Course Title: Engineering Physics for CSE stream 50 Course Code: **CIE Marks** 22PHYS12/22 50 SEE Marks Course Type (Theory/Practical) Theory 100 **Total Marks** 03 Exam Hours Teaching Hours/Week (L+T) 3 Credits 03 Total Hours of Pedagogy 40 hrs

Course objectives

- To study the essentials of Lasers and Optical fibers for engineering applications.
- To study the principles of quantum mechanics and its application in quantum computing.
- To study the electrical properties of materials especially superconductors.
- To study the essentials of physics for computational aspects like design and data analysis.

Teaching-Learning Process

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes andmake Teaching –Learning more effective

- 1. Flipped Class
- 2. Smart Class Room
- 3. Blended Mode of Learning
- 4. Interactive Simulations and Animations
- 5. Assignments based learning
- 6. NPTEL and Other Videos for theory topics
- 7. Lab Experiment Videos

Module-1 (8 Hours)

Laser and Optical Fibers:

LASER : Basic properties of a LASER beam, Interaction of Radiation with Matter, Einstein's A and B Coefficients, Laser Action & Numerical Problems, Population Inversion, Metastable State, Requisites of a laser system, Types of Lasers, Semiconductor Diode Laser, Applications: Bar code scanner, Laser Printer, CD writing/reading.

Optical Fiber: Principle and structure, Acceptance angle and Numerical Aperture (NA), Expression for NA (derivation) & Numerical Problems, Types of Optical Fibers, Attenuation and Fiber Losses & Numerical Problems, Applications of Optical Fibers: Local Area Network (LAN) and Fiber Optic Communication.

Pre requisite: Properties of light

Self-learning: Total Internal Reflection & Propagation Mechanism (Optical Fibers) Module-2 (8 Hours)

Quantum Mechanics:

Inadequacies of Classical Mechanics (Blackbody radiation & Photo electric effect), de Broglie Hypothesis and Matter Waves, de Broglie wavelength, Heisenberg's Uncertainty Principle and its application (Non existence of electron insidethe nucleus-Non Relativistic) & Numerical Problems, Wave Function, Physical Significance of a wave function, Time independent Schrodinger wave equation, Eigen functions and Eigen Values, Motion of a particle in a one dimensional potential well of infinite depth.

Pre requisite: Wave-Particle dualism;

Self-learning: de Broglie Hypothesis

Module-3 (8 Hours)

Electrical Conductivity in metals :

Electrical Conductivity in metals, Concept of Resistivity and Mobility, Numerical Problems on resistivity and mobility, Assumptions and failures of Classical Free Electron Theory, Assumptions and success of Quantum Free Electron Theory, Fermi Energy (Qualitative).

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Superconductivity :

Introduction to Super Conductors, Temperature dependence of resistivity, Meissner Effect, Critical Field, Temperature dependence of Critical field & Numerical Problems, Types of Super Conductors, BCS theory (Qualitative), High Temperature superconductivity, Josephson Junctions(Qualitative), SQUIDs (Qualitative), Applications of superconductors - Maglev vehicle $\int Q u(t)$

Pre requisites: Basics of Electrical conductivity Self-learning: Resistivity and mobility

Module-4 (8 Hours)

Quantum Information & Quantum Computing:

Principles of Quantum Information & Quantum Computing: Introduction to Quantum Computing, Moore's law & its end. Single particle quantum interference, Differences between classical & quantum computing, concept of qubit and its properties. Representation of qubit by Bloch sphere. Single and Two qubits. Extension to N qubits.

Properties of a qubit: Mathematical representation. Summation of probabilities.

Dirac representation and matrix operations: Matrix representation of 0 and 1 states, Identity Operator I, Determination of I|0> and I|1>, Pauli Matrices and its operations on |0> and |1> states, Explanation of i) Conjugate of a matrix ii) Transpose of a matrix. Unitary Matrix U, Examples:Row and Column Matrices and their multiplication (Inner Product).

Pre requisites: Matrices Self-learning: Moore's law

Module-5 (8 Hours)

Quantum Gates & Physics of Animation :

Quantum Gates

Single Qubit Gates: Quantum Not Gate, Pauli -Z Gate, Hadamard Gate, Phase Gate (or S Gate), T Gate Multiple Qubit Gates: Controlled gate, CNOT Gate, (Discussion for 4 different input states). Representation of Swap gate, Controlled -Z gate, Toffoli gate.

Physics of Animation :

Taxonomy of physics based animation methods, Frames, Frames per Second, Size and Scale, Motion and Timing in Animations, Constant Force and Acceleration. The Odd rule, Odd rule Scenarios & Numerical Problems, Motion Graphs.

Pre requisites: Motion in one dimension

Self-learning: Frames, Frames per Second

Course outcome (Course Skill Set)

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

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CO1	Describe the principles of LASERS and Optical fibers and their relevant applications.	
CO2	Summarize the essential properties of conductors and superconductors.	
CO3	Discuss the basic principles of the Quantum Mechanics.	
CO4	Discuss the basics of Quantum Computing and Quantum Gates	
CO5	Illustrate the application of physics in design and data analysis.	

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing marks for the CIE is 45% of the maximum marks (23 marks out of 50). The minimum passing marks for the SEE is 35% of the maximum marks (18 marks out of 50).

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

Continuous Internal Evaluation(CIE):

The CIE shall be conducted by the course teacher throughout the semester. The suggested components of CIE for Theory course are

The CIE marks for the theory component shall be 50 marks is as detailed below

- Three Tests each of 15 Marks; (Third test is improvement test).
- CIE will be conducted by the university as per scheduled time table with question papers for the subject (duration of 1 hour 15 minutes)
- Session wise assignments for 25 marks
- For Seminar and library work 05 marks
- Attendance 5 marks (95% to 100%), 04 marks (85% to 94%)

Semester End Examination (SEE)

- Theory SEE will be conducted by University as per the scheduled time table, with question papers for the subject (duration 03 hours)
- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50 marks.
- The question paper will have ten full questions carrying equal marks.
- Each full question carries 20 marks.
- There will be two full questions (with a maximum of three 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 five full questions, selecting one full question from each module.

Suggested Learning Resources:

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

- 1. Solid State Physics, S O Pillai, New Age International Private Limited, 8th Edition, 2018,.
- 2. Engineering Physics by Gupta and Gour, Dhanpat Rai Publications, 2016 (Reprint).
- 3. Concepts of Modern Physics, Aurthur Beiser, McGrawhill, 6th Edition, 2009.
- 4. Lasers and Non Linear Optics, B B Loud, New age international, 2011 edition.
- 5. A text book of Engineering Physics by M .N. Avadhanulu, P G. Kshirsagar and T V S Arun Murthy, Eleventhedition, S Chand and Company Ltd. New Delhi-110055.
- Quantum Computation and Quantum Information, Michael A. Nielsen & Isaac L. Chuang, Cambridge 6. UniversitiesPress, 2010 Edition.
- Quantum Computing, Vishal Sahani, McGraw Hill Education, 2007 Edition. 7.
- 8. Engineering Physics, S P Basavaraj, 2005 Edition,
- Physics for Animators, Michele Bousquet with Alejandro Garcia, CRC Press, Taylor & Francis, 2016. 9. 10. Quantum Computation and Logic : How Quantum Computers Have Inspired Logical Investigations, Maria LuisaDalla Chiara, Roberto Giuntini, Roberto Leporini, Giuseppe Sergioli, TrendsinLogic, Volume 48, Springer.
- Statistical Physics : Berkely Physics Course, Volume 5, F. Reif, McGraw Hill. 11.

Web links and Video Lectures (e-Resources):

- Web links:
 - LASER : www.youtube.com/watch?v=WgzynezPiyc 1.
 - 2.
 - Superconductivity : https://www.youtube.com/watch?v=MT5XI5ppn48 Optical Fiber : www.youtube.com/watch?v=N kA8EpCUQo



- 4. Quantum Mechanics : https://www.youtube.com/watch?v=p7bzE1E5PMY&t=136s 5.
- Quantum Computing : https://www.youtube.com/watch?v=jHoEjvuPoB8 6.
- Physics of Animation : www.youtube.com/watch?v=kj1kaA_8Fu4 7.
- NPTEL Supercoductivity: https://archive.nptel.ac.in/courses/115/103/115103108/
- 8. NPTEL Quantum Computing : <u>https://archive.nptel.ac.in/courses/115/101/115101092</u>
- Virtual LAB: <u>https://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham</u>
- 10. Virtual LAB : https://vlab.amrita.edu/index.php?sub=1&brch=189&sim=343&cnt=1

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning http://nptel.ac.in

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https://swayam.gov.in

https://virtuallabs.merlot.org/vl_physics. htmlhttps://phet.colorado.edu

https://www.myphysicslab.com

Course Title:	Engineering Physics for I	EEE Stream	
Course Code:	22PHYE12/22	CIE Marks	50
Course Type (Theory/Practical)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L+T)	03	Exam Hours	03
Total Hours of Pedagogy	40 hrs	Credits	03

- To understand the properties of dielectrics and superconductors
- To study the principles of quantum mechanics.
- To understand fundamentals of vector calculus and EM waves.
- To study the knowledge about semiconductors and devices

Teaching-Learning Process

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

outcomes andmake Teaching -Learning more effective

- 1. Flipped Class
- 2. Smart Class Room
- 3. Blended Mode of Learning
- 4. Interactive Simulations and Animations
- 5. Assignments based learning
- 6. NPTEL and Other Videos for theory topics
- 7. Lab Experiment Videos

Module-1 (8 Hours)

Lasers: Characteristics of LASER, Interaction of radiation with matter, Expression for energy density of radiation and Numerical Problems, Requisites of a Laser system, Conditions for Laser action, Types of Lasers, Principle, Construction and working of Ga-As laser. Application of Lasers in Defence (Laser range finder) and Laser Printing.

Optical Fibers: Propagation mechanism, TIR, angle of acceptance, Numerical aperture and Numerical Problems on NA, fractional index change, Modes of propagation, Number of modes and V parameter and Numerical Problems, Types of optical fibers. Attenuation and Mention of expression for attenuation coefficient, Discussion of block diagram of point to point communication, Merits and demerits of optical fiber.

Pre requisite: Properties of light

Self-learning: Propagation Mechanism & TIR in optical fiber

Module-2 (8 Hours)

Dielectric Properties: Basic concepts of conductors, insulators and semiconductors, Polar and non-polar dielectrics, Types of Polarization, internal fields in solid, solid, liquid and gaseous dielectrics. Application of dielectrics in transformers, Capacitors.

Superconductivity:

Introduction to Superconductors, Temperature dependence of resistivity, Meissner Effect, Critical temperature, Types of Super Conductors, Temperature dependence of Critical field & Numerical Problems, BCS theory (Qualitative), High Temperature superconductivity, Applications of Superconductivity - SQUID, MAGLEV. Pre requisites: Difference between Insulators & Dielectrics. Self-learning: Dielectrics Basics

Quantum Mechanics:

Module-3 (8 Hours)

Inadequacies of Classical Mechanics (Blackbody radiation & Photo electric effect), de Broglie Hypothesis and Matter Waves, de Broglie wavelength, Heisenberg's Uncertainty Principle and its application (Non existence of electron inside the nucleus-Non Relativistic) & Numerical Problems, Wave Function, Time independent

Thanks Waager-

Schrodinger wave equation, Physical Significance of a wave function, Eigen functions and Eigen Values,

Motion of a particle in a one dimensional potential well of infinite depth.

Pre requisite: Wave-Particle dualism

Self-learning: de Broglie Hypothesis

Maxwell's Equations and EM waves:

Maxwell's Equations: Fundamentals of vector calculus. Divergence and curl of electric field and magnetic field (static) & Numerical Problems, Gauss' divergence theorem and Stoke's theorem, Faraday's laws of EMI, Current density & equation of continuity; displacement current (with derivation) Maxwell's equations in vacuum.

Module-4 (8 Hours)

EM Waves: Plane electromagnetic waves in vacuum, their transverse nature, Numerical problems.

Pre requisite: Electricity & Magnetism

Self-learning: Fundamentals of vector calculus.

Module-5 (8 Hours)

Semiconductor and Devices:

Fermi energy and Fermi factor, Variation of Fermi factor with temperature and energy & Numerical Problems, Fermi level in intrinsic semiconductors, Electrical conductivity of a semiconductor (derivation) & Numericals, Hall effect and mention its application, Photodiode and Power responsivity, Four probe method to determine resistivity, Photo transistor.

Pre requisite: Basics of Semiconductors

Self-learning: Solar cell

Course outcome (Course Skill Set) At the end of the course the student will be able to:

CO1	Discuss the essential concepts of Lasers and Optical fibers.
CO2	Elucidate the concepts of dielectrics and superconductivity.
CO3	Describe the fundamental principles of the Quantum Mechanics.
CO4	Discuss the fundamentals of vector calculus and their applications in Maxwell's Equations and EM Waves.
CO5	Summarize the properties of semiconductors and the working principles of semiconductor devices.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing marks for the CIE is 45% of the maximum marks (23 marks out of 50). The minimum passing marks for the SEE is 35% of the maximum marks (18 marks out of 50).

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

Continuous Internal Evaluation(CIE):

The CIE shall be conducted by the course teacher throughout the semester. The suggested components of CIE for Theory course are

The CIE marks for the theory component shall be 50 marks is as detailed below

- Three Tests each of 15 Marks; (Third test is improvement test).
- CIE will be conducted by the university as per scheduled time table with question papers for the subject (duration of 1 hour 15 minutes)
- Session wise assignments for 25 marks
- For Seminar and library work 05 marks
- Attendance 5 marks (95% to 100%), 04 marks (85% to 94%)

Semester End Examination (SEE)

- Theory SEE will be conducted by University as per the scheduled time table, with question papers for the subject (duration 03 hours)
- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50 marks.
- The question paper will have ten full questions carrying equal marks.

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- Each full question carries 20 marks.
- There will be two full questions (with a maximum of three 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 five full questions, selecting one full question from each module.

Suggested Learning Resources:

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

- 1. A Text book of Engineering Physics- M.N. Avadhanulu and P.G. Kshirsagar, 10th revised Ed, S. Chand. & Company Ltd, New Delhi.
- 2. An Introduction to Lasers theory and applications by M.N.Avadhanulu and P.S.Hemne revised Edition 2012 . S.Chand and company Ltd -New Delhi.
- 3. Engineering Physics-Gaur and Gupta-Dhanpat Rai Publications-2017.
- 4. Concepts of Modern Physics-Arthur Beiser: 6th Ed; Tata McGraw Hill Edu Pvt Ltd- New Delhi 2006.
- Fundamentals of Fibre Optics in Telecommunication & Sensor Systems, B.P. Pal, New Age International Publishers.
- 6. Introduction to Electrodynamics, David Griffith, 4th Edition, Cambridge University press 2017.
- 7. Lasers and Non Linear Optics B.B. Laud, 3rd Ed, New Age International Publishers 2011.
- 8. LASERS Principles, Types and Applications by K.R. Nambiar-New Age International Publishers.
- 9. Solid State Physics-S O Pillai, 8th Ed- New Age International Publishers-2018.
- Web links and Video Lectures (e-Resources):

Web links:

- 1. Laser: www.britannica.com/technology/laser,k
- 2. Laser: https://nptel.ac.in/courses/115/102/115102124/
- 3. Quantum Mechanics: https://nptel.ac.in/courses/115/104/115104096/
- 4. Physics: http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html
- 5. Numerical Aperture of fiber: https://bop-iitk.vlabs.ac.in/exp/numerical-aperture-measurement

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

http://nptel.ac.in

https://swayam.gov.in

https://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham

https://vlab.amrita.edu/index.php?sub=1&brch=189&sim=343&cnt=1

- https://virtuallabs.merlot.org/vl physics.
- htmlhttps://phet.colorado.edu
- https://www.myphysicslab.com

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SHARNBASVA UNIVERSITY DEPT OF PHYSICS

Course Title:	ENGINEERING P	HYSICS SYLLABUS	
Course Code:	Physics for ME Stream 22PHYM12/22		
Course Type	222011112/22	CIE Marks	50
Theory/Practical)	Theory	SEE Marks	50
Teaching Hours/Week		Total Marks	100
$L \pm I$)	03	Exam Hours	03
Total Hours of Pedagogy	40 hrs	Credits	
 To understand th To understand th To study the vari Teaching-Learning Proc These are sample Strategi outcomes andmake Teach 1. Flipped Class 2. Smart Class Roo 3. Blended Mode o 4. Interactive Simu 5. Assignments ba 6. NPTEL and Oth 7. Lab Experiment Oscillations: Simple Har of springs (Derivation), Engineering applications oscillation (derivation). reference	e types of oscillation, shoel stic properties of materials a e fundamentals of thermoe e Concepts in Lasers, Low ous relevant material chara ress es, which teacher can use t ing -Learning more effection f Learning lations and Animations sed learning er Videos for theory topics Videos <u>Modu</u> monic motion (SHM), diff Damped oscillations, esonance, sharpness of resc ober and Mach Angle. Mac	k waves & its generation, and and failures of engineering m lectric materials and devices temperature phenomena and acterization techniques o accelerate the attainment of ive le-1 (8 Hours) Ferential equation for SHM, s equation of motion for da Forced oscillations and di ponance. Numerical Problems.	aterials and their application. generation of low temperature. The various course eries and parallel combination mped oscillation (derivation),
Pre-requisites: Basics of Self-learning: Simple Ha	Oscillations		
	Modu	ile-2 (8 Hours)	
a beam (derivation), Ca	ailures of Engineering mat roblems y, Stress & Strain rain Curve	IUIUS OF A SINGLE contilovor (io, Beams, bending moment of derivation) and MEMS and its le fracture, torsion of a cylinder
Thermoelectric materia	ls and devices:	and the second	
(Mention Expression), lay	ws of thermoelectricity. Co ers (TEC), low, mid and Space Program (RTG), N Electrical conductivity	nstruction and Working of T high temperature thermos	tier coefficients, figure of merit hermoelectric generators (TEG) electric materials, Applications:



LASER : Basic properties of a LASER beam, Interaction of Radiation with Matter, Einstein's A and B Coefficients, Laser Action & Numerical Problems, Population Inversion, Metastable State, Requisites of a laser system, Types of Lasers, Carbon dioxide Laser, Applications: Laser welding, Laser cutting and Laser drilling. Cryogenics: Production of Low temperature - Joule-Thomson effect, Porous plug experiment, Cascade Process. Applications of Cryogenics, in aerospace and food processing (Qualitative). Pre requisites: Basics of Heat and Thermodynamics Self-learning: Joule Thomson effect.

Module-5 (8 Hours)

Material Characterization and Instrumentation Techniques:

Introduction to nano materials: Nanomaterial and nanocomposites. Principle, construction and working of X-ray Diffractometer, crystallite size determination by Scherrer equation, Principle, construction, working and applications of Scanning electron microscopy (SEM), Transmission electron microscopy (TEM), Numerical

Pre requisites: Principle and working of optical Microscope Self-learning: X-Ray Diffractometer

Course outcome (Course Skill Set)

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

CO1 Elucidate the concepts in oscillations and waves,	
CO2 Discuss concepts of elasticity and material failures	
Discuss the fundamentals of Thermoelectric materials and their and their	
Summarize the low temperature phenomena and generation of low temperature	
CO5 Explain the various material characterization techniques	

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing marks for the CIE is 45% of the maximum marks (23 marks out of 50). The minimum passing marks for the SEE is 35% of the maximum marks (18 marks out of 50).

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Continuous Internal Evaluation(CIE):

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- For Seminar and library work 05 marks
- Attendance 5 marks (95% to 100%), 04 marks (85% to 94%)

Semester End Examination (SEE)

- Theory SEE will be conducted by University as per the scheduled time table, with question papers for the subject (duration 03 hours)
- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50 marks.
- The question paper will have ten full questions carrying equal marks.
- Each full question carries 20 marks.
- There will be two full questions (with a maximum of three sub questions) from each module



SHARNBASVA UNIVERSITY DEPT OF PHYSICS

ENGINEERING PHYSICS SYLLABUS

- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

Suggested Learning Resources:

- Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)
 - 1. Vibrations and Waves (MIT introductory Physics Series), A P French, CBS, 2003 Edition
 - 2 Timoshenko, S. and Goodier J.N. "Theory of Elasticity", 2nd Edition, McGraw Hill Book Co, 2001.
 - 3. Sadhu Singh, "Theory of Elasticity", Khanna Publishers, 1997
 - 4. Mechanical Properties of Engineered Materials By Wole Soboyejo, CRC Press; 1st edition, 2002
 - 5. Heat & Thermodynamics and Statistical Physics(XVIII-Edition) Singhal, Agarwal
 - &Satyaprakash PragatiPrakashan, Meerut, 2006. 4
 - 6. Heat and Thermodynamics (I-Edition) D.S.Mathur S. Chand & Company Ltd., New-Delhi, 1991
 - 7. Physics of Cryogenics by Bahman Zohuri, Elsevier, 2018
 - 8. Materials Characterization Techniques-Sam Zhang, Lin Li, Ashok Kumar, CRC Press, First Edition, 2008.
 - 9. Characterization of Materials- Mitra P.K . Prentice Hall India Learning Private Limited.
 - 10. Nanoscience and Nanotechnology: Fundamentals to Frontiers M.S.Ramachandra Rao & Shubra Singh, WileyIndia Pvt Ltd.
 - 11. Nano Composite Materials-Synthesis, Properties and Applications, J. Parameswaranpillai,, N.Hameed, T.Kurian, Y. Yu, CRC Press.

