EVEN SEM - 2021 - 2022

K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BENGALURU - 560109

DEPARTMENT OF BASIC SCIENCE

SESSION: 2021-2022 (EVEN SEMESTER)

CO-PO MAPPING

Course Title: Engineering Physics			
Type: Fundamental		Course Code:21PHY22	
No of Hours			
Theory (Lecture Class)	Practical/Field Work/Allied Activities	Total hours/Week	Total teaching hours
4	0	4	40
Marks			
Internal Assessment	Examination	Total	Credits
50	50	100	3

Aim/Objectives of the Course

1. Engineering Physics is one of a basic subject for all engineering course. In this course, principles of Physics are taught to build strong foundation of knowledge required for engineering courses.
2. Learning the basic concepts in Physics which are very much essential in understanding and solving engineering related challenges.
3. Gaining the knowledge of newer concepts in modern physics for the better appreciation of modern technology.

Course Learning Outcomes

After completing the course, the students will be able to

CO1	**Utilizing** the knowledge of simple harmonic motion, derive the expressions for various types of oscillations and to understand the role of shock waves in various fields.	**Applying (K3)**
CO2	**Understand** the principles of lasers, optical fibers and **Applying** its applications in modern technology.	**Applying (K3)**
CO3	**Apply** the theory of modern physics to explain the principles of quantum mechanics, to set up one-dimensional Schrodinger's wave equation and its applications.	**Applying (K3)**
CO4	**Determine** the various electrical and thermal properties of materials like conductors, semiconductors and dielectrics using different theoretical models.	**Applying (K3)**
CO5	**Interpret** the application of sensitive instrumentation for Nano-scale system.	**Applying (K3)**

Syllabus Content

Module 1: Oscillations and Waves Oscillations: Basics of SHM, derivation of equation for SHM, Mechanical simple harmonic oscillators (spring constant by series and parallel combination), Equation of motion for free oscillations, Natural frequency of oscillations. Damped Oscillations: Theory of damped oscillations (derivation), over damping, critical & underdamping (graphical representation), quality factor.	**CO1** 10 hrs PO1-3 PO2-2 PO4-1

Forced Oscillations: Theory of forced oscillations (derivation) and resonance, sharpness of resonance. **Shock waves:** Mach number, Properties of Shock waves, Construction and working of Reddy shock tube, LO: At the end of this module, the students will be able to 1. Explain SHM and different types of oscillations. 2. Derive the expressions for amplitude of damped and forced vibrations. 3. Explain Mach number, classification based on Mach number and Reddy shock tube.	PO6-2 PO7-2 PO12 -1 PSO1-3 PSO2-1

Module 2: **Lasers & Optical Fibers** **Lasers:** Interaction of radiation with matter, Einstein's coefficients (derivation of expression for energy density). Requisites of a Laser system. Conditions for Laser action. Principle, Construction, and working of CO2 and semiconductor Lasers. Application of Lasers in Defence (Laser range finder) and medical applications- Eye surgery and skin treatment. **Optical Fibers:** Propagation mechanism, angle of acceptance, Numerical aperture, Modes of propagation, Types of optical fibers, Attenuation, and Mention of expression for attenuation coefficient. Discussion of a block diagram of point-to-point communication, Optical fiber sensors- Intensity-based displacement sensor and Temperature sensor based on phase modulation, Merits, and demerits, Numerical problems. **LO:** At the end of this module, the students will be able to 1. Derive the expression for energy density in terms of Einstein's Coefficients. 2. Explain the construction and working of different types of lasers and its applications. 3. Explain the mechanism of optical fiber and attenuation. Explain the different types of optical fibers and its applications.	**CO2** 10 hrs PO1-3 PO2-2 PO4-2 PO6-2 PO7-3 PO12-1 PSO1-3 PSO2-1
Module 3: Modern Physics and Quantum Mechanics Introduction to blackbody radiation spectrum- Wien's law, Rayleigh Jean's law, Stefan - Boltzmann law and Planck's law (qualitative), Deduction of Wien's law, and Rayleigh Jeans law from Planck's law. Wave-Particle dualism, de-Broglie hypothesis, de-Broglie wavelength. Heisenberg's uncertainty principle and its physical significance, Application of uncertainty principle (Non-existence of electron in the nucleus), Wave function- Properties, Physical significance, Probability density, Normalization, Eigenvalues and Eigen functions. Time independent Schrödinger wave equation. Particle in a box- Energy Eigenvalues and probability densities, Numerical problems. **LO:** At the end of this module, the students will be able to 1. Explain the blackbody radiation spectrum based on Planck's law. 2. Explain the uncertainty principle and its applications. 3. Obtain the expression for time independent Schrodinger wave equation , energy Eigen values and Eigen functions.	**CO3** 10 hrs. PO1-3 PO2-3 PO4-3 PO6-3 PO7-1 PO12-1 PSO1-3 PSO2-2

Module 4: Electrical Conductivity in Solids **Classical free electron theory**: Free-electron concept, Drude- Lorentz theory & Assumptions. Drift velocity, Mean collision time, Mean free path & Relaxation time (only expression). Expression for electrical conductivity (no derivation), Failures of classical free-electron theory. **Quantum free electron theory**: Assumptions, Density of states (no derivation), Fermi-energy, Fermi factor & its temperature dependence, Fermi - Dirac Statistics, Expression for electrical conductivity (derivation), Merits of Quantum free electron theory. Physics of Semiconductors: Fermi level in intrinsic semiconductors, Expression for the concentration of electrons in the conduction band, Holes concentration in valance band (only mention the expression), Conductivity of semiconductors (derivation), Hall effect, Expression for Hall coefficient (derivation). **Dielectrics:** Electric dipole, Dipole moment, Polarization of dielectric materials, Types of polarization. Qualitative treatment of Internal field in solids for one dimensional infinite array of dipoles (Lorentz field). Claussius-Mossotti equation (derivation), Numerical problems. **LO:** At the end of this module, the students will be able to 1. Explain CFET, QFET, Fermi energy and Fermi Dirac statistics. 2. Derive an expression for electrical conductivity of semiconductors and Hall coefficients. 3. Explain dielectrics, types of polarization and hence arrive Clausius-Mossotti equations.	**CO4** 10hrs PO1-3 PO2-3 PO4-3 PO6-3 PO7-2 PO12-1 PSO1-3 PSO2-2
Module 5: Material Characterization Techniques and Instrumentation Introduction to materials: Nanomaterials and nanocomposites. Principle, construction and working of X-ray Diffractometer, crystal size determination by Scherrer equation, Principle, construction, working and applications of Atomic Force Microscopy (AFM), Fourier Transform Infrared Spectroscopy (FTIR), Xray Photoelectron Spectroscopy (XPS), Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), Scanning tunneling electron microscopy (STEM). **LO**: At the end of this module, the students will be able to 1. Explain nanomaterials and nanocomposites. 2. Determine crystal size using Scherrer equation. 3. Explain the construction and working of various nanomaterial characterization instruments.	**CO5** 10hrs PO1-3 PO2-1 PO4-1 PO6-3 PO7-3 PO12-1 PSO1-3 PSO2-3
Text Books 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 5. X-ray diffraction- B E Warren published by Courier Corporation. 6. Nano composite materials-Synthesis, properties and applications, CRC Press.	
Reference Books (specify minimum two foreign authors text books) 1. Introduction to Mechanics — M.K. Verma: 2nd Ed, University Press(India) Pvt Ltd, Hyderabad 2009	

2. Lasers and Non Linear Optics – B.B. Laud, 3rd Ed, New Age International Publishers 2011
3. LASERS Principles, Types and Applications by K.R,Nambiar-New Age International Publishers.
4. Solid State Physics-S O Pillai, 8th Ed- New Age International Publishers-2018
5. Shock waves made simple- Chintoo S Kumar, K Takayama and KPJ Reddy: Willey India Pvt. Ltd.New Delhi2014
6. Materials Characterization Techniques-Sam Zhang, Lin Li, Ashok Kumar, CRC Press, First Edition, 2008
7. Characterization of Materials- Mitra P.K . Prentice Hall India Learning Private Limited

Web links and Video Lectures (e-Resources):

- https://www.britannica.com/technology/laser,k
- https://nptel.ac.in/courses/115/102/115102124/
- http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html
- https://onlinecourses.nptel.ac.in/noc20_mm14/preview
- W1 Nptel.ac.in
- W2 www.physics.org
- W3 www.physicsclassroom.com
- W4 www.coursera.org

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

Useful Journals

- Journal of Nature Physics
- Journal of Foundation of Physics
- Journal of Physical Review
- Journal of Applied Physics
- Journal of Classical and Quantum Gravity

Teaching and Learning Methods

1. Lecture class: 40 hours
2. Practical classes: 2 hours

Assessment

Type of test/examination: Written examination

Continuous Internal Evaluation(CIE) : 50 marks (20 marks i.e., Sum of three tests + 20 marks Assignments + 20 marks Assignment activity)

Semester End Exam (SEE): 100 marks (students have to answer all main questions) which will be reduced to 50 Marks.

