ ಪದಗಳು*

* (ಅಧ್ಯಾಯ 3, 19, 20 ಮತ್ತು 21 ಇವುಗಳು ವಿಶಾಖಾ ಯದಿಂದ ಪ್ರಕಟಿತ " ಆಡಳಿತ ಕನ್ನಡ "

ಪುಸ್ತಕದಿಂದ ಆಯ್ದ ಲೇಖನಗಳು - ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ ಮತ್ತು ಪ್ರೊ. ವಿ. ಕೇಶವಮೂರ್ತಿ.



BALAKE KANNADA

Subject Code	21KBK36	Credit 01
Number of Lecture Hours/Week	1 Hours (Theory)	SEE: 50
Total Hours: 14	CIE: 50	SEE Hours: 1.5 Hrs

ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ ಬಳಕೆ ಕನ್ನಡ ಪಠ್ಯಪುಸ್ತಕ baLake Kannada Text Book for VTU

(Common to B.Arch, B.Plan and B.E/B.Tech of all branches)

[As per Outcome Based Education (OBE) and Choice Based Credit System (CBCS) scheme]

Course Learning Objectives:

The course will enable the non Kannadiga students to understand, speak, read and write Kannada language and communicate (converse) in Kannada language in their daily life with kannada speakers.

Table of Contents

Introduction to the Book
Necessity of learning a local language:
Tips to learn the language with easy methods.
Easy learning of a Kannada Language: A few tips
Hints for correct and polite conversation
Instructions to Teachers for Listening and Speaking Activities
Key to Transcription
Instructions to Teachers

Part – I Lessons to teach and Learn Kannada Language

- Lesson – 1 ವೈಯಕ್ತಿಕ, ಸ್ವಾಮ್ಯಸೂಚಕ/ಸಂಬಂಧಿತ ಸಾರ್ವನಾಮಗಳು ಮತ್ತು ಪ್ರಶ್ನಾರ್ಥಕ ಪದಗಳು - Personal Pronouns, Possessive Forms, Interrogative words
- Lesson – 2 ನಾಮಪದಗಳ ಸಂಬಂಧಾರ್ಥಕ ರೂಪಗಳು, ಸಂದೇಹಾಸ್ಪದ ಪ್ರಶ್ನೆಗಳು ಮತ್ತು ಸಂಬಂಧವಾಚಕ ನಾಮಪದಗಳು - Possessive forms of nouns, dubitive question and Relative nouns
- Lesson – 3 ಗುಣ, ಪರಿಮಾಣ ಮತ್ತು ವರ್ಣಬಣ್ಣ ವಿಶೇಷಣಗಳು, ಸಂಖ್ಯಾವಾಚಕಗಳು Qualitative, Quantitative and Colour Adjectives, Numerals
- Lesson – 4 ಕಾರಕ ರೂಪಗಳು ಮತ್ತು ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು – ಸಪ್ರಮಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯ – (ಅ, ಅದು, ಅವು, ಅಲ್ಲಿ) Predictive Forms, Locative Case
- Lesson – 5 ಚತುರ್ಥಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯದ ಬಳಕೆ ಮತ್ತು ಸಂಖ್ಯಾವಾಚಕಗಳು – Dative Cases, and Numerals
- Lesson – 6 ಸಂಖ್ಯಾಗುಣವಾಚಕಗಳು ಮತ್ತು ಬಹುವಚನ ನಾಮರೂಪಗಳು - Ordinal numerals

and Plural markers

Lesson – 7 ನ್ಯೂನ / ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾಪದಗಳು ಮತ್ತು ವರ್ಣ ಗುಣವಾಚಕಗಳು

Defective / Negative Verbs and Colour Adjectives

Lesson – 8 ಅಪ್ಪಣೆ / ಒಪ್ಪಿಗೆ, ನಿರ್ದೇಶನ, ಪ್ರೋತ್ಸಾಹ ಮತ್ತು ಒತ್ತಾಯ ಆರ್ಥರೂಪ ಪದಗಳು ಮತ್ತು ವಾಕ್ಯಗಳು - Permission, Commands, encouraging and Urging words (Imperative words and sentences)

Lesson – 9 ಸಾಮಾನ್ಯ ಸಂಭಾಷಣೆಗಳಲ್ಲಿ ದ್ವಿತೀಯ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ಸಂಭವನೀಯ ಪ್ರಕಾರಗಳು

Accusative Cases and Potential Forms used in General Communication

Lesson – 10 “ಇರು ಮತ್ತು ಇರಲ್ಲ” ಸಹಾಯಕ ಕ್ರಿಯಾಪದಗಳು, ಸಂಭಾವ್ಯಸೂಚಕ ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾ ಪದಗಳು
Helping Verbs “iru and iralla”, Corresponding Future and Negation Verbs

Lesson – 11 ಹೋಲಿಕೆ (ತರತಮ), ಸಂಬಂಧ ಸೂಚಕ ಮತ್ತು ವಸ್ತು ಸೂಚಕ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಪದಗಳ ಬಳಕೆ
Comparative, Relationship, Identification and Negation Words

Lesson – 12 ಕಾಲ ಮತ್ತು ಸಮಯದ ಹಾಗೂ ಕ್ರಿಯಾಪದಗಳ ವಿವಿಧ ಪ್ರಕಾರಗಳು
Different types of forms of Tense, Time and Verbs

Lesson – 13 ದ್, -ತ್, -ತು, -ಇತು, -ಆಗಿ, -ಅಲ್ಲ, -ಗ್, -ಕ್, ಇದೆ, ಕ್ರಿಯಾ ಪ್ರತ್ಯಯಗಳೊಂದಿಗೆ ಭೂತ, ಭವಿಷ್ಯತ್ ಮತ್ತು ವರ್ತಮಾನ ಕಾಲ ವಾಕ್ಯ ರಚನೆ
Formation of Past, Future and Present Tense Sentences with Verb Forms

Lesson – 14 ಕರ್ನಾಟಕ ರಾಜ್ಯ ಮತ್ತು ರಾಜ್ಯದ ಬಗ್ಗೆ ಕುರಿತಾದ ಇತರ ಮಾಹಿತಿಗಳು
Karnataka State and General Information about the State

Lesson – 15 ಕನ್ನಡ ಭಾಷೆ ಮತ್ತು ಸಾಹಿತ್ಯ -
Kannada Language and Literature

Lesson – 16 ಭಾಷೆ ಕಲಿಯಲು ಏನನ್ನು ಮಾಡಬೇಕು ಮತ್ತು ಮಾಡಬಾರದು
Do's and Don'ts in Learning a Language

Lesson – 17 PART - II

Kannada Language Script Part – 1

Lesson – 18 PART - III

Kannada Vocabulary List : ಸಂಭಾಷಣೆಯಲ್ಲಿ ದಿನೋಪಯೋಗಿ ಕನ್ನಡ ಪದಗಳು - Kannada Words in Conversation

Course Title: Ability enhancement course (AutoCAD Software)

Course Code	21CVAE36A	Credit:01
Number of Practical Hours/Week	2 Hrs.Practical	SEE: 50
Total Number of Practical Hours: 28	CIE: 50	SEE Hours: 03

Prerequisite: none

Course objectives:

To enable the student to acquire the knowledge in the following topics

1. Understand the concept of AutoCAD and application.
2. Create various types of building plans, Elevations etc.
3. Create centre line diagrams for various types of building plans.
4. Create Line diagram for various services in a building.

Modules	Teaching Hours
<p align="center">Module 1</p> <p>Introduction to AutoCad, Usage of AutoCAD tool commands like Line, circle, rectangle, polyline, trim, extend, copy, mirror, rotate, erase, offset, move, array, scale, fillet, explode, text, layers, coordinate system, import and exporting of data from various software and its compatibility</p>	02hours
<p align="center">Module III</p> <p>Development of plan, elevation and section elevation for</p> <ol style="list-style-type: none"> 1. One storey residential building 2. Two storeyed residential building 	06 hours
<p align="center">Module III</p> <p>Centre line diagram for Primary school building, Primary health centre and foundation center line diagram for load bearing and RCC structures in AutoCAD software</p>	04 hours
<p align="center">Module IV</p> <p>Line diagram for preparation of water supply, sanitary, electrical layouts and rain water harvesting</p>	02 hours

Text Book: AutoCAD User Manual			
Course outcomes: On completion of the course, the student will have the ability to:			
Course Code	CO#	Course Outcomes	Blooms Level
21CVA36A	CO1	Understand the concept of AutoCAD and application.	
	CO2	Create various types of building plans, Elevations etc.	
	CO3	Create centre line diagrams for various types of building plans.	
	CO4	Create Elevations for various types of building plans.	
	CO5	Create Line diagram for various services in a building.	

UNIVERSAL HUMAN VALUES-I

Course Code	21UHV36B	Credits:1	CIE: 50
Number of Lecture Hours/Week	2hrs (Tutorial)		SEE: 50
Total Number of Theory Hours	14 hours		SEE Hours: 03

Course Objectives:

1. To help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity, which are the core aspirations of all human beings.
2. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.
3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with Nature.

Modules	Teaching Hours
<p style="text-align: center;">Module I</p> <p>Introduction To Value Education: Understanding Value Education, Need Of Value Education, Basic Guidelines For Value Education, The Content Of Value Education, The Process Of Value Education.</p> <p>Self- Exploration As The Process For Value Education: Starting To Observe Inside, What Is Self-Exploration? What Is Its Purpose?, Content Of Self-Exploration, Natural Acceptance, What Is The State Today?, What Is The Way Out? What Do We Need To Do?.</p>	3hrs
<p style="text-align: center;">Module II</p> <p>The Basic Human Aspirations- Continuous Happiness And Prosperity:Continuous Happiness And Prosperity- Our Basic Aspiration, Exploring Happiness And Prosperity, A Look At The Prevailing Notions Of Happiness And Prosperity, Some Possible Questions/ Confusions.</p> <p>The Program To Fulfill Basic Aspiration: Basic Requirements For Fulfillment Of Human Aspirations, What Is Our State Today?, Why Are We In This State?- Living With Wrong Assumptions, What Is The Solution?- The Need For Right Understanding, Our Program: Understand And Live In Harmony At All Levels Of Living, Our State Today?, Our Natural Acceptance For Harmony At All Levels Of Our Living, Human And Animal Consciousness.</p>	3hrs

<p style="text-align: center;">Module III</p> <p>Understanding The Harmony At Various Levels: Understanding The Human Being As Co-Existence Of Self(I) And Body, Human Being Is More Than Just The Body, Understanding Myself As Coexistence Of Self And The Body, Understanding The Needs Of The Self And Needs Of The Body, Understanding The Self(I) As A Conscious Entity, The Body As The Material Entity, Exercise On Distinguishing Needs Of The Self(I) And The Body, Exercise On Distinguishing Activities Of The Self(I) And Body, Understanding The Body As An Instrument Of ‘I’(I Being The Seer, Doer And Enjoyer).</p> <p>Harmony In Self(I)- Understanding Myself: Why Should I Study Myself?, Getting To Know The Activities In I Related?, The Activities In I Are Continuous, What Is The Problem Today?, Effects Of The Problem, What Then Is The Solution?, Result Of Realization And Understanding-Living With Definiteness.</p> <p>Harmony With The Body- Understanding <i>Sanyama</i> And<i>Svashtya</i>: Our Body- A Self-Organised Unit, Harmony Of I With The Body: <i>Sanyama</i>And <i>Svashtya</i>, What Is Our State Today?, What Is The Way Out?, Understanding And Living With <i>Sanyama</i>, Correct Appraisal Of Our Physical Needs.</p>	3hrs
<p style="text-align: center;">Module IV</p> <p>Harmony In The Family- Understanding Values In Human Relationships: Family As The Basic Unit Of Human Interaction, Harmony In The Family, Justice(<i>Nyaya</i>), What Is The State Today?, Values In Human Relationships, Trust(<i>Visvasa</i>),Respect(<i>Sammana</i>), The Basis For Respect, Assumed Bases For Respect Today, The Problem Due To Differentiation, Difference Between Attention And Respect, What Is The Way Out?, Affection (<i>Sneha</i>), Care(<i>Mamata</i>), Guidance(<i>Vatsalya</i>),Reverence(<i>Shraddha</i>),Glory(<i>Gaurava</i>),Gratitude(<i>Kritagyata</i>),Love(<i>Prema</i>), Harmony From Family To World Family: Undivided Society.</p> <p>Harmony In The Society-From Family Order To World Family Order: Extending Relationship From Family To Society, Identification Of The Comprehensive Human Goal, Where Are We Today?, Programs Needed To Achieve The Comprehensive Human Goal: Five Dimensions Of Human Endeavour, Education-Right Living (<i>Siksha-Sanskara</i>), Health-Self-Regulation (<i>Svasthya-Sanyama</i>), Justice-Preservation (<i>Nyaya-Suraksha</i>), Production-Work (<i>Utpadana-Karya</i>), Exchange-Stotage (<i>Vinimaya-Kosa</i>), What Is Our State Today?, Harmony From Family Order To World Family Order: Universal Human Order.</p>	3hrs
<p style="text-align: center;">Module V</p> <p>Harmony In Nature-Understanding The Interconnectedness And Mutual Fulfillment: The</p>	2hrs

Four Orders Of Nature, Inconnectedness And Mutual Fulfillment (Parasparta And Paraspara Purakata), Recyclability And Self-Regulation In Nature, Understanding The Four Orders- Things (Vastu), Activity(Kriya), Innateness(Dharana), Natural Characteristic(Svabhava), Basic Activity, Conformance(Anu-Sangita), Human Beings-Our State Today, What Is The Way Out?.