Web links and Video Lectures (e-Resources):

Web links

- 1. Simple Harmonic motion:
 - https://www.youtube.com/watch?v=k2FvSzWeVxQhttps://www.youtube.com/watch?v=k2FvSz WeVxQ
- Shock waves: https://physics.info/shock/ 2.
- Shock waves and its applications: https://www.youtube.com/watch?v=tz_3M3v3kxk 3.
- Stress-strain curves: https://web.mit.edu/course/3/3.11/www/modules/ss.pdf 4.
- 5. Fracture in materials: https://www.youtube.com/watch?v=x47nky4MbK8
- 6. Thermoelectricity:
- https://www.youtube.com/watch?v=2w7NBuu5w9c&list=PLtkeUZItwHK5y6qy1GFxa4Z4RcmzU aaz6 Thermoelecrtic generator and coolers: https://www.youtube.com/watch?v=NruYdb31xk88 7.
- Cryogenics: https://cevgroup.org/cryogenics-basics-applications/
- 8. Liquefaction of gases: https://www.youtube.com/watch?v=aMelwOsGpIs
- 10. Virtual lab: https://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham
- 11. Material Characterization: https://onlinecourses.nptel.ac.in/noc20 mm14/preview
- Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

http://nptel.ac.in

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- https://swayam.gov.in https://virtuallabs.merlot.org/vl_physics.
- htmlhttps://phet.colorado.edu https://www.myphysicslab.com

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Course Title: Course Code:	Engineering Physics for CV	Stream	
	22PHYC12/22	CIE Marks	50
Course Type (Theory/Practical)	Theory	SEE Marks	50
Teaching	a war in all stranger and a second	Total Marks	100
Hours/Week(L+T)	03	Exam Hours	03
Total Hours of Pedagogy	40 hrs	Credits	03

Course objectives

- To understand the types of oscillation, shock waves & its generation, and applications.
- To Study the elastic properties of materials and failures of engineering materials
- To Study the acoustics buildings.
- To understand the principles photonic devices and their application relevant to civil engineering.
- To understand the various natural disaster and safety.

Teaching-Learning Process

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes andmake Teaching -Learning more effective

- 1. Flipped Class
- 2. Smart Class Room
- 3. Blended Mode of Learning
- 4 Interactive Simulations and Animations
- 5. Assignments based learning
- NPTEL and Other Videos for theory topics 6.
- 7. Lab Experiment Videos

Module-1 (8 Hours)

Oscillations and Shock waves:

Oscillations: Simple Harmonic motion (SHM), differential equation for SHM & Numericals, series and parallel combination of springs (Derivation) & Numericals, Damped oscillations and equation of motion for damped oscillation (derivation), Tuned Mass Damper (TMD) (Qualitative), Forced oscillations and differential equation of forced oscillation (derivation), resonance, sharpness of resonance.

Shock waves: Mach number and Mach Angle, Mach Regimes, definition and characteristics of Shock waves, Construction and working of Reddy shock tube, Applications of Shock Waves in treatment of dry borewell. **Pre-requisites: Basics of Oscillations**

Self-learning: Simple Harmonic motion, differential equation for SHM

Module-2 (8 Hours)

Elasticity:

Elasticity, Types of stress and strain, Hooke's law & stress-strain diagram, Elastic Moduli & Numericals, Poisson's ratio, Failures of Engineering materials - ductile fracture, brittle fracture, Beams, bending moment of a beam (derivation), Cantilever and Young's modulus of a single cantilever (derivation) and its Engineering Application (Cantilever Bridge). Torsion of a cylinder (derivation) & Numericals, Pre requisites: Elasticity, Stress & Strain

Self-learning: Stress-Strain Curve

Module-3 (8 Hours)

Acoustics:

Introduction to acoustics, Types of Acoustics, reverberation and reverberation time & Numericals, absorption power and absorption coefficient, Requisites for acoustics in auditorium, Sabine's formula (derivation & numericals), Measurement of absorption coefficient, factors affecting the acoustics and remedial measures, Noise and its Measurements, Sound Insulation and its measurements. Impact of Noise in Multi-storied buildings Pre requisites: Basics of Sound, Waves & light properties Self-learning: Introduction to acoustics

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Module-4 (8 Hours)

LASER

Properties of a LASER Beam, Interaction of Radiation with Matter, LASER action, Population Inversion, Metastable State, Requisites of a LASER System, Types of Lasers, Gallium-Arsenide LASER construction and working, LASER in Surveying and Ranging, Bridge deflection, Road Profiling. Numerical Problems. **Optical Fiber** Principle and Construction of Optical Fibers, Acceptance angle and NA, Expression for NA(derivation & numericals), Modes of Propagation, Attenuation and Fiber Losses & Numericals, Fiber Optic Displacement Sensor. Pre requisite: Properties of light Self-learning: Propagation Mechanism & TIR in optical fiber Module-5 (8 Hours) Natural hazards and Safety: Introduction, Earthquake, (general characteristics, Physics of earthquake, Richter scale of measurement and earthquake resistant measures), Landslide (causes such as excess rain fall, geological structure, human excavation etc, types of land slide, adverse effects, engineering solution for land slides). Fire hazards and fire protection, fireproofing materials, fire safety regulations and firefighting equipment - Prevention and safety measures. Building materials - Composite materials (Polymer composites, Ceramic composites and Metal composites) Pre requisite: Oscillations Self-learning: Richter scale Course outcome (Course Skill Set) At the end of the course the student will be able to: Elucidate the concepts in oscillations & waves. CO1 Discuss concepts of elasticity and material failures. CO2 Summarize concepts of acoustics in buildings. CO3 Discuss the principles of Photonic devices and their applications relevant to civil engineering. CO4 Describe the various natural hazards and safety precautions. CO5 Assessment Details (both CIE and SEE) The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing marks for the CIE is 45% of the maximum marks (23 marks out of 50). The minimum passing marks for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum and total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together. Continuous Internal Evaluation(CIE): The CIE shall be conducted by the course teacher throughout the semester. The suggested components of CIE for The CIE marks for the theory component shall be 50 marks is as detailed below Three Tests each of 15 Marks; (Third test is improvement test). CIE will be conducted by the university as per scheduled time table with question papers for the subject (duration of 1 hour 15 minutes) Session wise assignments for 25 marks For Seminar and library work 05 marks Attendance 5 marks (95% to 100%), 04 marks (85% to 94%) Semester End Examination (SEE) Theory SEE will be conducted by University as per the scheduled time table, with question papers for the subject (duration 03 hours)

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50 marks.
- The question paper will have ten full questions carrying equal marks.
- Each full question carries 20 marks.

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SHARNBASVA UNIVERSITY DEPT OF PHYSICS

ENGINEERING PHYSICS SYLLABUS

- There will be two full questions (with a maximum of three 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 five full questions, selecting one full question from each module.

Suggested Learning Resources:

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

- 1. Materials Science and Engineering by R Balasubramaniam, second edition, Wiley India Pvt. Ltd. Ansari Road, Daryaganj, New Delhi-110002.
- 2. A text book of Engineering Physics by M .N. Avadhanulu, P G. Kshirsagar and T V S Arun Murthy, Eleventh edition, S Chand and Company Ltd. New Delhi-110055.
- 3. Engineering Physics by R. K. Gaur and S. L. Gupta, 2010 edition, Dhanpat Rai Publications Ltd., New Delhi-110002.
- 4. Building Science: Lighting and Accoustics, B. P. Singh and Devaraj Singh, Dhanpat Rai Publications (P) Ltc.,
- 5. Building Acoustics : Tor Eric Vigran, Taylor and Francis, 2008 Edition.
- 6. Photometry Radiometry and Measurements of Optical Losses, Micheal Bukshtab, Springer, 2nd edition.
- 7. Materials Science for Engineers by James F. Shackelford and Madanapalli K Muralidhara, sixth edition, PearsonEducation Asia Pvt. Ltd., New Delhi.
- 8. Lasers and Non Linear Optics, B B Loud, New Age Internationals, 2011 edition
- 9. Shock waves made simple by Chintoo S Kumar, K Takayama and K P J Reddy: Willey India Pvt. Ltd, Delhi 2014.
- 10. An Introduction to Disaster Management, Natural Disastr & Man Made Hazards, S. Vaidyanathan, IKON Books P
- 11. Natural Hazards, Edward Bryant, Cambridge University Press, 2nd Edition
- 12. Natural hazards, Earthquakes, Volcanoes, and landslides by Ramesh P Singh, and Darius Bartlett, CRC Press, Taylorand Francis group.
- 13. Principles of Fire Safety Engineering Understanding Fire & Fire Protection, Akhil Kumar Das, PHI Learning, IIEdition.
- 14. Disaster Management, R.Subramanaian, S.Chand Publishing, 2018.

Web links and Video Lectures (e-Resources):

Web links:

- 1. Simple Harmonic motion: <u>https://www.youtube.com/watch?v=k2FvSzWeVxQ</u>
- 2. Shock waves: https://physics.info/shock/
- 3. Shock waves and its applications: https://www.youtube.com/watch?v=tz_3M3v3kxk
- 4. Stress- strain curves: https://web.mit.edu/course/3/3.11/www/modules/ss.pdf
- 5. Stress curves: <u>https://www.youtube.com/watch?v=f08Y39UiC-o</u>
- 6. Oscillations and waves : https://openstax.org > books > college-physics-2e
- 7. Earthquakes: www.asc-india.org
- 8. Earthquakes and Hazards: http://quake.usgs.gov/tsunami
- 9. Landslide hazards: http://landslides.usgs.gov
- 10. Acoustics: https://www.youtube.com/watch?v=fHBPvMDFyO8

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

http://nptel.ac.in

https://swayam.gov.in

https://virtuallabs.merlot.org/vl_physics.

htmlhttps://phet.colorado.edu

https://www.myphysicslab.com



SHARNBASVA UNIVERSITY **DEPT OF PHYSICS**

Course Title:	ENGINEERI	NG PHYSICS LAB	
Course Code:	Engineering Physics Lab	(Common for all Branches/Stream	m)
Course Type	22PHYL18/28	CIE Marks	50
(Theory/Practical)	Practical	SEE Marks	50
Teaching Hours/Week		Total Marks	100
(Practical) Total Hours of Pedagogy	02	Exam Hours	02
Course ching	38 hrs	Credits	01

Course objectives

- To realize experimentally, the mechanical, electrical and thermal properties of materials, concept of waves and oscillations
- To design simple circuits and hence study the characteristics of semiconductor devices

List of Experiments

- 1. Determine Acceptance angle and Numerical aperture of an optical fiber.
- 2. Determine Wavelength of semiconductor laser using Laser diffraction by calculating grating constant.
- 3. Draw I-V characteristics of photodiode and calculate power responsivity.
- 4. Determination and Estimation of Fermi Energy of Copper.
- 5. Calculation of Dielectric constant by RC charging and Discharging.
- 6. Stefan's Law of radiation.
- 7. Determination of Planck's constant using Light Emitting Diodes.
- 8. Study of input and output Transistor characteristics and hence calculate input resistance, and . . output resistance.

9. n & I by Torsional pendulum (radius of the wire, mass and dimensions of the regular bodies to be given).

- 10. Young's modulus of a beam by Single Cantilever experiment.
- 11. Determination of spring constants in Series and Parallel combination.
- 12. Study Series and parallel LCR resonance and hence Calculate inductance, band width and quality factor using series LCR Resonance.
- 13. Young's modulus by uniform bending.

14. Study of I-V characteristics of Zener diode and determine the knee voltage and breakdown voltage.

Course Outcomes:

Upon completion of this course, students will be able to

- Apprehend the concepts of interference of light, diffraction of light, Fermi energy and magnetic effect of current
- Understand the principles of operations of optical fibers and semiconductor devices such as Photodiode, and NPN transistor using simple circuits
- Determine elastic moduli and moment of inertia of given materials with the help of suggested procedures
- Recognize the resonance concept and its practical applications
- Understand the importance of measurement procedure, honest recording and representing the data, reproduction of final results

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CIE for the practical component

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing marks for the CIE is 45% of the maximum marks (23 marks out of 50). The minimum passing marks for the SEE is 35% of the maximum marks (18 marks out of 50).

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

CIE for the practical component

- On completion of every experiment in the laboratory, the students shall be evaluated and marks shall be awarded on the same day.
- The 25 marks are for conducting the experiment and preparation of the laboratory record,10 marks for individual evaluation (which includes viva voce), (the average of total experiments}
- The 15 marks shall be for the test conducted at the end of the semester, for the subject (duration of 1 hour 15 minutes)

SEE for the practical component

- SEE marks for the practical course is 50 marks
- All laboratory experiments are to be included for the practical exam
- Break up marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners
- Students can pick one question (experiment) from the questions lot prepared by the examiners
- General rubrics suggested for SEE are mentioned here write up 15%, conduction procedure and result is 70% and viva voce 10% of maximum marks.
- Practical SEE will be conducted by University as per the scheduled time table, for the subject (duration 02 hours).

Web links and Video Lectures (e-Resources):

https://www.britannica.com/technology/laser,k https://nptel.ac.in/courses/115/102/115102124/ https://nptel.ac.in/courses/115/104/115104096/ http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html https://onlinecourses.nptel.ac.in/noc20_mm14/preview

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning :

- http://nptel.ac.in https://swayam.gov.in
- https://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham

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SHARNBASVA UNIVERSITY **DEPT OF PHYSICS** INTRODUCTION TO NANOTECHNOLOGY SYLLABUS

Course Title:	Introduction to Nano Technology							
Course Code:	22ETC15L	50						
Course Type (Theory/Practical)	Theory	SEE Marks	50					
		Total Marks	100					
Teaching Hours/Week(L+T)	02	Exam Hours	03					
Total Hours of Pedagogy	40 hrs	Credits	02					

Course objectives

- To provide a comprehensive overview of synthesis and characterization of nanoparticles, nanocomposites and hierarchical materials with nanoscale features.
- To provide the engineering students with necessary background for understanding various nanomaterials characterization techniques
- To develop an understanding of the basis of the choice of material for device applications
- To give an insight into complete systems where nanotechnology can be used to improve our everyday life

Teaching-Learning Process

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes andmake Teaching -Learning more effective

- Flipped Class 1.
- Smart Class Room 2.
- Blended Mode of Learning 3.
- Interactive Simulations and Animations 4.
- Assignments based learning 5.
- NPTEL and Other Videos for theory topics 6.
- Lab Experiment Videos 7

Module-1 (8 Hours)

Nanomaterials Introduction, classification, Frontier of future-an overview, Length Scales, Variation of physical properties from bulk to thin films to nanomaterials, Confinement of electron in 0D, 1D, 2D and 3D systems, Surface to Volume Ratio, Synthesis of Nanomaterials: Bottom-Up approach: Chemical Routes for Synthesis of nanomaterials-Sol-gel, Precipitation, Solution Combustion synthesis, Hydrothermal, SILAR, Chemical Bath

Deposition. Top-Down

approach- Ball milling technique, Sputtering, Laser Ablation Module-2 (8 Hours)

Characterization of Nanomaterials

Basic principles, construction and working instrumentations of Electron Microscopy -- Transmission Electron Microscope, Scanning Electron Microscope, Scanning Probes- Scanning Tunneling microscope, Atomic

new?

SHARNBASVA UNIVERSITY DEPT OF PHYSICS INTRODUCTION TO NANOTECHNOLOGY SYLLABUS

Basic principles of working of X-ray diffraction, derivation of Debye-Scherrer equation, numericals on Scherrer equation, Optical Spectroscopy- Instrumentation and application of IR, UV/VIS (Band gap

Carbon Based Materials

Module-3 (8 Hours)

Introduction, Synthesis, Properties (electrical, Electronic and Mechanical), and Applications of Graphene, SWCNT, MWCNT, Fullerenes and other Carbon Materials: Carbon nanocomposites, nanofibres, nanodiscs, nanodiamonds.

Module-4 (8 Hours)

Nanotechnology in Energy storage and conversion

Solar cells: First generation, Second generation and third generation solar cells: Construction and working of Dye sensitized and Quantum dot sensitized solar cells.

Batteries: Nanotechnology in Lithium ion battery- working, Requirements of anodic and cathodic materials, classification based on ion storage mechanisms, limitations of graphite anodes, Advances in Cathodic materials, Anodic materials, Separators

Fuel Cells: Introduction, construction, working of fuel cells and nanotechnology in hydrogen storage and proton exchange membranes

Applications of Nanotechnology

Module-5 (8 Hours)

Nanotech Applications and Recent Breakthroughs: Introduction, Significant Impact of Nanotechnology and Nanomaterial, Medicine and Healthcare Applications, Biological and Biochemical Applications (Nano biotechnology), Electronic Applications (Nano electronics), Computing Applications (Nano computers), Chemical Applications (Nano chemistry), Optical Applications (Nano photonics), Agriculture and Food Applications, Recent Major Breakthroughs in Nanotechnology.

Course outcome (Course Skill Set)

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

-	Sugge	sted Learning Resources:	-
the states and	CO5	Assess the suitability of nanomaterials for various device applications. [L4]	
and a state of the second	CO4	Classify the nanomaterials based on the dimensions. [L3]	19
Sector Sector	CO3	Discuss the application of nanotechnology to mechanical and civil domains [L2]	1-1-1- 8-04
All and a state of the	CO2	Explain working of basic instruments used in characterization of nanoparticles. [L2]	
-	CO1	Demonstrate the synthesis of nanoparticles by various techniques. [L2]	
£.			