Test duration: 1 :00 hours

Examination duration: 3 hours

CO / PO	PO1	PO2	PO3	PO 4	PO5	PO6	PO 7	PO8	PO9	PO10	PO1 1	PO12	PS O1	PS O2
21PHY12	K-level													
CO1	K3	3	2	-	1	-	2	2	-	-	-	-	1	3	1
CO2	K3	3	3	-	3	-	3	1	-	-	-	-	1	3	2
CO3	K3	3	2	-	2	-	2	3	-	-	-	-	1	3	2
CO4	K3	3	3	-	3	-	3	2	-	-	-	-	1	3	2
CO5	K3	3	1	-	1	-	3	3	-	-	-	-	1	3	3

CO to PO mapping

PO1: Science and engineering Knowledge **PO2:** Problem Analysis **PO3:** Design & Development **PO4:**Investigations of Complex Problems **PO5:** Modern Tool Usage **PO6:** Engineer & Society	**PO7:** Environment and Society **PO8:** Ethics **PO9:** Individual & Team Work **PO10:** Communication **PO11:** Project Mngmt & Finance **PO12:** Life long Learning

PSO1: Ability to understand the basic principles, laws, theories and problem solving skills of Engineering Physics and their application in engineering and technology.

PSO2: Ability to apply the concepts of physics to design a process to address the real world challenges.

Course In charge

Head of the Department

Dr. C. VASUDEV
Professor & Head
Department of Basic Science
KS School of Engineering and Management
Bangalore - 560 109.

Principal

Dr. K. RAMA NARASIMHA
Principal/Director
K S School of Engineering and Management
Bengaluru - 560 109

K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BENGALURU - 560109

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CO-PO Mapping

Course: SYSTEM SIMULATION AND MODELLING			
Type: Elective		Course Code: 18CS645	
No of Hours			
Theory (Lecture Class)	Practical/Field Work/Allied Activities	Total/Week	Total teaching hours
4	0	4	40
Marks			
Internal Assessment	Examination	Total	Credits
40	60	100	3

Aim/Objectives of the Course

1. To explain the basic system concept and definitions of system and discuss technique to model and to simulate various systems.
2. To understand and illustrate various techniques to generate random numbers.
3. To interpret input models and estimate their performance.
4. To utilize characteristics of queuing system and use techniques to implement statistical models.
5. To outline the verification and validation of models.

Course Learning Outcomes

After completing the course, the students will be able to

CO1	**Illustrate** the importance of system simulation and **make use of** different techniques to simulate various systems.	**Applying (K3)**
CO2	**Utilize** the properties of random numbers and generate random variates using different techniques.	**Applying (K3)**
CO3	**Interpret** the use of input models in simulation by choosing the statistical distributions and **estimate** absolute performance.	**Applying (K3)**
CO4	**Summarize** characteristics of queuing system, and **apply** suitable techniques to implement statistical models.	**Applying (K3)**
CO5	**Outline** the output performance of simulation data and **make use of** the information to improve the system performance.	**Applying (K3)**

Syllabus Content	CO1
Module 1 **Introduction:** When simulation is the appropriate tool and when it is not appropriate, Advantages and disadvantages of Simulation; Areas of application, Systems and system environment; Components of a system; Discrete and continuous systems, Model of a system; Types of Models, Discrete-Event System Simulation examples: Simulation of queuing systems. General Principles,. **LO:** At the end of this session the student will be able to, 1. List the circumstances when simulation is appropriate and not appropriate. 2. Explain system and its components.	8 hrs PO1-3 PO2-2 PO3-2 P05-2 P09-2 PO12 -1 PSO1-3

3. Explain different types of simulation models. 4. Simulate discrete event systems and analyze the system. 5. Explain event-scheduling / time-advance algorithm and apply event scheduling algorithm to simulate the system.	PSO2-3
Module 3: Random-Number Generation: Properties of random numbers; Generation of pseudo-random numbers, Techniques for generating random numbers, Tests for Random Numbers, Random-Variate Generation: Inverse transform technique, Acceptance- Rejection technique. LO: At the end of this session the student will be able to, 1. Explain different techniques for random number generation. 2. Generate random numbers using various techniques. 3. Explain and apply KS test, Chi square test, inverse transformation technique, 4. Acceptance-rejection technique. 5. Generate random variate using inverse transformation, acceptance-rejection technique.	**CO2** 8 hrs. PO1-3 PO2-2 PO3-2 P05-2 P09-2 PO12 -1 PSO1-3 PSO2-3
Module 4 : Input Modeling: Data Collection; Identifying the distribution with data, Parameter estimation, Goodness of Fit Tests, Fitting a non-stationary Poisson process, Selecting input models without data, Multivariate and Time-Series input models. Estimation of Absolute Performance: Types of simulations with respect to output analysis, Stochastic nature of output data, Measures of performance and their estimation. **LO:** At the end of this session the student will be able to, 1. Explain the steps involved in development of a good input model 2. Explain multivariate and time-series input models 3. Explain the types of simulation with respect to output analysis	**CO3** 8 hrs PO1-3 PO2-2 PO3-2 P05-2 P09-2 PO12 -1 PSO1-3 PSO2-3
Module 2 **Statistical Models in Simulation:** Review of terminology and concepts, Useful statistical models, Discrete distributions. Continuous distributions, Poisson process, Empirical distributions. **Queuing Models:** Characteristics of queuing systems, Queuing notation, Long-run measures of performance of queuing systems, Long-run measures of performance of queuing systems cont…,Steady-state behavior of M/G/1 queue, Networks of queues. **LO:** At the end of this session the student will be able to, 1. Explain various statistical models in simulation 2. Solve the problems using statistical models 3. Explain characteristics of queuing systems 4. Explain M/G/1 queue	**CO4** 8 hrs PO1-3 PO2-2 PO3-2 P05-2 P09-2 PO12 -1 PSO1-3 PSO2-3

Module 5: Measures of performance and their estimation, Output analysis for terminating simulations Continued.., Output analysis for steady-state simulations. **Verification, Calibration And Validation:** Optimization: Model building, verification and validation, Verification of simulation models, Verification of simulation models, Calibration and validation of models, Optimization via Simulation. **LO:** At the end of this session the student will be able to, 1. Differentiate between terminating simulation and steady state simulation. 2. Explain model building, verification and validation of simulation. 3. Explain the iterative process of calibrating a model. 4. Explain the three steps approach to validation by Naylor and Finger.	**CO5** 8hrs PO1-3 PO2-2 PO3-2 P05-2 P09-2 PO12 -1 PSO1-3 PSO2-3

Text Books

1. Jerry Banks, John S. Carson II, Barry L. Nelson, David M. Nicol: Discrete-Event System Simulation, 5 th Edition, Pearson Education, 2010.