Harmony In Existence-Understanding Existence As Co-Existence: An Introduction To Space (Sunya), Co-Existence Of Units In Space, Limited And Unlimited, Active And No-Activity, Energised And Energy In Equilibrium, Each Unit Recognizes.... Space Is Reflecting Or Transparent, Self-Organised And Self-Organisation Is Available, Existence Is Co-Existence, What Are We Doing Today?, Where Do We Want To Be?

Text Books:

1. The Text Book R.R Gaur, R Sangal, G P Bagaria, A Foundation Course In Human Values And Professional Ethics, Excel Books, New Delhi, 2010, ISBN 978-8-174-46781-2.
2. The teacher's manual R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and professional Ethics – Teachers Manual, Excel books, New Delhi, 2010

Reference Books:

1. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.
2. PL Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Purblishers.
3. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
4. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
5. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, limits to Growth, Club of Rome's Report, Universe Books.
6. Subhas Palekar, 2000, How to practce Natural Farming, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
7. A Nagraj, 1998, Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.
8. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
9. A.N. Tripathy, 2003, Human Values, New Age International Publishers.

Course outcomes: On completion of the course, the student will have the ability to:

Course Code	CO	Course Outcome (CO)
	CO1	The students are able to see that verification on the basis of natural acceptance and experiential validation through living is the only way to verify right or wrong, and

21UHV36B		referring to any external source like text or instrument or any other person cannot enable them to verify with authenticity; it will only develop assumptions
	CO2	The students are able to see that their practice in living is not in harmony with their natural acceptance most of the time, and all they need to do is to refer to their natural acceptance to remove this disharmony
	CO3	The students are able to see that lack of right understanding leading to lack of relationship is the major cause of problems in their family and not the lack of physical facilities in most of the cases, while they have given higher priority to earning of physical facilities in their life ignoring relationships and not being aware that right understanding is the most important requirement for any human being
	CO4	The students feel confident that they can understand the whole existence; nothing is a mystery in this existence. They are also able to see the interconnectedness in the nature, and point out how different courses of study relate to the different units and levels. Also, they are able to make out how these courses can be made appropriate and holistic.
	CO5	The students are able to grasp the right utilization of their knowledge in their streams of Technology/Engineering/ Management to ensure mutually enriching and recyclable productions systems.
	CO6	The students are able to sincerely evaluate the course and share with their friends. They are also able to suggest measures to make the course more effective and relevant. They are also able to make use of their understanding in the course for a happy and prosperous society.

FLUID MECHANICS LAB

Course Code	21CVL31	CREDIT: 01
Number of Lecture Hours/Week	2 hrs (Practical)	CIE: 50Marks
Total hours: 28	CIE: 50 Marks	SEE: 03 Hours

Prerequisite: none

Course objectives:**To enable the student to acquire the knowledge in the following topics**

1. Calibration of various notches.
2. Calibration of plug sluice. Broad crested and ogee weir.
3. Determination of constants of Parshall flume, major and minor losses through pipes.
4. Determination of hydraulic coefficients of small circular orifice and external cylindrical mouth piece.
5. Determination of coefficient of discharge of venturi meter and study the performance of centrifugal pump.

Experiments	Teaching Hours
1. Calibration of rectangular notch	2hours
2. Calibration of triangular notch	2hours
3. Calibration of Cipolletti notch	2hours
4. Calibration of broad crested weir	2hours
5. Calibration of ogee weir	2hours
6. Calibration of plug sluice	2hours
7. Determination of constants of Parshall flume	2hours
8. Determination of minor losses through pipes	2hours
9. Determination of hydraulic coefficient of small circular orifice.	2hours
10. Determination of friction loss through pipes	2hours
11. Determination of hydraulic coefficients of external cylindrical mouth piece.	2hours
12. Determination coefficient of discharge of venturi meter.	2hours
13. Study of performance of centrifugal pump	2hours
14. Study of performance of Francis turbine	2hours
or	
Study of performance of Pelton wheel turbine	

15. Demonstrate of flow measurement using current meter

Question paper pattern:

Conduct any one experiment by picking up student and he has to prepare writeup and conduct experiment. Computations for result by Analytical and Graphical method.

Text books:

1. P N Modi and S M Seth, "Hydraulics and Fluid Mechanics, including Hydraulic Machines", 20th edition, 2015, Standard Book House, New Delhi
2. R.K. Bansal, "A Text book of Fluid Mechanics and Hydraulic Machines", Laxmi Publications, New Delhi

Papers from the international journals (Scopus index and web of science).

Reference Books:

Papers from the international journals (Scopus index and web of science).

E books and online course materials:

www.civildatas.com

Course outcomes:

On completion of the course, the student will have the ability to:

Course Code	CO #	Course Outcome (CO)	Blooms Level
21CVL31	CO1	To understand the concepts of Fluid Mechanics course through series of experiments.	C2
	CO2	Share the responsibilities in small teams of 4-5 members for conducting the experiments.	C3
	CO3	Perform the experiments and Calibration of notches, rectangular, triangular, Cipolletti notch, plug sluice, broad crested and ogee weir, determination of Parshall minor flume, losses through pipes cylindrical mouthpiece, centrifugal pump, small circular orifice, friction loss through pipes, external cylindrical mouth piece, venturi meter, study on centrifugal pump, francis turbine, Pelton wheel turbine, demonstrate of open channel flow parameters.	C3
	CO4	Analyse the data and interpret the results.	C4
	CO5	Prepare a well-organized laboratory report.	C3

SURVEYING LAB

Course Code	21CVL32	CREDIT: 01
Number of Lecture Hours/Week	2 hrs (Practical)	SEE: 50 Marks
Total Number of Lecture Hours: 28	CIE: 50Marks	SEE: 03 Hours

Prerequisite: Mathematics

Course objectives:

To enable the student to acquire the knowledge in the following topics

Experiments	Teaching Hours
1.a) To Measure distance between two points by direct Ranging	02 Hours
1.b) To Set out perpendiculars at various points on a given line by linear methods.	02 Hours
2. Setting out of rectangle, pentagon and hexagon by compass and Chain	02 Hours
3. Closed traverse of a small area using chain and compass & adjustment of closing error by Bowditch's rule	02 Hours
4. Determination of reduced level of points using dumpy level/auto level (simple leveling)	02 Hours
5. Determination of reduced level of points using dumpy level/auto level (differential leveling and inverted leveling)	02 Hours
6. Determination of reduced level of points using dumpy level/auto level (differential leveling and inverted leveling)	02 Hours
7. To determine the difference in elevation between two points using Reciprocal leveling and to determine the collimation error.	02 Hours
8. To conduct profile leveling, cross sectioning and block leveling. Plotting profile and cross sectioning in excel. Block contour on graph paper to scale.	02 Hours
9. To Determine the difference in elevation between two points by conducting Fly Levelling Also Carryout Fly Back Levelling calculate the RL of Points by RISE and FALL method	02 Hours
10. Measurements of horizontal angles by Reiteration method using transit theodolite.	02 hours
11. Measurement of vertical angle using transit Theodolite.	02hours
12. To Determine Distance and elevation of an inaccessible object using single plane	02hours

method.	
13.To Determine the Distance and Elevation of an object using double plane method when the base of an object is inaccessible.	02hours
14. To Setout simple circular curve using Rankine's deflection angle method	02 Hours
15. Demonstration of Digital Planimeter.	02 Hours

Question paper pattern:

Conduct any one experiment by picking up student and he has to prepare writeup and conduct experiment.

Text books:

1. B.C. Punmia, "Surveying Vol.1 & 2", Laxmi Publications pvt. Ltd., New Delhi –2009.
2. Kanetkar T P and S V Kulkarni, Surveying and Leveling Part I & II, Pune Vidyarthi Griha Prakashan, 1988

Reference Books:

1. S.K. Duggal, "Surveying Vol.1", Tata McGraw Hill Publishing Co. Ltd. New Delhi. 2009.
 2. K.R. Arora, "Surveying Vol. 1 & 2" Standard Book House, New Delhi. –2010
 3. R Subramanian, Surveying and Leveling, Second edition, Oxford University Press, New Delhi
- A. Bannister, S. Raymond, R. Baker, "Surveying", Pearson, 7th ed., New Delhi

E books and online course materials:

www.civildenggbooks.com

Course outcomes:

On completion of the course, the student will have the ability to:

Course Code	CO #	Course Outcome (CO)	Blooms Level
21CVL32	CO1	Demonstrate the concepts of Surveying through series of experiments.	C2
	CO2	Share the responsibilities in small teams of 4-5 members for conducting the experiments.	C3
	CO3	Perform the various experiments on surveying and leveling.	C3
	CO4	Analyse the data and interpret the results.	C4
	CO5	Prepare a well-organized laboratory report.	C3

Course Title: BUILDING PLANNING AND DRAWING		
Course Code	21CVL33	CREDIT:02
Number of Lecture Hours/Week	1 Hours (Lectures) 2 Hours (Practical)	SEE: 50
Total Number of Lecture Hours:28	CIE: 50	SEE:04 Hours
Prerequisite: none		
Course objectives: To enable the student to acquire the knowledge in the following topics		
		Teaching Hours
PART-I To prepare working drawing of component of buildings i) Stepped wall footing and isolated RCC column footing, ii) Fully paneled and flush doors, iii) Half panelled and half-glazed window. iv) symbols used in civil engineering drawing, types of masonry bonds Functional design of building (Residential, Public and Industrial), positioning of various components of buildings, orientation of buildings, building standards, bye laws, set back distances and calculation of carpet area, plinth area and floor area ratio. Functional design of building using inter connectivity diagrams (bubble diagram), development of line diagram only for following building: i) Residential building ii) Primary health center, iii) Primary school building For a given single line diagram, preparation of water supply, Sanitary and electrical layouts. Rain water harvesting elements		3 Hrs 4 Hrs 6 Hrs 4 Hrs
PART-II Development of plan, elevation, section and schedule of openings from the given line diagram of residential buildings, i) Two bed room Residential building, ii) Two storied building.		1 Hrs 10 Hrs
Question paper pattern: Part-I: one question of 30 marks Part-II. Two questions of 10 marks each		
Text books: 1 Shah M.H and Kale C.M “ Building Drawing ”, , Tata Mc Graw Hill Publishing co. Ltd., New Delhi.		

2 Gurucharan Singh **“Building Construction”**, , Standard Publishers & distributors, New Delhi.

Reference Books:

1. **National Building Code**, BIS, New Delhi.
2. “A Course in Civil Engineering Drawing”, by V. B. Sikka, S. K. Kataria & Sons

E books and online course materials:

www.civilenggebooks.com

Course outcomes:

On completion of the course, the student will have the ability to:

Course Code	CO #	Course Outcome (CO)
21CVL33	CO1	Understand the concepts of Principles of Planning and theory course through series of Drawings.
	CO2	Share the responsibilities in small teams of 4-5 members for planning and drawing.
	CO3	Perform the drawings with logic and application of principles
	CO4	Suitable dimensions as per standard data and interpreted the Drawings.
	CO5	Prepare set of Drawings relevant to the Course.