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

1. Nano Materials - A.K. Bandyopadhyay/ New Age Publishers

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SHARNBASVA UNIVERSITY DEPT OF PHYSICS INTRODUCTION TO NANOTECHNOLOGY SYLLABUS

2. Nan	ocrystals: Synthesis, Properties and Applications - C.N.R. Rao, P. John Thomas and G. U. Kulkarni,
Spr	inger Series in Materials Science
 Nat 4. Pet 	no Essentials- T. Pradeep/TMH er J. F. Harris, Carbon nanotube science: synthesis, properties, and applications. Cambridge
Un	iversity Press, 2011
Referen	A. Shah, K.A. Shah, "Nanotechnology" The Lemma of the publisher/Edition and Year) ace Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)
1. Introd	duction to Nanotechnology, C. P. Poole and F. J. Owens, whey, 2005
2 Unde	erstanding Nanotechnology, Scientific American 2002
	otechnology, M. Ratner and D. Ratner, Prentice Hall 2003 otechnology, M. Wildon, K. Kannagara, G. Smith, M. Simmons and B. Raguse, CRC Press Boca Raton
2002	2 and reactions on Lision batteries, solar cells and fuel cells
Web lin	hks and Video Lectures (e-Resources):
1. 2. 3.	https://nptel.ac.in/courses/118104008 https://www.digimat.in/nptel/courses/video/118104008/L16.html https://archive.nptel.ac.in/courses/113/106/113106099/
3. 4. 5.	https://nptel.ac.in/courses/112107283 https://onlinecourses.nptel.ac.in/noc22_me131/preview
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22	Physics for MES		3	10 A 10 T 1	2	0	3+2	50	50	100	4
	Physics for EES	Physics	3		0	0	3	50	50	100	3
23	Elements of Mechanical Engg (for				0	0	3	50	50	100	3
3	Mech & Energy Engg. only) Basic Electrical Engineering (for EEE	Civil Engg	3 or 2 (for integrated) 0				3 or 3+2	50	50	100	3
66) 	only)	EEE	3 or 2 (for integrated) 0				3 or 3+2	50	. 50	100	3
	Basic Electronics (for ECE only)	ECE	3 or 2 (for integrated) 0				3 or 3+2	50	50		10
	Engineering Science Course-II	Respective Dept.	2		0	0	3 or 3+2	50	50	100	3
15100	Emerging Technology Course-II/ Programming Language Course-II	Any Engg. Dept./ Any Dept.	3 or 2 (for integrated) 0				3 or 3+2	50	50 50	100 100	2
	Ability Enhancement Course-II	Any Dept.	1 hour the		d.				00	100	3
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		22PHYS12	Physics for CSS	Physics	3		0	0	3	50	50	100	4
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4	ESC-OE		LSS	CSE/AI&ML/ AI&DS	3 or 2 (for integrated)		0	3 or 3+2 5				3	
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6	AEC-OE	22AEC16X	Ability Enhancement Course-I	Any Dept.	1 hour theory or 2 hours tutorial /practice/activities or any other combinations of all of them.			18 - y	1 or 2	2 50	50	100	3
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Phone / Fax No. 08472-277852, 277853, 277854, 277855 www.sharnbasvauniversity.edu.in - email : Sharnbasvauniversity@gmail.com UGC Status: Letter No. F,8-29/2017(CPP-I/PU), Dated 20 Dec. 2017. Enlisted by the University Grants Commission, New Delhi, in the list of Private Universities in India. A Private University enacted by Govt. of Kamataka as "Shambasva University Act. 2012" Kamataka Act No. 17 of 2013. Notification No. ED 144 URC 2016 dated 29/07/2017

Dr. Niranjan V. Nisty M.D., Ph.D., Vice-Chancellor

Sri N.S. Devarkal Pro Vice-Chancellor

Dr. V. D. Mytri Pro Vice-Chancellor

Dr. Anilkumar Bidve Registrar : Cell : 6362910165

Dr. Basavaraj S. Mathapati Registrar (Eval) : Cell : 9448650187

Dr. Lakshmi Patil Dean : Cell : 6362910168

Prof. Kiran Maka M.Tech.(Ph.D.) Finance Officer : Cell : 9632294958

Faculty of Engg. & Tech. B.Tech

- 1. Electronics & Comm. Engineering
- 2. Electrical & Elcetronics Engineering
- 3. Computer Science & Engineering
- 4. Civil Engineering 5. Mechanical Engineering
- 6. Energy Engineering
- 7. Artifical Intelligence (AI) & Data Science
- M.Tech
- 1. Computer Science & Engineering 2. Computer Network & Engineering
- 3. Digital Electronics
- 4. VLSI & Embedded Systems
- 5. Machine Design Engineering
- 6. Structural Engineering
- 7. Artifical Intelligence & Data Science Faculty of Engg & Tech (Exclusively for Women)
- B.Tech.
- 1. Electronics & Comm. Engineering 2. Electrical & Electronics Engineering
- 3. Computer Science & Engineering
- 4. Civil Engineering
- 5. Artifical Intelligence & Machine Learning M.Tech.
- 1. Computer Science & Engineering
- 2. Digital Comm. & Network

Faculty of Architecture

- 1. B. Arch:Bachelor of Architecture
- Faculty of Business Studies
- 1. BBA- HR, Marketing, Finance
- 2. BBA- Tourism & Travel Mgmt.
- 3. BBA Logistics
- 4. MBA- HR, Marketing, Finance 5. MBA-Hospital Management
- 6. MBA- Tourism & Travel Mgmt
- 7. M.Com.
- (Exclusively for Women)
- 1. MBA-HR, Marketing, Finance
- 2. BBA-HR, Marketing, Finance
- 3. BBA-Aviation Services & Air Cargo Faculty of Social Science
- 1. M.A. Journalism & Mass Comm
- Faculty of Science & Tech.
- 1. M.Sc. Physics 2. M.Sc. Maths 3. M.Sc. Zoology 4. M.Sc. Botany
- Faculty of Computer Application
- 1. MCA 2. BCA
- (Exclusively for Women) 1. BCA
- Faculty of Fine Art
- 1. M.A. Visual Arts
- Faculty of Music
- 1. M.A. Music
- Faculty of Languages 1. M.A. Kannada 2. M.A. English
- Proposed Programes
- 1. M.Sc. Data Science 2. M.Sc./M.A. Yoga
- 3. M.A. Sanskrit

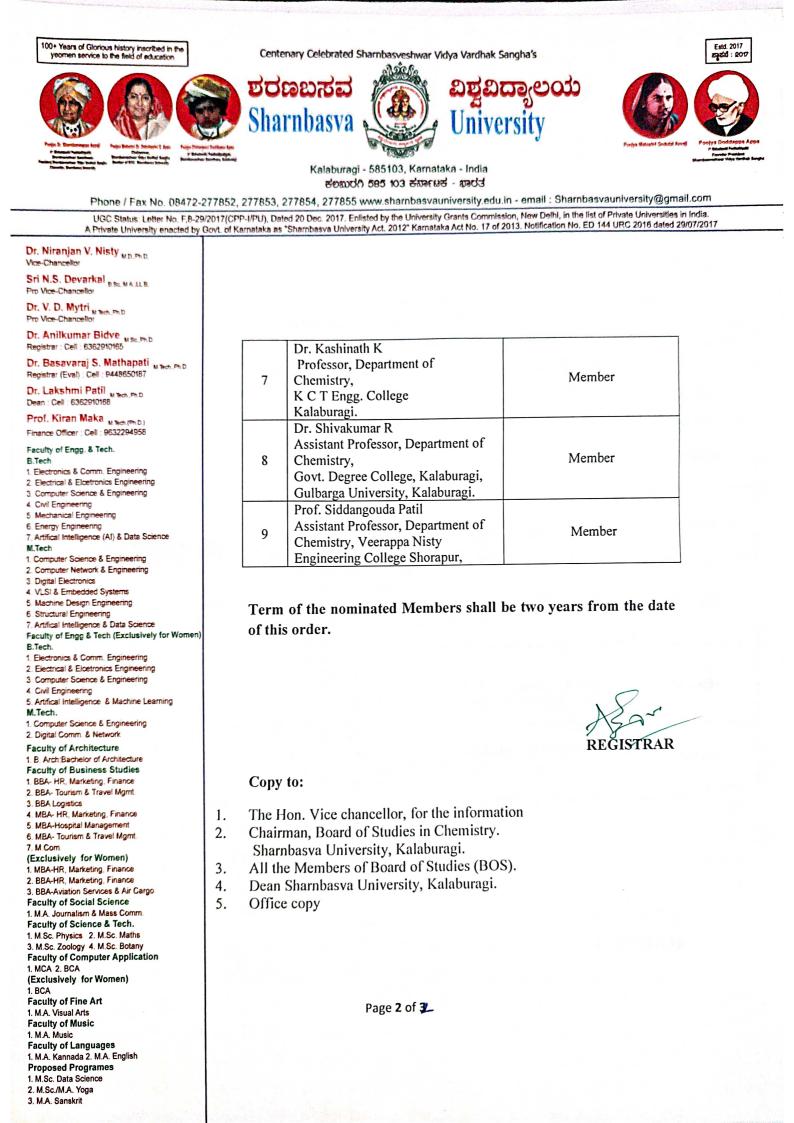
Date: 05-11-2022

CONSTITUTION OF BOARD OF STUDIES IN CHEMISTRY

Reference: 1. Hon. Vice Chancellor's approval dated 04/11/2022 With reference to the above cited subject and references, the Board of Studies in Mathematics for the period of two academic years i.e. 2022-2023 and 2023-2024 has been constituted as below.

SI. No.	Name and address of the Member	Appointed As		
	Dr.Nirdosh Patil			
	Professor and Chairman,			
1	B.Tech (Co-Ed)	Chairman		
	Dept. of Chemistry,			
	Sharnbasva University. Kalaburagi			
	Internal Members			
	Dr. Parvati S G			
2	Associate Professor, Department of Chemistry,	Member		
2	B.Tech (Co-Ed)	1,10,110,01		
	Sharnbasva University. Kalaburagi			
	Dr. Shweta Patil			
3	Associate Professor, Department of Chemistry,	Member		
5	B.Tech (Co-Ed)			
	Sharnbasva University. Kalaburagi			
4	Prof Anita R H Assistant Professor, Dept. of Chemistry,			
	B.Tech (Ex-Women)	Member		
	Sharnbasva University. Kalaburagi			
	Prof Sangeeta Aland			
	Assistant Professor, Dept. of Chemistry,	Member		
5	B.Tech (Ex-Women)	Wiember		
	Sharnbasva University. Kalaburagi			
	External Members			
	Dr. R S Malipatil			
	Associate Professor, Department of Chemistry,	Member		
6	Poojya Doddappa Appa College of Engineering,	wiennoer		
	Kalaburagi.			

Page 1 of 2





Kalaburagi - 585103, Karnataka - India ਜ਼ਰੂਆਰੀ 585 103 ਚਨਾਜ਼ਬਰ - ਬਾਹਤ

Phone / Fax No. 08472-277852, 277853, 277854, 277855 www.sharnbasvauniversity.edu.in - email : Sharnbasvauniversity@gmail.com UGC Status: Letter No. F,8-29/2017(CPP-I/PU), Dated 20 Dec. 2017. Enlisted by the University Grants Commission, New Delhi, in the list of Private Universities in India. A Private University enacted by Govt. of Kamataka as "Shambasva University Act. 2012" Kamataka Act No. 17 of 2013. Notification No. ED 144 URC 2016 dated 29/07/2017

Dr. Niranjan V. Nisty M.D., Ph.D., Vice-Chancellor

Sri N.S. Devarkal BSC, MA, LLB, Pro Vice-Chancellor

Dr. V. D. Mytri M. Tech. Ph. D Pro Vice-Chancellor

Dr. Anilkumar Bidve Registrar : Cell : 6362910165

Dr. Basavaraj S. Mathapati M. Tech., Ph. D Registrar (Eval) : Cell : 9448650187

Dr. Lakshmi Patil M.Tech., Ph.D. Dean : Cell : 6362910168

Prof. Kiran Maka M. Tech. (Ph.D.) Finance Officer : Cell : 9632294958

Faculty of Engg. & Tech. B.Tech

- 1. Electronics & Comm. Engineering
- 2. Electrical & Electronics Engineering 3. Computer Science & Engineering
- 4. Civil Engineering
- 5. Mechanical Engineering
- 6. Energy Engineering
- 7. Artifical Intelligence (AI) & Data Science M.Tech
- 1. Computer Science & Engineering
- 2. Computer Network & Engineering
- 3. Digital Electronics 4. VLSI & Embedded Systems
- 5. Machine Design Engineering
- 6. Structural Engineering
- 7. Artifical Intelligence & Data Science Faculty of Engg & Tech (Exclusively for Women)
- B.Tech. 1. Electronics & Comm. Engineering
- 2. Electrical & Electronics Engineering
- 3. Computer Science & Engineering
- 4. Civil Engineering
- 5. Artifical Intelligence & Machine Learning M.Tech.
- 1. Computer Science & Engineering
- 2. Digital Comm. & Network
- Faculty of Architecture
- 1. B. Arch:Bachelor of Architecture
- Faculty of Business Studies
- 1. BBA- HR, Marketing, Finance 2. BBA- Tourism & Travel Mgmt.
- 3. BBA Logistics
- 4. MBA- HR, Marketing, Finance
- 5. MBA-Hospital Management 6. MBA- Tourism & Travel Mgmt
- MBA- Tourism & Travel Mgi
 M.Com.
- (Exclusively for Women)
- 1. MBA-HR, Marketing, Finance
- 2. BBA-HR, Marketing, Finance 3. BBA-Aviation Services & Air Cargo
- Faculty of Social Science
- 1. M.A. Journalism & Mass Comm
- Faculty of Science & Tech.
- 1. M.Sc. Physics 2. M.Sc. Maths
- 3. M.Sc. Zoology 4. M.Sc. Botany
- Faculty of Computer Application
- 1. MCA 2. BCA
- (Exclusively for Women) 1. BCA
- Faculty of Fine Art 1. M.A. Visual Arts
- Faculty of Music
- 1. M.A. Music Faculty of Languages
- 1. M.A. Kannada 2. M.A. English Proposed Programes 1. M.Sc. Data Science
- 1. M.Sc. Data Scien 2. M.Sc./M.A. Yoga
- 3. M.A. Sanskrit

Board of Studies Members Sub Committee-I in Chemistry For Circuit Branches [ECE, EEE, CSE and AI&DS]

SI.	Name and address of the Member	Appointed As
No.		
1	Prof. Ambresh Reddy Assistant Professor, Dept. of Chemistry, Faculty of Engineering and Technology(Co-ed), Sharnbasva University, Kalaburagi.	Member
2	Prof. Earamma Patil Assistant Professor, Department of Chemistyr, Faculty of Engineering and Technology (Co-ed) Sharnbasva University, Kalaburagi.	Member
3	Dr. Nagabhushan Patil Professor, Department of Electrical and Electronics Engineering, Faculty of Engineering and Technology (Co- ed)Sharnbasva University, Kalaburagi.	Member
4	Dr. ShashidharSonnad Professor & Chairman Deparment of Electronics & Communication Engg, Faculty of Engineering and Technology(Co-ed), Sharnbasva University, Kalaburagi.	Member
5	Dr. SujataMallapur Professor & Chairman, Dept. of Artificial Intelligence and Machine Learning, Faculty of Engineering and Technology (Exclusively for Women), Sharnbasva University, Kalaburagi	Member
6	Dr. SachinVeershetty Associate Professor, Dept. of Computer Science & Engineering, Faculty of Engineering and Technology(Co-ed), Sharnbasva University, Kalaburagi.	Member

Term of the nominated Members shall be two years from the date of this order.

Copy to:

1. Chairman, Board of Studies UG in Chemistry.

- 2. All the Members of Board of Studies (BOS).
- 3. Dean, Sharnbasva University, Kalaburagi.

4. Office copy.

REGÍSTRAR

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Kalaburagi - 585103, Karnataka - India ಕ್ಷಣವಾರಗಿ 585 103 ಕರ್ನಾಟಕ - **ಭಾರತ**

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- M.Tech.
- 1. Computer Science & Engineering
- 2. Digital Comm. & Network
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- 7. M.Com
- (Exclusively for Women)
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- Faculty of Social Science 1. M.A. Journalism & Mass Comm
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- 1. M.Sc. Physics 2. M.Sc. Maths
- 3. M.Sc. Zoology 4. M.Sc. Botany **Faculty of Computer Application**
- 1. MCA 2. BCA
- (Exclusively for Women)
- 1. BCA Faculty of Fine Art
- 1. M.A. Visual Arts
- Faculty of Music
- 1. M.A. Music
- **Faculty of Languages** 1. M.A. Kannada 2. M.A. English
- **Proposed Programes** 1 M Sc. Data Science
- 2. M.Sc./M.A. Yoga 3. M.A. Sanskrit

- Sharnbasva University, Kalaburagi. Dr. S. S. Awanti Professor, Dept. of Civil Engineering,
- 4 Faculty of Engineering and Technology(Co-ed), Sharnbasva University, Kalaburagi.

Term of the nominated Members shall be two years from the date of this order.

Board of Studies Members Sub Committee-II in Chemistry

Name and address of the Member

For Non- Circuit Branches [Energy Engg, Mech and Civil]

Faculty of Engineering and Technology(Co-ed),

Assistant Professor, Department of Chemistyr,

Faculty of Engineering and Technology (Co-ed)

Faculty of Engineering and Technology(Co-ed),

Professor & Chairman, Dept. of Energy Engineering,

Assistant Professor, Dept. of Chemistry,

Sharnbasva University, Kalaburagi.

Sharnbasva University, Kalaburagi.

Prof. Earamma Patil

Dr. Basavaraj Srigiri

Copy to:

Sl. No.

1

2

3

Prof. Neha B

- Chairman, Board of Studies UG in Chemistry. 1.
- All the Members of Board of Studies (BOS). 2.
- 3. Dean, Sharnbasva University, Kalaburagi.
- 4. Office copy.

REGISTRAR

Appointed As

Member

Member

Member

Member

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SHARNBASVA UNIVERSITY Mechanical Engineering and Allied branches (Chemistry group)

	Applied Chemistry for Mec Engineering stream		
Course Code:		IE Marks	50
		EE Marks	50
Course Type	Theory	Total	
		Marks	100
Too shine Herry (MALes)	2	Exam	0.0
Teaching Hours/Week (L/T)	3	Hours	03
Total Hours of Pedagogy	40 hours	Credits	03
Course objectives			
 applications. To develop an intuitive undebranches of engineering. To provide students with a students with a student stude	re knowledge on principles of chem erstanding of chemistry by emphasi solid foundation in analytical reason	zing the rel	ated
societal problems.	y	8 1	
 Parious course outcomes and make Flipped class Smart class room Bended mode of leaning Interactive simulations and a Tutorial & remedial classes for Conducting Makeup classes Demonstration of concepts ei 	or needy students (not regular T/R) ther by building models or by indust shall be executed in blended mode (line courses	try visit	
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Metal finishing: Introduction, technological importance. Electroplating:

1. NOTE: Wherever the contact hours are not sufficient, tutorial hours can be converted to theory hours.

Electroplating of chromium (hard). Electroless plating: Introduction, electroless plating of

Module-3: Macromolecules for Engineering Applications (8 hr) Polymers:

Introduction, type of polymerization with examples condensation), molecular weight of polymers, numerical problems. Synthesis, properties and engineering applications of polyethylene (PE) and polyvinyl chloride (PVC). Fibers: Synthesis, properties and applications of Kevlar and nylon fibers.

Plastics: Introduction, synthesis, properties and industrial applications of poly(methyl methacrylate) (PMMA) and Teflon.

Polymer composites: Introduction, properties and applications of fiber reinforced polymers composites (FRPC),

Module-4: Phase Rule and Analytical Techniques (8 hr)

Phase rule: Introduction, Definition of terms: phase, components, degree of freedom, phase rule equation. Phase diagram: One component (water system) .

Analytical techniques: Introduction, principle, instrumentation of potentiometric sensors; its application in the estimation of iron, Optical sensors (colorimetry); its application in the estimation of the copper, pH-sensor (Glass electrode); its application in the determination of pH of beverages.

Module-5: Materials for Engineering Applications (8 hr)

Metals and Alloys: Introduction, Properties and application of Iron and its alloys, Ceramics: Introduction, classification based on chemical composition, properties and applications of perovskites (CaTiO₃).

Nanochemistry: Introduction, size-dependent properties of nanomaterial (surface area and catalytical), synthesis of nanoparticles by sol-gel, and precipitation method. Nanomaterials: Introduction, properties and engineering applications of carbon nanotubes and graphene.

Cours	se outcome (Course Skill Set): At the end of the course, the student will be able to:
CO1.	Identify the terms and Processes involved in scientific and engineering
CO2.	Explain the phenomena of chemistry to describe the methods of engineering Processes
CO3.	Solve the problems in chemistry that are pertinent in engineering applications
CO4.	Apply the basic concepts of chemistry to explain the chemical properties and Processes
CO5.	Analyze properties and Processes associated with chemical substances in multidisciplinary situations

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Assessment Details (both CIE and SEE)

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing marks for the CIE is 45% of the maximum marks (23 marks is 50%). marks (23 marks out of 50). The minimum passing marks for the CIE is 4576 of the SEE is 35% of the maximum marks (18 marks out of 50).

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

Continuous Internal Evaluation(CIE):

The CIE shall be conducted by the course teacher throughout the semester. The suggested components of CIE for Theory course are

- The CIE marks for the theory component shall be 50 marks is as detailed below .
 - Three Tests each of 15 Marks; (Third test is improvement test).
 - CIE will be conducted by the university as per scheduled time table with question • papers for the subject (duration of 1 hour 15 minutes)
 - Session wise assignments for 25 marks
 - For Seminar and library work 05 marks ۲
 - Attendance 5 marks (95% to 100%), 04 marks (85% to 94%)

Semester End Examination (SEE)

- 1. Theory SEE will be conducted by University as per the scheduled time table, with question papers for the subject (duration 03 hours)
- 2. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50 marks.
- 3. The question paper will have ten full questions carrying equal marks.
- 4. Each full question carries 20 marks.
- 5. There will be two full questions (with a maximum of three sub questions) from each module
- 6. Each full question will have sub questions covering all the topics under a module.
- 7. The students will have to answer five full questions, selecting one full question from each module.