Reference Books (specify minimum two foreign authors text books)

1 Lawrence M. Leemis, Stephen K. Park: Discrete – Event Simulation: A First Course, Pearson Education, 2006.

2. Averill M. Law: Simulation Modeling and Analysis, 4th Edition, Tata McGraw-Hill.2007.

Useful Websites

- http://www.systems-thinking.org/modsim/modsim.htm
- http://web.stanford.edu/class/archive/ee/ee392m/ee392m.1056/Lecture9_ModelSim.pdf
- http://www.eolss.net/sample-chapters/c15/e1-26-05-04.pdf
- https://shamsulsarip.files.wordpress.com/2015/07/system-modelling-and-simulation.pdf

Useful Journals

- A.LisJak, G.Grasselli: "A review of discrete modeling techniques for fracturing processes in discontinuous rock masses", CSRME, volume 6, 2014.
- Luc Devroye: "The Series method for Random Variate Generation and its Application to the Kolmogrov-Smirnov Distribution", American Journal of Mathematical and Management Sciences, volume 1, 2013

Teaching and Learning Methods

1. Lecture class: 40 Hrs
2. Revision : hrs

Assessment

Type of test/examination: Written examination

Continuous Internal Evaluation(CIE) : 40 marks (Average of three tests will be considered)

Semester End Exam(SEE) : 100 marks (students have to answer all main questions) which will be reduced to 60 Marks.

Test duration: 1 :30 hrs

Examination duration: 3 hrs

CO to PO Mapping

PO1: Science and engineering Knowledge **PO2:** Problem Analysis **PO3:** Design & Development **PO4:**Investigations of Complex Problems **PO5:** Modern Tool Usage **PO6:** Engineer & Society	**PO7:**Environment and Society **PO8:**Ethics **PO9:**Individual & Team Work **PO10:** Communication **PO11:**Project Mngmt & Finance **PO12:**Life long Learning

PSO1: Understand fundamental and advanced concepts in the core areas of Computer Science and Engineering to analyze, design and implement the solutions for the real world problems.

PSO2: Utilize modern technological innovations efficiently in various applications to work towards the betterment of society and solve engineering problems.

O	PO	PO1	PO2	PO3	PO 4	PO5	PO6	PO 7	PO8	PO9	PO10	PO1 1	PO12	PS O1	PS O2
	K-level														
1	K3	3	2	2	-	2	-	-	-	2	-	-	1	3	3
2	K3	3	2	2	-	2	-	-	-	2	-	-	1	3	3
3	K3	3	2	2	-	2	-	-	-	2	-	-	1	3	3
4	K3	3	2	2	-	2	-	-	-	2	-	-	1	3	3
5	K3	3	2	2	-	2	-	-	-	2	-	-	1	3	3

Course In charge

Head of the Department

HOD
Dept. of Computer Science & Engineering
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Principal

Dr. K. RAMA NARASIMHA
Principal/Director
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K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BANGALORE - 560109

DEPARTMENT OF CIVIL ENGINEERING

CO-PO MAPPING

Course: Elements of Civil Engineering and Mechanics			
Type: Core		Course Code: 21CIV24	
No of Hours			
Theory (Lecture Class)	Practical/Field Work/Allied Activities	Total/Week	Total teaching hours
3L	-	3	40
Marks			
Internal Assessment	Examination	Total	Credits
50	50	100	3

Aim/Objectives of the Course

- To make students learn the scope of various fields of civil engineering.
- To develop students' ability to analyze the problems involving forces, moments with their applications.
- To develop the student's ability to find out the center of gravity and moment of inertia and their applications.
- To make the students learn about kinematics and kinetics and their applications.

Course Learning Outcomes
After completing the course, the students will be able to

CO1	**Understand** and **explain** the various fields of civil engineering and the different building materials used.	**K3 Applying**
CO2	**Determine** the resultant and moment for a given force system subjected to various loads and **calculate** the friction, reactive forces and the effects that develop as a result of the external loads on rigid bodies.	**K3 Applying**
CO3	**Analyze** statically determinate beams and trusses (method of joints and sections).	**K4 Analyzing**
CO4	**Calculate** centroid and moment of inertia of regular and built-up sections.	**K3 Applying**
CO5	**Obtain** the relationship between motions of bodies.	**K3 Applying**

Syllabus Content

Module 1: Overview of Civil Engineering Systems: Introduction to structural engineering, geotechnical engineering, Construction technology, hydraulics, water resources and irrigation engineering transportation engineering, environmental and sanitary engineering, GIS, earthquake engineering. Role of civil engineers in the development of the nation. **Building materials:** Stone, brick, wood, glass, aluminum, cement, aggregates, concrete, steel, RCC, PSC, smart materials. **LO:** At the end of this session the student will be able to 1. List and explain the scope of different branches of civil engineering. 2. Explain the role of a civil engineer in the infrastructural development of a country.	**CO1** 8 hrs PO1-3 PO2-2 PO4-1 PO12 -1 PSO1-3 PSO2-1

3. List and explain the composition, manufacturing processes, properties and uses of various building materials used in construction.	
Module 2: Analysis of force systems: Concept of idealization, force, a system of forces, superposition, transmissibility, Resolution, and composition of forces, Law of Parallelogram of forces, polygonal law, Resultant of concurrent coplanar force system, coplanar non-concurrent force system, a moment of forces, couple, Varignons theorem, Resultant of coplanar non-concurrent force system, free body diagram, Lamis theorem, equations of equilibrium, equilibrium of concurrent and non-concurrent coplanar force system. **Friction:** Types of friction, laws of friction, limiting friction, coefficient of friction concept of static and dynamic friction, numerical problems on impending motion on horizontal and inclined planes along with connected bodies. **LO:** At the end of this session the student will be able to 1. List and explain the basic idealizations in engineering mechanics. 2. Define force, force-system, moment, couple and resolve the given force systems. 3. Explain Newton's laws, principle of physical independence, superposition, transmissibility of forces, equivalent force - couple system. 4. State and prove Varignon's principle of moments. 5. Determine magnitude and direction of resultant of concurrent and non-concurrent system of forces. 6. Explain free body diagram and its importance, resultant, conditions of equilibrium and equilibrant. 7. State and prove Lami's theorem. 8. Explain types of friction, laws of friction, limiting friction, angle of friction, coefficient of friction and angle of repose. 9. Calculate friction developed between contact surfaces, force required to cause and stop impending motion in blocks on inclined planes, rope and pulley systems, ladder friction and wedge friction.	**CO2** 8 hrs. PO1-3 PO2-3 PO4-2 PO12-1 PSO1-3 PSO2-1
Module 3: Support reactions: Types of loads and types of supports, statically determinate and indeterminate beams, support reactions in beams, Numerical problems on support reactions for statically determinate beams (point load, udl, uniformly varying loads and moments) **Analysis of trusses:** Types of trusses, analysis of statically determinate trusses using the method of joints and method of sections. **LO:** At the end of this session the student will be able to 1. Explain the types of loads, supports and beams. 2. Determine the reactions developed at supports. 3. Analyze statically determinate truss by method of joints and method of sections.	**CO3** 8 hrs PO1-3 PO2-3 PO4-3 PO12-1 PSO1-3 PSO2-1
Module 4: Centroid: Introduction, methods of determining the centroid, locating the centroid of simple figures from first principle, the centroid of composite and built-up sections. **Moment of inertia:** Introduction, method of determining the second moment of area of plane sections from first principles, parallel axis theorem and perpendicular axis theorem section modulus, the radius of gyration, moment of inertia of composite area	**CO4** 8 hrs PO1-3 PO2-3

and built-up sections, concept of product of inertia (No problem). **LO:** At the end of this session the student will be able to 1. Explain the concepts of centroid and moment of inertia. 2. State and prove Parallel axis theorem and Perpendicular axis theorem. 3. Derive equation for determining centroid of regular geometric shapes. 4. Derive equation for determining moment of inertia of regular geometric shapes. 5. Locate the centroid and determine moment of inertia of regular and given sections.	PO4-3 PO12-1 PSO1-3 PSO2-1
Module 5: Kinematics: Displacement, average velocity, instantaneous velocity, speed, acceleration, average acceleration, variable acceleration, acceleration due to gravity, Newton's law of motion, rectilinear motion and numerical problems, curvilinear motion, super elevation, projectile motion, relative motion, numerical problems, motion under gravity, numerical problems Kinetics: D 'Alembert's principle and its application in-plane motion and connected bodies including pulleys. **LO:** At the end of this session the student will be able to 1. Define displacement, average velocity, instantaneous velocity, speed, acceleration, average acceleration, variable acceleration, acceleration due to gravity, rectilinear motion, curvilinear Motion, super elevation, projectile motion, relative motion. 2. Calculate average velocity, instantaneous velocity, speed, acceleration, average acceleration, variable acceleration, acceleration due to gravity, rectilinear motion, curvilinear motion, super elevation, projectile motion, and relative motion. 3. Explain D'Alemberts principle.	**CO5** 8 hrs PO1-3 PO2-3 PO4-3 PO12-1 PSO1-3 PSO2-1