IV Semester

Course Title STRUCTURAL ANALYSIS		
Course Code	21CV41	Credit: 04
Number of Lecture Hours/Week	3 Hours (Theory)	SEE: 50 Marks
Total Number of Lecture :42 Hrs	CIE: 50 Marks	SEE: 03 Hours
Prerequisite: Engineering Mechanics, Strength of material		
Course objectives: To enable the student to acquire the knowledge in the following topics 1. Determine the degree of freedom and degree of redundancy of structures and analyse the trusses 2. Analysis beams, frames& trusses for displacements using strain energy methods. 3. Analysis arches, cables and analysis of beams by slope deflection method 4. Analysis of beams and frames by moment distribution method 5. Analysis of beams and frames by Kani's method.		
Modules		Teaching Hours
Module I Structural systems: Forms of structures. Determinate and indeterminate structures. Static and Kinematic Indeterminacy of structures. principle of superposition. linear and non-linear structures. Plane trusses: Introduction, analysis of trusses by method of joints and by method of sections.		8 hours
Module-II Strain energy: Strain energy and complimentary strain energy. Strain energy due to axial load, bending and shear, theorem of minimum potential energy, Law of conservation of energy, Clarke -Maxwell's theorem of reciprocal deflection & Castigliano's theorems. Numerical examples on beams & frames. Arches and cables: Analysis of three hinged parabolic arches and circular arches. (Support at same levels and different levels). Analysis of cables under point loads and UDL, length of cables (support at same levels only) Numerical problems		8 hours

Module -III			8 hours
Slope & deflection method: Analysis of continuous beams and Frames by Slope deflection method Analysis of rigid Frames by Slope deflection method			
Module IV			9 hours
Moment distribution method: Analysis of continuous beams with &without sinking of supports Analysis of rigid frames(sway& Non sway) by moment distribution method			
Module -V			9 hours
Rotation contribution method (Kani.s method): Analysis of continuous beams by Kani's method. Analysis of rigid frames by Kani's method (Non sway frames only)			
Question paper pattern: Two questions to be set from each module by inter-mixing the syllabus of respective module. Students have to answer any five full questions by selecting minimum one question from each module.			
Text books: 1. Reddy C S, Basic Structural Analysis, Tata McGraw Hill, New Delhi. 2. Muthu K U. etal, Basic Structural Analysis, 2nd edition, IK International Pvt. Ltd., NewDelhi,2015. 3. Bhavikatti, Structural Analysis, Vikas Publishing House Pvt. Ltd, New Delhi,2002. 4. S Ramamrutham R Narayan .Dhanpath Rai Publishing company(P) Ltd New Delhi Reference Books: 1. Hibbeler R C, Structural Analysis, Prentice Hall, 9th edition,2014. 2. Devadas Menon, Structural Analysis, Narosa Publishing House, New Delhi,2008. 3. Prakash Rao D S, Structural Analysis, University Press Pvt. Ltd,2007.			
On completion of the course, the student will have the ability to:			
Course Code	CO#	CourseOutcome(CO)	
21CV41	CO1	Describe different types of structural systems and analyze plane trusses	
	CO2	Analyze the beams, trusses and frames using energy principles and Analyze the arches and cables	
	CO3	Analyze frames and beams by slope deflection method	
	CO4	Analyze beams & frames by moment distribution method	
	CO5	Analyze beams & frames by Kani's method. Analyze beams subjected to rolling loads	

Course Title CONCRETE TECHNOLOGY		
Course Code	21CV42	Credit: 02
Number of Lecture/weeks	2 Hrs (Theory)	SEE:50 Marks
Total Number of LectureHours: 28	CIE:50 Marks	SEE: 03 Hours
Prerequisite: none		
Course objectives: To enable the student to acquire the knowledge in the following topics <ol style="list-style-type: none"> 1. Hydration of cement and physical properties of cement and types of cement. 2. Physical properties of course and fine aggregate. 3. Design of concrete mix. 4. Fresh and hardened state property of concrete. 5. Testing of concrete. 		
Modules		Teaching Hours
Module I Cement: Manufacture of cement (OPC) by dry and wet process (Flow charts only). chemical composition and their importance, bogue's compounds, hydration of cement, heat of hydration. Tests on cement- Fineness by sieve test and Blaine's air permeability test, normal consistency, setting time, soundness, compressive strength of cement specific gravity of cement..		5 hours
Module-II Aggregate: Coarse aggregate, importance of size, shape, texture, grading of aggregates, sieve analysis Flakiness and Elongation, Specific Gravity, Moisture Content, Crushing ,Impact, Abrasion tests.Fine Aggregate, Bulking of fine aggregate, Bulk Density, Ten percent Fineness Value, Sieve Analysis Specific Gravity. Deleterious Material and Introduction of M sand.		5 hours
Module -III Fresh Concrete: Workability-factors affecting, measurement of Workability-Slump, Compaction Factor, Vee-bee Consistometer, Flowtests. Segregation and Bleeding, Mixing, Placing and Compaction. Curing methods, Accelerated curing. Admixtures -plasticizer, superplasticizer, accelerators, retarders and airentraining agents. Mineral admixtures-fly ash and silica fume		6 hours

<p style="text-align: center;">Module IV</p> <p>Hardened Concrete: Factors affecting strength- w/c, degree of compaction, age, aggregate/cement ratio, aggregate properties, maturity concept. Elasticity, factors affecting modulus of elasticity, relation between modulus of elasticity and Poisson's ratio, Introduction to RMC. Testing: Destructive testing-compressive strength, flexural strength, splittensile strength NDT by Schmidt rebound hammer test. Relation between tensile strength and compressive strength</p>	6 hours
<p>Module V</p> <p>Shrinkage- types of shrinkage, factors affecting shrinkage. Creep- factors affecting creep, effect of creep. Durability-importance, permeability, sulphate attack, chloride attack, carbonation, freezing and thawing.</p> <p>Concrete Mix Design: Factors to be considered in Mix Design, Mix Design by IS method..</p>	6 hours
<p>Question paper pattern:</p> <p>Two questions to be set from each Module by intermixing (in total 10). Students have to answer any five full questions by selecting one question from each module.</p>	
<p>Textbooks:</p> <ol style="list-style-type: none"> 1. Neville A.M. "Properties of Concrete"-4th Ed., Longman. 2. M.S. Shetty, Concrete Technology - Theory and Practice Published by S.Chand and Company, New Delhi. 3. Kumar Mehta. P and Paulo J.M. Monteiro "Concrete-Microstructure, Property and Materials", 4th Edition, McGraw Hill Education, 2014 4. A.R. Santha Kumar, "Concrete Technology", Oxford University Press, New Delhi (New Edition). 	
<p>Reference Books:</p> <ol style="list-style-type: none"> 1. M L Gambir, "Concrete Technology", McGraw Hill Education, 2014. 2. N. V. Nayak, A. K. Jain Handbook on Advanced Concrete Technology, ISBN:978-81-8487-186-9 3. Job Thomas, "Concrete Technology", CENGAGE Learning, 2015. 4. IS 4926 (2003): Code of Practice Ready-Mixed Concrete [CED 2: Cement and Concrete] Criteria for RMC Production Control, Basic Level Certification for <p>Production Control of Ready Mixed Concrete BMTPC.</p>	
<p>E books and online course materials:</p> <p>www.civilenggebooks.com</p>	
<p>Course outcomes:</p> <p>On completion of the course, the student will have the ability to:</p>	

Course Code	CO #	Course Outcome (CO)	
21CV42	CO1	Explain manufacturing of cement and the significance of physical properties of cement.	
	CO2	Describe and identify the requirements of good quality fine aggregate and coarse Aggregate.	
	CO3	Design a concrete mix and explain the fresh state property requirements of concrete	
	CO4	Evaluate the influence of different parameters on the properties of hardened concrete	
	CO5	Analyze the quality of hardened concrete using the results of types of test	

WATER RESOURCES ENGINEERING

Subject code	21CV43	Credit: 03
Hours/Week	3 hours. (Theory)	SEE: 50 Marks
Total hours: 42	CIE: 50 Marks	SEE: 3 hours

Prerequisite: Fluid Mechanics, Engineering Mathematics

Course objectives:

to enable the student to acquire the knowledge in the following topics

1. Introduce importance of water resource engineering
2. Making students to understand basics of hydrology & Hydrograph
3. Introduce problems involved in canal irrigation system.
4. Design of Gravity Dams, earthen Dams and spillways

Modules	Teaching Hours
Module I Introduction: water resources engineering disciplines, water management sectors Water wealth of India. Hydrological cycle, water shed hydrology, measurement of precipitation by rain gauges Computation of precipitation, missing rainfall data, rain gauge density, rainfall mass curve & hyetograph - Problems on above.	8 Hours
Module-II Runoff: Runoff cycle, factors affecting runoff, computation of average annual runoff, maximum runoff, Concept of Hydrograph & Unit Hydrograph & Flood frequency Studies - problems. Reservoirs: Types, site selection, Investigations for reservoirs. Determination of storage capacity of reservoirs using mass curve, analytical method, storage zones of reservoir, economical height of dam.	8 Hours
Module-III	

Canal irrigation: Types of canals, alignment of canals, definition of gross command area, culturable command area, intensity of irrigation, time factor, capacity factor, kharif season, rabi season, types of crops & their duty, delta, base periods determination of canal capacity, frequency of irrigation, field capacity. Crop factor. Consumptive use of water, Blinney-criddle equation problems irrigation efficiency, L-section of canal, balancing depth of canal	10 Hours
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Module –IV

Types of Dams & Spillways: Rigid dams & non-rigid dams Gravity dams, Forces acting on gravity dams, design of elementary profile of gravity dam, Types of Spillways, Necessity, location, ogee spillway. Design of ogee spillway, Energy dissipation below spillway. Use of hydraulic jump & design of stilling basin	8 Hours
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Module-V

Earthen dams: Types, Necessity, mode of failures of earth dams, Preliminary section, design of earth dam, determination of Phreatic line in earth dams, seepage discharge and problems, Control of seepage in earth dams. Design criteria of earth dams, Seepage Analysis & stability Analysis of earthen dams- Fellenious method & Swedish Slip circle method,	8 Hours
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Course Outcomes: On completion of this course, students are able to:

CO	Course Outcomes	Blooms Level
CO1:	Explain water management sectors and importance of water resource projects	C2
CO2:	Describe hydrological cycles and various components	C2
CO3:	Assess requirements of canal irrigation and gain knowledge about spillways and energy dissipating systems	C2
CO4	Design Spillways and Dams	C5
CO5	Design earthen dam	C5

Question paper pattern:

Scheme of SEE: i) Two questions are to be set from each module. i) Total five questions are to be answered by selecting minimum one question from each module.

Text book:

1. S. K. Garg, "Irrigation Engineering and Hydraulic Structures", Khanna Publishers, New Delhi.
2. Punmia and Pandey Lal, "Irrigation and Water Power Engineering" Lakshmi Publications, New Delhi.
3. K. R. Arora. "Irrigation, Water Power and Water Resources Engineering" Standard Publications, New Delhi.

Reference books:

1. Garg, S.K. "Hydrology & Water Resource Engineering" Khanna publications
2. Modi, P.N. "Irrigation, Water Resources and Water Power Engineering Standard Book
3. R.K. Sharma, "Hydrology & Water resources Engineering House, New Delhi.
4. Punmia and Pandey Lal, Irrigation and Water Power Engineering Lakshmi Publications, New Delhi.

Nptel Link: <https://youtu.be/fx1uUek3Iqg>

E-Books: www.civilenggebooks.com

BUILDING MATERIALS AND CONSTRUCTION TECHNOLOGY

Course Code	21CV44	CREDIT: 03
Number of Lecture Hours/Week	3 Hrs (Theory)	SEE: 50
Total Hours: 42	CIE: 50	SEE: 03 Hours

Prerequisite: None

Course objectives:

To enable the student to acquire the knowledge in the following topics

1. Properties and preservation for stone and timber.
2. Properties of bricks and bonds in brick work
3. Types of stone masonry, materials and methods of damp proofing courses.
4. Types of stairs and design of dog legged stair.
5. Roof, insulating materials and types of plastering.
6. Types of doors, windows, flooring and paints,
7. Plumbing and electrical materials and works.