Suggested Learning Resources:

- 1.
- Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)
- Wiley Engineering Chemistry, Wiley India Pvt. Ltd. New Delhi, 2013- 2nd Edition.
- Engineering Chemistry, Satyaprakash & Manisha Agrawal, Khanna Book Publishing, Delhi
 A Toyt Pool of P 3. A Text Book of Engg. Chemistry, Shashi Chawla, Dhanpat Rai & Co. (P) Ltd.
- 4. Essentials of Physical Chemistry, Bahl&Tuli, S.Chand Publishing
- 5. Applied Chemistry, Sunita Rattan, Kataria 5. Engineering Chemistry, Baskar, Wiley
- 6. Engineering Chemistry I, D. Grour Krishana, Vikas Publishing 7. A Text book of Engineering Chemistry, SS Dara & Dr. SS Umare, S Chand & Company Ltd., 12th
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- 13. OLED Display Fundamentals and Applications, Takatoshi Tsujimura, Wiley-Blackwell, 2012
- 14. Supercapacitors: Materials, Systems, and Applications, Max Lu, Francois Beguin, Elzbieta Frackowiak, Wiley-VCH; 1st edition, 2013.
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	COs and POs Mapping (Individual teacher has to fill up)
	<u>https://interestingengineering.com/science</u>
	<u>https://demonstrations.wolfram.com/topics.php</u>
	<u>https://www.vlab.co.in/broad-area-chemical-sciences</u>
Act	tivity Based Learning (Suggested Activities in Class)/ Practical Based learning
	<u>https://www.youtube.com/watch?v=wRAo-M8xBHM</u>
	<u>https://www.youtube.com/watch?v=1xWBPZnEJk8</u>
	 <u>https://www.youtube.com/watch?v=X9GHBdyYcyo</u>
	 https://www.youtube.com/watch?v=j5Hml6KN4TI
	<u>9IbHrDMjHWWh</u>
	 <u>https://www.youtube.com/watch?v=TBqXMWaxZYM&list=PLyhmwFtznRhuz8L1bb3X-</u>
	 https://www.youtube.com/watch?v=faESCxAWR9k
	• <u>https://ndl.iitkgp.ac.in/</u>
	• https://nptel.ac.in/courses/104/103/104103019/
	 https://nptel.ac.in/downloads/122101001/
	<u>http://libgen.rs/</u>
We	eb links and Video Lectures (e-Resources):
29.	Laboratory Manual Engg. Chemistry, Anupma Rajput, Dhanpat Rai & Co.
	Chemistry of Engineering materials, Malini S, K S Anantha Raju, CBS publishers Pvt Ltd.,
	Reprint, 2015.
27.	"Engineering Chemistry", O. G. Palanna, Tata McGraw Hill Education Pvt. Ltd. New Delhi, Fourth
	Chemistry for Engineering Students, B. S. Jai Prakash, R. Venugopal, Sivakumaraiah & Pushpa Iyengar., Subash Publications, 5th Edition, 2014
26.	Principles of nanotechnology, Phanikumar, Scitech publications, 2 nd Edition, 2010.
25.	Principles of papotochnology Planting
⊷ .T,	Nanotechnology Principles and Practices, Sulabha K Kulkarni, Capital Publishing Company, 3 rd
24	Nanotocha-la a si
-0.	Nanostructured materials and nanotechnology, Hari Singh, Nalwa, academic press, 1 st Edition, 2002.
22	Polymer Science, V R Gowariker, N V Viswanathan, Jayadev, Sreedhar, Newage Int. Publishers, 4th Edition, 2021 Engineering Chemistry, N P Viswanathan, Jayadev, Sreedhar, Newage Int. Publishers,
21.	Ath Edition
21	Principles of Instrumental Analysis, Douglas A. Skoog, F. James Holler, Stanley R. Crouch Seventh Edition, Cengage Learning, 2020 Polymer Science, V. R. Gowarika, and Dr. L. Sathiyanarayanan, Nirali
20.	Frinciples of Instrumental Analysis Davelant and
	Takaslian 2020
19.	High Performance Metallic Materials for Cost Sensitive Applications, F. H. Froes, et al. John Wiley & Sons, 2010 Instrumental Methods of Analysis, Dr. K. R. Mahadik and Dr. L. Sathiyanarayanan, Nirali Prakashan, 2020
	& Sons, 2010
18.	High Performance Metallic Material C
05	Bengaluru, ISBN 978-93-85155-70-3, 2022 High Performance Metallic M

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SHARNBASVA UNIVERSITY

Electrical & Electronics Engineering and Allied branches (Chemistry group)

Course Code: 22CHEE12/22 CIE Marks 5 Course Type (Theory) Total Marks 10 Teaching Hours/Week (L/T) 3 Exam Hours 0 Total Hours of Pedagogy 40 hours Credits 0 Total Hours of Pedagogy 40 hours Credits 0 Total Hours of Pedagogy 40 hours Credits 0 Course objectives To enable students to acquire knowledge on principles of chemistry for engineer applications. To develop an intuitive understanding of chemistry by emphasizing the related branches of engineering. To provide students with a solid foundation in analytical reasoning required to s societal problems. Teaching-Learning Process These are samples trategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching-Learning more effective Flipped class Smart class room Bended mode of leaning Interactive simulations and animation Tutorial & remedial classes for needy students (not regular T/R) Conducting Makeup classes Demonstration of concepts either by building models or by industry visit Experiments in laboratories shall be executed in blended mode (conventional or r conventional methods) Use of ICT - Online videos, online courses Daily learn	Course Title:	Chemistry for Electrica Engineering stream	l and Electronics	5
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1. NOTE: Wherever the contact hours is not sufficient, tutorial hour can be converted to theory hours

polymer electrolyte membrane (PEM) fuel cell.

Sensors: Introduction, working principle and applications of Conductometric sensors, Electrochemical sensors, Thermometric sensors, and Optical sensors. Sensors for the measurement of dissolved oxygen (DO). Electrochemical gas sensors for SOx and NOx.

MODULE 3: Corrosion Science and Energy Conversion Systems(8hr)

Corrosion Chemistry: Introduction, electrochemical theory of corrosion, types of corrosion-differential metal and differential aeration. Corrosion control - galvanization, anodization and sacrificial anode method. Corrosion Penetration Rate (CPR) - Introduction and numerical problem.

Electrode System: Introduction, types of electrodes. Ion selective electrode – definition, construction, working and applications of glass electrode. Determination of pH using glass electrode. Reference electrode - Introduction, calomel electrode – construction, working and applications of calomel electrode. Concentration cell– Definition, construction and Numerical problems.

Solar Energy: Introduction, importance of solar PV cell, construction and working of solar PV cell, advantages and disadvantages.

MODULE 4: Display and Memory Systems (8hr)

Display Systems: Photoactive and electroactive materials, Nanomaterials and organic materials used in optoelectronic devices. Liquid crystals (LC's) - Introduction, classification, properties and application in Liquid Crystal Displays (LCD's). Properties and application of Organic Light Emitting Diodes (OLED's) and Quantum Light Emitting Diodes (QLED's), Light emitting electrochemical cells.

Memory: Introduction, Basic concepts of electronic memory, History of organic/polymer electronic memory devices, Classification of electronic memory devices, types of organic memory devices (organic molecules, polymeric materials, organic-inorganic hybrid materials).

MODULE 5: Nanomaterials, E-Waste Management and Analytical Techniques (8hr)

Nanomaterials : Introduction, size dependent properties of nanomaterials (surface area, catalytic and electrical), preparation of NPs by sol-gel and precipitation methods

E-Waste: Introduction, sources of e-waste, Composition, Characteristics, and Need of ewaste management. Toxic materials used in manufacturing electronic and electrical products, health hazards due to exposure to e-waste. Recycling and Recovery: Different approaches of recycling (separation, thermal treatment)

Analytical Techniques: Introduction, principle and instrumentation of Colorimetric sensors; its application in the estimation of copper, Potentiometric sensors; its application in the estimation of iron.

 Course outcome (Course Skill Set) At the end of the course the student will be able to: Identify the terms and processes involved in scientific and engineering Processes Explain the phenomena of chemistry to describe the methods of engineering Processes CO3. Solve for the problems in chemistry that are pertinent in engineering applications Processes Apply the basic concepts of chemistry to explain the chemical properties and Processes Analyze properties and processes associated with chemical substances in multidisciplinary situations Assessment Details (Doth CIE and SEE) 	Identify the terms and processes involved in scientific and engineering Explain the phenomena of chemistry to describe the methods of engineering Processes Solve for the problems in chemistry that are pertinent in engineering applications Apply the basic concepts of chemistry to explain the chemical properties and processes Analyze properties and processes associated with chemical substances in multidisciplinary situations Assessment Details (both CIE and SEE) The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing marks for the CIE is 45% of the maximum marks (23 marks out of 50).
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 The question paper will have ten full questions carrying equal marks. Each full question carries 20 marks. There will be two full questions (with a maximum of three 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 five full questions selecting one full a student. 	
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 5. There will be two full questions (with a maximum of three sub questions) from each module 6. Each full question will have sub questions covering all the topics under a module. 7. The students will have to answer five full questions selecting one full a student. 	
 There will be two full questions (with a maximum of three 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 five full questions, selecting and full and the sub questions. 	20 Each run guestion carries 20 marks
6. Each full question will have sub questions covering all the topics under a module.7. The students will have to answer five full questions, selecting one full and the selecting one full and t	5. There will be two full questions (with a maximum of three sub questions) from a l
students will have to answer five full questions selecting one full	
and students will have to answer five full questions selecting one full	7. The student will have sub questions covering all the topics under a module.
each module.	students will have to answer five full questions, selecting one full
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Suggested Learning Resources:

- Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)
- 1. Wiley Engineering Chemistry, Wiley India Pvt. Ltd. New Delhi, 2013- 2nd Edition.
- 2. Engineering Chemistry, Satyaprakash & Manisha Agrawal, Khanna Book Publishing, Delhi
- 3. A Text Book of Engg. Chemistry, Shashi Chawla, Dhanpat Rai & Co. (P) Ltd. 4. Essentials of Physical Chemistry, Bahl&Tuli, S.Chand Publishing
- 5. Applied Chemistry, Sunita Rattan, Kataria 5. Engineering Chemistry, Baskar, Wiley 6. Engineering Chemistry – I, D. GrourKrishana, Vikas Publishing
- 7. A Text book of Engineering Chemistry, SS Dara & Dr. SS Umare, S Chand & Company Ltd.,
- 8. A Text Book of Engineering Chemistry, R.V. Gadag and Nityananda Shetty, I. K. International
- Publishing house. 2nd Edition, 2016.
- 9. Text Book of Polymer Science, F.W. Billmeyer, John Wiley & Sons, 4th Edition, 1999.
- 10. Nanotechnology A Chemical Approach to Nanomaterials, G.A. Ozin& A.C. Arsenault, RSC Publishing, 2005.
- 11. Corrosion Engineering, M. G. Fontana, N. D. Greene, McGraw Hill Publications, New York, 3rd Edition, 1996.
- 12. Linden's Handbook of Batteries, Kirby W. Beard, Fifth Edition, McGraw Hill, 2019.
- 13. OLED Display Fundamentals and Applications, TakatoshiTsujimura, Wiley-Blackwell, 2012
- 14. Supercapacitors: Materials, Systems, and Applications, Max Lu, Francois Beguin, ElzbietaFrackowiak, Wiley-VCH; 1st edition, 2013.
- 15. "Handbook on Electroplating with Manufacture of Electrochemicals", ASIA PACIFIC BUSINESS PRESS Inc., 2017. Dr. H. Panda,
- 16. Expanding the Vision of Sensor Materials. National Research Council 1995, Washington, DC: The

National Academies Press. doi: 10.17226/4782.

- 17. Engineering Chemistry, Edited by Dr. Mahesh B and Dr. Roopashree B, Sunstar Publisher, Bengaluru, ISBN 978-93-85155-70-3, 2022
- 18. High Performance Metallic Materials for Cost Sensitive Applications, F. H. Froes, et al. John Wiley & Sons, 2010
- 19. Instrumental Methods of Analysis, Dr. K. R. Mahadik and Dr. L. Sathiyanarayanan, NiraliPrakashan, 2020
- 20. Principles of Instrumental Analysis, Douglas A. Skoog, F. James Holler, Stanley R. Crouch Seventh Edition, Cengage Learning, 2020
- 21. Polymer Science, V R Gowariker, N V Viswanathan, Jayadev, Sreedhar, Newage Int. Publishers, 4th Edition, 2021
- 22. Engineering Chemistry, P C Jain & Monica Jain, Dhanpat Rai Publication, 2015-16th Edition.
- 23. Nanostructured materials and nanotechnology, Hari Singh, Nalwa, academic press, 1st Edition, 2002.
- 24. Nanotechnology Principles and Practices, Sulabha K Kulkarni, Capital Publishing Company, 3rd Edition 2014
- 25. Principles of nanotechnology, Phanikumar, Scitech publications, 2nd Edition, 2010.
- 26. Chemistry for Engineering Students, B. S. Jai Prakash, R. Venugopal, Sivakumaraiah& Pushpa Iyengar., Subash Publications, 5th Edition, 2014
- 27. "Engineering Chemistry", O. G. Palanna, Tata McGraw Hill Education Pvt. Ltd. New Delhi, Fourth Reprint, 2015.
- 28. Chemistry of Engineering materials, Malini S, K S Anantha Raju, CBS publishers Pvt Ltd.,
- 29. Laboratory Manual Engg. Chemistry, Anupma Rajput, Dhanpat Rai & Co.

Web links and Video Lectures (e-Resources):

- <u>http://libgen.rs/</u>
- https://nptel.ac.in/downloads/122101001/
- https://nptel.ac.in/courses/104/103/104103019/
- https://ndl.iitkgp.ac.in/
- <u>https://www.youtube.com/watch?v=faESCxAWR9k</u>
- <u>https://www.youtube.com/watch?v=TBqXMWaxZYM&list=PLyhmwFtznRhuz8L1bb3X-9lbHrDMjHWWh</u>
- <u>https://www.youtube.com/watch?v=j5Hml6KN4TI</u>
- <u>https://www.youtube.com/watch?v=X9GHBdyYcyo</u>
- <u>https://www.youtube.com/watch?v=1xWBPZnEJk8</u>
- https://www.youtube.com/watch?v=wRAo-M8xBHM

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- <u>https://www.vlab.co.in/broad-area-chemical-sciences</u>
- <u>https://demonstrations.wolfram.com/topics.php</u>
- <u>https://interestingengineering.com/science</u>

			COs an	d POs N	lappin	g (Indiv	vidual t	eacher	has to	fill up)		
						P						
	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
C01	3	1	1				1					
CO2	3	1	1				1					
CO3	3	1	1				1					
CO4	3	1	1				1					
CO5	3	1	1				1					

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SHARNBASVA UNIVERSITY Engineering Chemistry Lab

Course Title:	Engineering Chemistry Lab (Common for all Branches /Streams)								
Course Code:	22CHEL18/28	CIE Marks	50						
Gourge court		SEE Marks	50						
Course Type	(Practical)	Total Marks	100						
Teaching Hours/Week (Practical)	2	Exam Hours	02						
Total Hours of Pedagogy	38 hours	Credits	01						

Course Objectives:

- To provide students with practical knowledge of
- Quantitative analysis of materials by classical methods of analysis.
- Instrumental methods for developing experimental skills in building technicalcompetence.

Instrumental Experiments

- 1. Potentiometric estimation of FAS using standard K₂Cr₂O₇ solution.
- 2. Conductometric estimation of acid mixture.
- 3. Determination of Viscosity co-efficient of the given liquid using Ostwald's viscometer.
- 4. Colorimetric estimation of estimation of copper.
- 5. Determination of pKa of the given weak acid using pH meter.

Volumetric Experiments

- 1. Estimation of total hardness of water by EDTA complexometric method.
- 2. Estimation of CaO in cement solution by rapid EDTA method.
- 3. Determination of percentage of Copper in brass using standard sodium thiosulphatesolution.
- 4. Determination of COD of waste water.
- 5. Estimation of Iron in haematite ore solution using standard K₂Cr₂O₇ solution by externalindicator method.

Demonstration Experiments

1. Synthesis of nanomaterials by precipitation method.

2. Determination of percentage of chlorine in bleaching powder by lodometric method

On completion of this course, students will have the knowledge in, CO1: Principles and procedure.(Knowledge)

CO2: Understanding the reactions.(Comprehension) CO3: Applications

CO 4: Handling different types of instruments for analysis of materials using small quantities of materials involved for quick and accurate results (Analysis) CO5: Carrying out different types of titrations for estimation of concerned in materials using

comparatively more quantities of materials involved for good results (Synthesis)

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing marks for the CIE is 45% of the maximum marks (23 marks out of 50). The minimum passing marks for the SEE is 35% of the maximum marks (18 marks out of 50).

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

CIE for the practical component

- On completion of every experiment in the laboratory, the students shall be evaluated and marks shall be awarded on the same day.
- The 25 marks are for conducting the experiment and preparation of the laboratory record,10 marks for individual evaluation (which includes viva voce), (the average of total experiments}
- The 15 marks shall be for the test conducted at the end of the semester, for the subject (duration of 1 hour 15 minutes)

SEE for the practical component

- SEE marks for the practical course is 50 marks
- All laboratory experiments are to be included for the practical exam
- Break up marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners
- Students can pick one question (experiment) from the questions lot prepared by the . examiners
- General rubrics suggested for SEE are mentioned here write up 15%, conduction procedure and resulst is 70% and viva voce 10% of maximum marks.
- Practical SEE will be conducted by University as per the scheduled time table, for the subject (duration 02 hours)

Reference Books:

- G.H. Jeffery, J. Bassett, J. Mendham and R.C. Denney, "Vogel's A I, Text Book ofQuantitative analysis, Dorling Kindersley (Idia) Pvt. Ltd. 35th Edition 2012.
- 2. O.P. Vermani & Narula, "Theory and Practice in Applied Chemistry", New Age InternationalPublishers.
- 3. Gary D. Christian, "Analytical chemistry", 6th Edition, Wiley India.2015



SHARNBASVA UNIVERSITY **Civil Engineering and Allied branches** (Chemistry group)

Course Title:	Applied Chemistr S	y for Civil Engin tream	neering	
Course Code:	22CHEC12/22	CIE Marks	50	
Course Tune		SEE Marks	50	
Course Type	Theory	Total Marks	100	
Teaching Hours/Week (L/T)	3	Exam Hours	03	
Course Type Teaching Hours/Week (L/T) Total Hours of Pedagogy	40 hours	Credits	03	

Course objectives

- To enable students to acquire knowledge on principles of chemistry for engineering applications.
- To develop an intuitive understanding of chemistry by emphasizing the related branches of engineering.
- To provide students with a solid foundation in analytical reasoning required to solve societal problems.

Teaching-Learning Process Teaching-Learning Process

These are samples trategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching-Learning more effective

- Flipped class
- Smart class room
- Bended mode of leaning
- Interactive simulations and animation
- Tutorial & remedial classes for needy students (not regular T/R)
- Conducting Makeup classes
- Demonstration of concepts either by building models or by industry visit
- Experiments in laboratories shall be executed in blended mode (conventional or nonconventional methods)
- Use of ICT Online videos, online courses
- Daily learning through assignments

Module-1: Structural Materials (8 hr)

Metals and Alloys: Introduction, Properties and application of Iron and its alloys, Cement: Introduction, composition, properties, classification, manufacturing process of cement, process of setting and hardening of cement, additives for cement and testing of cement.

Refractories: Introduction, classification based on chemical composition, properties and application of refractory materials (clay bricks. silicon bricks, casting materials)

Glass: Introduction, Composition, Types, Preparation of Soda-lime glass, properties and applications of Soda-lime glass.

Module-2: Energy Conversion Systems and Corrosion (8 hr)

Energy conversion: Fuel Cells: Introduction, construction, working and applications of methanol-oxygen and polymer electrolyte membrane (PEM) fuel cell. Storage devices: Introduction, construction and working of Li-ion battery.

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1. NOTE: Wherever the contact hours is not sufficient, tutorial hour can be converted to theory hours

Corrosion: Introduction, electrochemical corrosion of steel in concrete, types (differential metal and aeration), Stress corrosion in civil structures, corrosion control (design and selection of materials, galvanization, anodization and sacrificial anode method).

Module-3: Nanotechnology and Water Technology (8 hr)

Nanotechnology: Introduction, size dependent properties of nanomaterial (surface area and catalytic), Synthesis of nanomaterial by sol-gel method and precipitation method.

Nanomaterials: Introduction, properties and engineering applications of carbon nanotubes, graphene and nanomaterials for water treatment (Metal oxide).

Water technology: Introduction, water parameters, hardness of water, determination of temporary, permanent and total hardness by EDTA method, numerical problems, softening of water by ion exchange method, desalination of water by reverse osmosis, determination ofCOD, numerical problems.

Module-4:Polymer and Composites (8 hr)

Polymer: Introduction, type of polymerization with examples (Addition and condensation), molecular weight of polymers, numerical problems. Synthesis, properties and engineering applications of polyethylene (PE) and polyvinyl chloride (PVC).

Fibers and composites: Synthesis, properties and applications of Kevlar and nylon fibers. Adhesives: Introduction, properties and applications of epoxy resin.

Biodegradable polymers: Synthesis of polylactic acid (PLA) and their applications.

Module-5: Phase Rule and Analytical Techniques (8 hr)

Phase rule: Introduction, Definition of terms: phase, components, degree of freedom, phase rule equation. Phase diagram: One component (water system).

Analytical techniques: Introduction, principle, instrumentation of potentiometric sensors; its application in the estimation of iron, Optical sensors (colorimetry); its application in the estimation of the copper, pH-sensor (Glass electrode); its application in the determination of pH of beverages.

Course outcome (Course Skill Set)

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

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	applications
CO2.	Explain the phenomena of chemistry to describe the methods of engineering
	processes
CO3.	Solve for the problems in chemistry that are pertinent in engineering applications
CO4.	Apply the basic concepts of chemistry to explain the chemical properties and
	processes
CO5.	Analyze properties and Processes associated with chemical substances in
	multidisciplinary situations

and

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing marks for the CIE is 45% of the maximum marks (23 marks out of 50). The minimum passing marks for the SEE is 35% of the maximum marks (18 marks out of 50).