Text Books

1. R.K. Bansal, **"A Text Book of Engineering Mechanics"**, Laxmi Publications.
2. R. C. Hibbler, **"Engineering Mechanics: Principles of Statics and Dynamics"**, Pearson Press.

Reference Books (specify minimum two foreign authors text books)

1. Andy and Rudra Pratap, Introduction to Statics and Dynamics, Oxford University Press.
2. F.P. Beer and E.R. Johnston, Mechanics of Engineers, Statics and Dynamics, McGraw Hill.
3. Irving H Shames, Engineering Mechanics, Prentice Hall.

Useful Websites

1. http://www.scirp.org/Journal/ojce/
2. http://www.springer.com/engineering/civil+engineering/journal/12205

Useful Journals

1. Journal of Engineering Mechanics (http://ascelibrary.org/journal/jenmdt)
2. Canadian Journal of Civil Engineering (http://www.nrcresearchpress.com/journal/cjce)

Teaching and Learning Methods

Lecture class: 40 hrs

Assessment

Type of test/examination: Written examination.

Continuous Internal Evaluation (CIE): 100 marks {60 marks (total of three tests, each of 20 marks) + 20 (two assignments, each of 10 marks) +20 (Quiz/Seminar. Group Discussion)}, which will be reduced to 50 marks.

Semester End Exam (SEE): 100 marks (students have to answer all main questions) which will be reduced to 50 marks.

Test duration: 1 hr

Examination duration: 3 hrs

CO to PO Mapping

PO1: Science and engineering Knowledge **PO2:** Problem Analysis **PO3:** Design & Development **PO4:**Investigations of Complex Problems **PO5:** Modern Tool Usage **PO6:** Engineer & Society	**PO7:**Environment and Society **PO8:**Ethics **PO9:**Individual & Team Work **PO10:** Communication **PO11:**Project Mngmt & Finance **PO12:**Lifelong Learning

PSO1: The proficiency in mathematics, physical and management sciences helps to excel in the areas of planning, analysis related to Civil Engineering systems.

PSO2: Identify sustainable materials and technologies, codes of practice in construction industry and transportation Systems.

CO	PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
21CIV 24	K-level														
CO1	K3	3	2	-	1	-	-	-	-	-	-	-	1	3	1
CO2	K3	3	3	-	3	-	-	-	-	-	-	-	1	3	1
CO3	K4	3	3	-	3	-	-	-	-	-	-	-	1	3	1
CO4	K3	3	3	-	3	-	-	-	-	-	-	-	1	3	1
CO5	K3	3	3	-	3	-	-		-	-	-	-	1	3	1

Course In charge

Head - Dept

Professor & Head
Dept. of Civil Engineering
K.S. Group of Institutions
K.S. School of Engineering & Management
Bangalore-560 062.

Principal

Dr. K. RAMA NARASIMHA
Principal/Director
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Bengaluru - 560 109

K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BENGALURU - 560109

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SESSION: 2021-2022 (EVEN SEMESTER)

CO-PO MAPPING

Course: DIGITAL COMMUNICATION			
Type: Core		Course Code: 18EC61	
No of Hours			
Theory (Lecture Class)	Practical/Field Work/Allied Activities	Total/Week	Total teaching hours
4	0	4	50
Marks			
Internal Assessment	Examination	Total	Credits
40	60	100	4

Aim/Objectives of the Course

1. To illustrate the use of Hilbert Transform and represent the binary data using Line Codes.
2. To explain and apply Gram-Schmidt Orthogonalization procedure, detection and estimation in optimum receiver and matched filter receiver.
3. To explain and estimate the probability of error of coherent and non-coherent digital modulation.
4. To Illustrate Correlative coding, precoding and concept of equalization
5. To describe the spread spectrum modulation technique.

Course Learning Outcomes

After completing the course, the students will be able to

CO1	Explain and **solve** Hilbert transform, pre envelopes, and complex envelopes, represent binary data using line codes and **estimate** power spectral densities.	**Applying (K3)**
CO2	Explain and **apply** Gram-Schmidt Orthogonalization procedure, detection and estimation concept in optimum receiver and matched filter receiver	**Applying (K3)**
CO3	Explain coherent and non-coherent digital modulation techniques and **estimate** the probability of error.	**Applying (K3)**
CO4	Explain and **solve** estimation of probability of error through bandlimited channel, Correlative coding, DB and MDB, Pre-coding and equalization principle for non-ideal channels.	**Applying (K3)**
CO5	**Discuss** Spread spectrum modulation techniques and **solve** the properties of spread spectrum modulation technique	**Applying (K3)**

Syllabus Content

MODULE 1:Bandpass signal to equivalent low pass: Hilbert Transform, Pre-envelopes, Complex envelopes, Canonical representation of bandpass signals, Complex low pass representation of band-pass systems, Complex representation of bandpass signals and systems. **Line codes:** Unipolar, Polar, Bipolar (AMI) and Manchester code and their power spectral densities. Overview of HDB3, B3ZS, B6ZS. (Text 1, Ref 1, 2) **LO:** At the end of this session the student will be able to 1. Explain and solve Hilbert transform, pre envelops and complex envelops. 2. Explain and apply the concepts of complex bandpass signals and systems. 3. Apply the concepts of different types of line codes.	**CO1** 10 hrs PO1-3 PO2-2 PO3-1 PO4-1 PO5-1 PO12 -2 PSO1- 3 PSO2-2