Modules	Teaching Hours
<p style="text-align: center;">Module I</p> <p>Building Stones: Common building stones and their uses, quarrying of stones, qualities of good building stones, deterioration of stones, Preservation of stones, dressing of stones, tests on building stones.</p> <p>Timber: Important varieties and uses, defects in timber, tests for good timber, seasoning of timber, ply wood and its uses.</p>	8 hours
<p style="text-align: center;">Module-II</p> <p>Bricks & Brick Masonry: Classification and composition of bricks, qualities of good bricks, tests on bricks. Definition of terms used in masonry, bonds in brick work, English bond, Flemish bond, Reinforced brick work, Sand lime brick.</p> <p>Stone Masonry: Rubble Masonry, Coursed and Un-coursed rubble masonry, Ashlar masonry, Shoring, Under Pinning and Scaffolding.</p>	7 hours

<p style="text-align: center;">Module III</p> <p>Damp Proof Course: Materials used for damp proof course, D.P.C Treatment in building methods of treatment to foundations, treatment to floors, walls and slabs, Concrete paver blocks.</p> <p>Stairs: Types (classifications) and technical terms in stairs, requirements of a good stair, geometric design of R.C.C dog legged and open well stairs (Plan and Sectional elevation of stairs).</p>	<p>5hours</p> <p>3hours</p>
<p style="text-align: center;">Module IV</p> <p>Doors: Types, Paneled doors, glazed doors, flush doors.</p> <p>Windows: Types, Paneled Window, glazed Window, UPVC Windows, .</p> <p>Floors: Types of flooring (materials and methods of laying), Granolithic, mosaic, ceramic, marble and polished granite, Linoleum.</p> <p>Plastering & Painting: Purpose of plastering, materials of plastering, lime mortar, cement mortar, masonry mortar, methods of plastering, Stucco plastering, Lath plastering.</p> <p>Purpose of painting, types of paints, application of paints to new and old surfaces, distemper, plastic emulsion, enamel, polishing of wood surface.</p>	<p>5hours</p> <p>4hours</p>
<p style="text-align: center;">Module V</p> <p>Roofs & Miscellaneous Materials: Sloped roof (R.C.C and tile roof), Requirements of good roofs, Adhesives, Asbestos, Thermopolis, Fibers, Heat insulating materials, Sound insulating materials, Geosynthetics. Partition walls (Gypsum sheets etc), other advanced building materials.</p> <p>Plumbing: Pipework, Pipe fittings – couplings and connections, Range of fittings, Valves and cocks Services generally, Hot and cold-water services, Soil and ventilation stacks, Overflows, Water supply from the main, Equipment, Cold water storage cisterns, Hot water storage cylinders, Feed and expansion tanks, Central heating, Piping for central heating systems, Emitters, Appliances, Waste disposal piping and systems, Insulation, Corrosion, Air locking and water hammer, First fixings.</p> <p>Electrical: Power generation, wiring installation types, Sub-mains and consumer, control units, Sub-circuits, Work stages, Electrician's roughing, Earth bonding, Final fix, Testing and certification, more on protective devices, Wiring diagrams, Accessories</p>	<p>3 hours</p> <p>4 hours</p> <p>3 hours</p>
<p>Question paper pattern:</p> <p>Two questions to be set from each Module by intermixing (in total 10). Students have to answer any five full questions by selecting one question from each module.</p>	

Text books:

1. B.C. Punmia, "Surveying Vol.1", Laxmi Publications pvt. Ltd., New Delhi – 2009.
2. Kanetkar T P and S V Kulkarni, Surveying and Leveling Part I, Pune VidyarthiGrihaPrakashan,1988

Reference Books:

1. S.K. Duggal, "Surveying Vol.1", Tata McGraw Hill Publishing Co. Ltd. New Delhi.2009.
2. K.R. Arora, "Surveying Vol. 1" Standard Book House, New Delhi. –2010
3. R Subramanian, Surveying and Leveling, Second edition, Oxford University Press, New Delhi
4. A. Bannister, S. Raymond, R. Baker, "Surveying", Pearson, 7th ed., New Delhi
5. Eric Fleming. "Construction technology".

E books and online course materials:

www.civilenginebooks.com, https://youtu.be/EIDXE28_8eQ

Course outcomes:

On completion of the course, the student will have the ability to:

Course Code	CO #	Course Outcome (CO)	Blooms Level
21CV44	CO1	Explain and compare the properties of stone and timber materials suitable for building construction	C3
	CO2	Select suitable type of stone masonry and brick masonry compatible for a particular work.	C3
	CO3	Explain the importance of DPC, types of stair case and do the geometric design of dog legged staircase.	C3
	CO4	Compare and select suitable types of doors, windows, floors, plastering and painting.	C3
	CO5	Explain different types of roofs and decide the requirement of plastering and electricals.	C3

CONSTITUTION OF INDIA AND PROFESSIONAL ETHICS

Course Code	21HU45	CREDIT: 01
Number of Lecture Hours/Week	2Hrs (Theory)	SEE: 50
Total Hours: 28	CIE: 50	SEE: 03 Hours

Course Objectives :

To enable the students to obtain the basic knowledge about The Constitution of India and Professional Ethics in the following topics:-

- . Introduction and Fundamental Rights
- . Directive Principles of the State Policy and the State Executive
- . The Union Executive
- . Constitutional Provisions for women, Children & SC/ST 'S , Emergency Provisions and Election Process
- . Engineering Ethics

MODULE – I

Introduction and Fundamental Rights : The Constitution of India. Evolution of the Constitution. The Constituent Assembly of India. Sources and Features of the Indian Constitution. Preamble to the Constitution of India. Salient Features of Fundamental Rights and their classification. General exercise of Fundamental Rights and their limitations. RTI (Right to Information Act of 2005 Under Article 19(1)) and The Right of Children to Free and Compulsory Education Act or Right to Education Act (RTE) Under Article 21-A of the Constitution. Article 371(J) of the Constitution applicable to Hyderabad Karnataka Area.

6 hrs.

MODULE – II

Directive Principles of the State Policy and The State Executive: Under Article 36 to 51 of The Constitution and their Relevance. Fundamental Duties Under Article 51A of The Constitution and their Relevance. State Government - The Governor- Appointment, Powers and Functions of the Governor. The Appointment of Chief Minister, his Powers and Functions. The State Council of Ministers and their Functions. The State legislature and The State Council. The High Court of the State, its Powers and Jurisdiction. Appointment and Qualifications of High Court Judges.

6 hrs.

MODULE – III

The Union Executive: Central Government. The President of India, his Election, Powers and Functions. The Vice-President of India, his Election, Powers and Functions. The Supreme Court of India and its Structure. Appointment and Qualification of Supreme Court Judges. Their Powers and Functions. The Structure of Judiciary in India. The Parliament of India. The Prime Minister, his Appointment, Powers and Functions. The Union Council of Ministers their Powers and Responsibilities. Concept of Public Interest Litigation (PIL)

6 hrs.

MODULE – IV

Constitutional Provisions and Emergency Provisions and Election Process : Constitutional for Women, Children, Backward Classes and Scheduled Caste and Scheduled Tribes under different Article of The Constitution. Different types of Emergencies under Article 352, 356 and 360 of the Constitution of India. The Election Commission of India- its Powers and Functions. The State Election Commission

5 hrs.

MODULE – V

Engineering Ethics: Its Aims and Scope, Responsibilities of Engineers, Impediments to their Responsibilities, Honesty, Integrity, Reliability, Risk and Safety Measures, Liabilities of Engineers. **5 hrs.**

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

CO 1	Explain the evolution and features of constitution, fundamental rights and their classification L 2
CO 2	Describe the directive principles of state policy, fundamental duties and The State Executive L 2
CO 3	Describe about The Union Executive and concept of Public Interest Litigation L 2
CO 4	Explain the Constitutional Provisions for women, children, SC/ST'S, Emergency Provisions and Election Process L 2
CO 5	Identifies the qualities required for an professional engineers to be ethical L 4

TOTAL STATION SURVEYING LAB

Course Code	21CVAE46B	CREDIT:2
Number of Lecture Hours/Week	2hrs(Practical)	SEE:50Marks
Total Number of LectureHours:28	CIE:50Marks	SEE:03Hours

Prerequisite: Basic Surveying, AutoCAD

Course objectives:

To enable the student to acquire the knowledge in the following topics

Experiments	Teaching Hours
1. Setting up, levelling up, centering and creation of file in Total Station.	02Hours
2. Taking out basic measurements RDM, REM & SHV using Total Station	02Hours
3. Determination of Area measurement using Total Station	02Hours
4. Establishment of new station using free stationing technique	02Hours
5. Traversing using total station to prepare topographic map of Area.	04Hours
6. Contour surveying using Total station.	04Hours
7. Plotting of topographic details within contours.	04Hours
8. Downloading total station data and map completion.	04Hours
9. Strake-out using Total Station	04Hours

Question paper pattern:

Conduct any one experiment by picking up student and he has to prepare writeup and conduct experiment.

Reference Books:

1. S.K. Duggal, "Surveying Vol.1", Tata McGraw Hill Publishing Co. Ltd. New Delhi.2009.
2. A. Bannister, S. Raymond, R. Baker, "Surveying", Pearson, 7th ed., New Delhi

Course outcomes:

On completion of the course, the student will have the ability to:

Course Code	CO#	Course Outcome(CO)	Blooms Level
21CVAE46B	CO1	Understand the concepts of Surveying theory course through series of experiments.	C2
	CO2	Share the responsibilities in small teams of 4-5 members for	C3

		conducting the experiments.	
	C03	Perform the various experiments on total station survey	C3
	C04	Analyze the data and interpret the results.	C3
	C05	Prepare a well-organized laboratory report.	C3

UNIVERSAL HUMAN VALUES-II

Course Code	21UHV46C	Credits:1	CIE: 50
Number of Lecture Hours/Week	2hrs (Tutorial)		SEE: 50
Total Number of Theory Hours	14 hours		SEE Hours: 03

Course Objectives:

1. To facilitate the students to understand harmony at all the levels of human living, and live accordingly.
2. To facilitate the students in applying the understanding of harmony in existence in their profession and lead an ethical life.

Modules	Teaching Hours
Module I Implications Of The Right Understanding: Providing The Basis For Universal Human Values And Ethical Human Conduct- Value In Different Dimensions Of Humanliving, Universal Values Naturally Emerging From The Right Understanding, Defintiveness Of Ethical Human Conduct, Identification Of <i>Svatva</i> Leading To <i>Svatantrata And Svarajya</i> , Development Of Human Consciousness, Implications Of Value-Based Living.	3hrs
Module II Basis For The Holistic Alternative Towards Universal Human Order: Identification Of Comprehensive Human Goal, Vision For The Holistic Alternative, Basis For Humanistic Education And Humanistic Constitution, Universal Human Order And Its Implications.	3hrs
Module III Professional Ethics In The Light Of Right Understanding: Profession-In The Light Of Comprehensive Human God, Ensuring Competence In Professional Ethics, Issues In Professional Ethics-The Current Scenario, Inherent Contradictions And Dilemmas And Their Resolutions.	3hrs
Module IV Vision For Holistic Technologies, Production Systems And Management Models: The Holistic Criteria For Evaluation, A Critical Appraisal Of The Prevailing Systems, Learning From The Systems In Nature And Traditional Practices, Holistic Technologies And Systems- Typical Case Studies.	3hrs
Module V Journey Towards the Holistic Alternative- The Road Ahead: Appreciating The Need For Self-Exploration, Facilitating The Understanding Of Harmony At Various Levels, Steps For Evaluation At The Individual Level, Steps For Transition At The Level Of Family, Society And	2hrs

Profession, Promoting Mass Awareness And Moving Towards Humanistic Education, Evolving Holistic Models Of Living, Amending Policies, Programs And Social Systems In Tune With Comprehensive Human Goal, Is The Transition Too Difficult?, Concluding Remarks.

Text Books:

1. The Text Book R.R Gaur, R Sangal, G P Bagaria, A Foundation Course In Human Values And Professional Ethics, Excel Books, New Delhi, 2010, ISBN 978-8-174-46781-2.
2. The teacher's manual R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and professional Ethics – Teachers Manual, Excel books, New Delhi, 2010

Reference Books:

1. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.
2. PL Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Purblishers.
3. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
4. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
5. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, limits to Growth, Club of Rome's Report, Universe Books.
6. Subhas Palekar, 2000, How to practce Natural Farming, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
7. A Nagraj, 1998, Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.
8. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
9. A.N. Tripathy, 2003, Human Values, New Age International Publishers.

Course outcomes: On completion of the course, the student will have the ability to:

Course Code	CO	Course Outcome (CO)
21UHV46	CO1	The students are able to visualize the co-relation between lack of human values and the prevailing problems.
	CO2	They are also able to visualize tangible steps and a roadmap for moving in the cherished direction.
	CO3	The students are able to visualize an appropriate utilization of the knowledge in their respective streams to ensure mutually enriching and sustainable systems.

	CO4	The students are able to sincerely evaluate the course and the transformation achieved in this process.
	CO5	They are also able to make use of this understanding for moving towards happy and prosperous life including an ethical conduct of their profession.