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

Continuous Internal Evaluation(CIE):

The CIE shall be conducted by the course teacher throughout the semester. The suggested components of CIE for Theory course are

The CIE marks for the theory component shall be 50 marks is as detailed below

- Three Tests each of 15 Marks; (Third test is improvement test). •
- CIE will be conducted by the university as per scheduled time table with question • papers for the subject (duration of 1 hour 15 minutes)
- Session wise assignments for 25 marks
- For Seminar and library work 05 marks •
- Attendance 5 marks (95% to 100%), 04 marks (85% to 94%)

Semester End Examination (SEE)

- 1. Theory SEE will be conducted by University as per the scheduled time table, with question papers for the subject (duration 03 hours)
- 2. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50 marks.
- 3. The question paper will have ten full questions carrying equal marks.
- 4. Each full question carries 20 marks.

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- 5. There will be two full questions (with a maximum of three sub questions) from each module
- 6. Each full question will have sub questions covering all the topics under a module.
- 7. The students will have to answer five full questions, selecting one full question from each module.

Suggested Learning Resources:

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

- 1. Wiley Engineering Chemistry, Wiley India Pvt. Ltd. New Delhi, 2013- 2nd Edition.
- 2. Engineering Chemistry, Satyaprakash& Manisha Agrawal, Khanna Book Publishing, Delhi
- 3. A Text Book of Engg. Chemistry, Shashi Chawla, Dhanpat Rai & Co. (P) Ltd.
- 4. Essentials of Physical Chemistry, Bahl&Tuli, S.Chand Publishing
- 5. Applied Chemistry, Sunita Rattan, Kataria 5. Engineering Chemistry, Baskar, Wiley
- 6. Engineering Chemistry I, D. GrourKrishana, Vikas Publishing
- 7. A Text book of Engineering Chemistry, SS Dara & Dr. SS Umare, S Chand & Company Ltd.,
- 8. A Text Book of Engineering Chemistry, R.V. Gadag and Nityananda Shetty, I. K. International Publishing house. 2nd Edition, 2016.
- 9. Text Book of Polymer Science, F.W. Billmeyer, John Wiley & Sons, 4th Edition, 1999.
- 10. Nanotechnology A Chemical Approach to Nanomaterials, G.A. Ozin& A.C. Arsenault, RSC
- 11. Corrosion Engineering, M. G. Fontana, N. D. Greene, McGraw Hill Publications, New York, 3rd
- 12. Linden's Handbook of Batteries, Kirby W. Beard, Fifth Edition, McGraw Hill, 2019.
- 13. OLED Display Fundamentals and Applications, TakatoshiTsujimura, Wiley–Blackwell , 2012 Beguin,
- 14. Supercapacitors: Materials, Systems, and Applications, Max Lu, Francois
- 15. "Handbook on Electroplating with Manufacture of Electrochemicals", ASIA PACIFIC BUSINESS
- 16. Expanding the Vision of Sensor Materials. National Research Council 1995, Washington, DC: The
- 17. Engineering Chemistry, Edited by Dr. Mahesh B and Dr. Roopashree B, Sunstar Publisher, National Academies Press. doi: 10.17226/4782.
- Bengaluru, ISBN 978-93-85155-70-3, 2022

18. High Performance Metallic Materials for Cost Sensitive Applications, F. H. Froes, et al. John Wiley

- 19. Instrumental Methods of Analysis, Dr. K. R. Mahadik and Dr. L. Sathiyanarayanan,
- 20. Principles of Instrumental Analysis, Douglas A. Skoog, F. James Holler, Stanley R. Crouch Seventh
- 21. Polymer Science, V R Gowariker, N V Viswanathan, Jayadev, Sreedhar, Newage Int. Publishers,
- 22. Engineering Chemistry, P C Jain & Monica Jain, Dhanpat Rai Publication, 2015-16th Edition. 23. Nanostructured materials and nanotechnology, Hari Singh, Nalwa, academic press, 1st Edition,
- 24. Nanotechnology Principles and Practices, Sulabha K Kulkarni, Capital Publishing Company, 3rd
- 25. Principles of nanotechnology, Phanikumar, Scitech publications, 2nd Edition, 2010.
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- 27. "Engineering Chemistry", O. G. Palanna, Tata McGraw Hill Education Pvt. Ltd. New Delhi, Fourth Reprint, 2015.
- 28. Chemistry of Engineering materials, Malini S, K S Anantha Raju, CBS publishers Pvt Ltd.,
- 29. Laboratory Manual Engg. Chemistry, Anupma Rajput, Dhanpat Rai & Co.

Web links and Video Lectures (e-Resources):

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- http://libgen.rs/
- https://nptel.ac.in/downloads/122101001/
- https://nptel.ac.in/courses/104/103/104103019/
- https://ndl.iitkgp.ac.in/
- https://www.youtube.com/watch?v=faESCxAWR9k ė
- https://www.youtube.com/watch?v=TBqXMWaxZYM&list=PLyhmwFtznRhuz8L1bb3X-91bHrDMjHWWh
- https://www.youtube.com/watch?v=j5Hml6KN4TI
- https://www.youtube.com/watch?v=X9GHBdyYcyo •
- https://www.youtube.com/watch?v=1xWBPZnEJk8 ٠
- https://www.youtube.com/watch?v=wRAo-M8xBHM ٠

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- https://www.vlab.co.in/broad-area-chemical-sciences •
- https://demonstrations.wolfram.com/topics.php •
- https://interestingengineering.com/science ٠

			COs an	d POs M	lappin	g (Indiv	vidual t	eacher	has to	fill up)		
РО												
	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
C01	3	1	1				1					
CO2	3	1	1				1					
CO3	3	1	1				1					
C04	3	1	1				1					
C05	3	1	1				1					
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SHARNBASVA UNIVERSITY

(Chem	istry group)		
Course Title:	Applied Chemistry	for Computer S	cience 8
Course Code:	22CHES12/22	ring stream CIE Marks	F 0
		SEE Marks	50
Course Type	(Theory)	Total	50
	(meory)	Marks	100
		Exam	
Teaching Hours/Week (L/T)	3	Hours	3
Total Hours of Pedagogy	40 hours	Credits	3
Course objectives			
 To develop an intuitive understanding branches of engineering. To provide students with a solid found societal problems. Teaching-Learning Process These are samples trategies, which teacher covarious course outcomes and make Teaching Flipped class Smart class room Bended mode of leaning Interactive simulations and animation Tutorial & remedial classes for needy st Conducting Makeup classes Demonstration of concepts either by bu Experiments in laboratories shall be experiments 	lation in analytical reas an use to accelerate the z-Learning more effecti udents (not regular T/1 ilding models or by ind	soning required e attainment of t ve R)	to solve
conventional methods)	ceated in Dichaed mou	e (conventional	or non-
• Use of ICT – Online videos, online course	es		
 Daily learning through assignments 	가장 수가 책을 가 물었는 것이.		
MODULE 1: Energy Storage	Systems and Sensors	(8hr)	
Energy Storage Systems: Introduction to ba	tteries, construction, w	orking and appl	ications
f Ni-MH battery, Lithium ion and Sodium ion	batteries.		
ensors: Introduction, working principle a	nd applications of Co	nductometric s	sensors.
lectrochemical sensors, Thermometric ser	nsors, and Optical ser	isors. Sensors	for the
neasurement of dissolved oxygen (DO). Elect	rochemical gas sensors	for SOx and NO	X.
MODULE 2: Display and	Memory Systems (8h	r)	
isplay Systems: Photoactive and electroa	ctive materials. Nano	materials and	organic
naterials used in optoelectronic devices. Liqu	id crystals (LC's) - Intra	duction classif	fication
roperties and application in Liquid Crystal D	isplays (LCD's) Propos	tios and anali-	ation of
rganic Light Emitting Diodes (OLED's) and Q	uantum Light Emitting	Diodes (OLDE)	
nitting electrochemical cells.	auntum Light Emitting	Diodes (QLED's	ij, Light
	oloctronia		
emory: Introduction, Basic concepts of ganic/polymer electronic memory devices	Classifie at a final	History of	
Dover a polymon clering in the more deviced	L Lassification of alast	1 a m 1 a m 1	

Computer Science and Engineering and allied branches (Chemistry group)

N organic/polymer electronic memory devices, Classification of electronic memory devices,

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1. NOTE: Wherever the contact hours is not sufficient, tutorial hour can be converted to theory hours

types of organic memory devices (organic molecules, polymeric materials, organicinorganic hybrid materials).

MODULE 3: Electrode System and Corrosion(8hr)

Corrosion Chemistry: Introduction, electrochemical theory of corrosion, types of corrosion-differential metal and differential aeration. Corrosion control - galvanization, anodization and sacrificial anode method. Corrosion Penetration Rate (CPR) - Introduction and numerical problem.

Electrode System: Introduction, types of electrodes. Ion selective electrode – definition, construction, working and applications of glass electrode. Determination of pH using glass electrode. Reference electrode – Introduction, calomel electrode – construction, working and applications of calomel electrode. Concentration cell– Definition, construction and Numerical problems.

MODULE 4: Green Fuels and Polymers (8hr)

Green Fuels: Introduction, construction and working of solar photovoltaic cell, advantages, and disadvantages. Generation of energy (green hydrogen) by electrolysis of water and its advantages.

Polymers: Introduction, Molecular weight - Number average, weight average and numerical problems. Conducting polymers – synthesis and conducting mechanism of polyacetylene and commercial applications. Preparation, properties, and commercial applications of graphene oxide.

MODULE 5: Analytical Techniques and E-Waste Management (8hr)

Analytical Techniques: Introduction, principle and instrumentation of Conductometry; its application in the estimation of weak acid. Potentiometry; its application in the estimation of iron.

E-Waste: Introduction, sources of e-waste, Composition, Characteristics, and Need of ewaste management. Toxic materials used in manufacturing electronic and electrical products, health hazards due to exposure to e-waste. Recycling and Recovery: Different approaches of recycling (separation, thermal treatment)

Course outcome (Course Skill Set)

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

- **CO1.** Identify the terms and processes involved in scientific and engineering Applications
- **CO2.** Explain the phenomena of chemistry to describe the methods of engineering processes
- **CO3.** Solve for the problems in chemistry that are pertinent in engineering applications
- **CO4.** Apply the basic concepts of chemistry to explain the chemical properties and processes
- **CO5.** Analyze properties and Processes associated with chemical substances in multidisciplinary situations

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing marks for the CIE is 45% of the maximum marks (23 marks out of 50). The minimum passing marks for the SEE is 35% of the maximum marks (18 marks out of 50).

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

The CIE shall be conducted by the course teacher throughout the semester. The suggested

components of CIE for Theory course are The CIE marks for the theory component shall be 50 marks is as detailed below

Three Tests each of 15 Marks; (Third test is improvement test).

- CIE will be conducted by the university as per scheduled time table with question
- papers for the subject (duration of 1 hour 15 minutes)
- Session wise assignments for 25 marks
- For Seminar and library work 05 marks
- Attendance 5 marks (95% to 100%), 04 marks (85% to 94%)
- Semester End Examination (SEE)
- 1. Theory SEE will be conducted by University as per the scheduled time table, with question papers for the subject (duration 03 hours)
- 2. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50 marks.
- 3. The question paper will have ten full questions carrying equal marks.
- 4. Each full question carries 20 marks.
- 5. There will be two full questions (with a maximum of three sub questions) from each module
- 6. Each full question will have sub questions covering all the topics under a module.
- 7. The students will have to answer five full questions, selecting one full question from each module.

Suggested Learning Resources:

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

- 1. Wiley Engineering Chemistry, Wiley India Pvt. Ltd. New Delhi, 2013- 2nd Edition.
- 2. Engineering Chemistry, Satyaprakash & Manisha Agrawal, Khanna Book Publishing, Delhi
- 3. A Text Book of Engg. Chemistry, Shashi Chawla, Dhanpat Rai & Co. (P) Ltd.
- 4. Essentials of Physical Chemistry, Bahl&Tuli, S.Chand Publishing
- 5. Applied Chemistry, Sunita Rattan, Kataria 5. Engineering Chemistry, Baskar, Wiley
- 6. Engineering Chemistry I, D. Grour Krishana, Vikas Publishing
- 7. A Text book of Engineering Chemistry, SS Dara & Dr. SS Umare, S Chand & Company Ltd., 12th Edition, 2011.
- 8. A Text Book of Engineering Chemistry, R.V. Gadag and Nityananda Shetty, I. K. International Publishing house. 2nd Edition, 2016.
- 9. Text Book of Polymer Science, F.W. Billmeyer, John Wiley & Sons, 4th Edition, 1999.
- 10. Nanotechnology A Chemical Approach to Nanomaterials, G.A. Ozin & A.C. Arsenault, RSC Publishing, 2005.
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- 20. Principles of Instrumental Analysis, Douglas A. Skoog, F. James Holler, Stanley R. Crouch Seventh Edition, Cengage Learning, 2020
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Web links and Video Lectures (e-Resources):

- http://libgen.rs/
- https://nptel.ac.in/downloads/122101001/ .
- https://nptel.ac.in/courses/104/103/104103019/ .
- https://ndl.iitkgp.ac.in/ .
- https://www.youtube.com/watch?v=faESCxAWR9k .
- https://www.youtube.com/watch?v=TBqXMWaxZYM&list=PLyhmwFtznRhuz8L1bb3X-• 9lbHrDMjHWWh
- https://www.youtube.com/watch?v=j5Hml6KN4TI
- https://www.youtube.com/watch?v=X9GHBdyYcyo .
- https://www.youtube.com/watch?v=1xWBPZnEJk8
- https://www.youtube.com/watch?v=wRAo-M8xBHM

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- <u>https://www.vlab.co.in/broad-area-chemical-sciences</u>
- https://demonstrations.wolfram.com/topics.php
- https://interestingengineering.com/science

COs and POs Mapping (Individual teacher has to fill up)

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Ref No:

Date: 08-11-2022

DEPARTMENT OF CHEMISTRY BOARD OF STUDIES(BOS) MEETING

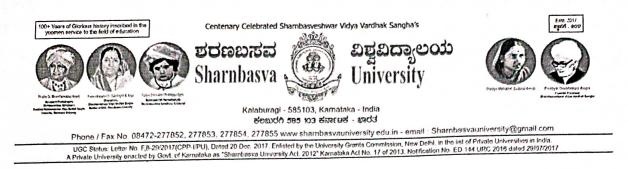
Proceeding of BOS Department of Chemistry was held on 08.11.2022 at 11:00 am in the Department of Chemistry B.Tech (Co-ed) building, Sharnbasva University.

AGENDA OF THE MEETING

- 1. Approval of syllabus and Question paper pattern of B.Tech. Engineering Chemistry for CES, CSS, MES and EES Streams as per NEP-2020 scheme for the academic year 2022-23 and 2023-24
- 2. Approval of syllabus and Question paper pattern of B.Tech. Engineering Chemistry Lab is common for all CES, CSS, MES and EES Streams as per NEP-2020 scheme for the academic year 2022-23 and 2023-24

MINUTES OF THE MEETING

- Proceeding of the meeting of the board of studies in chemistry held on 8th Nov 2022 at 11:00 am to prepare the syllabus and Question paper pattern of B.Tech. Engineering Chemistry, Choice Based Credit System (CBCS), Outcome Based Education (OBE) and as per National Education Policy (NEP) for the academic year 2022-23 and 2023-24
- 2. The syllabus and Question paper pattern of B.Tech. Engineering Chemistry was drafted after several deliberation and discussion during the meeting of the board of studies, it was decided and prepared the syllabus as chemistry for Civil Engineering stream(CES), chemistry for Computer Science stream(CSS), chemistry for Mechanical Engineering stream(MES) and chemistry for Electrical and Electronics Engineering stream(EES).
- 3. For Engineering Chemistry Lab, it was decided by all the BOS members that, all experiments should be common to all Streams/Branches. All laboratory experiments are to be included for the practical exam. Practical SEE will be conducted by University as per the scheduled time table, for the subject (duration 02 hours). Students can perform one experiment from the questions lot prepared by the examiners



RESOLUTIONS

- 1. The BOS Members approved scheme, syllabus and Question paper pattern of B.Tech. Engineering Chemistry for CES, CSS, MES and EES Streams as per NEP-2020 scheme for the academic year 2022-23 and 2023-24.
- 2. The BOS Members approved scheme, syllabus and Question paper pattern of B.Tech. Engineering Chemistry Lab is common for all CES, CSS, MES and EES Streams as per NEP-2020 scheme for the academic year 2022-23 and 2023-24,

The Following Members were attended the meeting approved the Scheme, Syllabus and Pattern of Question paper.

SI. NO.	NAME OF THE FACULTY	DESIGNATION	SIGNATURE
1	Dr. Nirdosh Patil	Chairman	÷.
2	Dr. Parvati G	Member	Aques.
3	Dr. Shweta Patil	Member	Reality
4	Prof. Anita R H	Member	T ffy
5.	Prof. Sangeeta Aland	Member	Bland
6	Dr. R. S Malipatil	Member	129
7	Dr. Kashinath K	Member	(-j=
8	Dr. Shivakumar R	Member	12
9	Prof. Siddangouda Patil	Member	J.P.

CHAIRMAN

Sharnbasva University, Kalaburagi

Scheme for B.Tech., First	Year Program from the	e Academic	Year: 2022-23
			THE PERCH & COLORS

All the B. Tech., branches offered by the University are grouped in to Four Streams (CES, MES, EES and CSS)

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MES	Mechanical Engineering Stream	MECH, ENERGY
EES	Electrical and Electronics Engineering Stream	EEE, ECE
CSS	Computer science Engineering Stream	CSE, AI&DS and AI&ML

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	13	Evaluating the rank of matrix
	14	Numerical solution of system linear equations , test for consistency .
Sug	gested so	Rware's : Mathematica/MatLab/Python/Scilab
		Details (both CIE and SEE)
E	Th Exam (SEE	e weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End 5) is 50%. The minimum passing marks for the CIE is 45% of the maximum marks (22.5 of 50). The minimum passing marks for the SEE is 35% of the maximum marks (18
0 5 5	A stredits allo (60) in the	student shall be deemed to have satisfied the academic requirements and earned the otted to each subject/ course if the student secures not less than 35% (18 Marks out of semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken
Con	tinuous l	internal Evaluation(CIE):
ן t	The CIE sh heory con The CIE ma	hall be conducted by the course teacher throughout the semester. The CIE marks for the nponent of the IC shall be 30 marks and for the laboratory component 20 Marks. arks for the theory component shall be 50 marks and scored will be reduced as below
1		ts each of 15 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90- pectively. Average of Best Two performances of the Internal Tests shall be considered iks.
		se assignments for 25 marks
		ar and library work 05 marks
• A	Attendanc	e 5 marks (95% to 100%), 04 marks (85% to 94%)
• (a a	On comple and marks and prepa	ractical component of the IC: etion of every experiment/program in the laboratory, the students shall be evaluated shall be awarded on the same day. The 35 marks are for conducting the experiment ration of the laboratory record, the other 15 marks shall be for the test conducted at the semester.
е	valuation	arks awarded in the case of the Practical component shall be based on the continuous of the laboratory report. Each experiment report can be evaluated for 50 marks. Il experiments' write-ups are added and scaled down to 20 marks.
1. T r	he SEE קו educed to	Examination(SEE) uestion paper will be set for 100 marks and the marks scored will be proportionately 50. ton paper will have ten full questions carrying equal marks.
		uestion carries 20 marks.
		be two full questions (with a maximum of three sub questions) from each module
5. I	Each full q	uestion will have sub questions covering all the topics under a module.
6. 1	'he studer	ts will have to answer five full questions, selecting one full question from each module.
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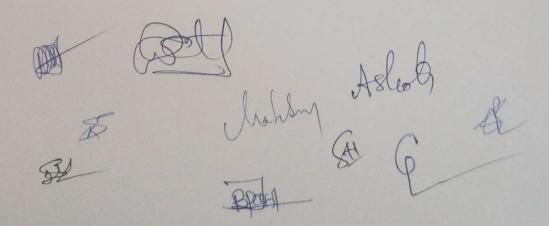
Suggested Learning Resources:

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)Text Books

- 1. B.S.Grewal: "Higher Engineering Mathematics", Khanna publishers, 44th Ed., 2021.
- 2. E. Kreyszig: "Advanced Engineering Mathematics", John Wiley & Sons, 10th Ed., 2018.

Reference Books

- 1. V.Ramana:"Higher Engineering Mathematics" McGraw-Hill Education, 11th Ed., 2017
- 2. Srimanta Pal & Subodh C. Bhunia: "Engineering Mathematics" Oxford University Press, 3rdEd., 2016.
- 3. N.PBali and Manish Goyal: "A textbook of Engineering Mathematics" Laxmi Publications, 10th Ed., 2022.
- 4. C.Ray Wylie, Louis C. Barrett: "Advanced Engineering Mathematics" McGraw-Hill Book Co., New york, 6thEd., 2017.
- 5. **C.B Gupta, S. R Singh and Mukesh Kumar:** "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education (India) Pvt.Ltd 2015.
- 6. **H.K.Dass and Er.Rajnish Verma:** "Higher Engineering Mathematics" S.Chand Publication, 3rdEd., 2014.
- 7. James Stewart: "Calculus" Cengage Publications, 7thEd., 2019.
- 8. David CLay: "Linear Algebra and its Applications", Pearson Publishers, 4th Ed., 2018.
- 9. Gareth Williams: "Linear Algebra with applications", Jones Bartlett Publishers Inc., 6thEd., 2017.