Module 2: Signaling over AWGN channels-Detection and Estimation: *Introduction,* Geometric representation of signals, Gram-Schmidt Orthogonalization procedure, Conversion of the continuous AWGN channel into a vector channel, Optimum receivers using coherent detection: ML Decoding, Correlation receiver, matched filter receiver. (Text 1) **LO:** At the end of this session the student will be able to 1. Explain Geometric representation of signals and solve Gram-Schmidt Orthogonalization procedure. 2. Derive expressions for Conversion of the continuous AWGN channel into a vector channel. 3. Explain and apply the concepts of Optimum receivers using coherent detection- ML Decoding, Correlation receiver and matched filter receiver.	CO2 10 hrs. PO1-3 PO2-2 PO3-1 PO4-1 PO5-2 PO12-2 PSO1-3 PSO2-2
Module 3: Digital Modulation Techniques: Digital modulation formats, Phase shift Keying techniques using coherent detection: BPSK, QPSK generation, and detection and error probabilities, M-ary PSK, M-ary QAM. Frequency shift keying techniques using Coherent detection: BFSK generation, detection and error probability. **Non coherent orthogonal modulation techniques:** BFSK, DPSK Symbol representation, Block diagrams treatment of Transmitter and Receiver, Probability of error (Without derivation) (Text 1). **LO:** At the end of this session the student will be able to 1. Explain different types of Digital modulation formats. 2. Explain the working of BPSK, QPSK generation techniques. 3. Derive the expressions for error probabilities for different detection techniques. 4. Explain the working of Frequency shift keying techniques using Coherent detection: BFSK generation, detection. 5. Derive the expressions for error probability for FSK modulation techniques.	CO3 10 hrs PO1-3 PO2-2 PO3-1 PO4-1 PO5-2 PO6-2 PO12-2 PSO1-3 PSO2-2
Module 4: Communication through Band Limited Channels: Digital Transmission through Band limited channels - Inter Symbol Interference, Eye diagrams, Signal design for Band limited ideal channel with zero ISI – Nyquist Criterion (statement only), Sinc and Raised pulse shaping. Signal design for Band limited channel with controlled ISI – Correlative coding, DB and MDB, Pre-coding. Basic Concepts of Equalization for non-ideal channels – ZFE, MMSE, (without derivations), Adaptive Equalizers (Block diagram only) (Text 2, Ref 2). **LO:** At the end of this session the student will be able to 1. Explain the concept of Inter Symbol Interference, Eye diagrams. 2. Derive the expression for Sinc and Raised pulse shaping. 3. Apply the concepts of DB and MDB, Pre-coding. 4. Explain the Basic Concepts of Equalization for non-ideal channels – ZFE, MMSE. 5. Explain with a neat block diagram the working of Adaptive Equalizers.	CO4 10 hrs PO1-3 PO2-2 PO3-1 PO4-1 PO5-2 PO12-2 PSO1-3 PSO2-2
Module 5: Two port network parameters **Principles of Spread Spectrum:** Concept of Spread Spectrum, Direct Sequence/SS, Frequency Hopped SS, Processing Gain, Interference, and probability of error statement only. PN sequences for Spread Spectrum – M- sequences with Properties; Gold, Kasami sequences with basic properties. Direct sequence spread spectrum system concepts, Frequency Hopped Spread spectrum system concepts, Spread Spectrum Synchronization (block diagram treatment) - Code Acquisition and Tracking. (Text 2)	CO5 10 hrs PO1-3 PO2-2 PO3-1 PO4-1

LO: At the end of this session the student will be able to	
1. Explain the Concept of Spread Spectrum Modulation. 2. Explain the different types of Spread Spectrum Modulation. 3. Explain the properties and apply the concepts of PN – sequence generation. 4. Explain the Concept of Frequency Hopped Spread spectrum system. 5. Explain the working of Code Acquisition and Tracking with a neat block diagram.	PO5-1 PO6-2 PO12-2 PSO1-3 PSO2-2

Text Books

1. Simon Haykin, "Digital Communication Systems", John Wiley & sons, First Edition, 2014, ISBN 978-0-471-64735-5.
2. John G Proakis and Masoud Salehi, "Fundamentals of Communication Systems", 2014 Edition, Pearson Education, ISBN 978-8-131-70573-5.

Reference Books

1. Ian A Glover and Peter M Grant, "Digital Communications", Pearson Education, Third Edition, 2010, ISBN 978-0-273-71830-7.
2. B.P.Lathi and Zhi Ding, "Modern Digital and Analog communication Systems", Oxford University Press, 4th Edition, 2010, ISBN: 978-0-198-07380-2.
3. Wayne Tomasi, Advanced Electronic Communication System, 6th Edition, Pearson education 2012.
4. Dr. Sanjay Sharma, Communication System Analog and Digital, Katria and Sons, 2012.

Useful Websites

- http://freevideolectures.com/Course/2311/Digital-Communication
- https://onlinecourses.nptel.ac.in/explorer
- http://nptel.iitg.ernet.in/

Useful Journals

- Communications Magazine, IEEE (http://ieeexplore.ieee.org/)
- Journal of the Institution of Electronic and Radio Engineers (http://digital-library.theiet.org/content/journals/ecej)
- International Journal of Communication Systems (http://onlinelibrary.wiley.com/)
- AEU - International Journal of Electronics and Communications (http://www.journals.elsevier.com/aeu-international-journal-of-electronics-and-communications/)
- Digital Communications and Networks (http://www.journals.elsevier.com/digital-communications-and-networks/))

Teaching and Learning Methods

1. Lecture class: 50 hrs

Assessment

Type of test/examination: Written examination

Continuous Internal Evaluation(CIE) : 40 marks (Average of three tests and assignments will be considered)

Semester End Exam(SEE) : 100 marks (students have to answer all main questions) which will be reduced to 60 Marks.

Test duration: 1 :30 hrs

Examination duration: 3 hrs

CO to PO Mapping

PO1: Science and engineering Knowledge **PO2:** Problem Analysis **PO3:** Design & Development **PO4:**Investigations of Complex Problems **PO5:** Modern Tool Usage **PO6:** Engineer & Society	**PO7:**Environment and Sustainability **PO8:**Ethics **PO9:**Individual & Team Work **PO10:** Communication **PO11:**Project Mngmt & Finance **PO12:**Life long Learning

At the end of the Program, the students should:

PSO1: Be able to acquire knowledge and apply concepts in the field of engineering and interdisciplinary subjects.

PSO2: Be able to identify the existing problems, effectively utilize tools to provide solution, and disseminate the information.

	PO	PO1	PO2	PO3	PO 4	PO5	PO6	PO 7	PO8	PO9	PO10	PO1 1	PO12	PS O1	P O 2
	K-level														
	K3	3	2	1	1	1	--	-	-	-	-	-	2	3	2
	K3	3	2	1	1	2	-	-	-	-	-	-	2	3	2
	K3	3	2	1	1	2	2	-	-	-	-	-	2	3	2
	K3	3	2	1	1	2	-	-	-	-	-	-	2	3	2
	K3	3	2	1	1	1	2	-	-	-	-	-	2	3	2

Course In charge **Head of the Department** **IQAC Coordinator** **Principal**

Professor & Head
Dept. of Electronics & Communication Engineering
K. S. School of Engineering & Management
Bangalore-560 109

Dr. K. RAMA NARASIMHA
Principal/Director
K S School of Engineering and Management
Bengaluru - 560 109

K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BANGALORE - 560109
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
SESSION: 2021– 2022 (EVEN SEMESTER)
CO-PO Mapping

Course: Power System Operation and Control			
Type: Core		**Course Code: 18EE81**	
No of Hours			
Theory (Lecture Class)	Practical/Field Work/Allied Activities	Total hours/Week	Total teaching hours
3	0	3	40
Marks			
Internal Assessment	Examination	Total	Credits
40	60	100	3

Aim/Objectives of the Course

1. To discuss various levels of controls in power systems and the vulnerability of the system.
2. To explain components, architecture and configuration of SCADA.
3. To explain basic generator control loops, functions of Automatic generation control, speed governors and mathematical models of Automatic Load Frequency Control.
4. To explain automatic generation control, voltage and reactive power control in an interconnected power system.
5. To explain reliability and contingency analysis, state estimation and related issues.