Course Title: ENGINEERING GEOLOGY LABORATORY		
Course Code	21CVL41	CREDIT: 01 CIE: 50
Number of Lecture Hours/Week	2 hrs. (Practical)	SEE: 50
Total Number of Lecture Hours	14/28 Hours	SEE: 03 Hours
Prerequisite: none		
Course objectives: This laboratory course will enable students to 1: Understand the various physical properties of minerals, and they can identify different types of Minerals 2: Understand the various physical properties of the rocks, and they can classify different types of rocks. 3: Understand the various structural features of the earth.		
		Teaching Hours
1. Physical properties of minerals: Identification of		2 Hrs
I. ROCK FORMING MINERALS - Quartz group, Feldspar group, Garnet group, Mica group & Talc, Chlorite, Olivine, Asbestos, Calcite, Gypsum, etc		2 Hrs
II. ORE FORMING MINERALS- Magnetite, Hematite, Pyrite, Pyralusite, Graphite, Chromite, etc		2 Hrs
2. Engineering Properties of Rocks: Identification of		2 Hrs
I. IGNEOUS ROCKS- Types of Granites, Dolerite, Granite Porphyry, Basalt, Pumice etc		2 Hrs
II. SEDIMENTARY ROCKS- Sandstone, Lime stone, Shale, Laterite, Breccia etc		1 Hrs
III. METAMORPHIC ROCKS- Gneiss, Slate, Schist, Marble, Quartzite etc		1 Hrs
3.. Dip and Strike problems. Determination of Apparent dip and True dip.		
5. Calculation of Vertical, True thickness and width of the outcrops.		2 Hrs
6. Three-point borehole problems.		
7. Interpretation and drawing of sections for geological maps showing tilted beds, faults, unconformities etc.		1 Hrs
8. Interpretation and drawing the GEOLOGICAL SECTION MAPS.		
9. Field work– To identify Minerals, Rocks, Geomorphology and Structural features with related to the Civil Engineering projects.		

Text books:

Papers from the international journals(scopus index and web of science).

E books and online course materials:

www.civilenggebooks.com

Course outcomes:

On completion of the course, the student will have the ability to:

Course Code	CO #	Course Outcome (CO)
21CVL41	CO1	The students able to identify the minerals, rocks and utilize them effectively in civil engineering practices.
	CO2	The students will interpret and understand the geological conditions of the area for implementation of civil engineering projects.
	CO3	The students will interpret subsurface information such as thickness of soil, weathered
	CO4	The students will learn the techniques in the interpretation of GEOLOGICAL MAPS to find out the lineaments and other structural features for the given area.
	CO5	The students will be able to identify the different structures in the field.

Course Title: STRENGTH OF MATERIALS LAB

Course Code	21CVL42	CREDIT:01 CIE: 50
Number of Lecture Hours/Week	2 hrs(Practical)	SEE: 50
Total Number of Lecture Hours	28 Hours	SEE: 03 Hours

Prerequisite: Strength of Materials

Course objectives:

To enable the student to acquire the knowledge in the following topics

- Determine tensile, compressive, torsional, shear and Impact strength of steel samples and interpret the results.
- Determine compressive strength and bending strength of wood samples and interpret the results
- Determine strength properties of brick and tile and interpret the results.

	Teaching Hours
1. Tension test on Mild Steel.	2 Hrs
2. Tension test on HYSD bar	2 Hrs
3. Torsion test on Mild Steel circular sections.	2 Hrs
4. Bending test on Wood under two-point loading.	2 Hrs
5. Compression test of Mild Steel, Cast iron and Wood.	2 Hrs
6. Impact test on Mild steel (Charpy & Izod)	2 Hrs
7. Hardness test on metals-Brinell's Test	2 Hrs
8. Test on Bricks: Compressive strength, Water absorption and Efflorescence.	2 Hrs
9. Demonstration of Strain gauges and Strain indicators.	2 Hrs
10. Demonstration of loading frame	2 Hrs

Question paper pattern:

Student have to conduct two tests one on major experiments (1 to 4 in syllabus)

and one test on remaining experiments (5 to 11 experiments). Picked by the student and he has to prepare write up and conduct experiment.

Text books:

Papers from the international journals (Scopus index and web of science).

Reference Books:

1. Davis, Troxell and Hawk, Testing of Engineering Materials, International Student edition-Mcgraw Hill Book Co. New Delhi.
2. Fenner, George Newness, Mechanical Testing of Materials Ltd., London.

3. Holes K.A, Experimental Strength of Materials, English Universities Press Ltd. London.

E books and online course materials:

www.civilenggebooks.com

Course outcomes:

On completion of the course, the student will have the ability to:

Course Code	CO #	Course Outcome (CO)
21CVL42	CO1	Demonstrate the concepts of SOM theory course through series of experiments.
	CO2	Share the responsibilities in small teams of 4-5 members for conducting the experiments.
	CO3	Perform the experiments and determination of Tension test, Compression test, Torsion test, Bending test, Shear Test, Impact test on Mild steel (Charpy & Izod), Hardness test, Test on Bricks: Compressive strength, Water absorption and Efflorescence, Demonstration of Strain gauges and Strain indicators parameters.
	CO4	Analyze the data and interpret the results.
	CO5	Prepare a well-organized laboratory report.

CONCRETE LAB

Subject code	21CVL43	Credit: 01
Hours/Week	2 hours. (Practical)	SEE: 50 Marks
Total hours: 28	CIE: 50 Marks	SEE: 3 hours

Prerequisite: Concrete Technology**Course objectives:**

To enable students to acquire the knowledge in the following topics:

Modules	Teaching Hours
I Testing of cement	
Cement:	
Normal Consistency,	1 Hours
Setting time (Initial and Final)	2 Hours
Soundness by autoclave method,	1 Hours
Compression strength test	2 Hours
Fineness of cement.	1 Hours
Specific gravity of cement	1 Hours
II Testing of aggregate	
Water absorption and moisture content of aggregate.	2 Hours
Specific gravity and bulk density of coarse and fine aggregates	2 Hours
Fineness modulus of fine and coarse aggregate (sieve analysis).	1 Hours
Flakiness index and elongation index of coarse aggregate.	2 Hours
Impact value and crushing value of aggregate.	1 Hours
Tests on Concrete	
Workability tests- Slump cone test.	2 Hours
Compression factor test.	2 Hours
Vee Bee consistometer test.	2 Hours
strength tests Concrete:	

Compression Strength	2 Hours
Split tensile tests	2 Hours
Permeability of concrete	2 Hours

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

CO	Course Outcomes	BL
CO1:	Demonstrate the concepts of CT theory course through series of experiments.	C2
CO2:	Share the responsibilities in small teams of 4-5 members for conducting the experiments	C3
CO3:	Perform the experiments and determination of specific gravity, Setting time of cement, soundness and Tests on Hardened concrete.	C4
CO4	Analyze the data and interpret the results.	C3
CO5	Prepare a well-organized laboratory report.	C3

Question paper pattern:

Any one of the above experiments is to be conducted in the examination by the student.

Reference books:

1. M. L. Gambir, "Concrete Manual", Danpat Rai and sons, New Delhi
2. Shetty M.S, "Concrete Technology", S. Chand & Co. Ltd, New Delhi.
3. Mehta P.K, "Properties of Concrete", Tata McGraw Hill Publications, New Delhi
4. Relevant codes.

Nptel Link: <https://youtu.be/cx5gPKp9QEc>



Hyderabad Karnataka Education Society's
Poojya Doddappa Appa College of Engineering
(An Autonomous Institution & Affiliated to
Visvesvaraya Technological University, Belagavi)
Aiwan E-Shahi Area KALABURAGI 585 102 Karnataka India

CURRICULUM

FOR B.E.V SEMESTER AND VI SEMESTER

FOR THE ACADEMIC YEAR 2023-24

DEPARTMENT OF CIVIL ENGINEERING

About College:

Poojya Doddappa Appa College of Engineering (PDACE) is the first institution of Hyderabad Karnataka Education (HKE) Society, Kalaburagi, which was established in the year 1958. The foundation stone of this college was laid by the then Vice President of India Dr.Sarvapalli Radhakrishnan in 1958.

At present, PDA College of Engineering is offering 11 UG programs, 10 PG Programs and 12 Research centers, spreading and imparting technical education in North Karnataka Region. The college has state of the art laboratories, digitalized smart class rooms having highly qualified and experienced faculty with highest no. of Ph.D. and M. Tech degrees.

PDACE is the only Autonomous Institution in the region, which was sponsored under TEQIP I , TEQIP-II and TEQIP-III from World Bank and received grants of Rs.10.43 crores, Rs. 17.5 crores and 7 crores respectively. This is one among 12 institutions having TEQIP-I and TEQIP -II sponsorship. At present, college is selected in TEQIP-III as Mentor Institution for Bundelkhand Institute of Engineering & Technology, Jhansi.

The Vision and Mission of PDA College of Engineering are as mentioned below.

VISION

- To be an institute of excellence in technical education and research to serve the needs of the industry and society at local and global levels.

MISSION

- To provide a high-quality educational experience for students with values and ethics that enables them to become leaders in their chosen professions.
- To explore, create and develop innovations in engineering and science through research and development activities.
- To provide beneficial service to the national and multinational industries and communities through educational, technical and professional activities.

About Department of Civil Engineering

The Civil Engineering Department was established in the year 1958 with an intake of 60 students. In 1994 the intake was increased to 90 and further increased to 180 in the year 2014. Presently the department runs both UG and PG (Environmental Engineering and Structural Engineering) programs with intake of 180 in UG program and 18 in each PG program. Department is recognized as Research Centre by Visvesvaraya Technological University Belagavi in the year 2002 and at present 35 research scholars are pursuing their Ph.D. and seven research scholars have been awarded with Ph D degree.

The Department has signed MoU with various industries like Medini, Sharan Technical consultancy, Canter Technologies Pvt. Ltd, Sharan Chandra Consultant, JGD Consultants, Jalavahini Management Services Pvt. Ltd. Dharwad, Shah Technical Consultants Pvt. Ltd., PP Raju & Co., Design Consortium, KRIDL, Bharath Dal and Oil Industries, Ultratech, ACC, Alstom, Karnataka State Pollution Control Board & HCC. These MoUs have helped the students in getting exposure to industrial environment and also for conducting Industry Institute Interaction events.

The Vision, Mission and Program educational objectives of Civil Engineering Department are as follows:

VISION

- To be the preeminent department for imparting technical knowledge and skills in the Civil Engineering field to meet the social, industrial, environmental and research needs at local and global levels.

MISSION

- To provide technical education to meet the challenges in the profession through a well-structured curriculum.
- To inculcate innovation and research ideas for sustainable development with ethical background.
- To impart entrepreneurial skills for serving the needs of the society through technical and professional activities.
- To create Civil Engineering professionals to serve the needs of the industry at local and global levels.

PROGRAM EDUCATIONAL OBJECTIVES(PEO'S)

Program educational objectives are broad statements that describe the Career and Professional accomplishments that the program is preparing graduates to achieve. The program educational objectives of the B.E. in Civil Engineering Program at PDA College of Engineering, Kalaburagi are:

PEO1: To provide the knowledge of mathematics, science and engineering fundamentals for solving civil engineering problems.

PEO2: To enable the graduates to exhibit their technical knowledge and skills of recent practices to identify and solve civil engineering problems.

PEO3: To enable the graduates to conduct and interpret the results of laboratory/ field experiments in basic sciences, engineering sciences and civil engineering.

PEO4: To enable the graduate for pursuing higher education and lifelong learning.

PEO5: To enable the graduates to acquire communication, team work and entrepreneurial skills along with the values of professional ethics.

PROGRAM 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, review research literature, and analyse 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 modelling 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, and 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.

PROGRAM SPECIFIC OUTCOMES

The Civil Engineering graduates are able to:

PSO1: Plan, Analyze and Design buildings, Water supply and Sewerage systems, Hydraulic structures and Transportation infrastructure using sustainable materials and conceptual knowledge of Geotechnical engineering.

PSO2: Conduct survey and Laboratory experiments/ field investigations and interpret the data for application to real life problems.