Page 5 of 5

Course Title:	Mathematics for Mechanical Engineering Stream					
Course Code:	22MATM11	CIE Marks	50			
Course Type(Theory/Practical/Integrated)	Integrated	SEE Marks	50			
		Total Marks	100			
Teaching Hours/Week (L:T:P:S)	2:2:2:0	Exam Hours	03+02			
Total Hours of Pedagogy	40hoursTheory+10- 12Lab slots	Credits	04			

Course objectives: The goal of the course Advanced Calculus, Transforms and Numerical methods (22MATM11) is to

- Familiarize the importance of series expansion and Vector calculus essential for Mechanical engineering.
- Analyze Mechanical engineering problems applying Partial Derivatives and understand the value of limit (continuity) of function by using indeterminate forms.
- Develop the knowledge of polar curves to trace different types of curves.
- Applications of first order first degree differential equations.
- To develop the knowledge of matrices and linear algebra in a comprehensive manner.

Teaching-Learning Process

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 and quizzes, and documenting students' progress.
- 5. Five assignment problems on each module.
- 6. Encourage the students for group learning to improve their creative and analytical skills.
- 7. 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 outcome (Course Skill Set)

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

C01	Learn the notion of partial differentiation to compute rate of change multivariate functions and understand the concept of Indeterminate forms.
CO2	Illustrate the applications of multivariate calculus to understand the solenoidal and irrotational vectors and know the expansions of functions in power series form.
CO3	Apply the knowledge of calculus to solve problems related to polar curves and graphical representation of different curves.
CO4	Solve first order linear/nonlinear differential equation analytically using standard methods and express the solution in graphical form.
CO5	Make use of matrix theory for solving for system of linear equations and

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	equations. Curvature and Radius of curvature - Cartesian, Parametric, Polar	anu reu						
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Self-study: C	elf-study: Center and circle of curvature, evolutes, involutes and envelopes.							
Applications	: Computer graphics, Image processing.							
(RBT Levels:)	L1, L2 and L3)	(8 Hour						
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Self-Study: A	pplications of ODE's, Solvable for x, y and p. Clairaut's form.							
Applications	Rate of Decay and growth and applications to Mechanical Engineering.							
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11	Program to compute area, volume and centre of gravity
12	Solving the Linear differential equations
13	Evaluating the rank of matrix
14	Numerical solution of system linear equations , test for consistency .

Suggested software's : Mathematica/MatLab/Python/Scilab

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing marks for the CIE is 45% of the maximum marks (22.5 marks out of 50). The minimum passing marks for the SEE is 35% of the maximum marks (18 marks out of 50).

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

<u>Continuous Internal Evaluation(CIE)</u>:

The CIE shall be conducted by the course teacher throughout the semester. The CIE marks for the theory component of the IC shall be 30 marks and for the laboratory component 20 Marks. The CIE marks for the theory component shall be 50 marks and scored will be reduced to 30.As below

- Three Tests each of 15 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively. Average of Best Two performances of the Internal Tests shall be considered for 15 Marks.
- Session wise assignments for 25 marks
- For Seminar and library work 05 marks
- Attendance 5 marks (95% to 100%), 04 marks (85% to 94%)

<u>CIE for the practical component of the IC:</u>

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The 35 marks are for conducting the experiment and preparation of the laboratory record, the other 15 marks shall be for the test conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 50 marks. Marks of all experiments' write-ups are added and scaled down to 20 marks.

Semester End Examination(SEE)

- 1. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- 2. The question paper will have ten full questions carrying equal marks.
- 3. Each full question carries 20 marks.
- 4. There will be two full questions (with a maximum of three sub questions) from each module
- 5. Each full question will have sub questions covering all the topics under a module.
- 6. The students will have to answer five full questions, selecting one full question from each module.

Page 4 of 5

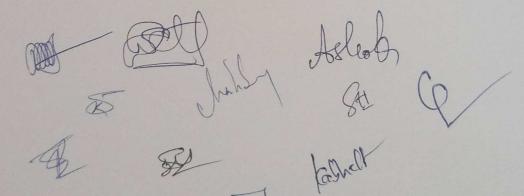
Suggested Learning Resources:

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)Text Books

- I. B.S.Grewal:"Higher Engineering Mathematics", Khanna publishers, 44th Ed., 2021.
- 2. E. Kreyszig: "Advanced Engineering Mathematics", John Wiley & Sons, 10th Ed., 2018.

Reference Books

- 1. V.Ramana:"Higher Engineering Mathematics" McGraw-Hill Education, 11th Ed., 2017
- 2. Srimanta Pal & Subodh C. Bhunia: "Engineering Mathematics" Oxford University Press, 3rdEd., 2016.
- 3. **N.PBali and Manish Goyal:** "A textbook of Engineering Mathematics" Laxmi Publications, 10th Ed., 2022.
- C.Ray Wylie, Louis C. Barrett: "Advanced Engineering Mathematics" McGraw-Hill Book Co., New york, 6th Ed., 2017.
- C.B Gupta, S. R Singh and Mukesh Kumar: "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education (India)Pvt.Ltd 2015.
- 6. **H.K.Dass and Er.Rajnish Verma:** "Higher Engineering Mathematics" S.Chand Publication, 3rdEd., 2014.
- 7. James Stewart: "Calculus" Cengage Publications, 7thEd., 2019.
- 8. David CLay: "Linear Algebra and its Applications", Pearson Publishers, 4th Ed., 2018.
- Gareth Williams: "Linear Algebra with applications", Jones Bartlett Publishers Inc., 6thEd., 2017.



Page 5 of 5

Course Title:	Mathematics for Electrical and Electronics Engineering					
Course Code:	22MATE11	CIE Marks	50			
Course	Integrated	SEE Marks	50			
Type(Theory/Practical/Integrated)		Total Marks	100			
Teaching Hours/Week (L:T:P:S)	2:2:2:0	Exam Hours	03+02			
Total Hours of Pedagogy	40hoursTheory+10-12Lab slots	Credits	04			

Course objectives: The goal of this course (22MATE11)

- Familiarize the importance of series expansion and Vector calculus and Linear Algebra essential for electrical and electronics engineering.
- Analyze electrical and electronics engineering problems applying Partial derivatives and understand the value of limit (continuity) of function by using indeterminate forms.
- Develop the knowledge of polar curves to trace different types of curves.
- Applications of first order first degree differential equations.
- To develop the knowledge of matrices and linear algebra in a comprehensive manner.

Teaching-Learning Process

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 and quizzes, and documenting students' progress.
- 5. Five assignment problems on each module.
- 6. Encourage the students for group learning to improve their creative and analytical skills.
- 7. Show related short 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 outcome (Course Skill Set)

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

CO1	Express the different types of functions in power series form.
CO2	Learn the notion of partial differentiation to compute rate of change multivariate functions and understand the concept of Indeterminate forms
CO3	Apply the knowledge of calculus to solve problems related to polar curves and graphical representation of different curves.
CO4	Solve first order linear/nonlinear differential equation analytically using standard methods and express the solution in graphical form.
CO5	Make use of matrix theory for solving for system of linear equations and compute Eigen values and Eigen vectors by using computational softwares.
CO6	Learn with modern mathematical tools namely SCILAB / PYTHON / MATLAB /

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Page 1 of 5

Bloom's level of the course outcomes:

			Bloom's Le	evel		
CO#	Remember (L1)	Understand (L2)	Apply (L3)	Analyze (L4)	Evaluate (L5)	Create (L6)
CO1		\checkmark	V			
CO2		\checkmark	V			
CO3	\checkmark	\checkmark	V			
CO4	\checkmark	\checkmark	V			
CO5		V	V			

Course Articulation Matrix / Course mapping :

CO#	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PS02	PS03
CO1	3	2	2		1				1			1			
CO2	3	2	2		1				1			1			
CO3	3	2	2		1				1			1			
CO4	3	2	2		1				1			1			
CO5	3	2	2		1				1			1			

Note: 1-Low mapped, 2-Medium mapped, 3-High mapped

MODULE-1 SEQUENCE AND SERIES

Introduction of Sequence and series in EE & EC Engineering Infinite series, tests for convergence/divergence, Limit comparison test, Ratio test, root test, Raabe's test, Alternating series, Absolute convergence and conditional convergence.

Self-study: Gauss's test, Cauchy integral test.

Applications: Sequence and Series expansion in communication signals.

(RBT Levels: L1, L2 and L3)

(8 Hours)

MODULE-2: INDETERMINATE FORMS AND PARTIAL DIFFERENTIATION

Introduction of Indeterminate forms and partial differentiation in EE & EC Engineering applications. Indeterminate forms - L'Hospital's rule. Problems. Partial differentiation, total derivative - differentiation of composite functions. Jacobian and

problems. Maxima and minima for a function of two variables. Problems.

Self-study: Euler's Theorem and problems. Method of Lagrange's undetermined multipliers with single constraint.

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Applications: Applications of maxima and minima in EE & EC Engineering.

(RBT Levels: L1, L2 and L3)

(8 Hours)

Page 2 of 5

DEPARTMENT OF MATHEMATICS, FACULTY OF ENGG. &TECH., SHARNBASVA UNIVERSITY, KALABURAGI **MODULE-3 : DIFFERENTIAL CALCULUS** Introduction to polar coordinates and curvature relating to EE & EC Engineering applications. Polar coordinates, Polar curves, angle between the radius vector and tangent, angle between two curves. Pedal equations. Curvature and Radius of curvature - Cartesian, Parametric, Polar and Pedal forms. Problems only. Self-study: Center and circle of curvature, evolutes, involutes and envelopes Applications: Communication signals, manufacturing of microphones and Image processing, (8 Hours) (RBT Levels: L1, L2 and L3) **MODULE- 4: LINEAR AND NON-LINEAR ORDINARY DIFFERENTIAL EQUATIONS OF FIRST** ORDER Introduction to first order ordinary differential equations pertaining to the applications for EE & EC Engineering. Exact and reducible to exact differential equations -Integrating factors type-1, linear and reducible to linear. Applications of ODE's - Orthogonal trajectories, Rate of Decay and growth, L-R and C-R circuits. Problems. Self-Study: Applications of ODE's, Solvable for x, y, p and Clairaut's form. Applications of ordinary differential equations: L-R and C-R circuits, Newton's law of cooling, Conduction of heat. (RBT Levels: L1, L2 and L3) (8 Hours) **MODULE- 5 : LINEAR ALGEBRA** Introduction of liner algebra related to EE & EC Engineering applications. Elementary row transformation of a matrix, Rank of a matrix. Consistency and Solution of system of linear equations - Gauss-Jordan method and approximate solution by Gauss-Seidel method. Eigen values and Eigen vectors, Rayleigh's power method to find the dominant Eigen value and Eigen vector. Problems Self-Study: Solution of system of equations by Gauss-Jacobi iterative method, Gauss-elimination method. Inverse of a square matrix by Cayley- Hamilton theorem. Applications of Linear Algebra: Network Analysis, Markov Analysis, Critical point of a network system. Optimum solution. (RBT Levels: L1, L2 and L3) (8 Hours) List of Laboratory experiments (2 hours/week per batch/ batch strength 15) 10 lab sessions + 1 repetition class + 1 Lab Assessment Finding the sum of the series up to infinity 2 Finding the given series convergent and divergent 3 **Evaluating the limits** Finding the Partial derivatives of a given function 4 Finding partial derivatives, Jacobian and plotting the graph Applications to Maxima and Minima of two variables 5 2D plots for Cartesian and polar curves 6 Finding of intersection between two polar curves 7 Finding the angle between the radius vector and the tangent 8 Finding the pedal equation of the polar curves 9 Finding radius of curvature of a given curve SP Page 3 of 5 Asleet berett Page 3 of

10	Solution of first order differential equation and plotting the graphs
11	Program to compute area, volume and centre of gravity
12	Solving the Linear differential equations
13	Evaluating the rank of matrix
A A	Numerical exturion of system linear equations, test for consistency.

Numerical solution of system linear Suggested software's : Mathematica/MatLab/Python/Scilab

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing marks for the CIE is 45% of the maximum marks (22.5 marks out of 50). The minimum passing marks for the SEE is 35% of the maximum marks (18 marks out of 50).

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

Continuous Internal Evaluation(CIE):

- The CIE shall be conducted by the course teacher throughout the semester. The CIE marks for the theory component of the IC shall be 30 marks and for the laboratory component 20 Marks. The CIE marks for the theory component shall be 50 marks and scored will be reduced to 30.As below
- Three Tests each of 15 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively. Average of Best Two performances of the Internal Tests shall be considered for 15 Marks.
- Session wise assignments for 25 marks
- For Seminar and library work 05 marks
- Attendance 5 marks (95% to 100%), 04 marks (85% to 94%)

CIE for the practical component of the IC:

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The 35 marks are for conducting the experiment and preparation of the laboratory record, the other 15 marks shall be for the test conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 50 marks. Marks of all experiments' write-ups are added and scaled down to 20 marks.

Semester End Examination(SEE)

- 1. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- 2. The question paper will have ten full questions carrying equal marks.
- 3. Each full question carries 20 marks.
- 4. There will be two full questions (with a maximum of three sub questions) from each module
- 5. Each full question will have sub questions covering all the topics under a module.
- 6. The students will have to answer five full questions, selecting one full question from each module.

Page 4 of 5

Suggested Learning Resources:

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)Text Books

- 1. B.S.Grewal:"Higher Engineering Mathematics", Khanna publishers, 44th Ed., 2021.
- 2. E. Kreyszig: "Advanced Engineering Mathematics", John Wiley & Sons, 10th Ed., 2018.

Reference Books

- 1. V. Ramana:"Higher Engineering Mathematics" McGraw-Hill Education, 11th Ed., 2017
- 2. Srimanta Pal & Subodh C. Bhunia: "Engineering Mathematics" Oxford University Press, 3rdEd., 2016.
- 3. N.P Bali and Manish Goyal: "A textbook of Engineering Mathematics" Laxmi Publications, 10th Ed., 2022.
- C. Ray Wylie, Louis C. Barrett: "Advanced Engineering Mathematics" McGraw-Hill Book Co., New York, 6thEd., 2017.
- 5. C.B Gupta, S. R Singh and Mukesh Kumar: "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education (India)Pvt.Ltd 2015.
- 6. H.K. Dass and Er. Rajnish Verma: "Higher Engineering Mathematics" S.Chand Publication, 3rdEd., 2014.
- 7. James Stewart: "Calculus" Cengage Publications, 7thEd., 2019.
- 8. David CLay: "Linear Algebra and its Applications", Pearson Publishers, 4th Ed., 2018.
- 9. Gareth Williams: "Linear Algebra with applications", Jones Bartlett Publishers Inc., 6thEd., 2017.

Page 5 of 5

Course Title:	Mathematics for Computer science & Engineering Stream						
Course Code:	22MATS11	CIE Marks	50				
Course	Integrated	SEE Marks	50				
Type(Theory/Practical/Integrated)		Total Marks	100				
Teaching Hours/Week (L:T:P:S)	2:2:2:0	Exam Hours	03+02				
Total Hours of Pedagogy	40hoursTheory+10-12Lab slots	Credits	04				

Course objectives: The goal of the course Advanced Calculus, Transforms and Numerical methods (22MATS11) is to

- Familiarize the importance of series expansion and Vector calculus essential for computer science engineering.
- Analyze computer science engineering problems applying Partial derivatives and understand the value of limit (continuity) of function by using indeterminate forms.
- Develop the knowledge of polar curves to trace different types of curves.
- Applications of first order first degree differential equations.
- To develop the knowledge of matrices and linear algebra in a comprehensive manner.

Teaching-Learning Process

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 and quizzes, and documenting students' progress.
- 5. Five assignment problems on each module.
- 6. Encourage the students for group learning to improve their creative and analytical skills.
- 7. 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 outcome (Course Skill Set)

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

. une en	d of the course the student will be able to.
CO1	Express the different types of functions in power series form.
CO2	Learn the notion of partial differentiation to compute rate of change multivariate functions and understand the concept of Indeterminate forms
CO3	Apply the knowledge of calculus to solve problems related to polar curves and graphical representation of different curves.
CO4	Solve first order linear/nonlinear differential equation analytically using standard methods and express the solution in graphical form.
CO5	Make use of matrix theory for solving for system of linear equations and compute

Page 1 of 5

CO6

Learn with modern mathematical tools namely SCILAB /PYTHON /MATLAB / MATHEMATICA

Bloom's level of the course outcomes:

	Bloom's Level											
CO#	Remember (L1)	Understand (L2)	Apply (L3)	Analyze (L4)	Evaluate (L5)	Create (L6)						
CO1		V	V									
CO2	\checkmark	\checkmark										
CO3		\checkmark										
CO4	V	V										
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Course Articulation Matrix / Course mapping :

CO#	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PS02	PS03
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CO2	3	2	2		1				1			1			
CO3	3	2	2		1				1			1			
C04	3	2	2		1				1			1			
CO5	3	2	2		1				1			1			

Note: 1-Low mapped, 2-Medium mapped, 3-High mapped

MODULE-1 SEQUENCE AND SERIES

Introduction of Sequence and series in CS Engineering Infinite series, tests for convergence/divergence, Limit comparison test, Ratio test, root test, Raabe's test, Alternating series, Absolute convergence and conditional convergence.

Self-study: Gauss's test, Cauchy integral test **Applications:** Sequence and Series expansion in communication signals.

(RBT Levels: L1, L2 and L3)

(8 Hours)

MODULE-2: INDETERMINATE FORMS AND PARTIAL DIFFERENTIATION Introduction of Indeterminate forms and partial differentiation in CS Engineering

applications. Indeterminate forms - L'Hospital's rule. Problems. Partial differentiation, total derivative - differentiation of composite functions. Jacobian and problems. Maxima and minima for a function of two variables. Problems.

Self-study: Euler's Theorem and problems. Method of Lagrange's undetermined multipliers with single constraint.

by Asler

Applications: Applications of maxima and minima in computer science engineering.

(RBT Levels: L1, L2 and L3)

Page 2 of 5

(8 Hours)

ntroduction	MODULE-3 : DIFFERENTIAL CALCULUS
urves. Pedal e	to polar coordinates and curvature relating to CS Engineering applications. Ates, Polar curves, angle between the radius vector and tangent, angle between two equations. Curvature and Radius of curvature - Cartesian, Parametric, Polar and Per
orms. Probler	ns only.
elf-study: Ce	nter and circle of curvature, evolutes, involutes, and envelopes
applications:	Image processing.
RBT Levels: L	.1, L2 and L3) (8 Hou
	4: LINEAR AND NON-LINEAR ORDINARY DIFFERENTIAL EQUATIONS OF FIRST
ntroduction	ORDER to first order ordinary differential equations pertaining to the applications for
CS Engineerin	
	ucible to exact differential equations -Integrating factors type-1, linear and reducibl
	lications of ODE's – Orthogonal trajectories, Rate of Decay and growth, L-R and C-R
circuits. Probl	ems.
Self-Study: Ap	pplications of ODE's, Solvable for x , y ,p and Clairaut's form.
Applications	of ordinary differential equations: L-R and C-R circuits, Newton's law of cooling,
Conduction of	
(RBT Levels: I	
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11	Program to compute area, volume and centre of gravity
12	Solving the Linear differential equations
13	Evaluating the rank of matrix
L 14 Suggested see	Numerical solution of system linear equations, test for consistency

Suggested software's : Mathematica/MatLab/Python/Scilab

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing marks for the CIE is 45% of the maximum marks (22.5 marks out of 50). The minimum passing marks for the SEE is 35% of the maximum marks (18 marks out of 50).

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

Continuous Internal Evaluation(CIE):

The CIE shall be conducted by the course teacher throughout the semester. The CIE marks for the theory component of the IC shall be 30 marks and for the laboratory component 20 Marks. The CIE marks for the theory component shall be 50 marks and scored will be reduced to 30.As below

- Three Tests each of 15 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively. Average of Best Two performances of the Internal Tests shall be considered for 15 Marks.
- Session wise assignments for 25 marks
- For Seminar and library work 05 marks
- Attendance 5 marks (95% to 100%), 04 marks (85% to 94%)

<u>CIE for the practical component of the IC:</u>

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The 35 marks are for conducting the experiment and preparation of the laboratory record, the other 15 marks shall be for the test conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 50 marks. Marks of all experiments' write-ups are added and scaled down to 20 marks.

Semester End Examination(SEE)

- **1**. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- 2. The question paper will have ten full questions carrying equal marks.
- 3. Each full question carries 20 marks.
- 4. There will be two full questions (with a maximum of three sub questions) from each module
- 5. Each full question will have sub questions covering all the topics under a module.
- 6. The students will have to answer five full questions, selecting one full question from each module.