Course Learning Outcomes
After completing the course, the students will be able to

CO1	**Explain** various levels of controls in Power Systems and **discuss** the architecture and classifications of SCADA.	**Understanding (K2)**
CO2	**Develop** the complete load frequency control model of an isolated power system.	**Applying (K3)**
CO3	**Develop** mathematical models of Automatic Generation Control in two area system, Automatic Voltage Regulator and **calculate** different parameters of control area.	**Applying (K3)**
CO4	**Derive** the relation between voltage, power, reactive power at a node along with voltage control methods and **calculate** voltage and reactive power of system.	**Applying (K3)**
CO5	**Derive** an expression for change in network parameters required for contingency analysis and state vector by linear Least Square estimation methods.	**Applying (K3)**

Syllabus Content

Module 1: **Introduction**: Operating States of Power System, Objectives of Control, Key Concepts of Reliable Operation, Preventive and Emergency Controls, Energy Management Centers. **Supervisory Control and Data acquisition (SCADA)**: Introduction, components, application in Power System, basic functions and advantages, Building blocks of SCADA system, components of RTU, communication subsystem, IED functional block diagram. **Classification of SCADA System**: Single master–single remote, Single master–multiple RTU, Multiple master–multiple RTUs, and Single master, multiple submaster, multiple remote.	**CO1** 8 hrs PO1-3 PO6-2 PO12 -1 PSO1-3 PSO2-1

LO: After completing these chapters, students will be able to 1. Discuss Operating States and reliable operation in Power System. 2. Illustrate Preventive and emergency control in Power System. 3. Explain the components, configurations and application of SCADA system. 4. Draw the IED functional block diagram and Common communication channels used. 5. Classify SCADA System and illustrate each type with neat diagram.	
Module-2: Automatic Generation Control (AGC): Introduction, Schematic diagram of load frequency and excitation voltage regulators of turbo generators, Load frequency control (Single area case), Turbine speed governing system, Model of speed governing system, Turbine model, Generator load model, Complete block diagram of representation of load frequency control of an isolated power system, Steady state analysis, Control area concept:, Proportional plus Integral Controller. **LO**: After completing these chapters, students will be able to 1. Explain basic AVR and ALFC control loop of Generator. 2. Obtain the functional speed – governor model of an ALFC for isolated power system. 3. Develop mathematical modelling of Speed governing system, Turbine, Generator and load. 4. Develop complete block diagram of single control area having a turbo – generator supplying an isolated load for load frequency problem and discuss the response of the system for a sudden change in load demand. 5. Calculate primary ALFC loop parameter for control area and explain briefly the Secondary ALFC loop with control specification and Proportional integral controller.	**CO2** 8hrs. PO1-3 PO2-2 PO3-2 PO6-2 PO12-1 PSO1-3 PSO2-2
Module-3: Automatic Generation Control in Interconnected Power system: Two area load frequency control, Optimal (Two area) load frequency control by state variable, Automatic voltage control, Load frequency control with generation rate constraints (GRCs), Speed governor dead band and its effect on AGC, Digital LF Controllers, Decentralized control. **LO**: After completing these chapters, students will be able to 1. Derive the expression for tie – line power and frequency deviation for two area system. 2. Develop the two-area load frequency model of two system interconnected by a tie line and obtain the state variable model of two area system. 3. Derive mathematical modelling of AVR with neat block diagram and list the requirements of good AVR system. 4. Write short note on Load frequency control with generation rate constraints and dead band in Speed governor control loop. 5. Explain Digital LF Controllers and Decentralized control in AGC strategies.	**CO3** 8hrs PO1-3 PO2-2 PO3-2 PO6-2 PO12-1 PSO1-3 PSO2-2
Module–4: Control of Voltage and Reactive Power: Introduction, Generation and absorption of reactive power, Relation between voltage, power and reactive power at a node, Methods of voltage control: i. Injection of reactive power, Shunt capacitors and reactors, Series capacitors, Synchronous compensators, Series injection, ii Tap changing transformers, Combined use of tap changing transformers and reactive power injection, Booster transformers, Phase shift transformers, Voltage collapse.	

LO: After completing these chapters, students will be able to 1. Explain the components of power systems that can generate and/or absorb reactive power, 2. Derive the equations to get the relation between voltage, power and reactive power at a node, 3. Calculate real and reactive power delivered by the generator in a transmission network. 4. Explain different Voltage Control methods with neat diagram. 5. Write short note on voltage collapse.	**CO4** 8hrs PO1-3 PO2-2 PO3-2 PO6-2 PO12-1 PSO1-3 PSO2-2
Module–5: Power System Security: Introduction, Factors affecting power system security, Contingency Analysis, Linear Sensitivity Factors, AC power flow methods, Contingency Selection and Ranking. **State estimation of Power Systems**: Introduction, Linear Least Square Estimation. **LO**: After completing these chapters, students will be able to 1. Derive an expression for contingency selection by calculating the performance index, network sensitivity factor and contingency ranking. 2. Explain major functions involved in system security. 3. Explain contingency analysis procedure with flow chart. 4. Define state estimation and explain the objectives, issues and process of power system state estimation. 5. Explain Linear least square estimation methods and derive mathematical description for Process.	**CO5** 8hrs PO1-3 PO2-2 PO6-2 PO12-1 PSO1-3 PSO2-1

Text Books:

1. Modern Power System Analysis, D. P. Kothari, McGraw Hill, 4th Edition, 2011.
2. Power Generation Operation and Control, Allen J Wood & *Woollenberg*, Wiley ,2nd Edition, 2003.
3. Electric Power Systems, B M Weedy, B J Cory, Wiley, 4th Edition, 2012.

Reference Books:

1. Computer-Aided Power System Analysis, G. L. Kusic, CRC Press, 2nd Edition.2010
2. Power System SCADA and Smart Grid, Mini S Thom and John D. McDonald, CRC Press, 2015
3. Power System Stability and Control, Kundur, McGraw Hill, 8th Reprint, 2009

Useful Websites

1. https://www.youtube.com/watch?v=D7nUa7zRPa4
2. https://www.youtube.com/watch?v=zkN13OmgGOs
3. https://nptel.ac.in/courses/108/104/108104052/
4. https://www.youtube.com/watch?v=IK_j_3ZJwuk
5. https://nptel.ac.in/courses/108/101/108101040/

Useful Journals

1. International Journal of Engineering Trends and Technology (IJETT): http://www.ijettjournal.org/2017/volume-43/number-4/IJETT-V43P232.pdf
2. International Electrical Engineering Journal (IEEJ): https://www.researchgate.net/profile/AlmoatazAbdelaziz/publication/306120177_Optimal_Power_Flow_Methods_A_Comprehensive_Survey/links/57b3059b08aec0b132d8ceb1/Optimal-Power-Flow-Methods-A Comprehensive-Survey.pdf

Teaching and Learning Methods: Lecture class: 40 hours

Assessment

Type of test/examination: Written examination

Continuous Internal Evaluation (CIE): 40 marks (30 marks -Average of three tests + 10 marks Assignments)

Semester End Exam (SEE): 100 marks (students have to answer all main questions) which will be reduced to 60 Marks.

Test duration: 1:30 hours

Examination duration: 3 hours

CO to PO Mapping

PO1: Science and engineering Knowledge	**PO7:** Environment and Society
PO2: Problem Analysis	**PO8:** Ethics
PO3: Design & Development	**PO9:** Individual & Team Work
PO4: Investigations of Complex Problems	**PO10:** Communication
PO5: Modern Tool Usage	**PO11:** Project Management & Finance
PO6: Engineer & Society	**PO12:** Lifelong Learning

PSO1: Graduates should be able to develop an inclination towards acquiring analytical, technical, managerial and communicative skills by gaining knowledge in fundamental concepts in the field of Electrical sciences and allied subjects.

PSO2: Graduates should be able to Contribute for the development of society by providing technical solutions to complex electrical engineering problems through life-long learning.

CO	PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
18EE81	K-level														
CO1	K2	3	-	-	-	-	2	-	-	-	-	-	1	3	1
CO2	K3	3	2	2	-	-	2	-	-	-	-	-	1	3	2
CO3	K3	3	2	2	-	-	2	-	-	-	-	-	1	3	2
CO4	K3	3	2	2	-	-	2	-	-	-	-	-	1	3	2
CO5	K3	3	2	-	-	-	2		-	-	-	-	1	3	1

Course In charge | HOD EEE | IQAC- Coordinator | Principal

K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BANGALORE - 560109

DEPARTMENT OF MANAGEMENT STUDIES

CO-PO Mapping

Course: FINANCIAL MANAGEMENT			
Type: CORE		Course Code: 20MBA22	
No of Hours			
Theory (Lecture Class)	Practical/Field Work/Allied Activities	Total/Week	Total teaching hours
3	2	5	52
Marks			
Internal Assessment	Examination	Total	Credits
40	60	100	3

Aim/Objectives of the Course

1. To familiarize the students with basic concepts of financial management and financial system.
2. To understand concept of time value of money and its implication.
3. To evaluate the investment proposals.
4. To understand the management of working capital in an organization.
5. To analyse capital structure and dividend decision.