PSO3: Prepare detailed estimate of civil Engineering works and Execute the civil Engineering Projects with optimum resources using effective communication skills and Professional ethics

POOJYA DODDAPPA APPA COLLEGE OF ENGINEERING, KALABURAGI											
DEPARTMENT OF CIVIL ENGINEERING											
Choice Based Credit System (CBCS)											
Scheme of Teaching and Examination 2021 – 22											
(Effective from the academic year 2021 – 22)											
V semester											
Sl. No	Category	Subject Code	Subject Title	Credits	L	T	P	SS	CIE	SEE	Total
1	HSMC/PC	21HU51	ENTREPRENEURSHIP MANAGEMENT AND FINANCE	3	2	2	0		50	50	100
2	IPCC	21CV52	ENVIRONMENTAL ENGG	4	3	0	2		50	50	100
3	PC	21CV53	DESIGN OF RCC STRUCTURES	3	2	2	0		50	50	100
4	PC	21CV54	GEOTECHNICAL ENGG	3	2	2	0		50	50	100
5	PCL	21CVL55	GEOTECHNICAL ENGG LAB	1	0	0	2		50	50	100
6	AEC	21RMI56	RESEARCH METHODOLOGY AND IPR	2	1	2	0		50	50	100
7	HSMS	21CIV57	MECHANIZATION IN CONSTRUCTION	1	0	2	0		50	50	100
8	AEC	21CVAE58X	ABILITY ENHANCEMENT COURSE	1	0	2	0		50	50	100
TOTAL				18					400	400	800

Ability Enhancement Course					
Sl. No	Course Code	Course Title	Sl. No	Course Code	Course Title
1.	21CVAE581	Remote Sensing and GIS	3.	21CVAE583	Quality Control and Quality Assurance
2.	21CVAE582	Software Applications	4.	21CVAE584	Offshore Structures

COURSE TITLE: ENTREPRENEURSHIP, MANAGEMENT AND FINANCE		
Course code	21HU51	Credit: 03
Hours/Week	03 hours. (Theory)	SEE: 50 Marks
Total hours: 42 hours	CIE: 50 Marks	SEE: 03 hours
Prerequisite:		
Course objectives: To enable the students to obtain the basic knowledge about Entrepreneurship and Management and finance in the following topics:- <ul style="list-style-type: none"> • The Meaning, Functions, Characteristics, Types, Role and Barriers of Entrepreneurship, Government Support for Entrepreneurship • Management – Meaning, nature, characteristics, scope, functions, role etc and Engineers' social responsibility and ethics • Preparation of Project and Source of Finance • Fundamentals of Financial Accounting • Personnel and Material Management, Inventory Control 		
Modules		Teaching Hours
Module I ENTREPRENEUR : Meaning of Entrepreneur; Functions of an Entrepreneur; Characteristics of an entrepreneur , Types of Entrepreneur; Intrapreneurs – an emerging class ; Role of Entrepreneurs in economic development; Barriers to entrepreneurship, Government Support for Innovation and Entrepreneurship in India - Startup-India, Make-in-India, PMMY, AIM , STEP, BIRAC, Stand-up India, TREAD		08 hours
Module II MANAGEMENT: Introduction – Meaning – nature and characteristics of Management, Scope and functional areas of management, Levels of Management, Henry Fayol - 14 Principles to Management , McKinsey's 7-S Model, Management by objective(MBO) – Meaning, process of MBO, benefits and drawbacks of MBO		08 hours
Module-III PREPARATION OF PROJECT AND SOURCE OF FINANCE: PREPARATION OF PROJECT: Meaning of project; Project Identification; Project Selection; Project Report; Need and Significance of Report; Contents; SOURCE OF FINANCE: Long Term Sources(Equity, Preference, Debt Capital, Debentures, loan from Financial Institutions etc) and Short Term Source(Loan from commercial banks, Trade Credit, Customer Advances etc)		08 hours
Module -IV FUNDAMENTALS OF FINANCIAL ACCOUNTING: Definition, Scope and Functions of Accounting , Accounting Concepts and Conventions: Golden rules of Accounting, Final Accounts - Trading and Profit and Loss Account, Balance sheet		09 hours

Module – V		09 hours
PERSONNEL MANAGEMENT, MATERIAL MANAGEMENT AND INVENTORY CONTROL:		
PERSONNEL MANAGEMENT: Functions of Personnel Management, Recruitment, Selection and Training, Wages, Salary and Incentives		
MATERIAL MANAGEMENT AND INVENTORY CONTROL: Meaning, Scope and Objects of Material Management. Inventory Control- Meaning and Functions of Inventory control ; Economic Order Quantity(EOQ) and various stock level (Re-order level, Minimum level, Maximum level, Average level and Danger level)		
Course Outcomes: On completion of this course, students are able to:		
CO		
CO1:	Develop Entrepreneurship skills	
CO2:	Apply the concepts of management and Management By Objective(MBO)	
CO3:	Prepare project report & choose different Source of Finance.	
CO4	Apply Fundamentals of Financial Accounting and interpret the final accounts	
CO5	Apply personnel management skills, Material and inventory control techniques	
Question paper pattern:		
i) Two questions are to be set from each module.		
ii) Total five questions are to be answered by selecting minimum one question from each module		
Text Books :		
1. Financial Accounting -B S RAMAN- United Publishers Manglore, Maheswar S N & Maheswari S K-Vikas Publishing House. January 2018		
2. Management & Entrepreneurship- K R Phaneesh- Sudha Publications January 2018 ,Prof Manjunatha & Amit kumar G – laxmi Publication , January 2011. Veerbhadrappa Havina - Published by New Age International (P) Ltd., 2009.		
3. Principles of Management First Edition (English, G. Murugesan), Laxmi Publications – New Delhi		
4. Management by Objectives (Mbo) in Enterprises: 21 December 2018 by Dr Wazir Ali Khan		
Reference books:		
Management Studies IIT Madras https://nptel.ac.in/courses/110/106/110106141/		
https://www.businessmanagementideas.com/notes/management-notes/notes-on-management-in-an-organisation/4669		
https://vskub.ac.in/wp-content/uploads/2020/04/Unit-5-ppmb.pdf		

ENVIRONMENTAL ENGINEERING		
Subject code	21CV52	Credit: 04
Hours/Week	3 hours. (Theory)	SEE: 3 hours
Total hours: 42	CIE: 50 Marks	SEE: 50 Marks
Prerequisite: Water Resources engineering		
Course objectives: To enable the student to acquire the knowledge in the following topics. <ol style="list-style-type: none"> 1. Fundamentals of water and wastewater engineering. 2. Various components of water supply and wastewater collection systems. 3. Quantitative and qualitative assessment of water and wastewater. 4. Design water and wastewater system using hydraulic principles. 5. Operation of water wastewater treatment systems. 		
Modules		Teaching Hours
MODULE-I INTRODUCTION: Waste water disposal - Necessity for sanitation. methods of sewage disposal. Introduction: Need for protected water supply. Demand of water: Types of water demands- domestic demand in detail, institutional and commercial, public uses, fire demand. Per capita consumption –factors affecting per capita demand, population forecasting, different methods with merits and demerits- variations in demand of water. Fire demand – estimation by Kuching's formula, Freeman formula and national board office underwriters' formula, peak factors, design periods and factors governing the design periods. Quality of water: Objectives of water quality management. Concept of safe water wholesomeness, palatability and potable. water borne diseases. Sources: Surface and subsurface sources – suitability with regard to quality and quantity.		08 Hours
MODULE-II Materials of Sewers: Sewer materials, Shapes or sewers, laying of sewers, jointing and testing of sewers, ventilation and cleaning of sewers. . Examination of water and wastewater: objectives – Physical chemical and Microbiological Examinations, (IS: 3025 and IS: 1622) using analytical and instrumental techniques. Drinking water standards BIS and WHO standards. Health significance of Fluoride, Nitrates and heavy metals like Mercury and Cadmium. Sampling of water for examination. Analysis of wastewater: Physical. chemical and biological characteristics concepts of aerobic and anaerobic activity, CNS cycles, more emphasis on BOD and COD. Sampling, significance, techniques and frequency. Quantity of Sewage: Dry weather flow, factors affecting dry weather flow, flow variations and their effects on design of sewerage system; computation of design		08 Hours

<p>flow, estimation of storm flow, rational method and empirical formulae of design of storm water drain; Time of concentration.</p> <p>Sewer Appurtenances: Catch basins, manholes, flushing tanks, oil and grease traps, drainage traps, basic principles of house drainage, typical layout plan showing house drainage connections, maintenance of house drainage</p>	
<p style="text-align: center;">MODULE-III</p> <p>Collection and conveyance of water: Intake structures – different types of intakes; factor of selection and location of intakes. Pumps- Necessity, types – power of pumps; factors for the selection of a pump. Pipes – Design of the economical diameter for the rising main; Nomograms – use; Pipe appurtenances.</p> <p>types of sewerage systems and their suitability.</p> <p>Design of Sewers: Hydraulic formulae for velocity, effects of flow variations on velocity, self-cleansing and non-scouring velocities. Design of hydraulic elements for circular sewers flowing full and for partially full.</p> <p>Disposal of effluents: By dilution, self-purification phenomenon, oxygen sag curve, zones of purification, sewage farming, sewage sickness, disposal standards on land and water, chlorination of sewage.</p> <p>Treatment of sewage: Flow diagram of municipal sewage treatment Plant.</p>	08 Hours
<p style="text-align: center;">MODULE-IV</p> <p>Water treatment: Objectives – Treatment of flow-chart. Aeration- Principles, types of aerators.</p> <p>Sedimentation: Theory of settling tanks, types, design. Aided sedimentation –with coagulants, dosages, chemical feeding, flash mixing, and flocculator-design of all units.</p> <p>Primary Treatment: screening, grit chambers, skimming tanks, primary sedimentation tanks – Designs.</p>	08 Hours
<p style="text-align: center;">MODULE-V</p> <p>Filtration: Mechanism – theory of filtration, types of filters, slow sand, rapid sand and pressure filters including construction, operation, cleaning and their design – excluding under drainage system – back washing filters.</p> <p>Softening: Definition, methods of removal of hardness lime soda process and zeolite process.</p> <p>Disinfections: Theory of disinfections, methods of disinfections, Chlorination, chlorine demand, residual chlorine, use of bleaching powder.</p> <p>Secondary Treatment: Trickling filter – types, theory and operation – Designs. Activated sludge process – principle and flow diagram, methods of aeration, modifications, F/M ratio – Design</p>	08 Hours
<p>Course Outcomes: On completion of this course, students are able to:</p>	
<p>Question paper pattern:</p> <p>i) Two questions are to be set from each module.</p> <p>ii) Total five questions are to be answered by selecting minimum one question from each module</p>	
<p>Text books:</p> <ol style="list-style-type: none"> 1. Environmental Engineering (Vol I & II) – By S.K. Garg, Khanna Publishers 2. Environmental Engineering – (Vol I & II) By B.C. Punmia and Ashok Jain 3. Water and Wastewater Engineering Vol – II By Fair, Geyer, Okun, Willey Eastern 	

Publishers, New York

4. Waste Water Treatment, Disposal and Reuse - By Metcalf & Eddy Inc... Tata McGraw Hill Publications (2003 Edition)

5. Water Technology By Hammer & Hammer

Environmental Engineering By Howard.S. Peavy, Donald. Rowe, George Tchobanoglouse, McGraw Hill International Edition

Reference Books:

1. Manual on Waste Water Treatment – CPHEEO, Ministry of Urban Development, New Delhi

E-Books: www.civilenggebooks.com

ENVIRONMENTAL ENGG LAB

Prerequisite: None

Course objectives:

1. To enable the student to acquire the knowledge in the following topics
2. Determination of Solids in Water / Sewage, turbidity, electrical conductivity, optimum alum dosage, Sieve Analysis of Filter Sand.
3. Determination of Chlorides. Alkalinity, Acidity, Total Hardness, COD, BOD, percentage of chlorine,
4. Determination of pH. Sulphate, Fluoride. Iron. Nitrate.
5. Determination of Total Count Test, Most Probable Number (MPN).

Modules	Teaching Hours
I Analysis of Physical Parameters:	
1. Determination of Solids in Water / Sewage – Total Solids, Suspended Solids, Dissolved Solids, Volatile Solids, Fixed Solids, Settleable Solids.	2 Hours
2. Determination of Turbidity present in water.	2 Hours
3. Determination of Electrical Conductivity of water.	2 Hours
4. Determination of Optimum Alum Dosage.	2 Hours
5. Sieve Analysis of Filter Sand.	2 Hours
II Analysis of Chemical Parameters:	
1. Determination of Chlorides.	2 Hours
2. Determination of Alkalinity, Acidity.	2 Hours
3. Determination of Total Hardness, Calcium Hardness, Magnesium Hardness	2 Hours
4. Determination of Dissolved Oxygen, Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD).	2 Hours
5. Determination of Percentage of Chlorine in Bleaching Powder, Residual Chlorine, Chlorine Demand	2 Hours
III Analysis of Chemical Parameters by Instrumental Methods:	
1. Determination of pH.	2 Hours
2. Determination of Sulphate.	2 Hours
3. Determination of Fluoride	2 Hours
4. Determination of Iron.	