Page 4 of 5

DEPARTMENT OF MATHEMATICS, FACULTY OF ENGG. &TECH., SHARNBASVA UNIVERSITY, KALABURAGI

Suggested Learning Resources:

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)Text Books

- 1. B.S.Grewal:"Higher Engineering Mathematics", Khanna publishers, 44th Ed., 2021.
- 2. E. Kreyszig: "Advanced Engineering Mathematics", John Wiley & Sons, 10th Ed., 2018.

Reference Books

- 1. V. Ramana: "Higher Engineering Mathematics" McGraw-Hill Education, 11th Ed., 2017
- 2. Srimanta Pal & Subodh C. Bhunia: "Engineering Mathematics" Oxford University Press, 3rdEd., 2016.
- 3. N.P Bali and Manish Goyal: "A textbook of Engineering Mathematics" Laxmi Publications, 10th Ed., 2022.
- 4. C. Ray Wylie, Louis C. Barrett: "Advanced Engineering Mathematics" McGraw-Hill Book Co., New York, 6thEd., 2017.
- C.B Gupta, S. R Singh and Mukesh Kumar: "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education (India)Pvt.Ltd 2015.
- 6. **H.K. Dass and Er. Rajnish Verma:** "Higher Engineering Mathematics" S.Chand Publication, 3rdEd., 2014.
- 7. James Stewart: "Calculus" Cengage Publications, 7thEd., 2019.
- 8. David CLay: "Linear Algebra and its Applications", Pearson Publishers, 4th Ed., 2018.
- 9. Gareth Williams: "Linear Algebra with applications", Jones Bartlett Publishers Inc., 6thEd., 2017.

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Course Title:	Mathematics for Civil Engineering	Stream-II	
Course Code:	22MATC21	CIE Marks	50
Course Type	Integrated	SEE Marks	50
(Theory/Practical/Integrated)		Total Marks	100
Teaching Hours/ Week	2:2:2:0	Exam Hours	03+02
Total Hours of Pedagogy	40hoursTheory+10-12Lab slots	Credits	04

Course objectives :The goal of the course **Advanced Calculus, Transforms and Numerical methods (22MATC21)**is to

- **Familiarize** the importance of Integral calculus and Vector calculus essential for Civil engineering.
- Analyze Civil engineering problems applying Partial Differential Equations.
- **Develop** the knowledge of solving Civil engineering problems numerically.

Teaching-Learning Process 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 and quizzes, and documenting students' progress.
- 5. Five assignment problems on each module.
- 6. Encourage the students for group learning to improve their creative and analytical skills.
- 7. 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 outcome (Course Skill Set)

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

the en	d of the course the student will be able to:
CC	Apply the knowledge of Integral calculus to solve Double and Triple Integral for
	evaluating surface area and volume related to Civil Engineering.
CO	2 Illustrates the Applications of Multivariate calculus to understand the solenoidal
	and irrational vectors and also exhibit the inter dependence of line, surface and
	volume integrals.
CC	
	engineering.
CC	Apply the concept of numerical techniques to solve algebraic and non-algebraic
	equations for solving Civil engineering problems.
CC	
	order differential equations.
CC	
	MATHEMATICA to solve problems in Civil engineering.
	223

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Applications: Heat and mass transfer, oil refinery problems, environmental engineering. Anal stream lines.	of o dou Bet Pro Self App pro	rder of ble inte a and Ga blems. f-Study: plicatio babilist	integ gral. amma : Volu ns: A ic mo	ls: Eva ration, Proble a funct ume by pplica odels.	lluation , changers. tions: I v triple tions t	n of d ging ir Definit integ	ouble nto pol tions, p ration hemat	and tri ar coo proper , Cente tical qu	ple in rdinat ties, r er of g lantiti	tegral tes. Ap elation ravity. es (Ar	s, eval pplicat n betw ea, Su	uation ions to veen B rface a	of do find: eta ar	Area	and V	/olun functi nalys	ne b ions is o	
(RBT Levels: L1, L2 and L3) (8 h	of o dou Bet: Pro Self App pro (RB Intr Vec Stat	rder of ble inte a and Ga blems. f-Study: plicatio babilist T Level roducti tor Inte tement of f-Study:	integ gral. Volu ns: A ic mo s: L1, on to gratio	ls: Eva ration, Proble a funct ume by pplica odels. , L2 an Vecto on: Lin een's tl	lluation , changers. cions: I v triple tions t d L3) or Calc he integ	n of do ging ir Definit integ o mat culus grals, n, Stol	ouble nto pol tions, j rration hemat hemat Mo in Civ Surfac ke's th	and tri ar coo proper , Cente cical qu dule-2 il Engi se integ eorem	ple in rdinat rties, r er of g antiti : Vect : Vect : Reeri grals. <i>J</i> and (tegral tes. Ap elation ravity. es (Ar tor Ca ng ap Applic Gauss	s, eval oplicat n betw ea, Su <u>lculus</u> plicat ations diverg	uation ions to reen B rface a ions. to wo gence t	of do find: eta ar area, V wrk do heore	Area nd Gan Volumo ne by em anc	and V nma f e),. A a for d Pro	/olun functi nalys (8 ce an blem	ions is o <u>hou</u> d flu s.	

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Formati	on of F	PDE's by elimination of arbitrary constants and functions. Solution of non-	
homoge		PDE by direct integration. Homogeneous PDEs involving derivative with res	most to on
indepen	dent v	rariable only. Solution of Lagrange's linear PDE. Derivation of one-dimension	spect to on
equation	n and w	wave equation.	lai neat
variable	ay: 30	lution of one-dimensional heat equation, wave equation by the method of se Charpits method.	eparation of
		Design of structures (vibration of rod/membrane).	
(DBT Lo	vole: I		(0 h
	veis: L	Module-4 :Numerical methods	(8 hours)
Import	anceo	f numerical methods for discrete data in the field of Civil Engineering.	
Solution	of alg	a humerical methods for discrete data in the field of civil Engineering.	the de (an)
formula	a) Pro	ebraic and transcendental equations: Regula-Falsi and Newton-Raphson me	thoas (on
Newton'	's divid	ces, Interpolation using Newton's forward and backward difference formula	e,
proof). F	Proble	ded difference formula and Lagrange's interpolation formula (All formulae w	inout
			-
Numeric		egration: Trapezoidal, Simpson's (1/3) rd and (3/8) th rules (without proof). Pr	roblems.
Self-Stu	dv Bi	section method, Lagrange's inverse Interpolation and Weddles rule.	
Annlica	tions:	Estimating the approximate roots enterpolation and weddles rule.	F ' 1'
approvi	mate s	Estimating the approximate roots, extreme values, Area, volume, surface are solutions to Civil engineering problems.	ea. Finding
(RRT Le	mate s		
(IND I LC			
	, eis. L	(1, L2 and L3) [8]	8 hours)
Introdu		Module-5 : Ordinary Differential Equation	
Introdu	iction	Module-5 : Ordinary Differential Equation to Linear ordinary differential equations of second and Higher order fo	
handlin	iction ig Civi	Module-5 : Ordinary Differential Equation to Linear ordinary differential equations of second and Higher order fo l Engineering applications.	
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Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing marks for the CIE is 45% of the maximum marks (22.5 marks out of 50). The minimum passing marks for the SEE is 35% of the maximum marks (18 marks out of 50).

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

Continuous Internal Evaluation(CIE):

The CIE shall be conducted by the course teacher throughout the semester. The CIE marks for the theory component of the IC shall be 30 marks and for the laboratory component 20 Marks.

- The CIE marks for the theory component shall be 50 marks and scored will be reduced to 30.As below
- Three Tests each of 15 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively. Average of Best Two performances of the Internal Tests shall be considered for 15 Marks.
- Session wise assignments for 25 marks
- For Seminar and library work 05 marks
- Attendance 5 marks (95% to 100%), 04 marks (85% to 94%)

<u>CIE for the practical component of the IC:</u>

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The 35 marks are for conducting the experiment and preparation of the laboratory record, the other 15 marks shall be for the test conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 50 marks. Marks of all experiments' write-ups are added and scaled down to 20 marks.

Semester End Examination(SEE)

- 1. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- 2. The question paper will have ten full questions carrying equal marks.
- 3. Each full question carries 20 marks.
- 4. There will be two full questions (with a maximum of three sub questions) from each module
- 5. Each full question will have sub questions covering all the topics under a module.
- 6. The students will have to answer five full questions, selecting one full question from each module.

Suggested Learning Resources:

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)Text Books

- 1. B.S.Grewal: "Higher Engineering Mathematics", Khanna publishers, 44th Ed., 2021.
- 2. E. Kreyszig: "Advanced Engineering Mathematics", John Wiley & Sons, 10th Ed., 2018.

Reference Books

- 1. V.Ramana:"Higher Engineering Mathematics" McGraw-Hill Education, 11th Ed., 2017
- 2. Srimanta Pal & Subodh C. Bhunia: "Engineering Mathematics" Oxford University Press, 3rdEd., 2016.
- 3. **N.PBali and Manish Goyal:** "A textbook of Engineering Mathematics" Laxmi Publications,10th Ed.,2022.
- 4. **C.Ray Wylie, Louis C. Barrett:** "Advanced Engineering Mathematics" McGraw–Hill Book Co., New york, 6thEd., 2017.
- 5. **C.B Gupta, S. R Singh and Mukesh Kumar:** "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education (India)Pvt.Ltd 2015.
- 6. **H.K.Dass and Er.Rajnish Verma:** "Higher Engineering Mathematics" S.Chand Publication, 3rdEd., 2014.
- 7. James Stewart: "Calculus" Cengage Publications, 7thEd., 2019.
- 8. David CLay: "Linear Algebra and its Applications", Pearson Publishers, 4th Ed., 2018.
- Gareth Williams: "Linear Algebra with applications", Jones Bartlett Publishers Inc., 6thEd., 2017.

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Course Title:	Mathematics for Mechanical Engir	eering Stream-II	
	22MATM21	CIE Marks	50
		SEE Marks	50
(Theory/Practical/Integrated)		Total Marks	100
0 /	2:2:2:0	Exam Hours	03+02
Total Hours of Pedagogy	40hoursTheory+10-12Lab slots	Credits	04

Course objectives :The goal of the course **Advanced Calculus, Transforms and Numerical methods (22MATM21)**is to

- **Familiarize** the importance of Integral calculus and Vector calculus essential for mechanical engineering.
- Analyze mechanical engineering problems applying Partial Differential Equations.
- **Develop** the knowledge of solving mechanical engineering problems numerically.

Teaching-Learning Process

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 and quizzes, and documenting students' progress.
- 5. Five assignment problems on each module.
- 6. Encourage the students for group learning to improve their creative and analytical skills.
- 7. 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 outcome (Course Skill Set)

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

Apply the knowledge of Integral calculus to solve Double and Triple Integral for evaluating surface area and volume related to Mechanical Engineering.
evaluating surface area and volume related to Mechanical Engineering.
Illustrates the Applications of Multivariate calculus to understand the solenoidal
and irrational vectors and also exhibit the inter dependence of line, surface and
volume integrals.
Construct a variety of Partial Differential Equations for the problems in
mechanical engineering.
Apply the concept of numerical techniques to solve algebraic and non-algebraic
equations for solving mechanical engineering problems.
Demonstrate the various physical modules in mechanical engineering through
high a order differential equations
higher order differential equations.
Modern mathematical tools namely SCILAB /PYTHON /MATLAB /
MATHEMATICA to solve problems in mechanical engineering.

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	CO2	3	2	2		1				1			1	-				
	CO3	3	2	2		1				1			1					
	CO4	3	2	2		1				1			1					
	CO5	3	2	2		1				1			1					
	blems. - Study :	ns: A	pplica	triple i tions to				0	,		rface a	rea, V	olumo	e),. A	nalys	is c		
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Module-3: Partial Differential Equations	
Importance of partial differential equations for Mechanical Engineering of PDE's by elimination of arbitrary constants and function	neering application.
Formation of PDE's by elimination of arbitrary constants and function homogeneous PDE by direct integration. Homogeneous PDEs involving the second se	
independent variable only. Solution of Lagrange's linear PDE. Derivat	ing derivative with respect to one
equation and wave equation.	ion of one-unnensional near
Self-Study: Solution of one-dimensional heat equation, wave equation	n by the method of separation of
variables and Charpits method.	if by the method of separation of
Applications: Design of structures (vibration of rod/membrane).	
(RBT Levels: L1, L2 and L3)	(8 hours)
Module-4 :Numerical methods	(0.100.00)
Importance of numerical methods for discrete data in the field o	f Mechanical Engineering.
Solution of algebraic and transcendental equations: Regula-Falsi and	
formulae). Problems.	
Finite differences, Interpolation using Newton's forward and backwar	rd difference formulae,
Newton's divided difference formula and Lagrange's interpolation for	mula (All formulae without
proof). Problems.	
Numerical integration: Trapezoidal, Simpson's (1/3) rd and (3/8) th rul	es (without proof). Problems.
Self-Study: Bisection method, Lagrange's inverse Interpolation and V	Veddles rule
Applications: Estimating the approximate roots, extreme values, Are	
approximate solutions to Mechanical engineering problems.	a, volume, surface area. I manig
(RBT Levels: L1, L2 and L3)	(8 hours)
Module-5 : Ordinary Differential Equa	
Introduction to Linear ordinary differential equations of second	and Higher order for
handling Mechanical Engineering applications.	5
Solution of second and higher order Ordinary Linear Differential Equa	ations with constant
coefficients, Inverse Differential Operator Method, Variation of Param	neters method, applications of
Differential equations LCR Circuits.	
Self-Study: Singular Solutions and ODE with variable co-efficient.	
Applications: Application of second order ODE, initial conditions and	i initial value problems.
(RBT Levels: L1, L2 and L3)	(8 hours)
List of Laboratory experiments (2 hours/week per batch/ batch	strength 15j
10 lab sessions + 1 repetition class + 1 Lab Assessment	
1 Evaluation of Double and triple integrals.	
3 Finding surface integrals4 Evaluation of surface area by Green's theorem.	
4 Evaluation of surface area by Green's theorem.	
5 Formation of PDE w.r.t. one independent variable.	
6 Solution of PDE by direct integration.	ula
7 Newton's forward and Backward interpolation form	Ird rule
8 Solution of numerical integration by Simpson's (1/3)	
9 Finding the roots for second order ODE.	notor
10 Finding the roots by the method of variation of parar	neter.
(Mattach / Brithon / Scilph	
Suggested software's : Mathematica /MatLab/Python/Scilab	1
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Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing marks for the CIE is 45% of the maximum marks (22.5 marks out of 50). The minimum passing marks for the SEE is 35% of the maximum marks (18 marks out of 50).

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

Continuous Internal Evaluation(CIE):

The CIE shall be conducted by the course teacher throughout the semester. The CIE marks for the theory component of the IC shall be 30 marks and for the laboratory component 20 Marks.

- The CIE marks for the theory component shall be 50 marks and scored will be reduced to 30.As below
- Three Tests each of 15 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively. Average of Best Two performances of the Internal Tests shall be considered for 15 Marks.
- Session wise assignments for 25 marks
- For Seminar and library work 05 marks
- Attendance 5 marks (95% to 100%), 04 marks (85% to 94%)

CIE for the practical component of the IC:

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The 35 marks are for conducting the experiment and preparation of the laboratory record, the other 15 marks shall be for the test conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 50 marks. Marks of all experiments' write-ups are added and scaled down to 20 marks.

Semester End Examination(SEE)

- 1. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- 2. The question paper will have ten full questions carrying equal marks.
- 3. Each full question carries 20 marks.
- 4. There will be two full questions (with a maximum of three sub questions) from each module
- 5. Each full question will have sub questions covering all the topics under a module.
- 6. The students will have to answer five full questions, selecting one full question from each module.

Suggested Learning Resources:

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)Text Books

- 1. **B.S.Grewal**: "Higher Engineering Mathematics", Khanna publishers, 44th Ed., 2021.
- 2. E. Kreyszig: "Advanced Engineering Mathematics", John Wiley & Sons, 10th Ed., 2018.

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Reference Books

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- 1. V.Ramana:"Higher Engineering Mathematics" McGraw-Hill Education, 11th Ed., 2017
- 2. Srimanta Pal & Subodh C. Bhunia: "Engineering Mathematics" Oxford University Press, 3rdEd., 2016.
- 3. **N.PBali and Manish Goyal**: "A textbook of Engineering Mathematics" Laxmi Publications, 10th Ed., 2022.
- 4. **C.Ray Wylie, Louis C. Barrett:** "Advanced Engineering Mathematics" McGraw-Hill Book Co., New york, 6thEd., 2017.
- 5. **C.B Gupta, S. R Singh and Mukesh Kumar:** "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education (India)Pvt.Ltd 2015.
- 6. **H.K.Dass and Er.Rajnish Verma:** "Higher Engineering Mathematics" S.Chand Publication, 3rdEd., 2014.
- 7. James Stewart: "Calculus" Cengage Publications, 7thEd., 2019.
- 8. David CLay: "Linear Algebra and its Applications", Pearson Publishers, 4th Ed., 2018.
- Gareth Williams: "Linear Algebra with applications", Jones Bartlett Publishers Inc., 6thEd., 2017.