Course Learning Outcomes

After completing the course, the students will be able to:

CO1	**Understand** the basic financial concepts	**Understanding (K1)**
CO2	**Apply** time value of money	**Applying (K3)**
CO3	**Evaluate** the Cost of Capital	**Applying (K3)**
CO4	**Evaluate** the investment decisions	**Applying (K3)**
CO5	**Estimate** working capital requirements	**Applying (K3)**
CO6	**Analyze** the capital structure and dividend decisions	**Applying (K3)**

Syllabus Content

Unit 1: (7 Hours) Introduction : Meaning and objectives of Financial Management, changing role of finance managers. Interface of Financial Management with other functional areas. Indian Financial System: Financial markets, Financial Instruments, Financial institutions and financial services. Emerging issues in Financial Management: Risk Management, Behavioural Finance, Financial Engineering, Derivatives (Theory). **LO:** At the end of this session the student will be able to 1. Describe the significance of Financial Management.	**CO1** 07 hrs PO1, PO3,PO5 PSO1,PSO2

2. Explain Emerging issues in Financial Management? 3. Write short note on Derivatives. 4. Describe all Money Market Instruments? 5. Explain Capital Market?	
Unit 2: (10 Hours) Time value of money : Meaning of Time value of money –Future value of single cash flow & annuity, present value of single cash flow, annuity & perpetuity. Simple interest & Compound interest, Capital recovery & loan amortization. (Theory & Problem). Case Study on Loan amortization. Computer lab for calculation of future value, present value and loan amortisation in MS excel. **LO:** At the end of this session the student will be able to 1. Define term Time Value of money? 2. Explain the forms of time value of money. 3. What is Annuity 4. Distinguish between Compound Interest and Simple Interest?	**CO2** 10 hrs. PO1,PO2, PO3 PSO1,PSO2
Unit 3: (10 Hours) Sources of Financing: Shares, Debentures, Term loans, Lease financing, Hybrid financing, Venture Capital, Angel investing and private equity, Warrants and convertibles (Theory Only). Cost of Capital: Basic concepts. Cost of debenture capital, cost of preferential capital, cost of term loans, cost of equity capital (Dividend discounting and CAPM model) - Cost of retained earnings - Determination of Weighted average cost of capital (WACC) and Marginal cost of capital. (Theory & Problem). Case Study on WACC. **LO:** At the end of this session the student will be able to 1. Define Shares and Debentures? 2. Determine the meaning of Hybrid Financing and Venture Capital. 3. Discuss the Cost of Capital. 4. Explain Dividend Discounting and CAPM Model?	**CO3** 10 hrs PO1,PO2, PO3 PSO1,PSO2
Unit 4: (9 Hours) Investment Decisions : Capital budgeting process, Investment evaluation techniques – [Net present value, Internal rate of return, Modified internal rate of return, Profitability index, Payback period, discounted payback period, accounting rate of return Problem). Risk analysis in capital budgeting-Case Study on replacement of capital project. (Numerical problems). Computer lab for calculation of NPV, IRR, PI, Payback period, ARR in MS excel. **LO:** At the end of this session the student will be able to 1. Outline the meaning of Net Present Value 2. Discuss the Capital Budgeting Process. 3. Explain the Investment Evaluation Techniques.	**CO4** 9hrs PO1, PO3 PSO1,PSO2
Unit 5: (7 Hours) Working Capital Management : Factors influencing working capital requirements - Current asset policy and current asset finance policy- Determination of operating cycle and cash cycle on Excel- Estimation	**CO5** 7 hrs

of working capital requirements of a firm. (Does not include Cash, Inventory & Receivables Management). Case study on Working Capital Determination and the impact of negative working capital Amazon-negative working capital and profitability. Computer lab for calculation of working capital cycle and operating cycle in MS excel. **LO:** At the end of this session the student will be able to 1. Explain the Operating Cycle and Cash Cycle. 2. Explain the impact of Net Working Capital. 3. Discuss the factors influencing Working Capital Requirements.	PO1,PO3 PSO1,PSO2
Unit 6: (7 Hours) Capital structure and dividend decisions : Capital structure and dividend decisions – Planning the capital structure-Governance of Equity and Debt, Fall in interest rates and perils of Debt funding. Leverages, EBIT and EPS analysis. ROI & ROE analysis. Capital structure policy. Dividend policy – Factors affecting the dividend policy - Dividend Policies- Stable Dividend, Stable Payout (No dividend theories to be covered). Case Study on EBIT-EPS analysis & Leverages. **LO:** At the end of this session the student will be able to 1. Discuss the factors affecting Dividend Policy. 2. How do you calculate Leverages? 3. Write short note on Capital Structure. 4. What is Debt Financing.	**CO-6** 7 hrs PO1, PO2, PO4, PO5, PSO1,PSO2

Text Books

1. Financial Management by Khan and Jain , TMH 7e.
2. Financial Management by Prasanna Chandra , TMH 9e.
3. Financial Management by Prahlad Rathod, Babitha Thimmiah and Harish Babu , HPH 1e, 2015.
4. Financial Management: A Strategic Perspective by Nikhil Chandra Shil & Bhagaban Das , Sage Publications,1e,2016

Reference Books

1. Financial Management by I.M. Pandey , Vikas Publishing House Pvt. Ltd, 3e, 2012
2. Principles of Corporate Finance by Brealey, Myers, Allen and Mohanty, McGraw Education (India) Private Limited, 11e, 2014
3. Cases in Financial Management by I.M. Pandey and Ramesh Bhat, McGraw-Hill Education , 3e, 2015
4. Corporate Finance by Vishwanath S.R., Sage Publications, 3e, 2019

Useful Websites

- http://www.forbes.com/
- **Error! Hyperlink reference not valid.**
- www.reuters.com/
- www.cnnmoney.org/
- www.financialtimes.com/

Useful Journals

- Journal of Finance
- Journal of Financial Economics
- Review of Financial studies
- Global Finance Journal
- Indian Journal of Finance

K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BANGALORE - 560109

DEPARTMENT OF MANAGEMENT STUDIES

CO-PO Mapping

Teaching and Learning Methods

1. Lecture class: 44 hrs
2. Practical classes: 08 hrs

Question Paper: 40 % Theory 60% problems

Assessment

Type of test/examination: Written examination

Continuous Internal Evaluation(CIE) : 40 marks (Average of THREE tests will be considered)

Semester End Exam(SEE) : 100 marks (students have to answer all main questions) which will be reduced to 60 Marks.

Test duration: 1 :30 hrs **Examination duration:** 3 hrs

PO1: Acquire sufficient theoretical knowledge and are enabled to apply them to solve practical problems in business and other organizations/ institutions of importance.

PO2: Apply effective communication skills with a high degree of lateral and critical thinking that enhances learn ability, developed for being continuously employable.

PO3: Demonstrate leadership qualities, ethically sound, enabled with decision making skills that reflect a high degree of social consciousness

PO4: Recognize the need for sustained research orientation to comprehend a growing complex, economic, legal and ethical environment

PO5: Possess self- sustaining entrepreneurship qualities that encourages calculated risk taking.