IV. Analysis of Biological Parameters:	
1.Determination of Total Count Test, Most Probable Number (MPN).	2 Hours
Question paper pattern: Any one of the above experiments is to be conducted in the examination by the student.	
Reference books: 1.Standard Methods for Examination of Water & Wastewater American Publication-Association of Water Pollution Control Federation, American Water Works Association, Washington DC (New Edition). 2.Manual of Water Wastewater Analysis – NEERI Publication. 3. IS Standards: 2490-1974, 3360-1974, 3307-1974. 4.Chemistry for Environmental Engineering By Sawyer & Macarty.	
Nptel Link: https://youtu.be/LeKqhMqEoKQ	
E-Books: www.civilenggebooks.com	

DESIGN OF R.C.C STRUCTURES		
Subject code	21CV53	Credit: 03
Hours/Week	2 hours. (Theory) + 2 hours Tutorial	SEE: 50 Marks
Total hours: 42	CIE: 50 Marks	SEE: 3 hours
Prerequisite: Concrete Technology, Strength of Materials.		
Course objectives: To enable the students to acquire the knowledge in the following topics: 1. Basic concepts of RCC, Working Stress method, Limit state method. 2.Design of beams, slabs, staircases, columns and isolated column footing using LSM 3.Serviceability requirements.		
Modules		Teaching Hours
Module I Introduction: Basic concepts of reinforced concrete, Methods and design philosophies in RCC design, Load and Load combinations, Stress- Strain behavior of concrete and steel, working stress method (Elastic theory): Assumptions, concept of Transformed Area concept, Philosophy of limit state design, Characteristic loads and design loads, Characteristic. Strength and design strength, Limit State of Collapse- Flexure, Ultimate flexural strength of rectangular sections and flanged sections, Numerical examples for analysis of rectangular, flangedsection in Flexure.		9 Hours
Module-II Limit State of Collapse Shear: Ultimate Shear strength of R.C. Sections, Limit State of Collapse - Torsion, Concepts of development length and anchorage in R.C. Sections, Numerical examples. Limit state of serviceability for deflection, Computation of short term and long-term deflection for Singly Reinforced Rectangular section as per I.S.456-2000. Limit state of serviceability for cracking, Control of cracking and computation of crack width as per IS 456-2000 for Singly Reinforced sections. Numerical examples on computation of deflection and crack width.		8 Hours
Module-III Design of beams: Codal requirements in the design of beams, cover to reinforcement, spacing of Reinforcement, curtailment and splicing of reinforcement, Design of reinforced rectangular beams (singly & doubly) with detailing. (Cantilever & simply supported). Design of flanged beams with detailing.		8 Hours
Module -IV Design of slabs: Introduction, General aspects in the design of slabs, Design & detailing of rectangular slabs spanning in one direction (Simply supported and Continuous) as per IS: 456-2000, Design & detailing of rectangular slabs spanning in two directions (Simply supported and Continuous) as per IS: 456-2000, Design & detailing of Cantilever slabs. Design of staircase: Introduction, Structural behavior of staircases, Loads and distribution of load on staircases as per IS: 456-2000, Design & detailing of staircases (Dog legged, Open well type), Design concepts of Free-Standing Stair		8 Hours

cases.		
Module-V		
<p>Design of columns: Introduction, Limit state of compression, Minimum eccentricity, slenderness limits, Code provisions for reinforcement & detailing, Design & detailing of short axially loaded columns (Square & Rectangular and circular), Design & detailing of short columns under axial load with uniaxial bending and axial load with biaxial bending using SP-16 (Square & Rectangular sections).</p> <p>Design of footing: Introduction, types of footing, Structural behavior of footing, selection of types of footing, footing shapes & size, Reinforcement requirement as per IS: 456: 2000, Design & detailing of Isolated footing of uniform depth & variable depth (Square & Rectangular footing).</p>		9 Hours
Course Outcomes: On completion of this course, students are able to:		
CO		BL
CO1:	Analyze rectangular and flanged beams using working stress method	C3
CO2:	Analyze the beams using limit state approach for flexure, shear, torsion and also analyze the flexural members for limit state of serviceability	C3
CO3:	Design rectangular and flanged beams by limit state approach	C4
CO4	Design one way and two-way slabs and stair case using limit state approach	C4
CO5	Design columns and isolated column footing using limit state approach	C4
<p>Question paper pattern:</p> <p>i) Two questions are to be set from each module.</p> <p>ii) Total five questions are to be answered by selecting minimum one question from each module</p>		
<p>Text book:</p> <ol style="list-style-type: none"> Unnikrishnan Pillai and Devdas Menon, “Reinforced Concrete Design”, McGraw Hill, New Delhi Subramanian, “Design of Concrete Structures”, Oxford university Press H J Shah, “Reinforced Concrete Vol. 1 (Elementary Reinforced Concrete)”, Charotar Publishing House Pvt. Ltd. 		
<p>Reference books:</p> <ol style="list-style-type: none"> P C Varghese, “Limit State design of reinforced concrete”, PHI, New Delhi. W H Mosley, R Husle, J H Bungey, “Reinforced Concrete Design”, MacMillan Education, Palgrave publishers. Kong and Evans, “Reinforced and Pre-Stressed Concrete”, Springer Publications. A W Beeby and Narayan R S, “Introduction to Design for Civil Engineers”, CRC Press. Robert Park and Thomas Paulay, “Reinforced Concrete Structures”, John Wiley & Sons, Inc. 		
Nptel Link: https://youtu.be/pIdaC_I6H_M		
E-Books: www.civilenggebooks.com		

GEOTECHNICAL ENGINEERING		
Subject code	21CV54	Credit: 03
Hours/Week	3 hours. (Theory)	SEE: 50 Marks
Total hours: 42	CIE: 50 Marks	SEE: 3 hours
Prerequisite: Engineering geology		
Course objectives: To enable the student to acquire the knowledge in the following topics. <ol style="list-style-type: none"> 1. Understand basic properties of soil and classify the soil 2. Determine compaction, permeability of soil and consolidation of soil. 3. Understand the Shear strength of soil and Stability of slopes. 4. Develop an understanding of stresses and lateral earth pressure of soil. 5. Understanding of the essential steps involved in a geotechnical site investigation and familiarize the students with the procedures used for estimation of Bearing capacity and settlements under the foundation. 		
Modules		Teaching Hours
Module I Introduction: Definition, origin and formation of soil, Phase Diagram, Voids ratio, Porosity, Percentage Air Voids, Air content, Degree of saturation, Moisture content, Specific gravity, Bulk density, Dry density, Saturated density, Submerged density and their inter relationships and Density index. Index properties of soils and their determination: Index properties of soils- Water content, Specific Gravity, Particle size distribution, Consistency limits and indices, insitu density. particle size distribution (Sieve analysis and Hydrometer analysis only). Classification of soils: Particle size Classification by IS Method.		08 hours
Module-II Flow of water through soils: Darcy's law- assumptions and validity, coefficient of permeability and its determination (laboratory), factors affecting permeability, permeability of stratified soils, Seepage velocity, Superficial velocity and coefficient of percolation, effective stress concept-total pressure and effective stress, quick sand phenomena, Capillary Phenomena. Compaction of soils definition: Standard and Modified proctor's compaction tests, factors affecting compaction, effect of compaction on soil properties, Field compaction control-proctor needle.		08 hours
Module-III Subsurface exploration: Importance, Exploration program, Methods of exploration: Boring, sounding tests, geophysical methods-Electrical resistivity and Seismic refraction methods. Types of samples- undisturbed, disturbed and representative samples. Samplers, sample disturbance, area ratio, Recovery ratio, clearance, Stabilization of boreholes. Typical boring log. Number and depth of borings for building and dams. Determination of ground water level by Hvorslev method Consolidation of soils: Definition, Mass-spring analogy, Terzaghi's one dimensional consolidation theory, assumption and limitations. Normally consolidated, under consolidated and over consolidated soils. Reconsolidation pressure and its determination by Casagrande's method. Laboratory one		09 Hours

dimensional consolidation test. Determination of consolidation characteristics of soils-compression index. and coefficient of consolidation, Determination of coefficient of consolidation by square root of time fitting method and logarithmic time fitting method.		
<p align="center">Module -IV</p> <p>Shear strength of soil: Concept of shear strength, Mohr's strength theory, Mohr-coulomb theory, measurement of shear parameters. Direct shear test, unconfined compression test, Triaxial compression test and vane shear test. Test under different drainage conditions. Conventional and modified failure envelopes. Total and effective shear strength parameters, factors affecting shear strength of soils.</p> <p>Lateral earth pressure: Types of Earth pressure, Active and Passive earth pressures, Earth pressure coefficient and their range. Earth pressure theories-Rankine's and Coulomb's – assumptions and limitations, Graphical solutions for active earth pressure (cohesionless soil only) –Cullman's and Rebhann's methods,Lateral earth pressure in cohesive and cohesionless soils, Earth pressure distribution.</p>		09 Hours
<p align="center">Module-V</p> <p>Bearing capacity: Definitions of ultimate, net and safe bearing capacities, Allowable bearing pressure. Terzaghi's and Brinch Hansen's bearing capacity equations-assumptions and limitations. Bearing capacity of footing subjected to eccentric loading. Effect of ground water table on bearing capacity. Plate load test, Standard penetration test, cone penetration test.</p> <p>Foundation settlement: Concept, immediate, consolidation and secondary settlements (no derivations), Tolerance BIS specifications for total and differential settlements of footings and rafts.</p>		08 hours
Course Outcomes: On completion of this course, students are able to:		
CO		BL
CO1:	Determine the index properties of soil and classify the soils.	C3
CO2:	Apply the principal of flow of water through the soil and also determine the compaction properties.	C4
CO3:	Explain the methods of subsurface exploration and determine the consolidation properties.	C4
CO4	Analyze the shear strength of soil and determine lateral earth pressure in soils.	C4
CO5	Determine the bearing capacity and settlement of soils	C4
<p>Question paper pattern:</p> <p>iii) Two questions are to be set from each module.</p> <p>iv)Total five questions are to be answered by selecting minimum one question from each module</p>		
<p>Text book:</p> <ol style="list-style-type: none"> 1. Gopal Ranjan and Rao A.S.R., Basic and Applied Soil Mechanics, New Age International (P) Ltd., New Delhi. 2. Punmia B C, Soil Mechanics and Foundation Engineering, Laxmi Publications co., New Delhi. 3. Murthy V.N.S., Principles of Soil Mechanics and Foundation Engineering, UBS Publishers and Distributors, New Delhi. 4. Braja, M. Das, Geotechnical Engineering; Thomson Business Information India (P) Ltd., India. 5. Bowles,J.E., "Foundation Analysis and design" 5th edition, McGraw Hill Pub. Co ., New York (1996) 		

Reference books:

1. T.W. Lambe and R.V. Whitman, Soil Mechanics-, John Wiley & Sons.
2. Donald P Coduto, Geotechnical Engineering- Phi Learning Private Limited, New Delhi.
3. Shashi K. Gulathi & Manoj Datta, Geotechnical Engineering-Tata McGraw Hill Publications.
4. Debashis Moitra, “Geotechnical Engineering”, Universities Press.,
5. Malcolm D Bolton, “A Guide to soil mechanics”, Universities Press.,
6. Dr. C Venkataramaiah, ‘Geotechnical engineering” New age Publications.
7. Dr. Alam Singh , Modern Geotechnical engineering.