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	CO6	F	amiliar MATLA	ize wi				matica	al tool	s nam	ely SC	ILAB	/PYTH	ION		
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				L1)		(L2			L3		(L4)		(L5)		(L	
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	CO								\checkmark							
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	CO2	3	2	2		1				1			1			65
	CO3	3	2	2		1				1		1. 200	1			
	CO4 CO5	3	2	2		1				1			1	-		-
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char Volu Beta Prob Self App prob (RB Imp app Vect sets Line	tiple In nge of o ume by a and G olems. -Study licatio oabilist T Level licatio cor space , Basis ar tran	v: Vol doub amm v: Vol ons: A tic mo ls: L1 ce of ns. ces: I and co sform	r of inte ble inte a func ume by Applica odels. , L2 an Vector Definiti dimens mation	egratio egral. F tions: 1 / triple tions t d L3) r Spac on and ion. s: Defi	on, cha Proble: Definit e integ to mat co mat e and d exam nition	nging ms. tions, ration hemat Mod Linea uples, and e	into p prope , Centu tical qu lule-2 ur Tra subspa xampl	olar c rties, n er of g uantit :Vect nsfor ace, lin es, Al	oordin relatio gravity ies (Ar or Cal matio near s gebra	nates. on bet r. rea, Su ns in pan, L of tra	Applic ween E urface a the fie inearly	ation seta a area, eld of v inde	s to fir nd Gar Volum EC an epende	nd: An mma ne),. A d EE ent an rix of	ea an funct nalys (8 engi id dej	ions. sis of hou neer pend ear
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App	<mark>-study</mark> : licatio Г Level	ns: I	mage p	rocess												a. houi
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mportan	ce of numerical methods for discrete data in the field of EC and EE engineering
applicatio	115.
Solution of method (o	f polynomial and transcendental equations: Regula-Falsi method and Newton-Raphson nly formulae). Problems.
Finite diffe	rences, Interpolation using Newton's forward and backward difference formulae,
Newton's (livided difference formula and Lagrange's interpolation formula (All formulae without
proof). Pro	blems.
Self Study	: Bisection Method, Secant method, Numerical differentiation and Inverse Lagrange's
method.	, and the second of the second
Applicatio	ons: Power Systems
(RBT Leve	ls: L1, L2 and L3) (8 hour
	Module-4 : Laplace Transforms
Introduct	on to Laplace Transforms in EC and EE Engineering
Laplace T	ransforms: Definition, Laplace transforms of Flementary functions, properties (with
proof per	iouic function, Unit step function. Unit impulse function
inverse L	aplace Transforms: Definition, Convolution Theorem (without proof) and Findi
Inverse La	place transform by convolution Theorem. Solution of Linear Differential equations usi
Laplace Tr	ansforms and Applications.
Self-Study	: Laplace transform of ODE.
Applicatio	ns: Notwork analyzia Cignal Duranti II
(DDT I	ons: Network analysis, Signal Processing, and Image Processing.
(RBT Leve	IS: L1, L2 and L3) (8 hour
Introducti handling I Solution of	(8 hour Module-5 :Ordinary Differential Equation ion to Linear ordinary differential equations of second and higher order for EC and EE Engineering applications. second and higher order Ordinary Linear Differential Equations with constant
Introducti handling I Solution of coefficient Differentia Self-Study	(8 hour Module-5 :Ordinary Differential Equation ion to Linear ordinary differential equations of second and higher order for EC and EE Engineering applications. second and higher order Ordinary Linear Differential Equations with constant s, Inverse Differential Operator Method, Variation of Parameters method, applications o l equations LCR Circuits. : Singular Solutions.
Introducti handling I Solution of coefficient Differentia Self-Study	(8 hour Module-5 :Ordinary Differential Equation ion to Linear ordinary differential equations of second and higher order for EC and EE Engineering applications. Fisecond and higher order Ordinary Linear Differential Equations with constant s, Inverse Differential Operator Method, Variation of Parameters method, applications of l equations LCR Circuits. : Singular Solutions. Ins: Application of second order ODE, initial conditions and initial value problems.
Introducti handling I Solution of coefficient Differentia Self-Study	(8 hour Module-5 :Ordinary Differential Equation ion to Linear ordinary differential equations of second and higher order for EC and EE Engineering applications. second and higher order Ordinary Linear Differential Equations with constant s, Inverse Differential Operator Method, Variation of Parameters method, applications o l equations LCR Circuits. : Singular Solutions.
Introducti handling I Solution of coefficient Differentia Self-Study Applicatio (RBT Leve List of Lab 10 lab ses	(8 hour Module-5 :Ordinary Differential Equation ion to Linear ordinary differential equations of second and higher order for EC and EE Engineering applications. second and higher order Ordinary Linear Differential Equations with constant s, Inverse Differential Operator Method, Variation of Parameters method, applications o l equations LCR Circuits. : Singular Solutions. ons: Application of second order ODE, initial conditions and initial value problems. ds: L1, L2 and L3) (8 hours) poratory experiments (2 hours/week per batch/ batch strength 15) sions + 1 repetition class + 1 Lab Assessment
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Introducti handling I Solution of coefficient Differentia Self-Study Applicatio (RBT Leve List of Lab 10 lab ses	Is: L1, L2 and L3) (8 hour Module-5 :Ordinary Differential Equation ion to Linear ordinary differential equations of second and higher order for EC and EE Engineering applications. Second and higher order Ordinary Linear Differential Equations with constant s, Inverse Differential Operator Method, Variation of Parameters method, applications of l equations LCR Circuits. : Singular Solutions. ons: Application of second order ODE, initial conditions and initial value problems. els: L1, L2 and L3) coratory experiments (2 hours/week per batch/ batch strength 15) sions + 1 repetition class + 1 Lab Assessment Evaluation of Double and triple integrals. Evaluation of Beta and Gamma functions.
Introducti handling I Solution of coefficient Differentia Self-Study Applicatio (RBT Leve List of Lab 10 lab ses	Item (8 hour Module-5 :Ordinary Differential Equation ion to Linear ordinary differential equations of second and higher order for EC and EE Engineering applications. Second and higher order Ordinary Linear Differential Equations with constant s, Inverse Differential Operator Method, Variation of Parameters method, applications of lequations LCR Circuits. : Singular Solutions. ons: Application of second order ODE, initial conditions and initial value problems. ds: L1, L2 and L3) (8 hour: Coratory experiments (2 hours/week per batch/ batch strength 15) sions + 1 repetition class + 1 Lab Assessment Evaluation of Double and triple integrals. Evaluation of Beta and Gamma functions. Finding surface integrals
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Introducti handling I Solution of coefficient Differentia Self-Study Applicatio (RBT Leve List of Lab 10 lab ses 10 lab ses 1 3 4 5	Is: L1, L2 and L3) (8 hour Module-5 :Ordinary Differential Equation ion to Linear ordinary differential equations of second and higher order for EC and EE Engineering applications. second and higher order Ordinary Linear Differential Equations with constant s, Inverse Differential Operator Method, Variation of Parameters method, applications o l equations LCR Circuits. : Singular Solutions. ms: Application of second order ODE, initial conditions and initial value problems. els: L1, L2 and L3) (8 hours) oratory experiments (2 hours/week per batch/ batch strength 15) sions + 1 repetition class + 1 Lab Assessment Evaluation of Double and triple integrals. Evaluation of Beta and Gamma functions. Finding surface integrals Evaluation of surface area by Green's theorem. Formation of PDE w.r.t. one independent variable.
Introducti handling I Solution of coefficient Differentia Self-Study Applicatio (RBT Leve List of Lab 10 lab ses 10 lab ses 1 3 4 5 6	Is: L1, L2 and L3) (8 hour Module-5 :Ordinary Differential Equation ion to Linear ordinary differential equations of second and higher order for EC and EE Engineering applications. second and higher order Ordinary Linear Differential Equations with constant s, Inverse Differential Operator Method, Variation of Parameters method, applications of l equations LCR Circuits. : Singular Solutions. ons: Application of second order ODE, initial conditions and initial value problems. els: L1, L2 and L3) (8 hour oratory experiments (2 hours/week per batch/ batch strength 15) sions + 1 repetition class + 1 Lab Assessment Evaluation of Double and triple integrals. Evaluation of Beta and Gamma functions. Finding surface integrals Evaluation of surface area by Green's theorem. Formation of PDE w.r.t. one independent variable. Solution of PDE by direct integration.
Introducti handling I Solution of coefficient Differentia Self-Study Applicatio (RBT Leve List of Lab 10 lab ses 1 1 2 3 4 5 6 7	Is: L1, L2 and L3) (8 hour Module-5 :Ordinary Differential Equation Ion to Linear ordinary differential equations of second and higher order for EC and EE Engineering applications. Second and higher order Ordinary Linear Differential Equations with constant s, Inverse Differential Operator Method, Variation of Parameters method, applications of l equations LCR Circuits. : Singular Solutions. orse: Application of second order ODE, initial conditions and initial value problems. els: L1, L2 and L3) (8 hour: oratory experiments (2 hours/week per batch/ batch strength 15) sions + 1 repetition class + 1 Lab Assessment Evaluation of Double and triple integrals. Evaluation of Surface area by Green's theorem. Formation of PDE w.r.t. one independent variable. Solution of PDE by direct integration. Newton's forward and Backward interpolation formula.
Introducti handling I Solution of coefficient Differentia Self-Study Applicatio (RBT Leve List of Lab 10 lab ses 1 1 2 3 4 5 6 7 8	Is: L1, L2 and L3 (8 hour Module-5 :Ordinary Differential Equation Ion to Linear ordinary differential equations of second and higher order for EC and EE Engineering applications. Second and higher order Ordinary Linear Differential Equations with constant s, Inverse Differential Operator Method, Variation of Parameters method, applications of l equations LCR Circuits. : Singular Solutions. ms: Application of second order ODE, initial conditions and initial value problems. Is: L1, L2 and L3) (8 hour: oratory experiments (2 hours/week per batch/ batch strength 15) sions + 1 repetition class + 1 Lab Assessment Evaluation of Double and triple integrals. Evaluation of surface area by Green's theorem. Formation of PDE w.r.t. one independent variable. Solution of PDE by direct integration. Newton's forward and Backward interpolation formula. Solution of numerical integration by Simpson's (1/3) rd rule.
Introducti handling I Solution of coefficient Differentia Self-Study Applicatic (RBT Leve List of Lab 10 lab ses 1 1 2 3 4 5 6 7 8 9	Is: L1, L2 and L3 (8 hour Module-5 :Ordinary Differential Equation ion to Linear ordinary differential equations of second and higher order for EC and EE Engineering applications. "second and higher order Ordinary Linear Differential Equations with constant s, Inverse Differential Operator Method, Variation of Parameters method, applications of l equations LCR Circuits. : Singular Solutions. ons: Application of second order ODE, initial conditions and initial value problems. ds: L1, L2 and L3) (8 hour oratory experiments (2 hours/week per batch/ batch strength 15) sions + 1 repetition class + 1 Lab Assessment Evaluation of Double and triple integrals. Evaluation of Surface area by Green's theorem. Formation of PDE w.r.t. one independent variable. Solution of PDE by direct integration. Newton's forward and Backward interpolation formula. Solution of numerical integration by Simpson's (1/3) rd rule. Finding the roots for second order ODE.
Introducti handling I Solution of coefficient Differentia Self-Study Applicatic (RBT Leve List of Lab 10 lab ses 10 lab ses 1 3 4 5 6 7 8 9 10	Is: L1, L2 and L3 (8 hour Module-5 :Ordinary Differential Equation Ion to Linear ordinary differential equations of second and higher order for EC and EE Engineering applications. Second and higher order Ordinary Linear Differential Equations with constant s, Inverse Differential Operator Method, Variation of Parameters method, applications of l equations LCR Circuits. : Singular Solutions. ms: Application of second order ODE, initial conditions and initial value problems. Is: L1, L2 and L3) (8 hour: oratory experiments (2 hours/week per batch/ batch strength 15) sions + 1 repetition class + 1 Lab Assessment Evaluation of Double and triple integrals. Evaluation of surface area by Green's theorem. Formation of PDE w.r.t. one independent variable. Solution of PDE by direct integration. Newton's forward and Backward interpolation formula. Solution of numerical integration by Simpson's (1/3) rd rule.

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Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing marks for the CIE is 45% of the maximum marks (22.5 marks out of 50). The minimum passing marks for the SEE is 35% of the maximum marks (18 marks out of 50).

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

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The CIE shall be conducted by the course teacher throughout the semester. The CIE marks for the theory component of the IC shall be 30 marks and for the laboratory component 20 Marks. The CIE marks for the theory component shall be 50 marks and scored will be reduced

- to 30.As below
- Three Tests each of 15 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively. Average of Best Two performances of the Internal Tests shall be considered for 15 Marks.
- Session wise assignments for 25 marks
- For Seminar and library work 05 marks
- Attendance 5 marks (95% to 100%), 04 marks (85% to 94%)

<u>CIE for the practical component of the IC:</u>

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The 35 marks are for conducting the experiment and preparation of the laboratory record, the other 15 marks shall be for the test conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 50 marks. Marks of all experiments' write-ups are added and scaled down to 20 marks.

Semester End Examination(SEE)

- 1. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- 2. The question paper will have ten full questions carrying equal marks.
- 3. Each full question carries 20 marks.
- 4. There will be two full questions (with a maximum of three sub questions) from each module
- 5. Each full question will have sub questions covering all the topics under a module.
- 6. The students will have to answer five full questions, selecting one full question from each module.

Suggested Learning Resources:

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)Text Books

1. B.S.Grewal: "Higher Engineering Mathematics", Khanna publishers, 44th Ed., 2021.

2. E. Kreyszig: "Advanced Engineering Mathematics", John Wiley & Sons, 10th Ed., 2018. Reference Books

1. V.Ramana:"Higher Engineering Mathematics" McGraw-Hill Education, 11th Ed., 2017

- 2. Srimanta Pal & Subodh C. Bhunia: "Engineering Mathematics" Oxford University Press, 3rdEd., 2016.
- 3. **N.PBali and Manish Goyal:** "A textbook of Engineering Mathematics" Laxmi Publications, 10th Ed., 2022.
- 4. C.Ray Wylie, Louis C. Barrett: "Advanced Engineering Mathematics" McGraw-Hill Book Co., New york, 6thEd., 2017.
- 5. C.B Gupta, S. R Singh and Mukesh Kumar: "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education (India)Pvt.Ltd 2015.
- 6. **H.K.Dass and Er.Rajnish Verma:** "Higher Engineering Mathematics" S.Chand Publication, 3rdEd., 2014.
- 7. James Stewart: "Calculus" Cengage Publications, 7thEd., 2019.
- 8. David CLay: "Linear Algebra and its Applications", Pearson Publishers, 4th Ed., 2018.
- Gareth Williams: "Linear Algebra with applications", Jones Bartlett Publishers Inc., 6thEd., 2017.

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Course Title:		Mathematics for Com	puter Science an	d Engineering Strea	m-ll
Course Code:		22MATS21		CIE Marks	50
Course Type		Integrated		SEE Marks	50
(Theory/Practi	cal/Integrated)			Total Marks	100
Teaching Hour	s/Week (L:T:P:S)	2:2:2:0		Exam Hours	03+02
Total Hours of	Pedagogy	40 hoursTheory+10-1	2Lab slots	Credits	04
Numerical • Fan Con	methods (22M niliarize the impoputer science a	portance of Integral c nd engineering.	alculus and Vect	tor calculus essenti	al for
Diff	erential Equatio	and electrical engine ns. edge of solving Comp			ems
nun	nerically.		uter science and	r engineering probl	ems
	earning Process				
	eneral Instruct			the attainment of t	ho various
course outco		which teachers can u	ise to accelerate	the attainment of t	ne various
		ditional lecture meth	od. different tyn	es of innovative tea	ching metho
may	be adopted so th	hat the delivered less	ons shall develop	p student's theoreti	cal and appli
	ematical skills.			1.0	
		thematics with Engin		and Provide real-lif	e examples.
3. Supp	ort and guide th	e students for self–st onsible for assigning	uuy. homework and a	auizzes and docum	enting
	ents' progress.	onsidie for assigning	nomework and	quizzes, and ubcum	enting
5 Five	assignment nrol	olems on each modul	2.		
6 Enco	urage the stude	nts for group learning	to improve the	ir creative and anal	ytical skills.
7. Show	v short related v	ideo lectures in the fo	ollowing ways:		-
	As an introdu	ction to new topics (pre-lecture activ	vity).	
	As a revision	of topics (post-lectur	e activity).		
	As additional	examples (post-lectu	re activity).		
•	As an additio	nal material of challe	nging topics (pr	e-and post-lecture a	activity).
•		olution of some exerc	ises (post-lectur	e activity).	
Course outc	ome (Course Sl	kill Set)			
At the end of	the course the s	student will be able to):	11 J. Tuinle int	a mal fan
C01	evaluating surf	vledge of Integral calc ace area and volume	related to Comp	outer Science and	egrai for
CO2	Annly the know	vledge of Linear Alge d linearly independer	ora to find the line of linearly dependent	near space, basis, ndent of vector spa	ce
CO3	Apply the conc	ent of numerical tech	niques to solve a	algebraic and non-a	lgebraic
	equations for C	omputer Science and ackward Finite differ	engineering pro	oblems, Studying th	e
	Internolation				
CO4	Apply the know domain (Signal	vledge of Laplace tran and image processin equation (Partial fract	g) which transfo	e domain to freque orms differential eq	ncy Juation
		J Aslu	B E	Derth	

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CO5	Demonstrate the various physical modules through higher differential equations and solve such linear ordinary differential equations related to the Computer Science and Engineering.						
CO6	Familiarize with modern mathematical tools namely SCILAB /PYTHON /MATLAB / MATHEMATICA						

Bloom's level of the course outcomes:

	Bloom's Level											
CO#	Remember	Understand	Apply	Analyze	Evaluate	Create						
	(L1)	(L2)	(L3)	(L4)	(L5)	(L6)						
C01	\checkmark											
CO2												
CO3	\checkmark											
CO4	\checkmark		\checkmark									
CO5	\checkmark		\checkmark									

Course Articulation Matrix / Course mapping :

CO#	P01	P02	P03	P04	P05	P06	P07	P08	60d	P010	P011	P012	PS01	PS02	PS03
C01	3	2	2		1				1			1			
CO2	3	2	2		1				1			1			
CO3	3	2	2		1				1			1			
CO4	3	2	2		1				1			1			
CO5	3	2	2		1				1			1			

Note: 1-Low mapped, 2-Medium mapped, 3-High mapped

Module-1 : Definite Integral and Improper Integral.

Introduction to Integral Calculus in Computer Science Engineering applications.

Multiple Integrals: Evaluation of double and triple integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates. Applications to find: Area by double integral. Problems.

Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions. Problems.

Self-Study: Volume by triple integration, Center of gravity.

Applications: Applications to mathematical quantities (Area, Surface area, Volume),. Analysis of probabilistic models.

(RBT Levels: L1, L2 and L3)

Module-2 : Advanced Linear Algebra

(8 hours)

Importance of Vector Space and Linear Transformations in the field of Computer science and engineering applications.

Vector spaces: Definition and examples, subspace, linear span, Linearly independent and dependent sets, Basis and dimension.

Linear transformations: Definition and examples, Algebra of transformations, Matrix of a linear transformation.

Self-study: Change of coordinates, Rank and nullity of a linear operator, Rank-Nullity theorem. Inner product spaces and orthogonality. Angles and Projections. Rotation, reflection, contraction and expansion.

Applications: Image processing, AI & ML, Graphs and networks, computer graphics. (RBT Levels: L1, L2 and L3)

(8 hours)

Module - 3: Numerical Methods

Importance of numerical methods for discrete data in the field of Computer science and engineering applications.

Solution of polynomial and transcendental equations: Regula-Falsi method and Newton-Raphson method (only formulae). Problems.

Finite differences, Interpolation using Newton's forward and backward difference formulae, Newton's divided difference formula and Lagrange's interpolation formula (All formulae without proof). Problems. **Self Study:** Bisection Method, Secant method, Numerical differentiation and Inverse Lagrange's method. **Applications:** Power Systems

(RBT Levels: L1, L2 and L3)

Module - 4 : Laplace Transforms

(8 hours)

Introduction to Laplace Transforms in Computer Science & Engineering. Laplace Transforms: Definition, Laplace transforms of Elementary function

Laplace Transforms: Definition, Laplace transforms of Elementary functions, properties (without proof) periodic function, Unit step function, Unit impulse function.

Inverse Laplace Transforms: Definition, Illustrative examples on Laplace transform, Convolution Theorem (without proof) and Finding Inverse Laplace transform by convolution Theorem. Solution of Linear Differential equations using Laplace Transforms and Applications (5 Assignment Problem).

Self-Study: Solution of first order simultaneous differential equation and Laplace transform of derivative.

Applications: Network analysis, Signal Processing, and Image Processing. (RBT Levels: L1, L2 and L3)

(8 hours)

Module-5 : Ordinary Differential Equation-2

Introduction to Linear ordinary differential equations of second and Higher order for handling Computer Science and Engineering applications.

Solution of second and higher order Ordinary Linear Differential Equations with constant coefficients, Inverse Differential Operator Method (Types -I, II and III only), Variation of Parameters method, applications of Differential equations LCR Circuits.

Self-Study: Singular Solutions and Inverse Differential Operator Method (Types -IV and V).

Applications: Application of second order ODE, initial conditions and initial value problems.

(RBT Levels: L1, L2 and L3)

(8 hours)

List of Laboratory experiments (2 hours/week per batch/ batch strength 15) 10 lab sessions + 1 repetition class + 1 Lab Assessment

- 1 Evaluation of Double and triple integrals.
- 2 Evaluation of Beta and Gamma functions.
- 3 Finding surface integrals
- 4 Evaluation of surface area by Green's theorem.
- 5 Formation of PDE w.r.t. one independent variable.
 - 6 Solution of PDE by direct integration.
 - 7 Newton's forward and Backward interpolation formula.
 - 8 Solution of numerical integration by Simpson's (1/3)rd rule.
 - 9 Finding the roots for second order ODE.

10 Finding the roots by the method of variation of parameter. Suggested software's : Mathematica/MatLab/Python/Scilab

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing marks for the CIE is 45% of the maximum marks (22.5 marks out of 50). The minimum passing marks for the SEE is 35% of the maximum marks (18 marks out of 50).

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

Continuous Internal Evaluation(CIE):

The CIE shall be conducted by the course teacher throughout the semester. The CIE marks for the theory component of the IC shall be 30 marks and for the laboratory component 20 Marks.

The CIE marks for the theory component shall be 50 marks and scored will be reduced to 30.As below

- Three Tests each of 15 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively. Average of Best Two performances of the Internal Tests shall be considered for 15 Marks.
- Session wise assignments for 25 marks
- For Seminar and library work 05 marks
- Attendance 5 marks (95% to 100%), 04 marks (85% to 94%)

CIE for the practical component of the IC:

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The 35 marks are for conducting the experiment and preparation of the laboratory record, the other 15 marks shall be for the test conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 50 marks. Marks of all experiments' write-ups are added and scaled down to 20 marks.

Semester End Examination(SEE)

- 1. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- 2. The question paper will have ten full questions carrying equal marks.
- 3. Each full question carries 20 marks.
- 4. There will be two full questions (with a maximum of three sub questions) from each module
- 5. Each full question will have sub questions covering all the topics under a module.
- 6. The students will have to answer five full questions, selecting one full question from each module.

SuggestedLearningResources:

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)Text Books

1. B.S.Grewal: "Higher Engineering, Mathematics", Khanna publishers, 44th Ed., 2021.

2. E. Kreyszig: "Advanced Engineering Mathematics", John Wiley & Sons, 10th Ed., 2018.

Reference Books

- 1. V.Ramana:"Higher Engineering Mathematics" McGraw-Hill Education,11th Ed.,2017
- 2. Srimanta Pal & Subodh C. Bhunia: "Engineering Mathematics" Oxford University Press, 3rdEd., 2016.
- 3. **N.PBali and Manish Goyal**: "A textbook of Engineering Mathematics" Laxmi Publications, 10th Ed., 2022.
- 4. **C.Ray Wylie, Louis C. Barrett:** "Advanced Engineering Mathematics" McGraw-Hill Book Co., New york, 6thEd., 2017.
- 5. **C.B Gupta, S. R Singh and Mukesh Kumar:** "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education (India)Pvt.Ltd 2015.
- 6. **H.K.Dass and Er.Rajnish Verma:** "Higher Engineering Mathematics" S.Chand Publication, 3rdEd., 2014.
- 7. James Stewart: "Calculus" Cengage Publications, 7thEd., 2019.
- 8. David CLay: "Linear Algebra and its Applications", Pearson Publishers, 4th Ed., 2018.
- 9. Gareth Williams: "Linear Algebra with applications", Jones Bartlett Publishers Inc., 6thEd., 2017.