PSO1: Develop viable Managerial solutions in the dynamic Business eco system

PSO2: Establish and Encourage Entrepreneurial zeal along with Ethical Values in the business

CO		PO						
		PO1	PO2	PO3	PO4	PO5	PSO1	PSO2
20MBA22	K- Level	-	-	-	-	-	-	-
CO1	K3	3	-	-	-	-	2	2
CO2	K3	3	3	-	-	-	2	1
CO3	K3	3	3	-	-	-	2	1
CO4	K3	3	-	2	-	-	1	1
CO5	K3	3	-	2	3	-	1	2
CO6	K3	3	-	2	-	-	3	1

Course In charge

Head of the Department -MBA

Principal

Dr. K. RAMA NARASIMHA
Principal/Director
K S School of Engineering and Management
Bengaluru - 560 109

HOOL OF ENGINEERING AND MANAGEMENT, BENGALURU - 560109

DEPARTMENT OF MECHANICAL ENGINEERING

SESSION: 2021-2022 (EVEN SEMESTER)

CO-PO MAPPING

Course: Mechanical Measurements and Metrology			
Type: Core		Course Code:18ME46B	
No of Hours per week			
Theory (Lecture Class)	Theory (Lecture Class)	Theory (Lecture Class)	Total teaching hours
04	04	04	50
Marks			
Internal Assessment	Internal Assessment	Internal Assessment	Credits
40	40	40	4

Aim/Objective of the Course:

1. To have a working knowledge of the different measuring instruments
2. To have a knowledge of different types of comparators
3. To understand the effect Errors during measuring
4. To get an idea of Calibration of measuring instruments

Course Learning Outcomes

After completing the course, the students will be able to

CO1	Understand the objectives of metrology, methods of measurement, selection of measuring instruments, standards of measurement and calibration of end bars. Describe slip gauges	Applying (K3)
CO2	Explain tolerance, limits of size, fits, geometric and position tolerances, gauges and their design. Understand the principle and working of comparator	Applying (K3)
CO3	Describe the measurement of Thread and gear parameters by various method	Applying (K3)
CO4	Understand laser interferometers and Coordinate measuring machines. Explain measurement systems, transducers, intermediate modifying devices and terminating devices.	Understandin g (K2)
CO5	Describe functioning of force, torque, pressure, strain and temperature measuring devices	Understandin g (K2)

Syllabus Content

Module-1 **Introduction to Metrology** Definition, objectives and concept of metrology, Need of inspection, Principles, process, methods of measurement, Classification and selection of measuring instruments and systems. Accuracy, precision and errors in measurement. System of measurement, Material Standard, Wavelength Standards, Subdivision of standards, Line and End standards, Classification of standards and Traceability, calibration of End bars(Numerical), standardization.	CO1 08 hrs PO1 PO2 PO3 PO7 PO12

Linear Measurement and angular measurements

Slip gauges- Indian standards on slip gauge, method of selection of slip gauge, stack of slip gauge, adjustable slip gauge, wringing of slip gauge, care of slip gauge, slip gauge accessories, problems on building of slip gauges (M87, M112). Measurement of angles- sine bar, sine center, angle gauges, optical instruments for angular measurements, Auto collimator-applications for measuring straightness and squareness.

LO: After competing this unit the student will be able to

1. Define the term metrology and list the various objectives of metrology.
2. Explain the principle and the process of measurement.
1. Explain the concept of angle measurement using sine bar, sine center, angle gauges. Also explain the concept of measurement of straightness and squareness using auto-collimator.

Module- 2

System of Limits, Fits, Tolerance and Gauging

Definition of tolerance, Specification in assembly, Principle of interchangeability and selective assembly, limits of size, Indian standards, concept of limits of size and tolerances, definition of fits, hole basis system, shaft basis system, types of fits and their designation (IS 919-1963), geometric tolerance, position-tolerances.

Classification of gauges, brief concept of design of gauges (Taylor's principles), Wear allowance on gauges, Types of gauges-plain plug gauge, ring gauge, snap gauge, limit gauge and gauge materials.

Comparators

Functional requirements, classification, mechanical- Johnson Mikrokator, sigma comparators, dial indicator, electrical- principles, LVDT, Pneumatic- back pressure gauges, solex comparators and optical comparators- Zeiss ultra-optimeter.

LO: After competing this unit the student will be able to

1. Define the terms tolerance and fit. Also list the various types of fits and their designation, various types of gauges and the various Indian standards
2. Explain limits of size, principle of interchangeability and selective assembly, concept of limits of size, tolerances, hole basis system, shaft basis system, geometrical tolerance, positional-tolerances.
1. Explain classification of gauges and wear allowances on gauges, plain plug gauge, ring gauge, snap gauge, limit gauge and gauge materials

CO2
08 hrs
PO1
PO2
PO3
PO4
PO5
PO6
PO12

Module 3:

Measurement of screw thread and gear

Terminology of screw threads, measurement of major diameter, minor diameter, pitch, angle and effective diameter of screw threads by 2-wire and 3- wire methods, best size wire. Screw thread gauges, Tool maker's microscope. Gear tooth terminology, tooth thickness measurement using constant chord method, addendum comparator method and base tangent method, measurement of pitch, concentricity,

CO3
08 hrs
PO1
PO2
PO3
PO5
PO7

run out, and involute profile. Gear roll tester for composite error. **Advances in metrology:** Basic concepts of lasers, advantages of lasers, laser interferometers, types, applications. Basic concepts of Coordinate Measuring Machines-constructional features, applications. **LO: After competing this unit the student will be able to** 1. Explain the terminology of screw threads, measurement of major diameter, minor diameter and pitch angle. Also determine effective diameter of screw threads by 2-wire and 3-wire methods. 2. Explain the concept of best size wire, tool maker's microscope, and gear tooth terminology. 3. Explain tooth thickness measurement using constant chord method, addendum comparator method and base tangent method. 4. Explain the concept of measurement of pitch, concentricity, run out and involute profile	PO12
Module 4: **Measurement systems and basic concepts of measurement methods:** Definition, significance of measurement, generalized measurement system, definitions and concept of accuracy, precision, calibration, threshold, sensitivity, hysteresis, repeatability, linearity, loading effect, system response-time delay. Errors in measurement, classification of errors. Transducers, transfer efficiency, primary and secondary transducers, electrical, mechanical, electronic transducers, advantages of each type transducers. **Intermediate modifying and terminating devices:** Mechanical systems, inherent problems, electrical intermediate modifying devices, input circuitry, ballast circuit, electronic amplifiers. Terminating devices, Cathode ray oscilloscope, Oscillographs. **LO: After competing this unit the student will be able to** 1. Define the terms accuracy, precision, calibration, threshold, sensitivity, hysteresis and measurement and also explain the concept of generalized measurement system. 2. Define the terms accuracy, precision, calibration, threshold, sensitivity, hysteresis, repeatability, linearity, loading effect, system response-times, delay time and list the various errors in measurement.	CO4 08 hrs PO1 PO2 PO3 PO4 PO5 PO12
Module -5: **Force, Torque and Pressure Measurement** Direct methods and indirect method, force measuring inst. Torque measuring inst., Types of dynamometers, Absorption dynamometer, Prony brake and rope brake dynamometer, and power measuring instruments. Pressure measurement, principle, use of elastic members, Bridgeman gauge, McLeod gauge, Pirani gauge. **Measurement of strain and temperature** Theory of strain gauges, types, electrical resistance strain gauge, preparation and mounting of strain gauges, gauge factor, methods of strain measurement.	CO5 08 hrs PO1 PO2 PO3 PO4 PO5 PO6 PO12

PO2: Problem Analysis
PO3: Design & Development
PO4: Investigations of Complex Problems
PO5: Modern Tool Usage
PO6: Engineer & Society
PO8: Ethics
PO9: Individual & Team Work
PO10: Communication
PO11: Project Mngmt & Finance
PO12: Life long Learning

PSO1: Ability to apply concept of mechanical engineering to design a system, a component or a process/system to address a real world challenges

PSO2: Ability to develop effective communication, team work, entrepreneurial and computational skills

CO	PO	PO1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PS O1	PS O2
18 ME46B	K-level														
CO1	K3	3	3	3	2	-	1	-	-	-	-	-	1	3	1
CO2	K3	3	3	2	2	-	1	-	-	-	-	-	1	3	1
CO3	K3	3	3	3	2	1	1	-	-	-	-	-	1	3	1
CO4	K3	3	3	3	2	1	1	-	-	-	-	-	1	3	1
CO5	K3	3	3	3	2	1	1		-	-	-	-	1	3	1

Course In charge

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