Nptel Link: <https://youtu.be/afirGWlleSM>

E-Books: www.civilenggebooks.com

GEOTECHNICAL ENGINEERING LAB		
Subject code	21CVL55	Credit: 01
Hours/Week	2 hours. (Practical)	SEE: 50 Marks
Total hours: 28	CIE: 50 Marks	SEE: 3 hours
Prerequisite: Engineering geology		
Course objectives: To enable the student to acquire the knowledge in the following topics <ol style="list-style-type: none"> 1. Determination of Specific gravity, moisture content, Grain size analysis, density by core cutter 2. Determination of Consistency limits- Liquid limit, plastic limit and shrinkage limit. 3. Determination of Standard Proctor compaction test and Modified Proctor Compaction test, 4. Determination of Coefficient of permeability, Strength tests, Unconfined compression test, Direct shear test (for small and big particle size), Triaxial compression test 		
Modules		Teaching Hours
1.	Test for determination of specific gravity and moisture content	2 hours
2.	Grain size analysis of soil sample (sieve analysis)	2 hours
3.	Insitu density by core cutter and sand replacement methods.	
4.	Consistency limits- Liquidlimit (Casagrande and cone penetration methods), plastic limit and shrinkage limit.	2 hours
5.	Standard Proctor compaction test and Modified Proctor Compaction test.	2 hours
6.	Coefficient of permeability by constant head and variable head methods	2 hours
7.	Strength tests	
	a) Unconfined compression test	2 hours
	b) Direct shear test (for small and big particle size)	2 hours
	c) Triaxial compression test	2 hours
8.	Consolidation test–determination of compression index and co -efficient of consolidation.	2 hours
9.	Laboratory vane shear test	2 hours
	a) Demonstration of miscellaneous equipment's such as Augers, Samplers, Rapid moisture meter, Proctor's needle.	2 hours
	b) Demonstration of Hydrometer test.	2 hours
	c) Demonstration of free Swell Index test	2 hours
	d) Demonstration of determination of relative density	2 hours
Course Outcomes: On completion of this course, students are able to:		
CO		BL

CO1	Demonstrate the concepts of GT theory course through series of experiments.	C2
CO2	Share the responsibilities in small teams of 4-5 members for conducting the experiments	C3
CO3	Perform the experiments and determination of specific gravity, moisture content, Grain size analysis of soil sample, core cutter and sand replacement methods, Liquid limit, plastic limit and shrinkage limit, Standard Proctor compaction test, Modified Proctor Compaction test, compression index, co-efficient of consolidation, Laboratory vane shear test, Hydrometer test, Swell index test, relative density.	C4
CO4	Analyze the data and interpret the results.	C3
CO5	Prepare a well-organized laboratory report.	C3

Question paper pattern:

Any one of the above experiments is to be conducted in the examination by the student.

Reference books:

1. Soil testing –lab manual & question bank by KVS Appa Rao, VCS Rao, university science press
2. Punmia B C, Soil Mechanics and Foundation Engineering-(2017), 16th Edition, Laxmi Publications co., New Delhi.
3. Lambe T.W., “Soil Testing for Engineers”, Wiley Eastern Ltd., New Delhi.
4. Head K.H., “Manual of Soil Laboratory Testing” Vol. I, II, III, Princeton Press
5. Bowles J. E “Engineering Properties of Soil and Their Measurements”, -Mc Graw Hill Book Co. New York.
6. Relevant BIS Codes of Practice: IS-2720 series

Nptel Link: <https://youtu.be/55RwyS0-ySo>

E-Books: www.civilenggebooks.com

RESEARCH METHODOLOGY AND IPR		
Subject code	21RMI56	Credit: 02
Hours/Week	3 hours. (Theory)	SEE: 50 Marks
Total hours: 42	CIE: 50 Marks	SEE: 3 hours
Prerequisite: None		
Course Objectives: At the end of this course, students will be able: <ul style="list-style-type: none"> • To give an overview of the research methodology and explain the technique of defining a research problem. • To explain the functions of the literature review in research. • To carry out a literature review, developing theoretical and conceptual frameworks. • To explain the details of sampling designs, and also different methods of data collections. • To explain the art of interpretation and the art of writing research reports. • To explain various forms of the intellectual property, its relevance and business impact in the changing global business environment. • To discuss leading International Instruments concerning Intellectual Property Rights 		
Module-I Meaning, Objectives and characteristic of research, Research methods Vs Methodology. Types of Research - Descriptive Vs Analytical, Applied Vs Fundamental Quantities Vs Qualitative, Conceptual Vs Empirical -Research process. - Criteria of good research-Developing a research plan. Defining the research problem - Selecting the problem. Necessity of defining the problem Techniques involved in defining the problem- Importance of literature review in defining a problem		10 Hrs.
Module-II Literature review in defining a problem- Survey of literature - Primary and Secondary sources Reviews, treatise monographs patents- web as a source- searching the web-Identifying gap areas from literature review Development of working hypothesis. Research design and methods - Research design - Basic principles. Need of research design Features of good design- Important concepts relating to research design - Observation and Facts.		10 Hrs.
Module-III Research Design: Diagnosis and Experimentation Determining Experimental and simple designs. Sample design - Steps in sample design - Characteristics of a good sample design - Types of sample design- Measurement and scaling techniques. Methods of data collection-collection of primary data -Data collection instruments.		12 Hrs.

<p style="text-align: center;">Module-IV</p> <p>Testing hypotheses -Basic Concepts-Procedure for hypothesis testing flow diagram for hypotheses testing-Data analysis with statistical packages- correlation and regression- Important parametric test-Chi- square test-Analysis of variance and covariance.</p> <p>Interpretation and Report Writing: Meaning of Interpretation, Technique of Interpretation, Precaution in Interpretation, Significance of Report Writing, Different Steps in Writing Report, Layout of the Research Report, Types of Reports, Oral Presentation, Mechanics of Writing a Research Report, Precautions for Writing Research Reports</p>		10 Hrs.
<p style="text-align: center;">Module-V</p> <p>Intellectual Property: The Concept, Intellectual Property System in India, Development of TRIPS complied Regime in India, Patents Act,1970,,Trade Mark Act ,1999,The designs Act 2000,The Geographical Indications of Goods(Registration and Protection)Act 1999,Copyright Act 1957,The protection of plant varieties and farmers' Right Act 2001,Layout Design Act 2000,Trade Secrets, World Intellectual Property Organization(WIPO),WIPO and WTO, Paris Convention for the Protection of Industrial Property, National Treatment, Right of Priority, common Rules Patent Marks, Industrial Designs, Trade Names, Indications of Source Unfair competition, Patent Cooperation Treaty(PCT),advantages of PCT Filling Copyright and related Rights, Trademarks, Geographical indications, Industrial Designs, Patents, Patentable subject matter, Rights conferred, Exceptions, Term of protection, Conditions on Patent Applicants.</p>		10Hrs
Course outcomes:		
At the end of the course the student will be able to:		
CO1	<ul style="list-style-type: none"> Discuss research methodology and the technique of defining a research problem 	
CO2	<ul style="list-style-type: none"> Explain the functions of the literature review in research, carrying out a literature search, developing theoretical and conceptual frameworks and writing a review. 	
CO3	<ul style="list-style-type: none"> Explain various research designs and their characteristics. 	
CO4	<ul style="list-style-type: none"> Explain the art of interpretation and the art of writing research reports 	
CO5	<ul style="list-style-type: none"> Discuss various forms of the intellectual property, its relevance and business impact in the changing global business environment and leading international instruments concerning IPR 	

Question paper pattern:

Examination will be conducted for 100 marks with question paper containing 10 full questions, each of 20 marks.

- ☐ Each full question can have a maximum of 4 sub questions.
- ☐ There will be 2 full questions from each module covering all the topics of the module
- ☐ Students will have to answer 5 full questions, selecting one full question from each module

Textbooks

1. Research Methodology: Methods and Techniques C.R. Kothari, Gaurav Garg New Age International 4th Edition, 2018.
2. Research Methodology a step-by- step guide for beginners. (For the topic Reviewing the literature under module 2) Ranjit Kumar SAGE Publications Ltd 3rd Edition, 2011.
3. Study Material (For the topic Intellectual Property under module 5) Professional Programme Intellectual Property Rights, Law and Practice, The Institute of Company Secretaries of India, Statutory Body Under an Act of Parliament, September 2013.

Reference Books

1. Research Methods: the concise knowledge base Trochim Atomic Dog Publishing 2005.
2. Conducting Research Literature Reviews: From the Internet to Paper Fink A Sage Publications 2009

MECHANISATION IN CONSTRUCTION		
Subject code	21CIV57	Credit: 01
Hours/Week	2 hours. (Theory)	SEE: 50 Marks
Total hours: 28	CIE: 50 Marks	SEE: 2 hours
Prerequisite: None		
Course objectives: This course enables students to understand <ol style="list-style-type: none"> 1. Various type of equipment's used in constructions advantage & limitations of these equipment's 2. Manufacturing of natural aggregate & recycled aggregate through mechanization. 3. Mechanization in rebar fabrication, concrete production, placement, types of form work & scaffolding and materials used. 4. Construction of bridge/flyover by segmented construction and box pushing technology for tunneling & pile driving equipment. 5. Construction methods of drilling blasting, tunneling & various equipment's used in this construction. 		
Modules		Teaching Hours
Module I Introduction to mechanization: Definition, advantages and limitations of mechanization Mechanization through construction equipment: , cycle-Dozers, scrapers, Excavators, finishing equipment, Trucks and Hauling equipment, Hoisting equipment, Draglines and Clamshells		8 hours
Module-II Mechanization in aggregate manufacturing: Natural aggregates and recycled aggregates		6 hours
Module-III Mechanization in rebar fabrication Mechanization in concrete production and placement Mechanization through construction: Formwork and scaffolding types, materials and design principles		4 hours
Module -IV Mechanization through construction methods/technologies: Segmental construction of bridges/flyovers, box pushing technology for tunneling, trench-less technology Pile driving equipment: Pile hammers, selecting a pile hammer..		6 hours
Module-V Mechanization through construction methods of drilling, Blasting and Tunneling Equipment: Definition of terms, bits, Jackhammers, Drifters, wagon drills, chisel drills, piston drills, blast hole drills, shot drills.		4 hours

Course Outcomes: On completion of this course, students are able to:		
CO		BL
CO1:	Definition and explaining of various construction equipment's.	C2
CO2:	Explain the manufacturing process of natural & recycled Aggregate	C3
CO3:	Explain the production and placement of concrete through Mechanization materials of formwork& design of formwork.	C3
CO4	Explanation on construction of bridge/flyover by segmental Construction&boxpushingtechnologyfortunnelingandpiledrivingequipment.	C3
CO5	Choose the sites for tunneling& drilling method equipment.	C3
Question paper pattern:		
i) Objective type questions		
Text book:		
1) Construction equipment by, S. C. Shrama		
Nptel Link: https://youtu.be/2B7DhOvL8kw		
E-Books: www.civilenggebooks.com		

SUBJECT : REMOTE SENSING AND GEOGRAPHICAL INFORMATION SYSTEM		
SUBJECT CODE: 21CVAE581	CREDITS :01	Teaching Hours / Week : (L:T:P) (0:2:0)
CIE : 50 MARKS	SEE: 50 MARKS	SEE: 2 HRS

COURSE OBJECTIVES:

- To develop the fundamental concepts of GIS and remote sensing including the electromagnetic Spectrum, and nature of geospatial data.
- To make the student to understand the various Civil engineering applications of remote sensing.
- To familiarize s the students in the GIS based analytical and problem solving techniques for
- Sustainable planning and management of civil Engineering projects.

MODULE – I

INTRODUCTION:

Introduction to Remote Sensing , Historical Development of Remote Sensing , Remote Sensing Components.

BASIC PRINCIPLES: Energy Source & its characteristics, Electromagnetic Energy and Spectrum, Wave Bands,
Interaction of Electromagnetic Energy with Atmosphere and Earth's Surface

MODULE-2

REMOTE SENSING PLATFORMS AND SENSORS

Introduction, Satellite System Parameters, Sensor Parameters, Imaging Sensor System, Earth Resources Satellites, Metrological Satellites.

MODULE -3

MICROWAVE REMOTE SENSING

Introduction, The Radar Principle. Factors Affecting Microwave Measurements
Radar Wave Bands. Side Looking Airborne Radar(SLAR) System. Synthetic Aperture Radar (SAR).

MODULE-4

FUNDAMENTALS OF GIS AND INTRODUCTION OF GPS

Roots of GIS . Overview of Information System. The four Ms. GIS definition and terminology. In brief about GPS

MODULE-5

INTEGRATION OF REMOTE SENSING AND GIS

Introduction. Remote Sensing and GIS Synergy. Raster Data for GIS. Vector Data for GIS. Need of Integration. General view on application, Applications of RS & GIS in civil engineering field.

COURSE OUTCOMES:

- Understand the importance of remote sensing and GIS application in civil engineering
- Students are familiarize with study and identification of satellite imageries
- Students are able to learn the soft skills by using GIS technologies.

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

CO1: Understand the principles of RS and its components.

CO2: Understand the Remote Sensing Platforms and Sensors.

CO3: Understand and familiarize with study and identification of satellite imageries.

CO4: Understand the soft skills by using GIS technologies.

Apply their RS AND GIS knowledge to illustrate and graph a problem and describe the realities that civil engineers face when dealing with issues.

REFERENCE BOOKS.

1. M .ANJI REDDY “REMOTE SENSING AND GEOGRAPHICAL INFORMATON SYSTEM” B S PUBLICATIONS, 3RD EDITION

Question paper pattern:

- The Question paper will have 50 objective questions.
- Each question will be for 01 marks
- Students will have to answer all the questions in an OMR Sheet.
- The Duration of Exam will be 2 hours.